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THE ECONOMICS OF CATTLE AND MEAT
MARKETING IN IVORY COAST
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Traditional marketing systems for agricultural products in developing nations have often been accused of driving an unnecessarily large price differential between producers and consumers to the detriment of both. Some critics claim there are too many marketing agents forcing too many intermediate transactions. Others argue that small numbers of traders collude to exercise oligopsonistic power over producers and oligopolistic power over consumers. Marketing agents are frequently labeled as parasites who serve no useful function. Many developing nations have responded to these criticisms with strict regulation or complete take-over of agricultural marketing. Unfortunately the government-run system usually does not function so well as its predecessor. Furthermore, the few marketing studies that have been done in Africa and Asia tend to reveal that traditional systems operate relatively efficiently given the available physical infrastructure.

John Staatz's monograph on Ivory Coast livestock and meat marketing is an important addition to the small body of detailed empirical work that addresses the commonplace critiques of traditional marketing systems. His study extends the earlier work by looking at a commodity that raises several potential difficulties for traders because it is first alive as livestock and then highly perishable as meat. The West African livestock trade also provides new insights because it covers such long distances, is international, and involves credit and trust relations between people of different ethnic groups residing far apart under different legal jurisdictions.

Staatz finds that for the most part the traditional system handles these complex marketing challenges efficiently, and that the best role for government is improvement of physical infrastructure rather than regulation or replacement of marketing agents. Analysis of market structure, conduct, and performance among long distance traders, intermediaries, and butchers reveals fairly low concentration levels, no overt collusion, and modest net margins and rates of return to capital. Staatz discourages proposed government regulation of marketing agents because this is likely to reduce the number of agents and thereby foster collusion.

Perhaps moreso than in most similar studies, Staatz specifically investigates ways in which government assistance could facilitate marketing. His detailed analysis of potential improvements in physical infrastructure should be an important input to decision makers in the Ivory Coast and perhaps for other nations with similar systems. The comparisons of capital intensive

versus labor intensive abbatoirs, trekking versus train and truck for live-
stock transport, and slaughter near production ratt ؟ than near consumption
bear critically on numerous projects contemplated or in process. Staatz's
work on these and similar infrastructure issues clearly indicates useful
directions for interventions by donors and domestic agencies. His analysis
of the economic activity of traditional marketing agents significantly adds
to our understanding of this sector in developing nations, and concurs with
several earlier studies in finding a relatively efficient system, given
physical constraints, and no justification for major regulation or take over
by government.

This monograph is part of a three-year study of West African livestock
economics undertaken by the Center for Research on Economic Development,
University of Michigan, for the United States Agency for International Devel-
opment under Contract AID/afr-c-1169. The full study consisted of four
eighteen-month field studies, including Staatz's, two focusing on production
and two on marketing, in addition to several investigations based on the
existing data and literature. The geographic area of focus involved the five
member states of the Conseil de l'Entente, Ivory Coast, Togo, Benin, Niger,
and Upper Volta, but also included, in a more general fashion, Mali and Nigeria.
The following documents have been produced as a result of this study:

K. Shapiro, ed., Livestock Production and Marketing in the Entente States of
    West Africa: Summary Report. (This volume contains an overview plus
    separate summaries of each monograph.)

A. Ergas, ed., Livestock Production and Marketing in the Entente States of
    West Africa: Annotated Bibliography. (Included as part of the summary
    report.)

MONOGRAPHS:

Delgado, C., Livestock versus Foodgrain Production in Southeast Upper
    Volta: A Resource Allocation Analysis.

Staatz, J., The Economics of Cattle and Meat Marketing in Ivory Coast.

Eddy, E., Labor and Land Use on Mixed Farms in the Pastoral Zone of Niger.

Herman, L., The Livestock and Meat Marketing System in Upper Volta: An
    Evaluation of Economic Efficiency.

WORKING PAPERS:

1. Ferguson, D., A Conceptual Framework for the Evaluation of Livestock Pro-
    duction Development Projects and Programs in Sub-Saharan West Africa.

2. Wardle, C., _Promoting Cattle Fattening Amongst Peasants in Niger._

3. Swift, J., _West African Pastoral Production Systems._

4. Sleeper, J., _An Economic Analysis of the Role of Ox-Plowing and Cattle-Feeding in the Stratification of West African Livestock Production._

5. DeBoer, A.J., _The Short Run and Long Run Position of Australian Beef Suppli: : :nd the Competitiveness of Australian Beef in International Trade._

6. Porter, R., _The Uses of Economic Models in Analysis of the Cattle Sector._

These documents are available from the United States Agency for International Development, Bureau for Africa, Office of Development Resources (AFR/DR), New State Department Building, Washington, D.C. Some may be available from the Center for Research on Economic Development. The monographs and the summary report are also available in French.

Ann Arbor, Michigan   Kenneth Shapiro
March, 1979   Project Director

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PREFACE

In July 1975, the United States Agency for International Develop-
ment (USAID) provided funding for the University of Michigan's Center
for Research on Economic Development (CRED) to conduct an in-depth study
of problems and policy issues related to livestock production and
marketing in the Entente States of West Africa. The primary objective
of the study was to provide new information to help USAID develop its
livestock assistance programs and projects for the area. USAID's re-
quest for the study was based on USAID's conclusion that insufficient
economic information existed on the major policy issues then under
discussion. For example, even though widespread reorganization of the
cattle trade was under consideration, there had been no year-long
micro-level studies of how cattle and meat markets function in West
Africa. Planners were forced to design projects based on often con-
flicting statements regarding the competitiveness of the trade. Many
authors asserted that collusion among traders and intermediaries was
rife,depressing the prices livestock raisers received for their animals
and raising the prices consumers paid for their meat. Others argued
that the market was completely anarchic, incapable of functioning in an
economically rational manner. Still others claimed that the marketing
system was highly efficient and competitive. Few studies, however,
provided the microeconomic data necessary to test their
conclusions. The degree of competitiveness of the trade, both
in major cattle producing areas, like Upper Volta, and in major cattle-
deficit areas, like Ivory Coast, had strong implications for the welfare
of livestock producers and meat consumers. Obviously, there was a need
for detailed research in this area.

In response to USAID's desire for more information on livestock
production and marketing, CRED conducted four field studies in West
Africa, as part of its Entente Livestock Project (ELP): one study on

the economics of livestock production in the pastoral zone of Niger,[1] one on the constraints to expansion of mixed farming among sedentary agriculturalists in southeastern Upper Volta,[2] one on livestock and meat marketing in Upper Volta,[3] and this study on cattle and meat marketing in Ivory Coast. Preliminary results of the Ivory Coast study were reported to USAID in a paper by the author entitled "Cattle and Beef Marketing in Ivory Coast" (Ann Arbor: 1977).

The Ivory Coast study was originally envisioned primarily as an in-depth microeconomic study of the Bouaké cattle market. Bouaké was chosen as the research site because Bouaké is not only a major center of meat consumption in Ivory Coast, but it is also the country's largest redistribution market for cattle. It therefore exhibits characteristics of the major coastal consumption centers for meat, such as Abidjan, and of the northern redistribution markets for cattle, such as Tingrela. It was felt that by intensively studying the Bouaké markets for cattle and meat, insights could be gained into the efficiency of the cattle and meat trades.

It became apparent soon after my arrival in Ivory Coast in March, 1976, however, that researchers and government officials in Ivory Coast felt strongly that several areas of the cattle and meat trade needed study in addition to the microeconomics of the Bouaké market. These areas included the changing nature of Ivory Coast's meat supply,

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[1]Eddy, Edward D., Labor and Land Use on Mixed Farms in the Pastoral Zone of Niger (Ann Arbor: Center for Research on Economic Development, 1979).

[2]Delgado, Christopher L., Livestock Versus Food Grains in Southeastern Upper Volta: A Resource Allocation Analysis (Ann Arbor: Center for Research on Economic Development, 1979).

[3]Herman, Larry, The Livestock and Meat Marketing System in Upper Volta: An Evaluation of Economic Efficiency (Ann Arbor: Center for Research on Economic Development, 1979).

the problems and costs of transporting livestock and meat, the optimum location of slaughter facilities, and the need for improving market infrastructure. There was also a need for updated information on cattle and meat prices in Abidjan and Bouaké, as the last study of these prices had been published in 1971.[1] Government officials strongly suggested that the scope of the study be broadened, and as a result, the study grew. It ended up covering some of the macro aspects of the cattle and meat trade (e.g., changes in the demand and supply of beef in recent years) as well as microeconomic questions concerning the economic efficiency of the markets for cattle and meat. In addition, while doing the research I discovered that there exist several sources of data on cattle and meat marketing in Ivory Coast, but these sources are widely scattered and not easily available to researchers. I therefore tried to summarize some of these data and include them in the study as an aid to future researchers in the area.

As result of these modifications, the study is very long. In order to make it more manageable, I have tried to organize it in a way that will allow readers to find the topics of interest to them easily without having to read the entire volume. The thirteen chapters are grouped together into six areas of investigation, and within each chapter, topics and subtopics are set off by underscored headings. Appendices present case studies and and additional statistical information, and explain how certain results presented in the text were derived.

Part I of the study, which includes Chapters 1 and 2, examines Ivory Coast's pattern of meat supply in recent years. Chapter 1 presents data on the recent evolution of domestic livestock production and livestock and meat imports. It also briefly describes government projects aimed at increasing domestic beef production and improving livestock and meat marketing in Ivory Coast. Chapter 2 describes the geography of cattle marketing in Ivory Coast (e.g. the location of major trade routes and

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[1]SIGES, Aspects de la commercialisation du bétail sur pied et de la viande de boucherie en Cote d'Ivoire (Abidjan; 1971).

markets) and examines seasonal variations in the number of cattle marketed. Part II, which includes Chapters 3 and 4, describes the current organization of cattle and meat marketing in Ivory Coast. Chapter 3 examines the roles that cattle merchants and intermediaries play in the trade. It also measures the degree of market concentration among intermediaries in the Abidian and Bouaké cattle markets in order to test the hypothesis that a few intermediaries exercise monopoly control over these markets. Chapter 4 looks at the current organization of the butchers' trade, estimates the employment generated in cattle and beef marketing, and examines differences in the structure and function of the Abidjan and Bouaké markets for cattle and meat. Part III, which includes Chapters 5-7, examines problems and costs of transporting cattle and meat in Ivory Coast. Chapter 5 describes Ivory Coast's existing infrastructure for cattle and meat transport and examines whether a lack of transport infrastructure constrains expansion of the livestock and meat trades. Chapter 6 looks at the costs and problems of transporting cattle in Ivory Coast, and Chapter 7 examines transport costs for chilled and frozen meat. Chapter 7 also presents a model that specifies the conditions under which it would become more profitable to export chilled meat from northern livestock-producing regions to the coastal areas than to export live animals. Part IV, which includes Chapters 8-10, analyzes the behavior of cattle prices in Ivory Coast during 19˙6-77. Chapter 8 examines farm-level prices in rural northern Ivory Coast, Chapter 9 looks at the prices of slaughter cattle in majo towns in northern Ivory Coast, and Chapter 10 analyzes prices of slaughter cattle sold in Abidjan and Bouaké. In all three chapters, the price analysis yields insights into the nature of the demand for cattle in Ivory Coast and the functioning of the traditional marketing system. Part V, which includes Chapters 11 and 12, used the data presented in Parts III and IV to estimate the margins earned by cattle traders and butchers in Ivory Coast. From these margins it draws inferences about the competitiveness of the livestock and meat trades. Part VI, which includes only Chapter 13, summarizes the major findings of the study and makes policy recommendations aimed at improving cattle and meat marketing in Ivory Coast.

A word should be said about some of the data presented in this
study. Before beginning the research, I was warned that the traditional
marketing system for cattle and meat was a closed system, with market
participants suspicious and generally unwilling to talk to outsiders.
I was told that if market participants did give information to out-
siders, it was generally false information that could not be used for
serious analysis. My experience during the data collection, however,
leads me to believe that generally reliable information on many aspects
of the cattle and meat trades can be gathered from market participants.
It is true that initially most butchers, traders, and intermediaries in
Bouaké and Abidjan were quite suspicious and distrustful of this study.
A number of steps were taken, however, to allay their fears. Enumerators
were recruited the same ethnic groups as most of the market participants
(Malinké, Bambara, and Fulani), and some of the enumerators already knew
many butchers and traders. The enumerators stressed to the market par-
ticipants that the study was run independently of the Ivorian government.[1]
Since data collection continued in the markets for over a year (from
July, 1976 through July, 1977), the enumerators were able to get to know
the market participants well and establish bonds of trust with them.
Most of the sensitive interviews concerning business practices were con-
ducted near the end of the study period, after this trust had been estab-
lished. Nevertheless, it would be naïve to assume that the data are
perfect. Some of the market participants undoubtedly provided false
information to the enumerators. Therefore, the price and cost of the
data presented in this study should be taken as indicating the general
level of prices and costs, not as being precise to the last CFAF. Further-
more, the reader should note that the transport cost and profit margin
figures presented in the study are averages that are subject to considerable
variation.

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[1] Most market participants feared that government inquiries were
aimed at restructuring the marketing system or at increasing taxes on
butchers and traders.

NOTES ON TERMINOLOGY AND THE VALUE OF THE CFA FRANC

Five terms used in this study need special explanation. Cattle is used here to refer only to bovines, not other types of livestock. Small ruminants refers only to sheep and goats. The word steers is used as a translation of the French word boeufs and refers to all castrated male cattle, be they steers or oxen. The term red meat refers to beef, mutton, goat meat, horse meat, and pork. Finally, the term ton, as used in this study, refers to metric tons.

During the period in which data were collected for this report (March, 1976 - July, 1977) the rate of exchange between the U.S. dollar and the CFA Franc was approximately 245 CFAF = $1.

LIST OF ACRONYMS

AGRIPAC	An Ivorian parastatal company sharing duopolistic import rights for chilled and frozen meat (with DISTRIPAC)
AVB	Autorité pour l'Amenagement de la Vallée du Bandama (Ivory Coast)
BNETD	Bureaux Nationaux d'Etudes Techniques et du Développement (Ivory Coast) .
CEAO	Communauté Economique de l'Afrique de l'Ouest (Mauritania, Senegal, Mali, Upper Volta, Togo, and Ivory Coast)
CEBV	Communauté Economique du Bétail et de la Viande, an agency of the Entente Council (Upper Volta, Niger, Benin, Togo, and Ivory Coast)
CEIB	Centre d'Exploitation Industrielle du Bétail (Ivory Coast), the agency in charge of the Abidjan cattle and small ruminant markets
CIDT	Compagnie Ivoirienne de Développement des Textiles
CRZ	Centre de Recherches Zootechniques de Minankro - Bouaké (Ivory Coast)
DISTRIPAC	An Ivorian parastatal company sharing duopolistic import rights for chilled and frozen meat (with AGRIPAC)
EEC	European Economic Community (the European common market)
ELP	The Entente Livestock Project (of which this study is a part) conducted by the University of Michigan's Center for Research on Economic Development
IBRD	International Bank for Reconstruction and Development (World Bank)
IRCT	Institut de Recherche sur la Cultivation des Textiles (Ivory Coast)
OMBEVI	Office Malien du Bétail et de la Viande
RAN	Regie de Chemin de Fer Abidjan - Niger, the railroad linking Ouagadougou and Abidjan
SEDES	Societé d'Etudes pour le Développement Economique et Social (France)

SIGES	Societé Ivoirienne de Gestion, d'Etudes, et de Services
SODEPALM	Societé pour le Développement et l'Exploitation du Palmier à Huile (Ivory Coast)
SODEPRA	Societé pour le Développement des Productions Animales (Ivory Coast)
SOMBEPEC	Societé Malienne du Bétail, des Peaux et Cuirs
SONEA	Societé Nationale d'Exploitation des Produits Animaux (Mali – now defunct)
SONERAN	Societé Nationale pour l'Exploitation des Resources Animales du Niger
SOTRAF	Societé pour le Transport Frigorifique (Ivory Coast and Upper Volta)
USAID	United States Agency for International Development

PART I

IVORY COAST'S MEAT SUPPLY

CHAPTER 1

THE MEAT SUPPLY IN IVORY COAST: RECENT EVOLUTION
AND CURRENT TRENDS

This chapter discusses Ivory Coast's historical pattern of meat
supply and recent changes in West African markets for livestock and meat.
It also analyzes possible trends in the future. The first part of the
chapter discusses some of the major determinants of demand for animal
protein in Ivory Coast and how they have changed in recent years. These
factors include population growth, urbanization, and changes in real in-
come and its distribution. The second part of the chapter describes the
Ivorian meat supply. It discusses Ivory Coast's major sources of meat
and analyzes the available data on domestic livestock production, imports
of live animals, and imports of chilled and frozen meat. From these
statistics, estimates are made of the Ivorian red meat supply in 1976
and changes in the country's beef supply from 1970 through 1976. The
impact these changes had on per capita beef consumption is then discussed.
Estimates of regional and urban-rural differences in per capita beef con-
sumption in 1976 are also presented. The final part of the chapter
describes recent livestock development projects undertaken by the Ivorian
government and discusses the role that the traditional livestock market-
ing system is likely to play in the future.

The Ivorian Market for Meat

Ivory Coast has traditionally represented a major market for live-
stock and meat from the Sahelian countries, particularly from Mali and
Upper Volta. Throughout the 1960s and early 1970s, Ivory Coast imported
over 80 percent of its beef supply, largely in the form of live animals,
from Mali, Upper Volta, Mauritania, and Niger. Relative economic
prosperity resulted in a strong demand for meat in Ivory Coast, making
Ivory Coast an important outlet for livestock production from

these other countries. SEDES[1] (108, pp. 96-7, 150-60) estimated that in 1970 67 percent of Upper Volta's total cattle exports and 82 percent of its small ruminant exports went to Ivory Coast. In the same year, Mali sent 60 percent of its cattle exports and 49 percent of its small ruminant exports to Ivory Coast. Moreover, these countries have become increasingly dependent on the Ivorian market in recent years as the demand for livestock in Ghana has dwindled, due to economic problems in that country. In 1975, 87 percent of Upper Volta's recorded cattle exports and 83 percent of Mali's total estimated cattle exports went to Ivory Coast (28, p. 115; 95).

Traditionally, livestock, and particularly cattle, production has played a minor role in the Ivorian economy. Because of the many livestock diseases endemic in the country (e.g., trypanosomiasis, contagious bovine pleuro-pneumonia) and the humid tropical climate of the southern half of the country, Ivory Coast has had a comparative advantage in export-crop production over livestock production. The country has found it cheaper to produce and sell export crops and use the receipts to import its meat from its northern neighbors (largely in the form of live animals) than to produce the meat itself. As shown later in this chapter, only about 26 percent of the country's red meat consumption and about 16 percent of its beef consumption in 1976 were met by domestic production. The remainder was imported in the form of live animals and as chilled and frozen meat.

Since 1974, the meat supply situation in Ivory Coast has changed radically. There has been an abrupt fall in imports of live animals from the Sahelian countries and massive imports of frozen meat from Europe and South America. These changes resulted from two phenomena. The drought in the major livestock-exporting countries of West Africa during the late 1960s and early 1970s reduced the marketable surplus of animals available in these countries for export to the coastal states, and as a result, cattle prices rose. At the same time, a number of

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[1]Societé d'Etudes pour le Développement Economique et Social. The number in parentheses indicates the reference cited. The list of references begins on page 473.

factors independent of the drought in the Sahel combined to increase
world supplies of beef. To protect their own meat producers, the EEC,
Japan, and the United States tightened import restrictions on meat during
this period. This caused the major meat-exporting countries, particularly
Argentina, to be faced with increased stocks of meat and fewer markets in
which to sell. The exporting countries therefore began exploring new
export markets for beef, including the West African coastal countries,
which until 1975 had imported only small amounts of meat from overseas.
In 1975, the Sahelian countries, the traditional livestock and meat
suppliers of the coastal states, were unable to fill the coastal states'
demand for meat. Meat-exporting countries of Europe and Latin America
were thus able to enter the West African market, resulting in the opening
of that market which had previously been a closed system involving only
the coastal and Sahelian states. The West African meat market began to
integrate itself to some degree into the world meat economy.

Demand for Animal Protein in Ivory Coast

Three factors have tended to boost total demand for animal protein
in Ivory Coast since Independence in 1960: the population growth of the
country, increasing urbanization, and increases in per capita real income.

Population Growth.--Ivory Coast's population has grown very rapidly
in recent years, increasing by an average of 3.8 percent per annum between
1965 and 1975. This growth is attributable to two factors: a reduction
in death rates (resulting from improved sanitary conditions and medical
care), unaccompanied by a corresponding decline in birth rates (a situa-
tion common to most developing countries), and substantial immigration
to the country by non-Ivorian Africans. These immigrants are mainly
Voltaics and Malians attracted by employment possibilities in the rapidly
expanding Ivorian economy. Official figures on the recent growth of the
Ivorian population are shown in Table 1.1.

TABLE 1.1

OFFICIAL ESTIMATES OF IVORY COAST'S POPULATION
1960-75 (IN THOUSANDS)

Year	Population	Year	Population
1960	3,735	1969	4,940
1961	3,840	1970	5,115
1962	3,945	1971	5,264
1963	4,050	1972	5,423
1964	4,165	1973	5,809
1965	4,300	1974	6,064
1966	4,430	1975[a]	6,670
1967	4,560		
1968	4,765		

SOURCE: République de Côte d'Ivoire, Ministère du Plan, La Côte d'Ivoire en chiffres, Edition 76 (Abidjan: 1976), pp. 11, 37.

NOTE: Average annual growth rates: 1960-65 = 2.8 percent
                                     1965-75 = 3.8 percent

[a]Preliminary figure.

As Table 1.1 makes clear, the Ivorian population is expanding at an increasing rate. Between 1960 and 1965, the annual rate of increase was 2.8 percent; for the following decade, it was 3.8 percent; and between 1970 and 1974, the annual rate of increase reached 4.2 percent. The population figures shown in Table 1.1 for years prior to 1975 are only estimates made on the basis of sample surveys. In 1974-75, the first complete population census of the country was taken. It showed that the population in earlier years had been underestimated. (For example, if both the estimate for 1974 and the population figure established for 1975 by the census were correct, the growth rate between 1974 and 1975 would have been nearly 10 percent). Assuming that the 1975 census figure is correct and that the annual growth rates for 1960-74 discussed above are also correct, the following revised population estimate can be made:

TABLE 1.2

REVISED ESTIMATES OF THE IVORIAN POPULATION 1960-76

Year	Population	Year	Population
1960	4,001,460	1969	5,251,300
1961	4,113,500	1970	5,429,840
1962	4,228,680	1971	5,657,900
1963	4,347,090	1972	5,895,530
1964	4,468,800	1973	6,143,140
1965	4,593,930	1974	6,401,150
1966	4,750,130	1975	6,670,000
1967	4,911,630	1976	6,950,140
1968	5,078,620		

SOURCE: Based on census figure of 6,670,000 in 1975 and the following average annual growth rates:

1960-65: 2.8 percent
1965-70: 3.4 percent } 3.8 percent
1970-76: 4.2 percent

Urbanization.--The Ivorian population not only grew rapidly between 1965 and 1975; it also became increasingly urbanized. Urbanization tends to increase total demand for animal protein handled by the marketing system because per capita consumption of meat is higher in the cities than in the countryside (even among groups of equivalent income) and a much smaller proportion of the animal protein consumed by urban dwellers comes from game and noncommercially-caught fish. Table 1.3 compares official estimates of the urban-rural structure of the Ivorian population in 1965 and 1975 and clearly shows the rapid rate of urbanization taking place in the country. Table 1.4 presents annual rates of growth for various cities during this period.

During the decade 1965-75, while the total Ivorian population increased by 55 percent, urban population (defined as the number of people living in cities of over 10,000 inhabitants) grew by 174 percent, from 722,300 to 1,976,300. Abidjan paced this increase, growing at an annual rate of 10.5 percent. The average annual growth rate of all areas classified as urban in 1975 was 7.7 percent.

TABLE 1.3

URBAN-RURAL DISTRIBUTION OF THE IVORIAN POPULATION: 1965 and 1975

	1965			1975		
	Number of Cities in this Class	Population	Percent	Number of Cities in the Class	Population	Percent
Total Population	.	4,300,000	100.0		6,670,000	100.0
Urban Centers						
Abidjan	1	340,000	7.9	1	921,000	13.8
Bouaké	1	85,000	2.0	1	173,000	2.6
Other Cities with Pop. over 30,000	2	65,000	1.5	9	362,000	5.4
Cities with Pop. of 10,000 to 30,000	15	232,300	5.4	33	520,300	7.8
Total: Urban Centers	19	722,300	16.8	44	1,976,300	29:6
Semi-Urban Centers						
Towns with Pop. of 3,000 to 10,000	41	221,800	5.2	23	144,400	2.2
Rural Areas		3,355,900	78.0 ..		4,549,300	68.2

SOURCE: République de Côte d'Ivoire, Ministère du Plan, La Côte d'Ivoire en chiffres, pp. 11, 13, 37.

TABLE 1.4

ANNUAL RATES OF GROWTH OF URBAN CENTERS IN IVORY COAST 1965-75

City	Population		Average Annual Growth Rate 1965-75(percent)
	1965	1975	
Abidjan	340,000	921,000	10.5
Bouaké	85,000	173,000	7.4
Other Cities having population greater than 30,000 in 1975[a]	169,000	362,000	7.9
Cities (N=33) having population between 10,000 and 30,000 in 1975	276,300	520,300	6.5
All Cities having a population greater than 10,000 in 1975	870,300	1,976,300	7.7

SOURCE: République de Côte d'Ivoire, Ministère du Plan, La Côte d'Ivoire en chiffres, p. 13

[a]Daloa, Man, Korhogo, Gagnoa, Divo, Yamoussoukro, Dimbokro, San Pedro and Abengourou.

As a result of this rapid influx to the cities, the urban-rural distribution of the population shifted considerably between 1965 and 1975. Whereas only 16.8 percent of the total population lived in urban areas in 1965, nearly 30 percent were urban dwellers in 1975. Both the absolute and relative population of semi-urban areas (towns with populations of from 3,000 to 10,000) declined during the decade. This did not reflect out-migration from these towns, however, but rather the growth of these towns into population centers classified as urban in 1975.[1] In the same period, the proportion of the population living in rural areas fell by nearly 10 percent, from 78.0 percent to 68.2 percent. This rapid influx to the cities had an impact not only on total demand for animal protein (for the reasons discussed earlier) but also, by changing the relative proportions of different income classes in the cities, probably changed the average amount of meat consumed per capita by urban dwellers. For this reason, it is dangerous to forecast urban demand for meat in Ivory Coast by simply extrapolating from consumption patterns observed in the mid-sixties.

The Ivorian government feels that this increasing urbanization will continue at least through 1990, with roughly half of the total population living in urban or semi-urban areas by that year. The Planning Ministry has made two different projections of population growth and distribution through 1990. The first projection assumes a continued high level of immigration from neighboring countries and strong in-migration to Abidjan. The second assumes a slower overall growth rate due to reduced foreign immigration into Ivory Coast and a slower rate of urbanization, particularly for Abidjan, as social services improve in rural areas. Both projections, however, show roughly 50 percent of the population living in urban and semi-urban areas by 1990. (See Table 1.5.) This continuing urbanization will put great demands on the meat marketing system in the coming years.

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[1]Twenty-three of the forty-one towns classified as semi-urban in 1965 had populations of over 10,000 in 1975, and hence were classified as urban in 1975.

TABLE 1.5

PROJECTED GROWTH AND DISTRIBUTION OF POPULATION IN IVORY COAST: 1975-1990
HYPOTHESIS 1: CONTINUED HIGH RATES OF IMMIGRATION AND URBANIZATION

Region	1975	1980	Annual Growth Rate 1975-80 (percent)	1985	Annual Growth Rate 1980-85 (percent)	1990	Annual Growth Rate 1985-90 (percent)
Urban & Semi-Urban							
Abidjan	921,000	1,545,000	10.50	2,300,000	8.30	3,150,000	6.5
Other Urban and Semi-Urban Areas	1,200,000	1,685,000	6.80	2,300,000	6.40	3,150,000	6.5
Total Urban and Semi-Urban Areas	2,121,000	3,230,000	8.50	4,600,000	7.30	6,300,000	6.5
Rural							
Savanna	1,565,000	1,625,000	0.70	1,705,000	0.95	1,790,000	1.0
Forest	2,986,000	3,390,000	2.50	3,715,000	1.85	4,025,000	1.6
Total Rural	4,551,000	5,015,000	1.90	5,420,000	1.40	5,815,000	1.4
Total Population	6,672,000	8,245,000	4.20	10,020,000	4.00	12,115,000	3.9
Percent Urban & Semi-Urban	31.8	39.2		45.9		52.0	

TABLE 1.5 - (continued)

HYPOTHESIS 2: REDUCED RATES OF IMMIGRATION AND URBANIZATION

Region	1975	1980	Annual Growth Rate 1975-80 (percent)	1985	Annual Growth Rate 1980-85 (percent)	1990	Annual Growth Rate 1985-90 (percent)
Urban & Semi-Urban							
Abidjan	921,000	1,330,000	7.25	1,780,000	6.00	2,315,000	5.40
Other Urban and Semi-Urban Centers	1,200,000	1,635,000	6.10	2,200,000	6.10	2,900,000	5.70
Total Urban and Semi-Urban Areas	2,121,000	2,965,000	6.60	3,980,000	6.05	5,215,000	5.55
Rural							
Savanna	1,565,000	1,625,000	0.70	1,715,000	1.10	1,840,000	1.40
Forest	2,986,000	3,335,000	2.15	3,600,000	1.55	3,875,000	1.50
Total Rural	4,551,000	4,960,000	1.65	5,315,000	1.40	5,715,000	1.45
Total Population	6,672,000	7,925,000	3.35	9,295,000	3.25	10,930,000	3.30
Percent Urban & Semi-Urban	31.8	37.4		42.8		47.7	

SOURCE: République de Côte d'Ivoire, Ministère du Plan, Projet de plan quinquennal de développement économique, social et culturel 1976-80 (Abidjan: 1976), Tome III, Fasicule III, pp. 36-37.

Changes in Real Income and its Distribution.--Since independence in
1960, Ivory Coast has experienced perhaps the steadiest economic growth
of any country in West Africa. Between 1960 and 1970, total real domestic
income[1] more than doubled, rising from 212.0 billion CFAF to 491.7 billion
CFAF.[2] Over the same period, real per capita domestic income rose by
roughly 70 percent, or approximately 5.4 percent per year (33). The
growth of both total and per capita real domestic income from 1960 through
1975 is shown in Table 1.6 and graphically in Figure 1.1. Since 1969,
real income has grown at a slower rate than in previous years. This,
combined with the rapid population growth, has led to a stagnation in the
growth of real per capita domestic income in recent years. Figure 1.1 (b)
illustrates this point. From 1960 to 1969, real per capita income showed
a strong upward trend but, since 1969, it has remained stable. The 1975
figure is slightly below that of 1969. Despite the lack of growth in
per capita real income in recent years, per capita income remains high by
West African standards. It is also evident that real per capita income
rose substantially during the period 1960-69, and this undoubtedly increased
demand for red meat in the country.

Evidence suggests that although considerable income disparities exist
within the Ivory Coast, income is more equally distributed there than in
many other African countries (see Table 1.7). Little data exist on
changes in income distribution in recent years, but it appears that the
investment and agricultural price policies followed by the government
during the 1970s have tended to narrow, not widen, the income distribu-
tion (116). Not much evidence exists to support Montgomery's assertion (45)
that the income distribution has become less equal in recent years.[3]

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[1]Revenu intérieur brut (RIB): this measure of income includes the
wages of government employees and domestic servants. It is therefore
preferable, for the purposes of this study, to production intérieure brute,
which excludes them.

[2]Figures expressed in terms of 1973 francs.

[3]Data on changes in income distribution in Ivory Coast are very weak,
and it is difficult to draw conclusions from them. One may question
Montgomery's use of an index of only food prices to deflate nominal income
figures into terms of real income.

TABLE 1.6

REAL DOMESTIC INCOME,[a] IVORY COAST: 1960-75
(in 1973 CFAF)

Year	Total Real Domestic Income (billions of CFAF)	Population	Real per Capita Domestic Income	
			CFAF	US$[b]
1960	212.0	4,001,460	52,981	238
1961	225.9	4,113,500	54,917	246
1962	231.6	4,228,680	54,769	246
1963	283.6	4,347,090	65,239	293
1964	340.0	4,468,800	76,083	341
1965	310.3	4,593,930	67,546	303
1966	351.0	4,750,130	73,893	331
1967	358.0	4,911,630	72,888	327
1968	421.4	5,078,620	82,975	372
1969	452.4	5,251,300	86,150	386
1970	491.7	5,429,840	90,555	406
1971	498.3	5,657,900	88,072	395
1972	520.2	5,895,530	88,236	396
1973	564.0	6,143,140	91,810	412
1974	570.1	6,401,150	89,062	399
1975	597.0	6,670,000	89,505	401

SOURCE: IBRD (1976) and Table 1.2

[a]Revenu intérieur brut.

[b]Exchange rate used: US$1 = 223 CFAF

FIGURE 1.1

TOTAL AND PER CAPITA REAL DOMESTIC INCOME, IVORY COAST, 1960-75

(a) Total	(b) Per Capita

YEAR

YEAR
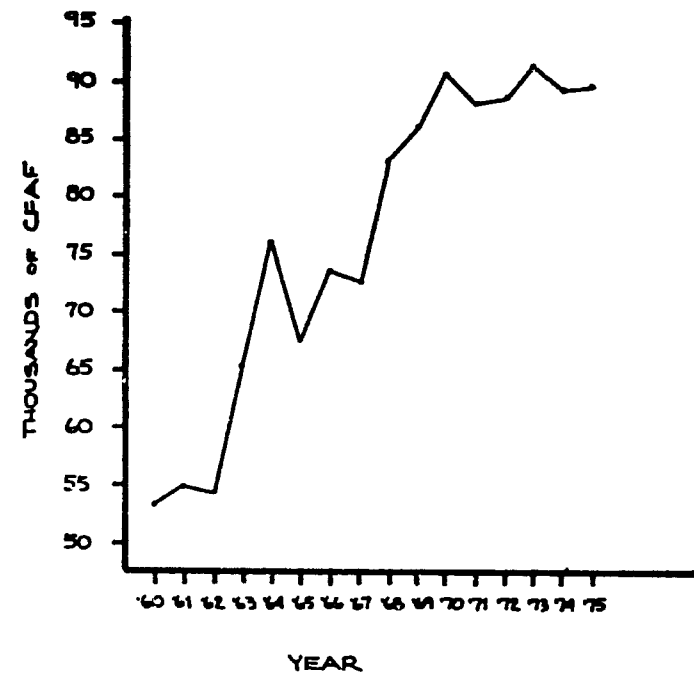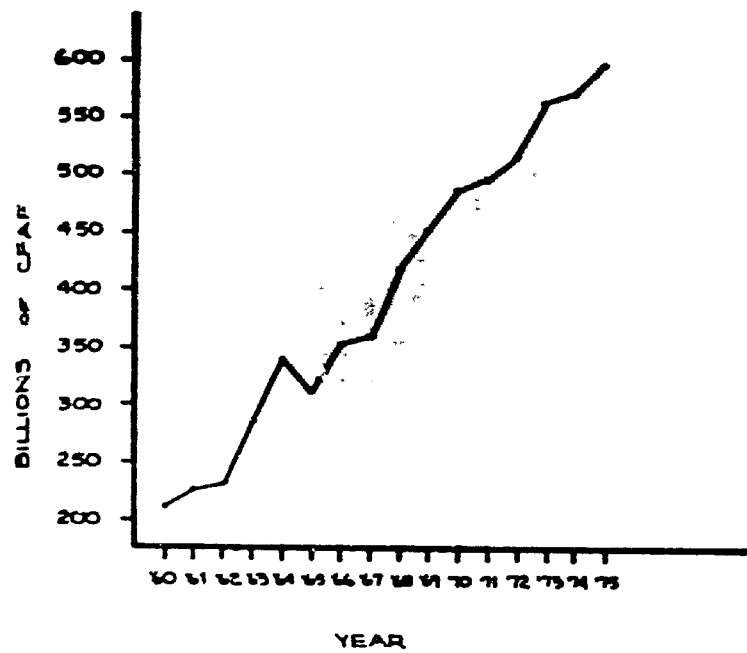
TABLE 1.7

INCOME DISTRIBUTION ESTIMATES: IVORY COAST,
VARIOUS AFRICAN COUNTRIES, AND INDIA

Country		Percent of Income Received by:		
		Lowest 40%	Middle 40%	Top 20%
High Inequality				
Kenya	(1969)	10.0	22.0	68.0
Sierra Leone	(1968)	9.6	22.4	68.0
Senegal	(1960)	10.0	26.0	64.0
Rhodesia	(1968)	8.2	22.8	69.0
Tunisia	(1970)	11.4	53.6	55.0
Gabon	(1968)	8.8	23.7	67.5
Medium Inequality				
Dahomey	(1959)	15.5	34.5	50.0
Tanzania	(1967)	13.0	26.0	61.0
Zambia	(1959)	14.5	28.5	57.0
India	(1964)	16.0	32.0	52.0
Low Inequality				
Chad	(1958)	18.0	39.0	43.0
Niger	(1960)	18.0	40.0	42.0 ·
Uganda	(1970)	17.1	35.8	47.1
Ivory Coast	(1970)	10.8	32.1	57.1
	1971a	42.9 → 16.3	31.8 → 24.1	25.3 → 59.6
	1973b	37.7 → 10.2	43.3 → 34.1	19.0 → 55.7
	1974c	40.1 → 13.9	40.8 → 33.0	19.1 → 53.1
	1973d	38.9 → 27.6	44.4 → 47.7	16.7 → 24.7
	1973e	28.3 → 19.9	48.5 → 49.3	23.2 → 30.8
	1973/4f	40.1 → 22.4	59.9 →	77.6
	1973/4g	39.2 → 19.5	60.8 →	80.5
	1973/4h	40.8 → 25.0	59.2 →	75.0
	1973i	38.2 → 32.7	61.8 →	67.3

SOURCE: Stolper, Wolfgang F., "Income Distribution in Ivory Coast,"
Seminar, Department of Economics, University of Michigan, January 23, 1976.
   NOTE: Because income classes cannot be formed by exact deciles, the
figures should be read as follows, e.g., for 1971:
         42.9% of income earners receive 16.3% of total income.
         31.8% of income earners receive 21.1% of total income.

a Salaried incomes, private and para-public sector
b Salaried incomes, private and para-public sector
c Salaried incomes, private sector
d African agricultural money incomes only, departmental
e African agricultural money and subsistence incomes
f Regional income distribution, formal sector, Assumption I
g Departmental income distribution, formal sector, Assumption I
h Departmental income distribution, formal sector, Assumption II
i Total income distribution, Assumption I

The Ivorian Red Meat Supply[1]

Ivory Coast's meat consumption is met by three sources of supply:
domestic production, imports of live animals from the Sahelian countries,
and imports of chilled and frozen meat. Up through 1974, imports of live
animals, especially cattle, were by far the most important source of
supply. SEDES figures (108 , pp. 439-41, 450-52) indicate that in 1970
imports of live animals provided 73 percent of Ivory Coast's total red
meat supply and 84 percent of its beef supply. Domestic production
accounted for 23 percent of the red meat supply and 12 percent of the
beef supply, while imports of chilled and frozen meat made up the remain-
ing 4 percent of the red meat supply and 4 percent of the beef supply.
Beef was the most widely consumed red meat in the country, accounting for
75 percent of total consumption. Goat meat and mutton made up to 20 percent,
and pork accounted for the remaining 5 percent.

Figures presented later in this chapter indicate that the pattern of
consumption in 1976 was about the same as in 1970. Beef made up 73 percent
of total red meat consumption, goat meat and mutton accounted for 18 percent,
and pork made up 9 percent. The pattern of supply, however, had changed
radically. In 1976, imports of livestock from the Sahelian countries
accounted for only 45 percent of the Ivorian red meat supply. Domestic
production made up to 26 percent of the total, and imports of chilled and
frozen meat accounted for 29 percent. Obviously, the Ivorian market for
meat changed considerably between 1970 and 1976, as the figures presented
below will demonstrate. The following three subsections of the chapter
show the recent evolution of Ivory Coast's domestic livestock production,
its imports of livestock from the Sahelian countries, and its imports of
chilled and frozen meat. The sources of data used in the analysis are
discussed in Appendix 1E.

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[1]In this study, red meat is defined as beef, mutton, goat meat,
horse meat, and pork.

Domestic Livestock Production.--Table 1.8 shows the small role that livestock production, and particularly cattle production, play in the Ivorian economy. In 1974, total livestock production accounted for only 2.5 percent of the country's GDP, with 1.0 percent of this being attributable to red meat production and merely 0.4 percent to cattle production. In contrast, agriculture contributed 28.9 percent of the GDP in 1974 (61, p. 84). As explained above, for health and economic reasons there is little tradition of cattle raising in Ivory Coast, and the country has met its meat requirements (especially its beef requirement) by importing live animals from the Sahelian countries.

TABLE 1.8

ESTIMATED VALUE OF LIVESTOCK PRODUCTION IN IVORY COAST IN 1974
(in millions of CFAF)

	Cattle	Sheep/Goats	Swine	Poultry	Eggs, Milk Hides, etc.	Total
Value	1,560	1,447	1,207	5,260	753	10,227
Percent of GDP	0.4	0.3	0.3	1.3	0.2	2.5

SOURCE: République de Côte d-Ivoire, La Côte d'Ivoire en chiffres, 84, 149.

a. Domestic Beef Production.--Two slightly different official estimates of Ivory Coast's cattle population in 1975 are available: that of the Ministry of Animal Production (72, p. 10) and that of the Planning Ministry (63, Table 3). These estimates are shown in Table 1.9.

The Ministry of Animal Production's figures appear to be more realistic than those of the Planning Ministry. The Planning Ministry seems to have overestimated the taurin[1] population and underestimated the zebu[2] population.

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[1] Humpless cattle, varieties of the species Bos taurus. For the sake of brevity, the word "taurin" is used in this study to indicate taurus cattle.

[2] Humped cattle, varieties of the species Bos indicus.

TABLE 1.9

OFFICIAL ESTIMATES OF IVORY COAST'S CATTLE POPULATION IN 1975

	Estimated Cattle Population (thousand head)	
Location	Planning Ministry	Ministry of Animal Population
Taurins		
Villages covered by extension projects	145	255 (northern Ivory Coast)
Villages not yet covered by extension projects	205	70 (southern and central Ivory Coast
Total: Villages	350	325
State Ranches	8	10
Palm Plantations	2	
Total Taurins	360	335
Zebus	105	115
Total	465	450

SOURCES: République de Côte-d'Ivoire, Ministère du Plan,"Objectifs du Plan 1976-1980: secteurs élevage et pêche: tableaux," Document No. DDP/PP-1 (Abidjan: 1977, mimeographed), Table 3; and République de Côte-d'Ivoire, Ministère de la Production Animale, Bureau des Projets, L'Elevage en Côte-d'Ivoire: programme de développement (Abidjan: 1976).

A SODEPRA census counted roughly 230,000 taurins in the north in 1975, and the total number of taurins covered by SODEPRA programs in early 1977 was about 120,000 (123). The detailed census of zebus in Ivory Coast discussed in Appendix 1E established a figure of roughly 115,000 zebus in 1975. Therefore, the figures of the Ministry of Animal Production are used in this study.

These figures show that in 1975 most Ivorian cattle (370,000 head, including all the zebus) were in the northern part of the country. About 70,000 head lived in the central and southern regions and 10,000 head were in government ranches and palm plantations. Taurins (humpless,

[1] Societé pour le Développement des Productions Animales, the parastatal company that promotes domestic livestock production.

trypano-tolerant cattle) are numerically more important than zebus, and they have increased in recent years at an estimated annual rate of 3 percent. Three distinct breeds of taurins are found in Ivory Coast.

Baoulés are the most widely-held type of cattle in Ivory Coast. They account for nearly 300,000 head and are found mainly in the northern and central regions of the country. A type of West African shorthorn, Baoulés are relatively small. Liveweights at four years average approximately 255 kg for males and 175 kg for females.[1] Weight gains are relatively low, averaging roughly 200 grams per day during the rainy season on natural pastures. Despite their very modest capacity to gain weight, Baoulés exhibit two important advantages: their strong resistance to trypanosomiasis and other diseases endemic in the Ivory Coast and their early age of first calving. Their rusticity allows villagers to raise them in both northern and central Ivory Coast with a minimum of veterinary care. Their early calving implies a numerical productivity higher than other breeds found in Ivory Coast. The fecundity of Baoulés is estimated at 82 percent, with the first calving taking place at roughly 26 months (80, p. 18).

The N'dama breed originated in Guinea and is found mainly in the northwest area of Ivory Coast, around Odienné. Although numerically less important than Baoulés (N'damas number between 40,000 and 60,000), these animals are taller, heavier, and perform better in fattening trials. An unselected herd of N'damas raised on natural pastures in Bouaké showed average liveweights at four years of 308 kg. for males and 279 kg for females. N'damas are, however, less trypano-tolerant than Baoulés and thus require more careful management. Their rate of fecundity is slightly higher than the Baoulés' (87 percent), but they calve later (age at first calving is roughly three years). They therefore have a lower numerical productivity than Baoulés (80, pp. 19-20). Most Ivorian government cattle projects (ranches, selection programs) have been based on the N'dama breed.

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[1] The weight and fecundity figures for Baoulés cited in this study are based on observations made by the Veterinary Service in Bouaké on an unselected herd raised on natural pastures. These animals benefitted from veterinary care, however; and weight and fecundity figures for animals in village conditions may be lower.

Lagune cattle live along the coast and account for only about one percent of the total cattle population of Ivory Coast. Although they are extremely small (liveweights vary between 120 and 175 kg), the main advantage of the laguniers is their very strong trypano-tolerance, which permits them to survive in an environment too demanding for other cattle breeds.

In addi lon to the taurins, roughly 115,000 zebus live in northern Ivory Coast. The number of zebus in the country has increased greatly in recent years as the result of Fulani herders moving their animals south from Mali and Upper Volta during the early 1970s to escape the drought.[1] Many of these herders appear to have settled permanently in the region around Korhogo and Boundiali.

It is, however, somewhat misleading to speak of separate breeds of cattle in northern Ivory Coast, as a tremendous amount of cross-breeding has taken place in this region. The most common practice among sedentary cattle raisers in the north is to cross Baoulé females with N'dama bulls in order to increase the size of the animals while retaining most of the rusticity inherent in the Baoulé breed. The Fulani herders in northern Ivory Coast have also cross-bred their zebus with taurins in order to increase the resistance of their herds to trypanosomiasis, contagious bovine pleuro-pneumonia, and other diseases. Those engaged in the meat trade (e.g., those who have settled around Boundiali) cross N'damas and zebus in order to obtain a degree of disease resistance while maintaining the general size of their animals. Those who move their herds south of Korhogo into areas where tsetse infestation becomes greater cross zebus and Baoulés to get a greater degree of trypano-tolerance in their herds, albeit at the cost of smaller animals. Such cross-breeding is continued over many generations, so it is common to see animals from northern Ivory Coast having characteristics of all three breeds found in the region (Zebu, N'dama, and Baoulé). Livestock raisers and cattle merchants in northern Ivory Coast refer to these cross-breeds, as well as to "pure" taurins, as merés.

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[1] SEDES (102, p. 107) estimated the zebu population of Ivory Coast at 38,000 head in 1966.

b. <u>Volume of Domestic Beef Production</u>.—The official Ivorian government estimate of domestic beef production in 1975 stood at 7,200 tons, as shown in Table 1.10. A more detailed estimate reveals a slightly lower level of domestic beef production in 1975, as shown in Table 1.11.

TABLE 1.10

OFFICIAL ESTIMATE OF DOMESTIC IVORIAN BEEF PRODUCTION IN 1975

Region/Breed	Number of Animals (in thousands)	Production of Meat and Edible Offals (thousand tons)
Northern Ivory Coast		
Taurins	255	4.0
Zebus	115	2.5
Ranches and cattle raising in palm plantations	10	0.1
Other (peasant production in central and southern Ivory Coast)	70	0.6
Total	450	7.2

SOURCE: République de Côte d'Ivoire, Ministère de la Production Animale, Bureau des Projets, <u>L'Elevage en Côte-d'Ivoire: programme de développement</u>, p. 10.

The difference stems from a lower estimate in Table 1.11 of meat production from the taurin herd (4,200 tons versus 4,700 tons); the estimated production from the zebu herd in 1975 is identical in both tables (2,500 tons). Table 1.11 shows that domestic beef production grew from 4,700 tons in 1970 to 6,923 tons in 1976, an increase of 46 percent, or approximately 6.5 percent per year. One reason for this rapid growth was that many Fulani herders moved their animals into Ivory Coast during the early 1970s to avoid the drought farther north in Mali and Upper Volta.

TABLE 1.11

ESTIMATE OF IVORIAN DOMESTIC BEEF PRODUCTION: 1970-76 (tons)

Year	Cattle Population[a]	Off-take Rate	Number Slaughtered	Ave. Carcass Weight	Meat Production (tons)	Edible Offals[b] (tons)	Total (tons)
Taurins							
1970	289,000	10%	28,900	100 kg.	2,890.0	722.5	3,612.5
1971	297,600	"	29,760	"	2,976.0	744.0	3,720.0
1972	306,600	"	30,660	"	3,066.0	766.5	3,832.5
1973	315,800	"	31,580	"	3,158.0	789.5	3,947.5
1974	325,200	"	32,520	"	3,252.0	813.0	4,065.0
1975	335,000	"	33,500	"	3,350.0	837.5	4,187.5
1976	345,000	"	34,500	"	3,450.0	862.5	4,312.5
Zebus							
1970	50,000	12%	6,000	145 kg.	870.0	217.5	1,087.5
1971	70,000	"	8,400	"	1,218.0	304.5	1,522.5
1972	77,000	"	9,240	"	1,339.8	335.0	1,674.8
1973	85,000	"	10,200	"	1,479.0	369.8	1,848.8
1974	105,000	"	12,600	"	1,827.0	456.8	2,283.8
1975	115,000	"	13,800	"	2,001.0	500.3	2,501.3
1976	120,000	"	14,400	"	2,088.0	522.0	2,610.0
Total Production							
1970	339,000		34,900		3,760.0	940.0	4,700.0
1971	367,600		38,160		4,194.0	1,048.5	5,242.5
1972	383,600		39,900		4,405.8	1,101.5	5,507.3
1973	400,800		41,780		4,637.0	1,159.3	5,796.3
1974	430,200		45,120		5,079.0	1,269.8	6,348.8
1975	450,000		47,300		5,351.0	1,337.6	6,688.8
1976	465,000		48,900		5,538.0	1,364.5	6,922.5

NOTES: Based on data from République de Côte-d'Ivoire, Ministère de la Production Animale, and the following assumptions:

a Cattle population:
   1) Taurins: Based on a population of 335,000 in 1975 and a 3 percent annual growth rate
   2) Zebus: Figures provided by Ministry of Animal Production

b Edible offals estimated at 25 percent of carcass weight.

Estimates of carcass weights and off-take rates provided by the Ministère de la Production Animale.

Between 1970 and 1976, the number of zebus in Ivory Coast increased by 140 percent. Many of the Fulani herders apparently have settled permanently in Ivory Coast, a move encouraged by the Ivorian government because it increases domestic beef production. The government hopes that increased domestic production will give Ivory Coast a more assured supply of beef and reduce foreign exchange expenditures currently needed to import livestock and meat.

c. Production of Small Ruminants.—No solid statistics exist on the number of small ruminants in Ivory Coast. Estimates run from 1.3 million (74), to 1.8 million (72, p. 14). The Planning Ministry estimated there were 1,000,000 sheep and 760,000 goats in the country in 1975, with the sheep producing 3,500 tons of meat and edible offals and the goats producing 2,000 tons (63).[1] Lacking more accurate statistics, the figures of the Planning Ministry are used in this report.

d. Pork Production.—Pork production in Ivory Coast takes place both in villages and in a few modern pig farms. The official estimate of pork production in 1975 was 5,000 tons, as shown in Table 1.12.

TABLE 1.12

ESTIMATED PORK PRODUCTION IN IVORY COAST IN 1975

	Traditional	Modern Farms	Total
Number of Animals	173,000	27,000	200,000
Offtake rate per year	75%	74%	
Number slaughtered annually	130,000	20,000	
Average Wt.: Meat and edible offals (kg.)	27.5	70	
Production: Meat and edible offals (tons)	3,600	1,400	5,000

SOURCE: République de Côte d'Ivoire, Ministère du Plan, "Objectifs du plan 1976-1980: secteurs élevage et pêche: tableaux," Table 6.

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[1]These estimates of meat production apparently are based on an offtake rate of 30 percent for both goats and sheep, carcass weights of 10 kg for sheep and 7.5 kg for goats, and edible offals equal to 15 percent of carcass weight.

In contrast to other types of red meat, Ivory Coast is largely self-sufficient in pork, producing 98 percent of its domestic consumption (63, Table 10).

In addition to the red meat production just mentioned, officials estimated the production of game, snails, and other <u>viande de brousse</u> equaled 16,000 tons in 1975 (63, Table 10). One must regard this figure with caution, however, as there are practically no data on which to base such an estimate.

Ivorian red meat production in 1975 can thus be summarized as follows:

TABLE 1.13

ESTIMATED IVORIAN RED MEAT PRODUCTION IN 1975
(tons of meat and edible offals)

Beef	6,689
Mutton	3,500
Goat Meat	2,000
Pork	5,000
Subtotal	17,189
Game[a]	16,000

SOURCES: Tables 1.11, 1.12, and text.

[a]Reliablility of this figure for game is questionable.

Imports of Livestock.--Imports of live animals from the Sahelian countries traditionally have provided the bulk of Ivory Coast's red meat supply, particularly its beef supply. Table 1.14 presents officially recorded imports of cattle into Ivory Coast from 1965 through 1976.

a. Cattle Imports.--Between 1965 and 1970, officially recorded cattle imports increased steadily, rising from 80,200 to 198,000 head. The annual average rate of increase of recorded cattle imports during this period was 20 percent. Real per capita income was increasing rapidly during this period and undoubtedly was one of the main forces boosting demand for meat and hence,cattle. Larger exports from Mali accounted for

TABLE 1.14

OFFICIALLY RECORDED IMPORTS OF CATTLE INTO IVORY COAST: 1965-76

Year	Mali		Mauritania		Upper Volta		Niger		France		Total	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent[a]
1965	24,446	30.5	1,914	2.4	53,828	67.1	10	—	—	—	80,198	100.0
1966	19,996	19.7	37,234	36.6	44,273	43.6	119	0.1	—	—	101,622	100.0
1967	46,063	38.5	16,739	14.0	56,123	46.9	718	0.6	—	—	119,643	100.0
1968	67,836	41.2	16,356	9.9	80,566	48.9	—	—	—	—	164,758	100.0
1969	113,234	65.8	16,908	9.8	41,335	24.0	567	0.3	—	—	172,064	100.0
1970	163,080[b]	72.1[b]	b	b	51,199	25.8	4,121	2.3	—	—	198,400	100.0
1971	—	—	—	—	—	—	—	—	—	—	175,896	100.0
1972	137,074[b]	64.5[b]	b	b	73,658	34.7	1,746	0.8	—	—	212,478	100.0
1973	117,942	52.7	29,001	13.0	73,054	32.6	3,938	1.7	—	—	223,935	100.0
1974	123,148	63.6	31,397	16.2	39,084	20.2	—	—	—	—	193,629	100.0
1975	77,065	54.7	5,069	3.6	58,441	41.5	395	0.3	—	—	140,970	100.0
1976	73,851	67.5	830	0.7	35,264	31.4	—	—	369	0.3	112,314	100.0

SOURCE: République de Côte-d'Ivoire, Ministère de la Production Animale, unpublished data; République de Côte-d'Ivoire, Ministère de l'Economie et des Finances, Direction de la Statistique, Situation économique de la Côte-d'Ivoire, various issues; and SEDES, Recueil statistique de la production animale, study done for République Française, Ministère de la Coopération (Paris: 1975), p. 450.

NOTES:

--- Not available

— None or negligible

The Ivorian Ministry of Animal Production accepts the figures published in the Recueil statistique de la production animale as the official figures for years prior to 1972. These figures differ in some years from the figures reported by the Veterinary Service and published in Situation économique de la Côte-d'Ivoire. For 1966 and 1967, these differences are very small, therefore the Veterinary Service's statistics are used, since they give the country of origin of the imported animals, which the SEDES figures for 1966 and 1967 do not. In years where there are large differences between the Veterinary Service's statistics and the SEDES figures, the latter are used. Figures for the years 1973-76 are from unpublished data of the Ministry of Animal Production. The Veterinary Service's estimates of imports are shown in Appendix 1.C.

a Totals may differ slightly from sum of subtotals due to rounding.

b Figures for Mauritania included in the figures for Mali.

much of the increase over this period. Mali's share of the market increased from 30.5 percent in 1965 to 65.8 percent in 1969.[1] During the same period, the number of cattle imported from Upper Volta actually fell by about 12,000, and the Voltaic share of the market fell from 67 percent to 24 percent. Part of the apparent growth in the Malian share of the market probably reflects an improvement in the statistics gathered along the Mali-Ivory Coast border. Ivory Coast ended its import tax on cattle in 1968, and this probably encouraged more traders to get the necessary Ivorian health papers for their herds (and hence have their import of animals officially recorded).[2] Much of the recorded increase, however, was probably due to the lifting of Malian exchange controls in 1967 and the reduction in the Malian export tax on cattle in 1969 (117, p. 9). These actions by the Malian government increased officially recorded exports from Mali to Ivory Coast from an average of 12,652 head per year in 1966-67 to an average of 24,218 head per year in 1968-69.[3] Total Malian cattle exports to Ivory Coast probably increased as well.[4] The growth in Malian exports was also tied to the growth of urban centers such as Daloa, Yamoussoukro, San Pedro, and Bouaké, whose meat supply is met by Malian animals transported south on hoof.[5]

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[1]Stryker (117, Table A-9), using other data, estimates that the Malian share of Ivorian cattle imports grew from 33.4 percent in 1965 to 55.4 percent in 1969.

[2]The bulk of the Malian cattle imported into Ivory Coast enters the country on hoof. It is likely that a larger proportion of these animals were not recorded in official statistics than was the case with Voltaic animals, most of which are imported by train and thus cross the border only at one point.

[3]See Appendix 1B for officially recorded exports of livestock and meat from Mali.

[4]The ratio between recorded exports of Malian cattle to Ivory Coast and recorded arrivals of Malian cattle in Ivory Coast fell from an average of 0.38 in 1966 and 1967 to an average of 0.27 in 1968 and 1969. This implies that total exports grew at a faster rate than recorded exports, or that a higher percentage of total arrivals in Ivory Coast were recorded in 1968 and 1969 than in previous years (e.g., due to the abolition of the tax) (92, pp. 43-5).

[5]As shown later in this study, Abidjan is largely supplied by Voltaic animals, while Bouaké, Daloa, and other cities in the center and west of the country rely mainly on Mali for their supply of cattle.

In 1971, total recorded imports fell by almost 23,000 head, reflecting the impact of the drought in the Sahel. Faced with increased mortality, Sahelian herders apparently held back animals and tried to maintain their herds. This was followed in 1972 through 1974 by a destocking of herds as the drought became more severe, and herders were obliged to sell even young males and cows to meet their cash needs. This destocking of northern herds is reflected in increased cattle imports into Ivory Coast during 1972-1973, particularly a sharp increase in imports from Mauritania, where the effects of the drought were severe. The high level of cattle imports into Ivory Coast from Mali during the period 1970-74 was also a by-product of the decline in the Ghanaian market for beef, which resulted from economic instability and the reorganization of the cattle trade in Ghana. Recorded cattle exports from Mali to Ghana fell from nearly 43,000 head in 1969 to 6,300 head in 1974 (95). Many of the cattle which normally would have been exported to Ghana ended up in Ivory Coast during this period.

In 1974, total recorded cattle imports into Ivory Coast fell by 30,000 head compared to the previous year. This decline was due to a sharp fall in recorded imports from Upper Volta, from 73,054 head to 39,084 head. Part of this drop in reported imports may have resulted from errors in the Ivorian statistics. Voltaic statistics show recorded exports from Upper Volta to Ivory Coast totalled 49,490 head in 1974 (85). This is the only year for which the Voltaic figure on recorded exports to Ivory Coast exceeds the Ivorian figure on recorded imports from Upper Volta.[1] The decline in recorded imports continued at an accelerating rate in 1975. Imports fell in 1975 not only because the marketable surplus of animals in the Sahelian countries was reduced by the drought and the subsequent destocking of herds in 1972-74, but also because Mali

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[1]According to the Voltaic statistics, recorded cattle exports from Upper Volta to Ivory Coast actually increased slightly from 1973 to 1974 (from 48,573 head to 49,490 head). Recorded exports plus transits fell sharply, however (from 73,153 head to 55,180), due to a drop in the number of Malian animals recorded as transiting through Upper Volta to Ivory Coast (85). This decline coincided with a worsening of the Malian-Voltaic border dispute. See Appendix 1.A for the official Voltaic export statistics.

and Niger closed their borders to livestock exports during part of the year. This did not cut off the trade completely, but it certainly reduced it.[1] Imports were also reduced because of the hostilities between Upper Volta and Mali, which essentially ended the transit of Malian animals through Upper Volta along the route Mopti-San-Bobo-Dioulasso-Ouangolodougou (Ivory Coast).[2] This is reflected in the 37-percent drop in recorded imports from Mali between 1974 and 1975; they fell from 123,148 head to 77,065 head. As a result, Mali's relative share of the import market fell from 63.6 percent to 54.7 percent. Mauritanian cattle exports to Ivory Coast also fell precipitously in 1975. In response to this drop in total cattle imports, the Ivorian government, through its state-owned company AGRIPAC, began importing large amounts of frozen meat, mainly from Europe, in September 1975.

The decline in total imports continued in 1976, falling to 112,314 head. While Malian imports remained at their 1975 level, imports from Upper Volta fell by 23,000 head, and Niger and Mauritania virtually ceased to export to Ivory Coast.[3] Imports continued to fall in 1976 for two reasons. First, the effects of the drought continued to be felt. (Many of the young animals that died in 1969-71 normally would have been marketed in 1976). Secondly, part of Ivory Coast's "normal" supply of cattle, particularly from Upper Volta, apparently was diverted toward

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[1] During the border closures, some Malian and Nigerien animals may have entered Upper Volta clandestinely en route to Ivory Coast. If so, they were probably recorded as Voltaic animals when they entered Ivory Coast. This may explain why recorded imports from Upper Volta rose in 1975.

[2] In 1973, 24,580 head of Malian cattle were recorded as transiting through Upper Volta for Ivory Coast. By 1975, the figure had fallen to 3,702 head. The transit trade along the route Mopti-San-Bobo-Dioulasso-Ouangolodougou does not seem to have re-established itself despite the resolution of the Malian-Voltaic territorial dispute. Herman (30) reports that trade along the routes Mopti-Ouahigouga (Upper Volta)-Djibo-Ouagadougou and Mopti-Ouahigouga-Djibo-Niger has been re-established however.

[3] France became an exporter of cattle to Ivory Coast in 1976. In July, AGRIPAC imported 369 cull cows from France by ship. These animals were available at low prices in France because of the European drought during the summer of 1976. AGRIPAC imported them as an experiment to see whether imports of live animals from Europe could compete with frozen meat imports. There are no plans to continue such imports.

more profitable markets in Niger and Nigeria. The high prices offered in
Niger stemmed from two causes: the Nigerien herd reconstitution program,
which resulted in high prices being offered for young animals, especially
heifers; and the strong demand for slaughter animals in Nigeria.[1] There
are, unfortunately, no statistics on the volume of this new trade between
Upper Volta and Niger, although it seems to involve at least several
thousand animals per year. Many cattle merchants in Upper Volta abandoned
the Abidjan market in 1976 to sell their animals at Téra, on the border
between Niger and Upper Volta. This trade involved above all animals from
northern Upper Volta (the regions around Djibo, Markoye, and Dori),
eastern Mali,and western Niger. Many of these animals, instead of going
south to the Ouagadougou market as in the past, traveled east to be sold
at Téra. It thus appears that the Ivorian government's policy of import-
ing large amounts of cheap frozen meat in order to hold down meat prices
in the major retail markets had the effect of diverting part of the
traditional supply of slaughter animals, particularly from Upper Volta,
to more profitable markets elsewhere.[2]

Data from the first few months of 1977 show a slight rise in cattle
imports in relation to 1976. Total imports for the months of January,
February, April, and May, 1977 (the data for March are being revised)
stood at 35,383 head, compared to 33,631 for the same months in 1976.

The destocking of herds in the Sahelian countries during the period
1972-76 was reflected in the sex structure of animals slaughtered at
Abidjan. Being one of the most important consumption markets in West
Africa, Abidjan traditionally attracted the best quality slaughter animals,

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[1] Because the port of Lagos was blocked throughout 1976, Nigeria was
not able to adopt the Ivorian expedient of importing large quantities of
frozen meat by sea in order to hold down retail meat prices. As a re-
sult, prices for cattle in Lagos reportedly rose to approximately 300 CFAF
per kg liveweight near the end of 1976, compared to roughly 210 CFAF per
kg liveweight in Abidjan (44).

[2] Many Voltaic cattle merchants complained to the investigator that
the Abidjan market had been "ruined" by frozen meat imports.

typically steers from 5 to 8 years old. Table 1.15 shows, however, that
the sex distribution of animals slaughtered in Abidjan changed radically
between 1970 and 1976, reflecting herders' increased sales of females
and young uncastrated males.[1] Between 1970 and 1975, while the total
number of animals slaughtered fell by 32 percent, the number of steers
slaughtered fell by 62 percent. The number of uncastrated males
(generally young animals) slaughtered increased by 55 percent and the
number of cows slaughtered increased by 88 percent. In relative terms,
steers represented 76.5 percent of the animals slaughtered in 1970 and
only 42.3 percent in 1975. The percentage of the slaughter accounted
for by uncastrated males increased from 14.4 percent to 32.7 percent and
that by cows from 9.1 percent to 25 percent. In 1976, the number of cows
slaughtered in Abidjan dropped sharply (accounting for nearly half the
total decrease in slaughters between 1975 and 1976), as did the proportion
of slaughter accounted for by cows. It appears that the pre-drought
pattern was starting to re-establish itself, with the 1976 sex distribution
being roughly the same as that of 1972. The proportion of the slaughter
accounted for by uncastrated males in 1976 was still more than double
that in 1970, however, although the absolute numbers were about the same.
This seems to indicate earlier exploitation of males than in the pre-
drought period.

The increase in the proportion of females and young males slaughtered
meant that the average weight per animal slaughtered in Abidjan declined.
Unfortunately, no actual weight statistics exist for animals slaughtered
at Abidjan. The Ivorian Ministry of Animal Production estimates that
the average carcass weights of zebu steers, uncastrated males, and cows
at 160 kg, 130 kg, and 110 kg, respectively.

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[1]The relative increase in the number of females and uncastrated
males slaughtered in Abidjan during the period 1970-76 may have been
also due to cattle merchants sending their choicest animals (older
steers) to Nigeria, where prices were higher than in Abidjan.

TABLE 1.15

RECORDED CATTLE SLAUGHTER AT
ABIDJAN BY SEX OF ANIMAL: 1970-76

Year	Steers		Uncastrated Males		Cows		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1970	38,456	76.5	7,262	14.4	4,578	9.1	50,296	100.0
1971	35,122	70.7	9,898	19.9	4,635	9.3	49,655	100.0
1972	28,621	52.0	16,138	29.3	10,318	18.7	55,077	100.0
1973	24,491	47.0	14,473	27.8	13,109	25.2	52,073	100.0
1974	20,944	48.6	12,955	30.0	9,221	21.4	43,120	100.0
1975	14,561	42.3	11,268	32.7	8,592	25.0	34,421	100.0
1976	13,113	53.5	7,594	31.0	3,814	15.5	24,521	100.0

SOURCE: République de Côte-d'Ivoire, Ministère de la Production Animale, unpublished data.

Applying these weights to the slaughter proportions indicated in Table 1.15 results in the following average carcass weights for animals slaughtered in Abidjan from 1970 to 1976:

1970:	151 kg	1974:	140 kg
1971:	149 kg	1975:	138 kg
1972:	142 kg	1976:	143 kg
1973:	139 kg		

These figures show that not only did the number of animals imported into Ivory Coast drop sharply during the period 1970-76, but so did the average weight per animal. If one assumes that the average slaughter weights for all imported animals were the same as those in Abidjan, the tonnage of beef imported on hoof can be estimated as in Table 1.16.

TABLE 1.16

ESTIMATED TONNAGE OF BEEF IMPORTED INTO IVORY COAST
ON THE HOOF FROM 1970 TO 1976

Year	Number of Cattle Imported	Average Carcass Weight (kg)	Meat (tons)	Edible Offals (tons)[a]	Total (tons)
1970	198,400	151	29,958	7,490	37,448
1971	175,896	149	26,209	6,522	32,761
1972	212,478	142	30,172	7,543	37,715
1973	223,935	139	31,127	7,782	38,909
1974	193,629	140	27,108	6,777	33,885
1975	140,970	138	19,454	4,863	24,317
1976	112,314	143	16,061	4,015	20,076

SOURCE: Table 1.14 and average slaughter weights (see text).

[a]Estimated at 25 percent of carcass weight.

According to Table 1.16, the total tonnage of beef imported on the hoof fell by nearly half between 1970 and 1976, from 37,448 tons to 20,076 tons. A small part of this decline was offset by an increase in domestic production resulting from Fulani cattlemen moving their herds south into Ivory Coast to escape the drought (Table 1.11), but most of it was not

met by a corresponding increase in other fresh beef supplies. The result was a decreasing total and per capita fresh beef supply throughout this period.[1]

   b. Imports of Sheep and Goats.--Table 1.17 presents officially recorded imports of sheep and goats from 1965 through 1976. In general, the pattern followed was the same as that for cattle. Recorded imports more than doubled between 1965 and 1970, they declined slightly from 1970 to 1971, increased sharply in 1972 and 1973, and then declined markedly from 1973 through 1976. The official Ivorian statistics on imports of small ruminants, at least from Upper Volta, appear less accurate than those for cattle, however. For four of the five years for which comparable data are available (1970 and 1973-76), Ivorian import statistics show an average of 20 percent fewer Voltaic small ruminants arriving in Ivory Coast than the Voltaic figures indicate left that country for Ivory Coast. The Voltaic figures show the same pattern of fluctuations as the Ivorian statistics (see Appendix 1A).

   It appears that the same forces that affected cattle imports also influenced sheep and goat imports. Rapidly rising incomes in the period 1965-1970 stimulated demand for meat and imports grew accordingly. The effects of the drought started to be felt in 1971, resulting in a slight reduction of imports in that year, followed by a massive destocking of herds in 1972 and 1973. This destocking boosted imports into Ivory Coast during these two years, but was followed by a decline in recorded imports from 1973 through 1976 as the number of animals available for sale from the Sahelian countries dropped as a result of this destocking. Recorded imports of sheep and goats fell proportionately less than did recorded cattle imports, however, declining by roughly 30 percent from 1973 to 1976, compared with a 50 percent drop in recorded cattle imports during the same period. In 1976, recorded sheep and goat imports stood at the same level as in 1970, whereas recorded cattle imports were considerably below their 1970 levels. Sheep and goat imports have

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[1]As mentioned in Appendix 1E, the official import statistics on which Table 1.16 is based slightly underestimate the true volume of imports. There is no reason to believe that the decline in recorded imports between 1970 and 1976 resulted from an increase in the proportion of unrecorded imports, however.

OFFICIALLY RECORDED IMPORTS OF SHEEP AND GOATS INTO IVORY COAST: 1965-76

Year	Mali Number	Mali Percent	Mauritania Number	Mauritania Percent	Upper Volta Number	Upper Volta Percent	Niger Number	Niger Percent	Total Number	Total Percent[a]
1965	39,902	28.1	4,936	3.5	86,347	60.8	10,780	7.6	141,965	100.0
1966	18,875	10.4	107,072	59.1	55,311	30.5	—	—	181,258	100.0
1967	—	—	—	—	—	—	—	—	180,517	100.0
1968	27,605	12.3	15,568	6.9	182,015	80.8	—	—	225,188	100.0
1969	89,503	32.0	29,928	10.7	159,929[b]	57.4[b]	b	b	279,360	100.0
1970	122,673	39.6	36,135	11.7	128,490	41.5	22,104	7.1	309,402	100.0
1971	—	—	—	—	—	—	—	—	303,479	100.0
1972	—	—	—	—	—	—	—	—	394,044[c]	100.0
1973	147,295	34.5	23,991	5.6	241,137	56.5	14,636	3.4	427,059	100.0
1974	165,718	42.9	29,919	7.8	187,80.	48.7	2,397	0.6	385,830	100.0
1975	96,005	27.2	2,811	0.8	253,517	71.9	309	0.1	352,642	100.0
1976	130,744	43.5	—	—	167,264	55.7	2,263	0.8	300,305	100.0

SOURCES: République de Côte-d'Ivoire, Ministère de la Production Animale, unpublished data; République de Côte-d'Ivoire, Ministère de l'Economie et des Finances, Direction de la Statistique, Situation économique de la Côte-d'Ivoire, various issues and SEDES, Recueil statistique de la production animale, study done for République Française, Ministère de la Coopération (Paris: 1975), p. 45.

NOTES:

— Not available

— None or negligible

The Ivorian Ministry of Animal Production accepts the figures published in the Recueil statistique de la production animale as the official figures for the years prior to 1972. These figures differ in some years from the figures reported by the Veterinary Service and published in Situation économique de la Côte-d'Ivoire. In years where there are large differences between the Veterinary Service's statistics and the SEDES figures, the latter are used. Figures for the years 1973-76 are from unpublished data of the Ministry of Animal Production. The Veterinary Service's estimates of imports are shown in Appendix 1.C.

[a] Totals may differ slightly from sum of subtotals due to rounding.

[b] Figures for Niger included in the figures for Upper Volta.

[c] Recently revised figure, differs from figure previously published by Ministry of Animal Production.

suffered less direct competition from frozen meat imports than have cattle imports, as the bulk of the frozen meat imported is beef and practically no frozen mutton or goat meat is sold on the traditional African market.[1]

As happened with recorded cattle imports, the relative market shares of the exporting countries changed in recent years. Mauritania and Niger virtually disappeared as important suppliers in the market, and Mali took over their share of the market (even though total exports from Mali declined slightly from 1973 to 1976).

Unfortunately, data on the sex distribution of imported sheep and goats are not available. If one accepts the SEDES figure of an average carcass weight of 17 kg for imported sheep and goats and edible offals equal to 15 percent of carcass weight (102, p. 117), one can estimate the tonnage of meat represented by these imports as in Table 1.18.

TABLE 1.18

ESTIMATED TONNAGE OF MUTTON AND GOAT MEAT IMPORTED INTO
IVORY COAST ON THE HOOF FROM 1970 TO 1976

Year	Number of Animals Imported	Average Carcass Wt. (kg)	Meat (tons)	Edible Offals (tons)[a]	Total (tons)
1970	309,402	17	5,260	789	6,049
1971	303,479	17	5,164	744	5,908
1972	394,044	17	6,699	1,005	7,704
1973	427,059	17	7,260	1,089	8,349
1974	385,830	17	6,559	984	7,543
1975	352,642	17	5,995	899	6,894
1976	300,305	17	5,105	766	5,871

SOURCES: Table 1.17 and SEDES, Approvisionnement en viandes de l'Afrique centre ouest, Secretariat d'Etat aux Affaires Etrangères (France) and Conseil de l'Entente (Paris: 1969), p. 121.

[a]Estimated at 15 percent of carcass weight.

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[1]Sales of sheep and goats may have been affected indirectly if consumers shifted from mutton to beef consumption as relatively inexpensive frozen beef became available. This probably did not happen very much. Many of the sheep sold in Ivory Coast are slaughtered for ceremonial occasions. In these circumstances, consumers do not consider beef an acceptable substitute for mutton.

Table 1.18 shows that the tonnage of meat represented by recorded small ruminant imports rose from roughly 6,000 tons in 1970 to 8,300 tons in 1973, then fell back to 6,J00 tons in 1976. Throughout this period, the tonnage was equal to between one-sixth and one-quarter of the beef im-‾ ported on the hoof. The figures in Table 1.18 are less than those given by the Ivorian Planning Ministry (63, Table 10), which estimated imports at 6,800 tons in 1970 and 8,000 tons in 1975. The Planning Ministry apparently felt that the official figures understated the true volume of imports. Examination of Voltaic export statistics (see p. 32) supports this view. The tonnage of mutton and goat meat imported on the hoof in 1976 was probably closer to 7,000 tons than to 5,800 tons.

Imports of Fresh, Chilled, and Frozen Meat.--In addition to domestic production and imports of live animals, imports of chilled and frozen meat are the other main source of meat supply for Ivory Coast. Until 1975, these imports represented a modest volume and were destined almost exclusively for a high-income, largely expatriate clientele in Abidjan. Since 1975, however, the pattern has completely changed, with large amounts of imported frozen meat (mainly beef) being sold on the traditional African market. Table 1.19 and Figure 1.2 show how Ivory Coast's recorded imports of chilled and frozen meat have changed from 1960 through 1976.

From 1960 to 1965, total recorded imports of chilled and frozen meat tripled from 528 tons to 1,567 tons. Throughout most of this period, beef accounted for roughly 66 percent of the total, mutton and goat meat made up about 20 percent, and pork and horse meat accounted for the rest. In 1966, the total climbed to 1,911 tons, and it remained between 1,900 and 2,000 tons from 1966 through 1970. Most of the increase, compared to previous years, was due to a rise in beef imports, which accounted for 73 percent of the imports during this period, while mutton and goat meat accounted for 17 percent. In 1970, recorded imports began to fall, and during the period 1972-74 they were at roughly the same level as a decade earlier. This decline reflected falling imports of chilled meat from Niger and the end of chilled meat imports from Mali. Recorded imports of pork also fell during this period as Ivory Coast moved toward self-sufficiency in pork production.

TABLE 1.19

RECORDED IMPORTS OF CHILLED AND FROZEN RED MEAT INTO
IVORY COAST FROM 1960 TO 1976 (tons)

Year	Beef		Goat/Sheep		Pork		Horse		Total[a]	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
1960	406	76.9	73	13.8	35	6.6	15	2.8	528	100.0
1961	570	65.3	171	19.o	88	10.1	43	4.9	873	100.0
1962	741	66.5	217	19.5	62	5.6	96	8.6	1,115	100.0
19/3	956	64.0	319	21.4	79	5.3	141	9.4	1,494	100.0
1964	1,015	63.2	350	21.8	127	7.9	112	7.0	1,605	100.0
1965	983	62.7	360	23.0	131	8.4	93	5.9	1,567	100.0
1966	1,289	67.5	391	20.5	141	7.4	90	4.7	1,911	100.0
1967	1,352	70.3	345	17.9	128	6.7	100	5.2	1,924	100.0
1968	1,466	74.1	339	17.1	78	3.9	95	4.8	1,978	100.0
1969	1,521	76.1	269	13.5	120	6.0	89	4.4	1,998	100.0
1970	1,477	73.8	305	15.2	123	6.1	97	4.8	2,001	100.0
1971	1,405	76.4	240	13.1	107	5.8	87	4.7	1,839	100.0
1972	1,204	80.6	163	10.9	78	5.2	48	3.2	1,494	100.0
1973	1,077	83.2	135	10.4	47	3.6	3:	2.7	1,294	100.0
1974	1,243	84.4	145	9.8	39	2.6	47	3.2	1,473	100.0
1975	6,093	96.3	122	1.9	72	1.1	42	0.7	6,329	100.0
1976	16,611	97.5	339	2.0	47	0.3	33	0.5	17,030	100.0

SOURCE: République de Côte'd'Ivoire, Ministère de la Production Animale, unpublished data.

NOTES: Some of the figures in this table and in Tables 1.21 and 1.23 differ slightly from previously published figures of the Ministère de la Production Animale; computational errors in the original data were discovered and corrected during the preparation of these tables.

[a] Totals may differ slightly from sum of subtotals due to rounding.

FIGURE 1.2

IMPORTS OF CHILLED AND
FROZEN MEAT INTO IVORY COAST 1960-76
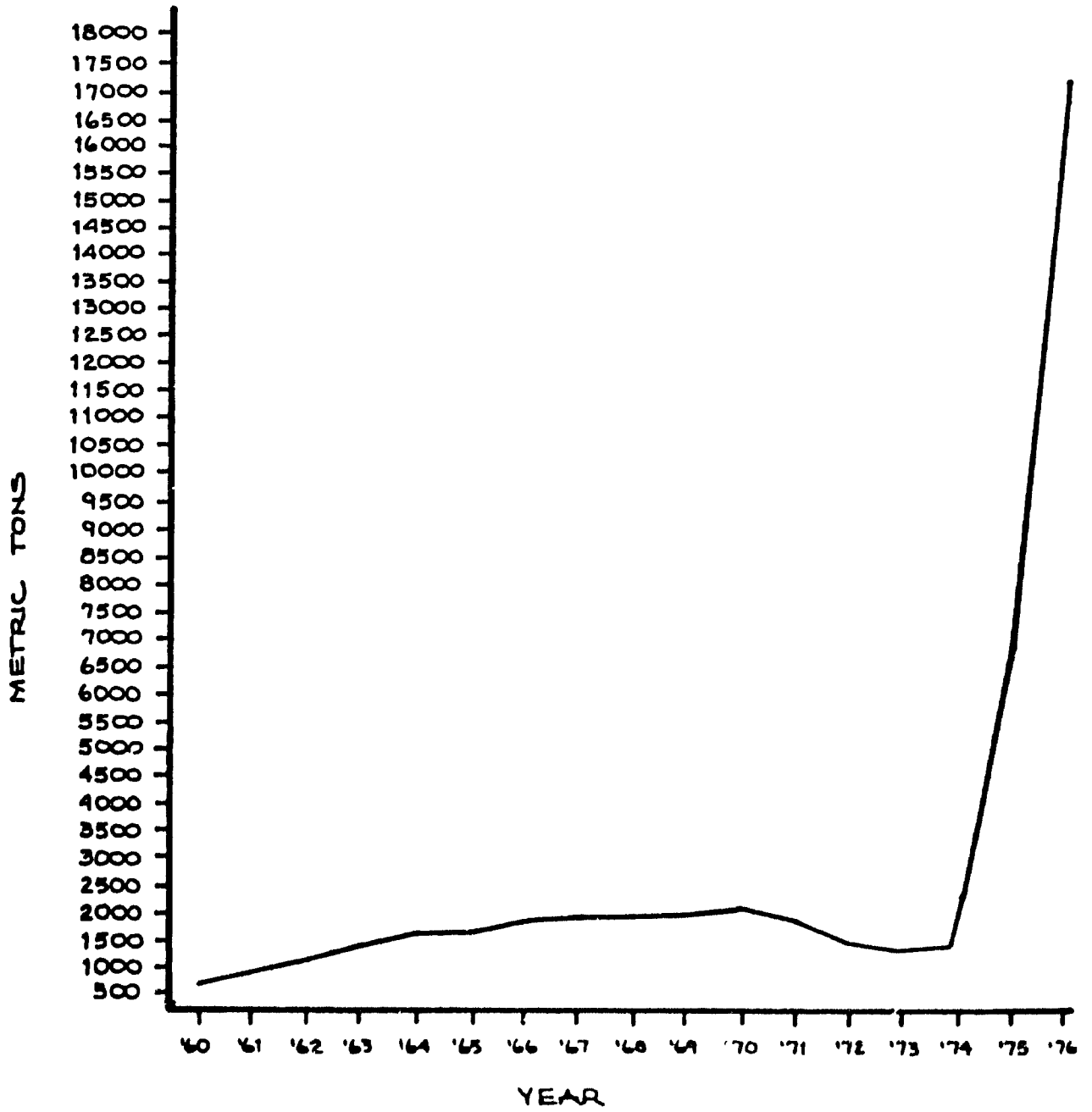
The downward trend in chilled and frozen meat imports continued through the first half of 1975. The abrupt drop in live animal imports in 1975 reduced the total meat supply on the market and, in order to check the resulting price rise, the Ivorian government began importing surplus frozen meat from the European Economic Community (EEC) in the second half of 1975. These imports are reflected in the huge increase in the figure for 1975 as compared to 1974. In one year, recorded imports jumped from 1,473 tons to 6,329 tons. In 1976, recorded imports increased even more rapidly, reaching 17,030 tons, much of it from South America. Almost all this new frozen meat was beef; as a result, beef accounted for over 97 percent of the imports in 1976 compared with 81 percent in the 1971-74 period.

Preliminary figures for 1977 indicate a reduction in frozen and chilled meat imports. During the first six months of the year, 4,912 tons of meat were imported by ship, while during the first five months, air imports totaled 335.6 tons, imports by rail equaled 7.6 tons, and imports by truck stood at 10.8 tons. Assuming air, rail, and truck imports in June were at their January-May average levels, the total frozen and chilled meat imports for the first six months of 1977 can be estimated at 5,436 tons, as shown in Table 1.20.

TABLE 1.20

ESTIMATED IMPORTS OF CHILLED AND
FROZEN RED MEAT: JANUARY-JUNE, 1977 (tons)

Type of Meat	Transport				
	Sea	Air	Rail	Truck	Total
Beef	4,866.4	338	71	12	5,287.4
Goat/Sheep	17.1	77	7	1	102.1
Horse	10.1	9	4	—	23.1
Pork	18.5	2	3	—	23.5
Total	4,912.1	426	85	13	5,436.1

SOURCE: République de Côte-d'Ivoire, Ministère de la Production Animale, unpublished data.

NOTE: Figures for imports by sea are actual figures. Other imports are estimated from data for January-May, 1977.

No frozen meat was imported during January or February 1977 because
AGRIPAC and DISTRIPAC, the two parastatal companies having the exclusive
import rights for meat, both overstocked in December 1976 and were
selling from those stocks during January and February. The only meat
imported during these two months was a small amount of chilled meat
(121 tons) imported by air. If imports of frozen beei (by sea) continued
at their March-June levels (roughly 1,200 tons per month) for the rest of
1977, they would have totaled approximately 12,000 tons by the end of the
year. Assuming that imports of high-quality meat (imports by rail, air,
and truck, as well as non-beef imports by sea) fell by 50 percent during
the months of July and August, when much of the expatriate population
was out of the country, but continued at their January-May levels (roughly
100 tons per month) for the rest of the year, total imports for 1977 can
be projected at roughly 13,100 tons:

Total imports, January-June, 1977:	5,436 tons
Frozen beef imports (by sea) 1,200 tons per month during July-December:	7,200 tons

High-quality meat imports
    50 tons per month during July and August:
    100 tons per month during September-December:
	100 tons
	400 tons

Total estimated red meat imports for 1977:	13,136 tons

This figure is somewhat higher than the 11,000-ton figure one would get
by simply extrapolating from the total figure for January to June. This
is because it t kes into account that imports during January and
February were unusually low.

In contrast to previous years, the bulk of the chilled and frozen
meat imported in 1975 and 1976 was destined for the traditional African
market, not a high-income urban clientele. Most of the beef imported in
previous years had been either rear quarters, veal, or select cuts
(e.g., filet), chilled and imported by air or rail. The beef imported
in 1975 and 1976, however, was composed mainly of frozen front quarters,
imported by refrigerated ship.[1] This meat was sold on the traditional

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[1]Chilled meat has been cooled to $0^{\circ}C$.; it can be stored for one to
two weeks. Frozen meat has been refrigerated to $-20^{\circ}C$. and can be kept
for months or even years.

market (with bones) for between 50 to 100 CFAF less per kg than locally slaughtered meat, which sold in 1976 in Abidjan for 350 to 400 CFAF per kg.

The large imports of frozen meat were initially a reaction to and not the cause of the decline in live animal imports in 1975. Imports of live animals fell sharply in mid-1975, and it was not until September that the massive frozen meat imports began. Once started, however, the sales of cheap frozen meat had the effect of checking the price increase of fresh meat and, as mentioned above, may have served to reduce live animal imports, particularly from Upper Volta.

Not only did the quantities of frozen and chilled meat imported increase tremendously between 1974 and 1976; the pattern of supply completely changed, as well. This is shown in Table 1.21, which outlines recorded imports of chilled and frozen meat by country of origin. Up until 1975, the Sahelian countries usually accounted for between 85 to 90 percent of Ivory Coast's recorded frozen and chilled meat imports, with Europe (mainly France) making up the rest. Upper Volta was the most important supplier, accounting for between 50 and 73 percent of total recorded imports between 1960 and 1974. Most of the Voltaic meat traveled south by refrigerated rail car from Ouagadougou and Bobo-Dioulasso to Abidjan. Imports from Mali and Niger came by air and by refrigerated truck. European imports, both by ship and by air, accounted for between 8 to 14 percent of total recorded imports during the period 1962-74, and there were no imports from non-Sahelian Africa until 1975.[1] Malian exports to Ivory Coast stopped in 1970, and imports from Upper Volta and Niger dropped fairly steadily from 1970 onward, as did total imports.

In 1975, the entire supply pattern changed. Large imports arrived from Europe, non-Sahelian Africa and, for the first time, South America. In one year, the combined market share of Mali, Upper Volta, and Niger fell from 85.9 percent to 13.7 percent, and by 1976 it represented only 2.5 percent of total recorded meat imports.

Non-African suppliers entered the Ivorian meat market in 1975 for two reasons. Meat prices in Ivory Coast rose sharply in 1975 because of the shortage of local slaughter animals, thus making Ivory Coast a more

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[1] The eight tons imported from "other African countries" in 1974 came from Senegal.

TABLE 1.21

RECORDED IMPORTS OF CHILLED AND FROZEN RED MEAT BY COUNTRY OF ORIGIN: 1960-76 (tons)

Year	Mali		Upper Volta		Niger		Other African Countries		Total African Countries		Europe		South America		Total[a]	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
1960	77	14.6	260	49.2	42	8.0	—	—	379	71.8	149	28.2	—	—	528	100.0
1961	—	—	471	54.0	179	20.5	—	—	650	74.5	223	25.5	—	—	873	100.0
1962	—	—	782	70.1	186	16.7	—	—	968	86.8	147	13.2	—	—	1,115	100.0
1963	95	6.4	918	60.9	270	18.1	—	—	1,275	85.3	219	14.7	—	—	1,494	100.0
1964	181	11.3	979	61.0	220	13.7	—	—	1,380	86.0	225	14.0	—	—	1,605	100.0
1965	167	10.7	969	61.3	230	15.1	—	—	1,363	87.0	203	13.0	—	—	1,567	100.0
1966	309	16.2	933	48.9	473	24.8	—	—	1,717	90.9	194	10.1	—	—	1,911	100.0
1967	37	3.0	1,317	68.5	363	18.9	—	—	1,737	90.3	188	9.7	—	—	1,924	100.0
1968	95	4.8	1,304	65.9	418	21.1	—	—	1,817	91.9	160	8.1	—	—	1,978	100.0
1969	179	9.0	1,232	61.7	406	20.3	—	—	1,817	90.9	181	9.1	—	—	1,998	100.0
1970	153	7.6	1,176	58.8	487	24.3	—	—	1,816	90.7	186	9.3	—	—	2,001	100.0
1971	—	—	1,326	72.1	340	18.5	—	—	1,666	90.6	173	9.4	—	—	1,839	100.0
1972	—	—	1,065	71.3	234	15.7	—	—	1,299	87.0	194	13.0	—	—	1,494	100.0
1973	—	—	915	70.7	194	15.0	—	—	1,199	85.7	185	14.3	—	—	1,294	100.0
1974	—	—	1,078	73.2	187	12.7	8	0.5	1,273	86.4	199	13.5	—	—	1,473	100.0
1975	—	—	591	9.3	277	4.4	891	14.1	1,759	27.8	3,990	63.0	580	9.2	6,329	100.0
1976	—	—	247	1.5	162	1.0	896	5.3	1,305	7.7	2,669	15.7	13,056	76.7	17,030	100.0

SOURCE: République de Côte-d'Ivoire, Ministère de la Production Animale, unpublished data.

NOTES: See Table 1.19

[a] Totals may differ slightly from sum of subtotals due to rounding.

attractive market to overseas meat suppliers. More importantly, the
world's traditional meat-exporting countries, especially Argentina,
were faced with increased stocks of meat in 1975 and fewer markets in
which to sell. Rising demand for meat spurred by increases in per
capita incomes in Europe, Japan, and North America had led the world's
cattle producers to increase herd sizes in the early 1970s. In 1972,
however, grain prices began to rise, raising production costs for beef
in the major consuming regions (Europe and North America). Producers
tried to pass on their increased production costs to consumers, but
in the face of an increase in the general rate of inflation in 1973,
consumers resisted,[1] and beef consumption fell in the major consuming
areas. In both the U.S. and the EEC, per capita consumption of beef
and veal fell four percent in 1973 compared to 1971 levels (121, p. 6).
Faced with increased production costs and falling demand, producers
reduced cattle numbers, increasing for the short-run the meat supply
through increased slaughter. The larger meat stocks depressed prices
and, in order to protect their own livestock producers, many importing
regions began restricting imports of meat. Japan banned beef imports
from mid-1974 through mid-1975, and the EEC imposed licensing and duty
regulations which cut imports drastically in 1974 and 1975. Net beef
imports into the EEC fell from 817,000 tons in 1973 to 80,000 in 1975,
and Japan's imports fell from 194,000 tons in 1973 to 70,300 in 1975
(120, p. 10). The United States negotiated a voluntary restraint
agreement with major suppliers in 1975 in order to protect domestic
producers. U.S. net beef imports fell from 875,100 tons in 1973 to
784,100 tons in 1975 (120, p. 10). The U.S. imposed import quotas in
1976 to limit total imports of beef, veal, pork, mutton, and goat meat
to roughly 560,000 tons (120, p. 2).

Traditional meat-exporting countries thus had their major markets
closed to them at the same time that their meat production (slaughter
rate) was rising. Between 1973 and 1975, Argentine beef and veal
production rose from 2,152,000 tons[2] to 2,411,000 tons. At the same

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[1] As witnessed by the "meat boycotts" in the United States.

[2] Carcass weight equivalent.

time,Argentine exports fell from 530,000 tons to 266,000 tons (122, p. 19). Similar situations existed in the other major meat exporting countries. Australia's beef production rose from 1,497,000 tons in 1973 to 1,661,000 tons in 1975, while its exports fell from 920,000 tons to 746,000 tons (122, p. 19). At the same time, France, protected by the EEC's variable levy, became a major beef exporter both within and outside of the EEC. French beef and veal exports rose from 177,200 tons in 1973 to 346,700 tons in 1975, and by 1975 France was the world's second largest beef exporter (after Australia), accounting for approximately 10.8 percent of world beef exports (120, p. 5).

These changes forced countries like Argentina and Australia to prospect for new export markets. Australia concentrated on Eastern Europe, including the Soviet Union, while Argentina turned to the Near East and Africa. In 1976, beef and veal production in Australia, New Zealand, Central America, Argentina, and Uruguay increased by 640,000 tons over the 1975 level,to a total of 6.8 million tons. Of the increase, the U.S., the EEC, Canada, and Japan imported 140,000 tons; 200,000 tons of the increase were domestically consumed or held in stocks, and 300,000 tons went to nontraditional markets (120, p. 2). Thus, while the nontraditional markets, such as West Africa, were not major outlets for production from the exporting countries, they did serve as important safety valves for these countries, allowing them to reduce their excess stocks.

The increased Ivorian beef imports from Europe in 1975 came from surplus EEC (mainly Frencn) stocks dumped on the market because the cost of storage had become prohibitive because of increases in oil prices. This meat, mainly front quarters, arrived by ship at Abidjan at roughly 230 CFAF per kg (c.i.f.) and therefore could be sold competitively on the African market. In addition to the European meat, imports of frozen meat also began arriving from South America in 1975. Most of this meat was also destined for the traditional market. In contrast, imports from "other African countries" represented high-quality meat which was sold mainly in supermarkets and European-style butcher shops. In 1975, this meat came almost exclusively from Rhodesia. It was imported by air through Gabon and marketed under the name "Boeuf de la Zambèze." These imports from Rhodesia continued through April 1976, when they were stopped

for political reasons after the collapse of the Smith-Nkomo constitutional talks in Salisbury. (In early 1977, AGRIPAC began to import meat from Botswana and market it under the name "Boeuf de la Zambèze.")

In 1976, both AGRIPAC and DISTRIPAC, the state-owned companies holding the exclusive import rights for meat, began to import heavily from South America, mainly Argentina. DISTRIPAC, which imported slightly over half the total, shipped "matched" front and rear quarters, while AGRIPAC dealt almost exclusively in front quarters. Most of this meat was destined for the traditional African market, particularly in Abidjan, although some high-quality meat was also imported by air from Argentina, especially after the suspension of meat imports from Rhodesia. Some imports of relatively cheap frozen meat continued from France, especially following the summer drought which led to increased cattle slaughter in Europe, but the total amount was less than in 1975. By the end of 1976, South America, particularly Argentina, completely dominated the chilled and frozen meat market, accounting for 76.7 percent of total recorded imports. The Sahelian countries, Ivory Coast's traditional suppliers of chilled and frozen meat, were no longer significant sources of supply. Table 1.22 provides a detailed picture of the supply pattern in 1976, and shows the degree to which non-Sahelian suppliers dominated the market. For the deluxe market, which includes mainly meat imported by air, rail and truck, Rhodesia was the most important supplier, followed by Argentina. Argentina and France dominated the trade in frozen meat destined for the traditional market.

Particularly noteworthy is the decline in Upper Volta's share of the deluxe market in recent years, after having dominated this market for most of the 1960's. Upper Volta's share of the market rose rapidly from 1960 to 1967. Its total meat exports to Ivory Coast increased five times during this period, while its market share climbed from 49 to 68 percent. Recorded Voltaic meat exports to Ivory Coast varied between 1,176 and 1,326 tons during the period 1967-71 and then fell to 900-1,110 tons in the period 1972-74. Since 1974, imports from Upper Volta have fallen precipitously. The 1976 figure of 247 tons is less than Ivory Coast imported from Upper Volta in 1960. According to both importers and retail butchers interviewed in Ivory Coast and exporters contacted by Herman in

TABLE 1.22

RECORDED RED MEAT IMPORTS INTO IVORY COAST
BY COUNTRY OF ORIGIN AND TRANSPORT
1976 (tons)

Transport	Country	Beef	Goat/Sheep	Pork	Horse	Total
AIR	Gabon (Rhodesia)	865.0	3.7	-	-	868.7
	Argentina	273.0	45.4	-	-	318.4
	Roumania	60.0	-	-	-	60.0
	Niger	43.0	58.4	-	16.6	118.0
	Chad	25.0	-	-	-	25.0
	France	15.0	6.5	1.5	2.0	25.0
	Upper Volta	10.0	-	-	-	10.0
	Kenya	2.0	-	-	-	2.0
	Subtotal-Air	1,293.0	114.0	1.5	18.6	1,427.1
SEA	Argentina	11,686.0	195.0	-	-	11,881.0
	France	2,549.0	-	34.5	-	2,583.5
	Uruguay	857.0	-	-	-	857.0
	Subtotal-sea	15,092.0		34.5	-	15,321.5
RAIL	Upper Volta	189.0	23.0	11.0	14.0	237.0
TRUCK	Niger	37.0	7.0	-	-	44.0
	Total	16,611.0	339.0	47.0	32.6	17,029.6

SOURCE: République de Côte-d'Ivoire, Ministère de la Production Animale, unpublished data.

Upper Volta (30), this fall is due almost entirely to a decline in the quality of refrigerated rail transport between Upper Volta and Ivory Coast. The refrigerated rail cars are owned by a private company, the Fruitière Ivoirienne (formerly CODAPAG) which, through its contract with the RAN,[1] has the monopoly on refrigerated rail transport between the two countries. Because the Fruitière Ivoirienne has not maintained the refrigerated wagons, breakdowns of the compressors are frequent, resulting in heavy losses for the exporters,who are only paid for their meat once it arrives safely in Abidjan.[2] This has had two results: fewer butchers in Ouagadougou and Bobo-Dioulasso are willing to risk shipping meat to the Ivorian market; and class 1 butchers in Abidjan and Bouaké, unable to have assured supplies of this meat, have turned to other sources, notably southern Africa and Argentina. The decline in imports from Upper Volta has been due primari / to transport problems rather than price competition from non-Sahelian imports. All the meat importers, wholesalers, and European-style butchers contacted in Abidjan and Bouaké during this study said that the Voltaic meat was well-liked by their customers, and that it represented a class intermediate in quality and price between locally slaughtered beef and the more expensive imports from southern Africa and South America.

In order to overcome these transport problems, the Voltaic and Ivorian governments created a joint state-owned company for refrigerated rail transport in 1976. This company, the Sociéte pour le Transport Frigorifique (SOTRAF) was due to begin trial meat shipments from Upper Volta to Abidjan by refrigerated containers in late 1977. If those trials were a success, additional containers would be purchased and regular service would begin in 1978.[3] Although a demand for perhaps between 1,500 and 2,000 tons per year of high-quality meat exists in Ivory Coast and could be tapped by Upper Volta through improved refrigerated rail transport,

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[1]Regie de Chemin de Fer Abidjan-Niger, the Ivorian-Voltaic railroad linking Ouagadougou and Abidjan.

[2]In the case of a breakdown, the meat, originally destined for Class 1 (European-style) butcher shops, is either seized by the Veterinary Service or, if it is still safely edible, sold at a loss on the African market.

[3]See Chapter 5 (pp. 198-99) for more details on SOTRAF.

Upper Volta's chances of doing this may not exist much longer. The
Ivorian government, through its animal production agency SODEPRA, has
built a feedlot near the sugar refinery at Ferkéssédougou, and a
refrigerated abattoir is planned for 1978 at the site. By 1980, plans
call for fattening 16,000 animals per year, which will be slaughtered at
the new abattoir. SODEPRA will ship the meat to Abidjan by refrigerated
truck (by 1980, the entire route between Ferkéssédougou and Abidjan will
be paved). Assuming 50 kg per rear quarter, this implies a production
of 1,600 tons of meat (rear quarters) per year of roughly the same quality
as that shipped previously from Upper Volta. This means that Upper Volta
may soon lose the intermediate-quality market. It also points out the
larger problem of producing more high-quality meat than can be absorbed
by the market. In addition to the feedlot currently in operation near
Ferkéssédougou, the Ivory Coast is planning a second feedlot, with an
annual capacity of 20,000 head (2,000 tons of rear quarters) for 1980.
Upper Volta is constructing feedlots near Banfora to supplement
the production of fattened animals currently carried out by individuals
in and around Ouagadougou, and Mali is planning to export roughly 18,800
fattened animals to Ivory Coast by 1980, the equivalent of 1,880 tons of
choice rear quarters (65, Vol. III, Part 1, pp. 184-5; 95). Most of these
projects are based on the assumption that the animals and/or meat can be
sold at a premium on the Ivorian market. Given the current size of the
market for high-quality meat in Ivory Coast, this seems doubtful.

The most marked change in the meat supply situation in Ivory Coast
in recent years, however, has not been the loss of the deluxe market by
the Sahelian countries to other exporters, but the rapid penetration of
the traditional African market by non-African suppliers. Prior to 1975,
virtually no non-West African meat was sold on the traditional market.
By 1976, frozen meat, most of it from South America, was being sold on
this market at the rate of approximately 15,000 tons per year. The rapid
increase in frozen meat imports for the traditional market is seen in
Table 1.23, which shows frozen and chilled meat imports by means of
transport. Although a small quantity of high meat was imported by sea
(roughly 100 tons per year, mainly from France), the bulk of the meat
imported by sea in 1975 and 1976 was frozen meat destined for the

TABLE 1.23

RECORDED IMPORTS OF CHILLED AND FROZEN RED MEAT
BY MEANS OF TRANSPORT: 1960-76 (tons)

Year	Air		Sea		Rail		Truck		Total[a]	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
1960	213	40.3	120	22.7	195	36.9	—	—	528	100.0
1961	347	39.7	187	21.4	338	38.7	—	—	873	100.0
1962	340	30.5	122	10.9	651	58.4	3	0.3	1,115	100.0
1963	476	31.9	164	11.0	843	56.4	11	0.7	1,494	100.0
1964	324	20.2	165	10.3	958	59.7	158	9.8	1,605	100.0
1965	340	21.7	148	9.4	944	60.2	135	8.6	1,567	100.0
1966	827	43.3	142	7.4	930	48.7	12	0.6	1,911	100.0
1967	429	22.3	136	7.1	1,309	68.0	50	2.6	1,924	100.0
1968	517	26.9	91	4.7	1,275	66.3	95	4.9	1,978	100.0
1969	491	24.6	105	5.3	1,222	61.2	179	9.0	1,998	100.0
1970	563	28.1	109	5.4	1,176	58.8	153	7.6	2,001	100.0
1971	441	24.0	85	4.6	1,313	71.4	—	—	1,839	100.0
1972	360	24.1	83	5.6	1,051	70.3	—	—	1,494	100.0
1973	394	30.4	87	6.7	813	62.8	—	—	1,294	100.0
1974	469	31.8	77	5.3	922	62.6	5	0.3	1,473	100.0
1975	1,295	20.5	4,502	71.1	503	7.9	29	0.4	6,329	100.0
1976	1,427	8.4	15,322	90.0	237	1.4	44	0.2	17,030	100.0

SOURCE: République de Côte-d'Ivoire, Ministère de la Production Animale, unpublished data.

NOTES: See Table 1.19.

[a]Totals may differ slightly from sum of subtotals due to rounding.

traditional market. Imports by sea jumped from 77 tons in 1974 to 4,502 tons in 1975 and 15,322 tons in 1976. They increased from 5 percent of total recorded frozen and chilled meat imports in 1974 to 90 percent in 1976. Roughly 80 percent of the new frozen meat imports were consumed in Abidjan.

The inroads made by frozen meat imports in supplying the traditional market were due primarily to the low price of this meat. According to the Ivorian Ministry of Animal Production, frozen front quarters (2ème choix) from Argentina arrived in Abidjan at the following prices during 1976 and early 1977:

Price c.i.f. Port of Abidjan

	U.S. $/Ton	CFAF/kg
Most of 1976:	600	144 F
December 1976:	750	188 F
Jan.-Feb. 1977:	1,100	275 F
March 1977:	1,260	315 F
April 1977:	870	217 F

(Note: Exchange rates used: 1976, $1 = 240 CFAF; 1977, $1 = 250 CFAF)

Throughout most of 1976, frozen meat arrived in Abidjan at an extremely low price. It was resold wholesale to butchers for 230-240 CFAF per kg. and sold retail (with bones) for between 280 and 300 CFAF per kg. At the same time, locally slaughtered meat sold retail for 350 CFAF to 400 CFAF per kg with bones. As is shown in Chapter 12, consumers strongly prefer fresh meat, and this explains why a price margii between fresh and frozen meat can be maintained. Nonetheless, the lower price of the frozen meat attracted many consumers, including most of the institutions in the major cities (hospitals, schools, army, etc.). As discussed earlier, unusual conditions in the world beef market led Argentina and other countries to unload excess stocks of frozen meat in West Africa. As the price rise in late 1976 and early 1977 indicates, the price of US$600 per ton c.i.f. Abidjan probably does not reflect current costs of production. From December 1976 through early March 1976, the wholesale price of frozen meat rose rapidly, but fell again in late March to roughly $870 per ton.

During this period, the retail price of frozen meat rose, but a 50-100 CFAF-per kg margin between its price and that of fresh meat was maintained. During this period, the gross margins of butchers who sold frozen meat fell considerably (from 60 CFAF per kg to 25 CFAF per kg in Bouaké), which led many butchers to switch back to selling fresh meat.

The Ivorian Red Meat Supply: A Summary.--One can use the figures presented in the preceding three sections on domestic livestock production, imports of livestock, and imports of chilled and frozen meat to estimate the volume of the Ivorian red meat supply in 1976 and changes in the beef supply from 1970 through 1976. Table 1.24 provides a picture of the Ivorian red meat supply in 1976.

Table 1.24 shows that beef is by far the most widely consumed red meat in Ivory Coast, accounting for nearly three fourths of the total supply. In 1976, meat from small ruminants made up only 18.3 percent of the total, and pork accounted for 8.7 percent. The bulk of the meat supply is imported. Domestic production accounted for only 26 percent of total red meat consumption in 1976, while imports of live animals from the Sahelian countries supplied about 45 percent and imports of frozen and chilled meat accounted for the remaining 29 percent.

Looking at changes in the beef supply in recent years (Tables 1.25 and 1.26), one can see that, while the volume of total supply was the same in 1970 and 1976 (approximately 43,600 tons), the pattern of supply changed considerably between these two years. As shown in Table 1.25, the share of the total supply met by domestic production increased gradually from 11 percent to 16 percent over the period. The major change, however, was the large increase in the relative share of frozen and chilled meat imports. From supplying an average of 3 percent of the total beef supply during the period 1970-74, chilled and frozen meat imports increased to 16 percent of the total supply in 1975 and 38 percent in 1976. The proportion of the total supply met by live animal imports from the Sahelian countries fell from 84 percent in the 1970-74 period to 66 percent in 1975 and 46 percent in 1976. As shown in Table 1.26, the massive increase in frozen meat imports in 1975 and 1976 represents the opening of the Ivorian market to non-West African suppliers.

TABLE 1.24

ESTIMATED IVORIAN RED MEAT SUPPLY IN 1976
(tons of meat and edible offals)

Type of Meat	Domestic Production Tons	Percent	Imports: Live Animals Tons	Percent	Imports: Meat Tons	Percent	Total Tons	Percent
Beef	6,923	11.6	20,076	33.6	16,611	27.8	43,610	73.0
Mutton/Goat Meat	3,600[a]	6.0	7,000[b]	11.7	339	0.6	10,939	18.3
Pork	5,150[a]	8.6	—	—	47	0.1	5,197	8.7
Horse	—	—	—	—	33	—	33	—
Total	15,673	26.2	27,076	45.3	17,030	28.5	59,779	100.0

SOURCES: Tables 1.11, 1.12, 1.16, 1.19 and text.

[a] Domestic goat, mutton, and pork production estimated at three percent above their 1975 levels.

[b] Author's estimate based on examination of statistics from exporting countries (see p. 35).

TABLE 1.25

THE IVORIAN BEEF SUPPLY: 1970-76 (TONS OF MEAT AND EDIBLE OFFALS)

| Year | Imports | | | | | | Domestic Production | | Total[a] | |
| | Live Animals | | Fresh, Chilled, and Frozen Meat | | Total Imports | | | | | |
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
1970	37,448	85.8	1,477	3.4	38,925	89.2	4,700	10.8	43,625	100.0
1971	32,761	83.1	1,405	3.6	34,166	86.7	5,243	13.3	39,409	100.0
1972	37,715	84.9	1,205	2.7	38,920	87.6	5,507	12.4	44,426	100.0
1973	38,909	85.0	1,077	2.3	39,986	87.3	5,796	12.7	45,782	100.0
1974	33,885	81.7	1,243	3.0	35,128	84.7	6,349	15.3	41,477	100.0
1975	24,317	65.5	6,093	16.4	30,410	82.0	6,689	18.0	37,100	100.0
1976	20,076	44.0	16,611	38.1	36,687	84.1	6,923	15.9	43,610	100.0

SOURCES Tables 1.11, 1.16, and 1.21.

[a]Totals may differ slightly from sum of subtotals due to rounding.

TABLE 1.26

THE IVORIAN BEEF SUPPLY BY REGION OF ORIGIN: 1970-76
(TONS OF MEAT AND EDIBLE OFFALS)

Year	Domestic Production		Sahelian Countries[a]		Other African Countries		Total: African Imports		Europe		South America		Total[b]	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
1970	4,700	10.8	38,825	89.0	___	___	38,825	89.0	102	0.2	___	___	43,625	100.0
1971	5,243	13.3	34,062	86.4	___	___	34,062	86.4	104	0.3	___	___	39,409	100.0
1972	5,507	12.4	38,786	87.3	___	___	38,786	87.2	133	0.3	___	___	44,426	100.0
1973	5,796	12.7	39,848	87.0	___	___	39,848	87.0	138	0.3	___	___	45,782	100.0
1974	6,349	15.3	34,977	84.3	8	___	34,985	84.3	143	0.3	___	___	41,477	100.0
1975	6,689	18.0	25,052	67.5	891	2.4	25,943	69.9	3,888	10.5	580	1.6	37,100	100.0
1976	6,923	15.9	20,263	46.5	892	2.0	21,155	48.5	2,716[c]	6.2	12,816	29.4	43,610	100.0

SOURCES: Tables 1.11, 1.16, and 1.21.

[a]Mali, Upper Volta, Mauritania, and Niger.

[b]Totals may differ slightly from sum of subtotals due to rounding.

[c]Includes an estimated 92 metric tons of meat and offals from 369 live animals imported from France.

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The Ivorian statistics reflect this. Up until 1975, 99.7 percent of the Ivorian beef supply was met by domestic production and imports from neighboring Sahelian countries. By 1976, wever, 37.6 percent of the total supply came from outside the West African region: 29.4 percent from South America, 6.2 percent from Europe, and 2.0 percent from southern and East Africa. The total recorded amount of non-West African meat imported in 1976 equaled 16,424 tons. This was the equivalent of roughly 91,880 head of Sahelian cattle.[1]

Tables 1.25 and 1.26 show clearly that, contrary to most projections made during the mid-1960s and early 1970s[2] the total beef supply in Ivory Coast did not increase over the period 1970-76. It rose in 1972 and 1973, reflecting the destocking of northern herds, then fell abruptly in 1974 and 1975. In 1976, the large imports of frozen meat boosted the supply back up to its 1970 level, but it was not near the 59,000 tons that most sources had projected for 1975 (23, pp. 24-37).

Per Capita Meat Consumption

Based on an estimated 1976 population of 6,950,140 (see Table 1.2), the figures in Table 1.24 imply the following per capita meat consumption in 1976:

Beef	6.3 kg
Mutton/Goat Meat	1.6 kg
Pork	0.7 kg
Total	8.6 kg

It is striking that this is exactly the same level of per capita beef consumption (6.3 kg.) found by SEDES in 1966 (102, pp. 119-24), SEDES found higher mutton/goat meat consumption, however (2.5 kg), and slightly lower pork consumption (0.5 kg).

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[1] Based on an average carcass weight of 143 kg plus edible offals equal to 25 percent of carcass weight. (See Table 1.16).

[2] For a review of these projections, see 23, pp. 24-37.

Since the total beef supply did not increase from 1970 to 1976 while population was growing steadily, per capita beef consumption fell during this period, as shown in Table 1.27. Per capita beef consumption fell abruptly from 1970 to 1971, reflecting a fall in imports, then partially recovered in 1972 and 1973 as imports picked up again. Between 1973 and 1975, annual per capita consumption fell from 7.5 kg to 5.6 kg. In 1976, due to the frozen meat imports, it rose back up to 6.3 kg. Per capita consumption in 1976 was still roughly 20 percent below that in 1970. This declining per capita beef consumption for the country as a whole is consistent with Montgomery's finding (45) that per capita beef consumption in Abidjan fell from 1967 through 1974. Consumers appear to have compensated for this decline in per capita beef consumption by increasing their consumption of fish. Between 1970 and 1975, estimated per capita fish consumption (in fresh fish equivalents)rose from 18.0 kg to 25.3 kg (66, p. 3).

TABLE 1.27

ESTIMATED PER CAPITA BEEF CONSUMPTION: 1970-76

Year	Total Beef Supply (tons)	Population	Per Capita Beef Consumption (kg per person per year)
1970	43,625	5,429,840	8.0
1971	39,409	5,657,900	7.0
1972	44,426	5,895,530	7.5
1973	45,782	6,143,140	7.5
1974	41,477	6,410,150	6.5
1975	37,100	6,670,000	5.6
1976	43,610	6,950,140	6.3

SOURCES: Tables 1.2 and 1.25.

This substitution was due to a change in relative prices of beef and fish. Price statistics collected by the Ministère de l'Economie et des Finances (56, 58) indicate that, between 1970 and 1975, retail prices in Abidjan for fresh fish rose 25 percent while retail beef prices rose 80 percent. The ratio between the recorded retail prices of beef (with bones) and

and fresh fish (sold on the traditional market) stood at 1.3 in 1970 and had risen to 1.9 by 1975.[1]

Per Capita Beef Consumption by Region.--Data are available for 1976 on officially recorded cattle slaughter by region and on regional sales of chilled and frozen meat. These permit estimation of per capita beef consumption in urban and semi-urban areas of different regions of the country. Once the overall level of urban and semi-urban beef consumption is known, the level of beef consumption in the rural areas can be calculated by taking the difference between total consumption and consumption in urban and semi-urban areas. No attempt is made here to estimate per capita consumption of mutton and goat meat by region. To do this is nearly impossible because a large part of the total sheep slaughter in the country takes place outside of abattoirs and thus is not reflected in figures on officially recorded slaughters.

Table 1.28 presents estimates of the 1976 beef supply in urban and semi-urban centers of different regions of Ivory Coast. The terns "urban" and "semi-urban," as used here, indicate cities in which the Veterinary Service recorded cattle slaughter in 1976. (See Appendix 1D.) Some cities with populations of less than 3,000 are included in this definition and a few cities with populations of over 3,000 are excluded, but in general, the correspondence is fairly close between the cities in which the Veterinary Service recorded slaughters and the terms "urban" and "semi-urban" as defined earlier in this chapter.

The figures on fresh beef supplies in each region are calculated on the basis of officially recorded slaughters. Figures on the availability of chilled and frozen meat are estimated from figures provided by AGRIPAC and DISTRIPAC. When looking for the fresh beef supply, one must remember that recorded slaughters may underestimate the true volume of slaughters taking place in these cities. For example, from his own personal observations, the investigator feels that the figure for recorded slaughter

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[1]The prices reported by the Ministère de l'Economie et des Finances probably underestimated the true price of beef (since beef prices are officially fixed). Nonetheless, the general tendency of beef prices to increase faster than fish prices over the period 1970-75 is clear.

TABLE 1.28

ESTIMATED TOTAL BEEF SUPPLIES IN URBAN AND SEMI-URBAN AREAS OF IVORY COAST, BY REGION, IN 1976

(tons)

| Region | Recorded Cattle Slaughter | | Fresh Beef Estimated Tonnage | | | | | Frozen/ Chilled Beef | Total |
| | Zebus | Taurins | Zebus[a] | | Taurins[b] | | Total | | |
			Meat	Offals	Meat	Offals			
Abidjan	24,521	0	3,507	877	0	0	4,384	13,220	17,604
Bouaké	9,184	1,657	1,313	328	166	42	1,849 [2,400]	1,434	3,283 [3,834]
South (excluding Abidjan)	7,293	287	1,043	261	29	7	1,340	483	1,823
Center (excluding Bouaké)	7,725	1,025	1,105	276	103	26	1,510	126	1,636
Center-West	8,445	1,403	1,210	303	140	35	1,688	603	2,291
West	1,736	3,879	248	62	388	97	795	92	887
East	2,728	3,971	390	98	397	99	984	230	1,214
North	5,376	10,553	769	192	1,055	264	2,280	28	2,308
All Urban and Semi-Urban Areas[c]	67,028	22,775	9,585	2,396	2,278	570	14,829 [15,380]	16,216[d]	31,046 [31,597]

SOURCES: Recorded Slaughters: République de Côte-d'Ivoire, Ministère de la Production Animale, unpublished data.

Frozen and Chilled Beef Estimated from AGRIPAC's reported sales by region for the first 11 months of 1976 (unpublished data) and DISTRIPAC's average monthly sales by region for 1976 (personal communication).

[a] Tonnage estimated assuming an average carcass weight of 143 kg. and edible offals equal to 25 percent of carcass weight (see Table 1.16).

[b] Tonnage estimated assuming an average carcass weight of 100 kg. and edible offals equal to 25 percent of carcass weight (see Table 1.11).

[c] Totals may differ slightly from sum of subtotals due to rounding.

[d] Approximately 395 tons of frozen meat were also sold in cities where the Veterinary Service did not record slaughters in 1976.

in Bouaké underestimates the true volume of cattle slaughter in that city by roughly 30 percent. The figures in brackets in Table 1.28 are the author's estimates of the fresh and total beef supplies in Bouaké.

From Table 1.28, several facts become apparent. Firrc, roughly 75 percent of the beef sold in Abidjan in 1976 was frozen or chilled. The bulk of this was frozen meat imported by sea from Latin America and Europe. In contrast, in 1974 roughly 80 percent of the beef consumed in Abidjan was fresh (45, p. 43). In two years, Abidjan went from a city supplied by West African exporters of cattle and beef to one dependent on overseas suppliers of beef. In the same period, the estimated beef supply in Abidjan more than doubled (from 8,133 tons to 17,604 tons) and per capita beef consumption rose to 70 percent (45, pp. 43-45; see also p. 60 below). In Bouaké, frozen and chilled meat made up less of the total beef supply n 1976, 44 percent if one accepts the official slaughter statistics, or 37 percent if one accepts the author's estimate of slaughters. In other regions, the importance of frozen beef varied. It made up 26 percent of the total urban and semi-urban beef supply in the south (excluding Abidjan) and the center-west areas linked to Abidjan by good roads that facilitated transport of frozen meat. Frozen beef accounted for 19 percent of the urban and semi-urban beef supply in the east, 10 percent in the west, 8 percent in the center (excluding Bouaké), and 1 percent in the north, Ivory Coast's main cattle producing area, where fresh beef is relatively cheap and transport costs for frozen meat are high. Table 1.28 also shows the importance of Abidjan as a market for beef. Abidjan accounted for 40 percent of total beef consumption in the country in 1976 (17,604 tons out of a total of 43,610 tons) and over half the beef consumption in urban and semi-urban areas. It is also clear from Table 1.28 that most beef consumed in the country (over 70 percent of it) is eaten in urban and semi-urban areas.

Table 1.29 presents estimates of per capita beef consumption in urban and semi-urban areas by region, based on the figures in Table 1.28. Table I.29 reveals considerable variation in per capita beef consumption by region. It was highest in Bouaké and Abidjan followed, in order of importance, by the center-east (the region around Daloa), the north, the east, the center (excluding Bouaké), the south (excluding Abidjan), and

TABLE 1.29

ANNUAL PER CAPITA BEEF CONSUMPTION IN URBAN AND SEMI-URBAN AREAS,
BY REGION, IN 1976

Region/City	Total Beef Supply (tons)	Estimated Urban and Semi-urban Population	Annual Per Capita Consumption (kg.)
Abidjan	17,604	1,017,700	17.3
Bouaké[a]	3,283 [3,834]	185,700	17.7 [20.6]
South (excluding Abidjan)	1,823	165,100	11.0
Center (excluding Bouaké)	1,636	143,300	11.4
Center-West	2,291	136,600	16.8
West	887	82,800	10.7
East	1,214	93,400	13.0
North	2,308	158,300	14.6
All Urban and Semi-Urban Areas[a]	31,046 [31,597]	1,982,900	15.7 [15.9]

SOURCES: Table 1.28 and Appendix 1D.

[a]Figures in brackets are totals and averages using the author's revised estimate of Bouaké slaughters.

the West. The variation in per capita consumption can be explained largely in terms of regional differences in income and in the relative price of beef and fish. Per capita consumption was highest in Abidjan and Bouaké, the two largest cities in the country. These cities have fairly large European populations (roughly 40,000 in Abidjan and 4,000 in Bouaké) and probably have the highest per capita incomes of any cities in Ivory Coast. Per capita beef consumption was higher in Bouaké than in Abidjan. This reflects the higher price of beef and the lower price of fish in Abidjan compared to Bouaké. (Fish is the main substitute for beef in the Ivorian diet.) Nonetheless, per capita beef consumption in Abidjan was high compared to other regions of Ivory Coast, and the 1976 figure of 17.3 kg per year is 70 percent above the 1974 figure of 10.2 kg per year reported by Montgomery (45, p. 45). While per capita beef consumption in the country as a whole fell slightly from 1974 to 1976, in Abidjan it rose sharply due to frozen meat imports. Per capita beef consumption outside of Abidjan fell markedly during this period, however, from 6.0 kg. in 1974 to 4.4 kg in 1976.[1]

After Bouaké and Abidjan, per capita beef consumption was highest in the center-west, the region around Daloa. This area includes the third and sixth largest cities in Ivory Coast, Daloa, and Gagnoa, and is a rich agricultural area. Three of the four cities included in Veterinary Statistics for this region are located roughly 300 km inland, and fish consumption is probably lower there than in the South. The north ranks next in per capita beef consumption. Although the north is the poorest region of the country, it is also the region where most cattle are produced in Ivory Coast. Beef is consequently cheaper in the North than in any other region of the country, and, because the north is so far inland, fish is more expensive there than in any other region. After the north, in terms of per capita beef consumption, come the east (13.0 kg per year) and the center, excluding Bouaké (11.4 kg per year). The cities in these regions are fairly small. The largest city in the east,

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[1]These figures were :lated from data in Tables 1.4, 1.27, 1.28, and using Montgomery's estimate of total beef consumption in Abidjan in 1974 of 8,133 tons (45, p. 43).

Abengourou (population 30,000) ranks eleventh among Ivorian cities in
terms of population, while Yamoussoukro, the largest city in the center
(excluding Bouaké), ranks eighth with a population of 35,000. Many of
the cities in both regions are located either in the savanna zone or in
a transitional zone between the savanna and the forest, zones which are
generally poorer than the forest zone to the south.

Per capita beef consumption in the outh (excluding Abidjan) was
low, 11.0 kg per year. This reflects the low price of fish relative to
beef in the south and the preference among some coastal people for fish
rather than red meat. Table 1.29 indicates that per capita beef
consumption in urban and semi-urban areas was lowest in the west (the
cities of Man, Danané, and Duékoué). This is difficult to explain.
Perhaps it reflects a strong export demand for livestock (to ship to
Liberia) that drains off most of the available cattle, thus reducing
slaughters in the region. This export demand is reflected in higher
prices for cattle in western Ivory Coast than in any other region of the
country at the same latitude (102, p. 286; 103, Vol. 3, p. 77; see also
Chapter 10).

Per capita beef consumption in the rural areas is calculated using
information from Tables 1.2, 1.25, and 1.29. Table 1.2 indicates the
1976 population of Ivory Coast was 6,950,140; of this total, approximately
1,987,900 lived 'i urban and semi-urban centers where the Veterinary
Service recorded cattle slaughter (Table 1.29). Thus, roughly 4,962,200
people lived in rural areas outside these cities. The 1976 Ivorian beef
supply stood at 43,610 tons (Table 1.25), of which roughly 31,597 tons
were consumed in urban and semi-urban area (Table 1.29). This implies
that total beef consumption in the rural areas was 12,013 tons and per
capita consumption was 2.4 kg per year.

It is clear from these figures that beef consumption is primarily
an urban phenomenon. Rural people appear to have a lower level of per
capita meat consumption than urban dwellers, and a higher proportion of
their meat consumption is probably made up of game and small ruminants.
(Unfortunately, reliable data to test this hypothesis are lacking.)

The figures just calculated are consistent with the per capita consumption figures found by SEDES in 1966 (102, Vol. 1, p. 124). SEDES estimated combined urban and semi-urban beef consumption in Ivory Coast at 18.3 kg per capita per year and rural beef consumption at 2.5 kg per capita per year.

Government Livestock Development Projects and the Future Role of Cattle Imports

Faced with the prospect of insufficient meat supplies from its traditional suppliers and an increasing dependence on an uncertain world market, the Ivorian government has taken a number of steps aimed at boosting domestic livestock production and thus limiting the growth of imports. The current stated government policy is to "increase by all means possible Ivorian animal production, by utilizing the country's enormous potential for the production of forage and agricultural by-products, in order to fill the deficit in meat which continues to grow due to the increase in the population and its needs" (73).[1] However, it is difficult to increase domestic beef production rapidly because of the small number of cattle in the country. Fven large percentage increases in domestic production have a small impact on total beef supplies. It also appears that, given existing technology and current world prices for beef, Ivory Coast cannot produce beef more cheaply than it can import it from overseas. For example, AGRIPAC and DISTRIPAC sometimes refuse to buy animals from government-run projects (e.g. small-holder fattening projects run by the Bandama Valley Development Authority) because they can buy frozen Argentine meat at a lower price. (AGRIPAC and DISTRIPAC view their jobs as supplying urban consumers with beef at the lowest possible price, not as increasing domestic production.) This competition from overseas, along with retail price controls on beef, has the effect of reducing the profitability of domestic beef production and therefore discouraging it.

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[1] Author's translation.

Faced with the small size of the domestic cattle herd and the impossibility of producing a large proportion of domestic beef consumption in the near future, the stated policy of the government is to concentrate on the production of animals with short reproductive cycles (poultry, - swine, sheep, and goats), since meat production from these sources can be increased more rapidly than from cattle. "It is certain that this option will imply the modification of firmly-established eating habits among our population, and beef will become, in time, a luxury item."[1]

Despite its emphasis on the production of meat from animals with short reproductive cycles, the Ivorian government has carried out a number of projects aimed at improving cattle and meat marketing and at increasing domestic beef production. It also plans several new projects for the 1977-85 period. Among the most important marketing projects are the construction of five entry stations[2] for cattle along the northern border, the furnishing of scales to 18 cattle markets in the country under a CEAO[3] program, the construction of a number of new abattoirs in medium-sized cities, and the creation of SODEPRA's cattle marketing service.

The entry stations along the northern border are to serve as both veterinary posts and major cattle markets. Their main purpose is to improve the government's control over the state of health of cattle imported into the country. The stations are also to be equipped as cattle markets, however. The government hopes that be establishing new major cattle markets in the north, the northern Ivory Coast cattle trade will become more competitive. These stations are schedule to go into operation in early 1978. (See Chapter 5, pp. 182-84 for details of this program.)

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[1] Statement by Philippe Yacé, Secretary-General of the PDCI (Parti Democratique de Côte-d'Ivoire, the country's single political party) at the Sixth Party Congress (October, 1976), quoted in 72, p. 3. Author's translation.

[2] Portes d'entrée.

[3] Communauté Economique de l'Afrique de l'Ouest.

A second program aimed at improving market performance is the furnishing of 18 Ivorian cattle markets with livestock scales.[1] Officials hope that the scales will encourage cattle merchants and butchers to move toward sales of animals on a per-kilogram basis. Presumably, they feel that sales by weight would increase market efficiency by giving buyer and seller more information on which to base their decisions (i.e., knowledge of the animals' weights). Part of this program involves training and assigning contrôleurs to each market, who will record sale prices and commercial movements of cattle into and out of these markets. Officials sometimes imply that these agents will eventually set livestock prices, although they do not say when this will begin. The scales are to be installed in 1978.[2]

In order to improve the sanitary conditions under which animals are slaughtered in Ivory Coast, USAID, through the CEBV,[3] financed the construction of six small open-air abattoirs in cities such as Daloa, San Pedro, and Korhogo. Although most of these abattoirs were completed by 1976, they have not gone into service because the Veterinary Service has refused to certify them, saying that the abattoirs are poorly constructed.[4] The basic design of the new abattoirs is simple and well-suited to conditions in these towns, and the old abattoirs which they

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[1]The markets are at Korhogo, Boundiali, Odienné, Man, Daloa, Gagnoa, San Pedro, Agboville, Divo, Bondoukou, Abengourou, Dimbork..o, Katiola, Touba, Séguela, Aboisso, Mankono, and Ferkéssédougou. Abidjan and Bouaké already have scales provided under a CEBV program.

[2]Based on his experience weighing trade cattle in Bouaké and Abidjan, the investigator feels that merely providing scales will not induce cattle merchants and butchers to use them. The merchants and butchers must be convinced that it is in their interest to weigh the animals before they will do so voluntarily. Given the difficulty of getting animals into the scales and the risk of the cattle injuring themselves during the weighings, cattle merchants currently prefer to buy and sell animals by sight.

[3]Communauté Economique du Bétail et de la Viande, an agency of the Entente Council.

[4]The investigator visited the new abattoirs at Korhogo and Daloa and noticed several potential problems, including poor drainage and problems with the carcass hoists.

were designed to replace are in very poor repair. Nonetheless, the dispute over the quality of the construction has prevented their use.

Perhaps the most important project aimed at improving cattle marketing has been SODEPRA's creation of a marketing service to sell animals produced in its projects or in herds covered by its extension programs.[1] Although officials consider SODEPRA primarily a production rather than a marketing company, they feel that livestock producers involved in SODEPRA programs will expand production only if guaranteed an outlet for their animals. Furthermore, they feel that traditional cattle merchants offer producers "ridiculously low prices."[2] Therefore, they created a marketing service that offers to buy animals from all herds covered by SODEPRA extension programs. It also sells animals from other SODEPRA projects, such as the feedlot at Ferkéssédougou. Livestock owners participating in SODEPRA programs are free to sell animals to SODEPRA (or to private traders) during any time of the year, and, in addition, SODEPRA conducts two yearly purchasing campaigns. The timing of these campaigns is based on the assumption that cattle owners sell their animals only when they need cash. The campaigns are therefore timed contracyclically with the crop calendar, occurring when the peasant is receiving no crop income and when his cash needs are greatest. The first campaign runs from April 1 through July 31. This is the rainy season and the period of cultivation, when farmers need money for seed, fertilizer, and the like. The second campaign runs from October 1 through December 31, after the end of the rainy season. During this time, the peasants have heavy cash expenses for sending their children back to school and for celebrating the many religious and other holidays (Tabaski, New Year's, etc.).

Animals sold to SODEPRA are either used for reproduction in other SODEPRA projects, sold for animal traction, or sold for slaughter. SODEPRA pays uniform prices throughout the country, which means that livestock production in remote areas is subsidized relative to production

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[1] The following information is taken from an interview with Mr. Kamagaté, director of SODEPRA's Service Commercial.

[2] Prix derisoires.

in areas closer to major consumption centers. The SODEPRA marketing
service first became active over a large part of northern Ivory Coast in
1976. During its initial period of operations in the north, SODEPRA has
bought less than one-fifth of all animals sold from herds covered by its
programs, but its share of the market will probably increase as its pro-
gram becomes better established.[1] In theory, nearly all Ivorian cattle
herds will be covered by SODEPRA extension and marketing programs by
the 1990's.

In addition to the marketing projects just described, the Ivorian
government has planned an extremely ambitious set of programs aimed at
increasing domestic beef production by over 800 percent between 1975
and 1990, from 6,940 tons of beef and edible offals to 58,450 tons (63).
Among the current and proposed programs are the following:[2]

--SODEPRA extension programs (encadrement) for sedentary livestock
producers in the north and central parts of the country. The main goals
of these programs are to insure better veterinary care for the animals
and to improve management practices. One aspect of these programs is
the creation of village cooperative feedlots to fatten animals from
local herds during the dry season. As of July, 1977, SODEPRA had
created 18 such feedlots, with a total of 750 head, and plans call for
fattening 2,500 head in 1978. Over half the sedentary herds in northern
Ivory Coast are currently involved in SODEPRA extension programs, which
are continuing to expand. In the central region of the country, extension
programs began late in 1976 and, as of 1977, did not yet involve many
herds.

--Creating medium-sized private farms (moyennes entreprises), each
having between 700 and 800 head of cattle (of which 250 will be cows).
These farms, which do not yet exist, are to be privately owned or
owned cooperatively by a village. Their level of management is

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[1] Between August 1976 and March 1977, 50 percent of the recorded sales
from sedentary herds covered by SODEPRA programs in northern Ivory Coast
went to traditional marketing agents (butchers, 39 percent; cattle merchants,
11 percent), while 16 percent of the sales were to SODEPRA or to village
fattening projects. (The remainder were to other peasants and to miscella-
neous buyers.) (110, p. 3.)

[2] Most of the following descriptions and production projections are
drawn from documents of the Planning Ministry (63, 65).

envisaged as intermediate between that of village herds covered by
SODEPRA extension programs and that of large-scale "industrial" ranches
(described below).

--Creating "industrial-scale" cattle ranches, using impqrted breeds
of cattle. This project calls for setting up several large-scale
private or joint state-private enterprises for beef and milk production.
Because of the shortage of breeding stock in Ivory Coast, the government
plans to import both West African and exotic-breed heifers for these
farms. For meat production, it plans to import 4,500 "foreign" (i.e.,
temperate-climate breed) heifers and 3,000 West African heifers in
1977-78. Beginning in 1982, it wants to import 6,000 head of foreign
heifers and 4,000 head of West African heifers yearly. In addition,
officials hope to import 2,400 to 2,500 heifers per year for milk
production (65, Vol. III, part 1, pp. 182-4).

--Large-scale fattening projects. The 1976-1980 National Plan (65)
calls for creating large-scale feedlots to fatten thin cattle imported
from the Sahelian countries, using agro-industrial by-products like
molasses and cottonseed. One such feedlot has been operating near the
sugar refinery at Ferkéssédougou since late 1976 and, during its initial
phase, was fattening approximately 750 animals per year. The fattening
period is roughly six months, and the mean daily liveweight gain per
animal is approximately 600 grams.[1] The ration consist of molasses,
cottonseed, and cut forage. Plans call for expanding the operation to
8,000 head per year by 1979, with the possibility of further expansion
to 16,000 head in 1980. A second feedlot, with a capacity of 20,000
head per year, is planned for 1980. Officials hope for additional large-
scale feedlots if private capital is found to finance them.

--Sedentarization of Fulani herds in northern Ivory Coast. In
order to increase the amount of breeding stock in Ivory Coast (and hence
increase domestic production), the Ivorian government has created a

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[1]Information on liveweight gains is from Dr. Klaus Hübl, director
of the project (personal communication). The Planning Ministry assumed
a daily liveweight gain of 750 grams per animal when it made the
production projections for this feedlot (65, Vol. III, part 1, p. 185).

14,000-hectare pastoral zone near Boudiali which will be reserved for Fulani herders. This zone[1] will be provided with wells, roads, veterinary facilities (dipping tanks, vaccination chutes, etc.), and other improvements in the hope that these facilities will induce transhumant Fulani herders from Mali and Upper Volta to settle permanently in the region with their animals. Officials project that by 1991, when the project becomes fully operational, 158 herds with a total of 30,000 head of zebus will have settled in the region.

--Cattle raising in palm plantations. Since 1974, the parastatal company for palm oil production (SODEPALM) has been stocking trypano-tolerant Baoulé and N'dama cattle in its palm plantations. The aim is threefold: one herd serves as a center for selection of improved Baoulé breeding stock, which SODEPRA distributes to participants in its other projects (small-holders, medium-sized farms, etc.); the sale of cattle adds to SODEPALM's revenues; and cattle, by keeping down grasses and other plant growth, considerably reduce labor costs in the palm planta-tions. As of March 1977, there were 5,030 head of cattle in the palm plantations. Plans call for expanding the total to 15,000 head by 1982-83 and to 30,000 head in 1984, when new palm plantations are created (101; 65, vol. III, part I, p. 189).

--The expansion of three state-owned ranches, located at Sipilou (near Man), Abokouamikro (near Yamoussoukro), and the Marahoué Valley (near Mankono). These ranches serve primarily as centers for selection and diffusion of improved N'dama breeding stock; their main goal is not meat production. Nonetheless, meat is produced as a by-product of their operations and this meat production will increase as the ranches expand. Currently, the two ranches at Sipilou and Abokouamikro have nearly reached their capacity of 4,000 head each. The Marahoué ranch, projected to have 30,000 head by 1986, began stocking in July, 1976 and in mid-1977 had about 1,000 head (19). A refrigerated abattoir is planned for the Marahoué ranch in the early 1980s.

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[1] Zone pastorale de la Palé.

—Animal traction projects. Officials consider these projects primarily as agricultural, not livestock, programs. Nonetheless, the rapid expansion of animal traction in Ivory Coast has an impact on meat production. Animal traction is used primarily in cotton production (and to a lesser extent, in rice cultivation) and has expanded very rapidly in Ivory Coast. In 1971-72, CIDT[1] reported 126 pair of oxen in use by cotton farmers in Ivory Coast. By 1976-77, the total had grown to 5,790 pair, and CIDT projected 11,315 pair by 1980 (14). Animal traction is a type of long-term fattening lasting several years. By working, the animal develops its musculature and adds roughly 50 kg to its carcass weight.[2] This implies that if the 5,054 oxen put into service during CIDT's 1976-77 campaign are sold for meat after having worked for four years, animal traction projects will have produced a "supplemental" 253 tons of beef by 1980.

Based on the projects just described, the Planning Ministry made projections of domestic beef production and beef imports through 1990. Table 1.30 presents these projections. The projections of domestic production seem over-optimistic. Even the Planning Ministry i self states that "it must be understood that the production goals established in the 1976-80 Plan are purposely very ambitious and can be achieved only to the extent that an entire set of necessary pre-conditions are met" (63).[3] One may seriously question whether all these pre-conditions can be met (e.g., whether a sufficient number of female breeding stock can be imported from neighboring countries, or whether the feedlots and ranches can be expanded as rapidly as projected). In short, one should take the Planning Ministry's projections of domestic production as the absolute maximum possible in the coming years. In all likelihood, domestic production will be below these levels.

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[1]Compagnie Ivoirienne pour le Développement des Textiles, the parastatal company for cotton production.

[2]Between 1974 and mid-1977, CIDT sold 23 oxen from animal traction projects to butchers at Bouaké. These animals had an average carcass weight of 172 kg (14, p. 2). Assuming an initial liveweight of 250 kg and a 50 percent dressing-out rate, this implies a mean gain of 47 kg per carcass. (The 250 kg liveweight figure was supplied by Dr. Charrey, the official in charge of animal traction projects for CIDT.)

[3]Author's translation.

TABLE 1.30

PROJECTED DOMESTIC BEEF PRODUCTION AND IMPORTS BY PROJECT: 1975-1990
(tons of meat and edible offals)

Project	1975	1980	1985	1990
Smallholder (taurin) herds covered by SODEPRA extension programs	2,030	4,275	8,000	16,600
Medium-sized farms (moyennes entreprises)	——	495	1,400	5,000
State ranches	140	380	735	1,500
Cattle raising in SODEPALM plantations	——	250	525	750
Zebu production (including northern Ivory Coast pastoral zone)	2,000	3,150	5,400	9,800
Smallholder (taurin) herds not covered by SODEPRA extension programs	2,770	2,100	2,465	2,850
"Industrial" scale enterprises	——	270	3,000	15,200
Fattening of imported zebus	——	2,700	6,075	6,750
Total	6,940	13,620	27,600	58,450
Projected consumption Per person (kg./year) Total (tons)	4.7 37,350	6.3 50,000	6.0 60,000	7.0 83,000
Required imports	30,410	36,380	32,400	24,550
Domestic production as a percentage of domestic consumption	1J	27	46	70

SOURCE: République de Côte-d'Ivoire, Ministère du Plan, "Objectifs du Plan 1976-1980, secteurs élevage et pêche, tableaux," Tables 1, 3 and 10.

Table 1.30 shows total beef imports rising through 1980 and then declining gradually thereafter as the share of domestic consumption met by domestic production increases steadily. Total beef consumption grows constantly through 1990, but per capita consumption is fairly steady after 1980. This hypothesis assumes that the government will follow price and other policies (e.g., advertising campaigns) that will encourage consumption of mutton, goat meat, pork, poulcry, and fish instead of beef (see p. 63). The role that the traditional cattle marketing system will play in this changing supply situation will depend on several factors:

1) the degree to which the production goals of the Planning Ministry are met. To the extent that they are not met, Ivory Coast will have to increase its cattle or meat imports if it is to maintain projected levels of consumption.

2) whether per capita beef consumption stays at the projected levels. Although per capita consumption has fallen since 1970 (see Table 1.27), the projected increases in per capita income and rates of urbanization could lead to increased per capita demand for beef in the future. The price of fish will play a major role in determining the level of demand for beef. If fish prices rise sharply, consumers may substitute beef for fish in their diet, thus increasing the total demand for beef. Despite its statements to the contrary, the government's current policy is to encourage beef consumption vis à vis consumption of poultry, pork, mutton, and goat meat by importing large quantities of cheap frozen beef. One should not underestimate the political difficulties that the government would face in restricting beef imports in order to raise the relative price of beef in relation to other meats.

3) the proportion of total meat imports met by imports of frozen meat as opposed to imports of live animals from the Sahelian countries. The larger the imports of non-West African meat, the smaller will be the volume of cattle sold by the traditional marketing system in Ivory Coast. Since 1975, Ivory Coast has been able to import frozen meat inexpensively from Europe and Latin America because major exporting countries have been burdened with excessive stocks that they were willing to sell cheaply.

This situation will not continue indefinitely, and the price of frozen meat may rise relative to the price of meat imported on the hoof from the Sahelian countries.[1] If this happens, imports of live animals from the north may rise and the traditional marketing system will handle the added sales.

4) the degree to which livestock producers involved in government extension programs sell their animals through the SODEPRA marketing service. To the extent that Ivorian livestock producers participate in this program, the traditional marketing system's volume will diminish.

In sum, the relative share of the total beef supply handled by the traditional marketing system probably will decline in the coming years. Nevertheless, this system will continue to play a crucial role in supplying Ivory Coast with beef. Even if the very optimistic production goals of the 1976-80 National Plan were met, the absolute volume of animals handled by this system would not decline until after 1985.[2] To the degree that the Plan's production goals are not met, the traditional system will serve as the residual supplier of animals for the market.

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[1] This will depend not only on the world price of frozen meat, but also on the price of cattle in the Sahelian countries. The level of production in these countries and demand for beef in other markets (e.g., Nigeria) will help determine these cattle prices.

[2] Assuming the traditional system would handle a large percentage of total cattle imports, almost all sales from herds not covered by SODEPRA's extension programs, and a third of all sales from herds covered by SODEPRA programs.

CHAPTER 2

FLOWS OF TRADE CATTLE IN IVORY COAST

This chapter describes the geography of the cattle trade in Ivory Coast and seasonal variations in the number of cattle marketed. The first section describes the major trade corridors for cattle in Ivory Coast and estimates the number of animals moving along each of them. The seasonality of the cattle trade is then analyzed using data on recorded monthly imports of cattle and recorded monthly slaughters in Abidjan and Bouaké. A final section presents a typology of major cattle and meat markets in Ivory Coast.

Flows of Trade Cattle in Ivory Coast

There are four major north-south cattle trade corridors in Ivory Coast: one in the west, two in the central part of the country and one in the east. (See Figure 2.1.) In the west, the two major border-crossing points are Tienko and Maninian, both near Odienné. Tienko receives zebus, taurins, and crossbreeds from Mali while Maninian receives both Malian and Guinean animals (the latter are mostly N'damas).[1] These animals pass south, mainly on hoof, through Odienné and Touba to Man. Additional animals enter this corridor from Guinea at the town of Waninou (near Touba). At Man, the animals are either redirected to Danané and from there exported to Liberia, slaughtered in Man itself, or shipped to markets farther south (Guiglo, Tabou, and San Pedro).

The official statistics on the volume of animals passing through this western corridor are incomplete, not taking account of all the animals entering the country around Odienné or any of the imports from Guinea (100). The only available official statistic on the number of animals passing through this corridor is the figure for imports passing through Tienko. In 1976, these totalled 4,195 head (76, p. 60);

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[1] Guinean animals imported into Ivory Coast are listed in the Ivorian statistics as coming from Ivory Coast because Ivory Coast and Guinea do not officially acknowledge that any trade takes place between them.

FIGURE 2.1

MAJOR TRADE ROUTES FOR CATTLE IN IVORY COAST
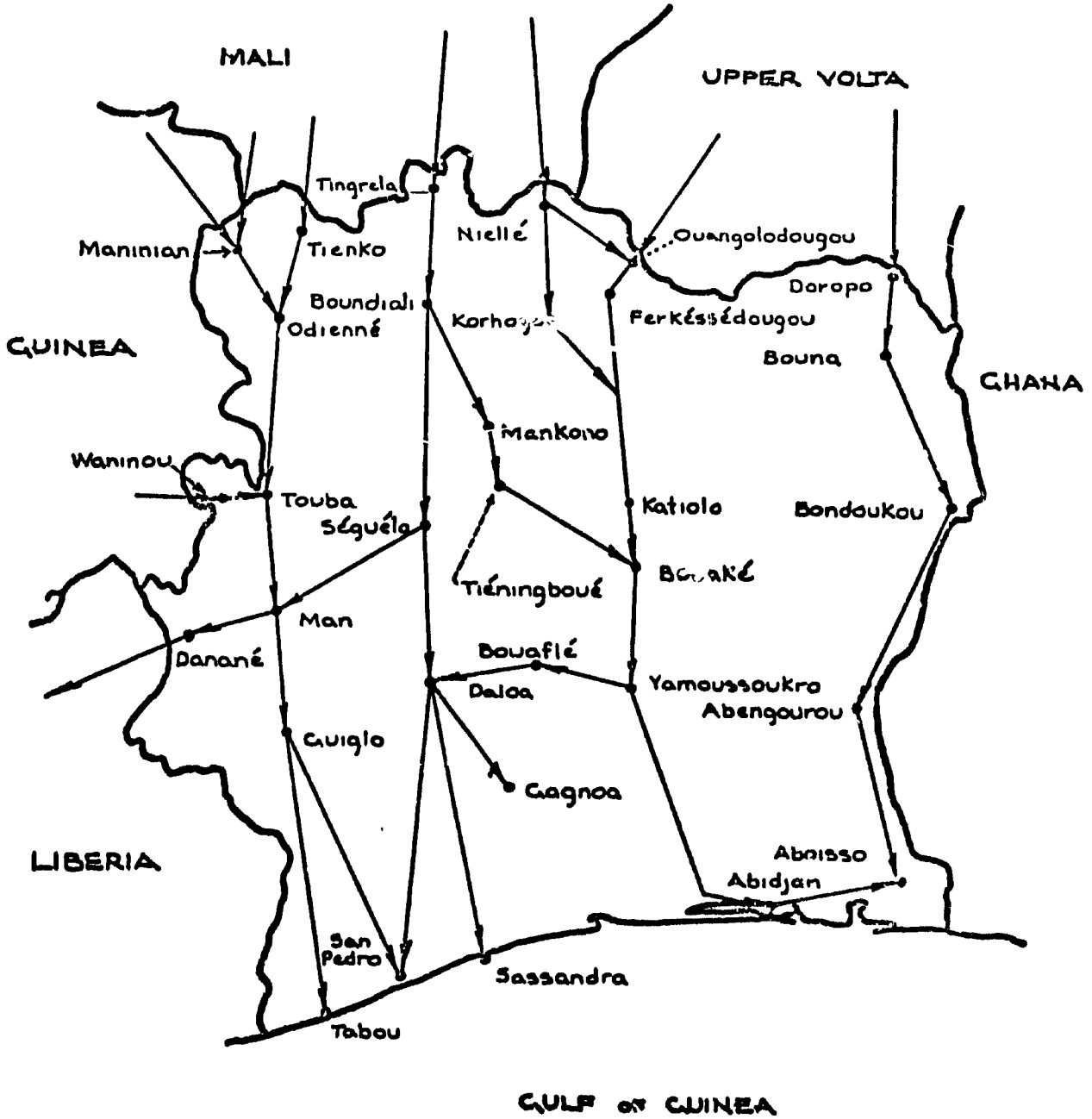
even this figure is an underestimation. One can get a rough idea of the volume of animals entering the western corridor at points other than Tienko by looking at the number of animals from other border regions passing through Man and the number of animals sold at Touba. Man is the major redistribution market of this corridor, and a large percentage of the animals passing through this corridor (including most of the animals eventually exported to Liberia) pass through Man. Between February 1976 and February 1977, 858 animals from Maninian were recorded as either entering the market at Man or transiting through Man for another destination.[1] A total of 2,066 head were noted from the region of Touba (Touba, Waninou, and Booko); these were probably Guinean animals. Touba itself is an important market for cattle, especially N'dama males to be used in animal traction. For example, from May 1975 through January 1976, CIDT purchased 1,947 N'damas at Touba for its animal traction programs (14). It is likely that most of these animals originally came from Guinea. Inflating all these figures slightly to take account of animals that escaped official enumeration, the following estimate of the number of animals passing through the western corridor in 1976 can be made:

Imports from Mali entering Ivory Coast at Tienko	5,000
Imports from Mali and Guinea entering Ivory Coast at Maninian	1,200
Imports from Guinea entering Ivory Coast at Waninou and Touba	4,000
Total	10,200

No official Ivorian statistics exist on the number of cattle that pass along this corridor and are eventually exported to Liberia. Liberian customs statistics (51) show that officially recorded imports of cattle from Ivory Coast totaled 4,439 head in 1975 and 4,494 head in 1976.

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[1] These figures (from laissez-passer sanitaire statistics) probably understate the volume of animals passing through Man because it is likely that not all herds transiting through Man for other destinations are recorded by the Veterinary Service. Figures used are for February 1976 to February 1977, rather than for the calendar year 1976, because figures were unavailable for January 1976.

(These figures are down sharply from those recorded in the early 1970s when annual recorded cattle imports from Ivory Coast ran between 5,600 head and 10,200 head.[1]) It appears that slightly less than half the animals passing along the trade corridor in western Ivory Coast eventually leave Ivory Coast for Liberia.

A second cattle corridor lies in the east of Ivory Coast. Voltaic animals enter the country, mainly on hoof, at Doropo and pass south to Bouna and to the major cities of the east (Bondoukou, Abengourou, and Agnibilékru). Formerly, this was an important trade route for animals going to Ghana; they would exit Ivory Coast at Bondoukou and Agnibelikro. As the economic situation in Ghana worsened in recent years, the volume of animals passing along this corridor dropped. In 1966, SEDES (102, Vol. I, p. 281) estimated that 7,000 imported animals moved along this corridor annually. By 1976, Ivorian Veterinary Service statistics (181) indicated that only 1,970 cattle entered the country at Doropo.

The two most important north-south cattle corridors, in terms of the number of animals handled, are in the center of the country. One circuit runs from southern Mali (the region between Bougouni and Sikasso) to Tingrela, which is the most important border-crossing point in Ivory Coast. In 1976, the Veterinary Service recorded 32,382 head of cattle passing through Tingrela. Tingrela is also the larg st cattle market in northern Ivory Coast. Local cattle producers and merchants sell animals produced in the surrounding area to long-distance traders who ship the animals to the major consumption markets farther south. Cattle merchants based in southern and central Ivory Coast sometimes also come to Tingrela to buy from their Malian counterparts, particularly when there are shortages of slaughter animals in the south. From Tingrela, animals generally trek south to Boundiali. From Boundiali, the animals either travel directly south toward Séguéla or they go southeast toward Mankono. At Séguéla, some animals are slaughtered and a few travel southwest toward Man and Danané; the bulk, however, continues on to Daloa, which is a major consumption and redistribution center for cattle. Animals not slaughtered at Daloa journey on to other markets throughout the southwest (e.g. Gagnoa,

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[1] See Appendix 2A for details.

San Pedro, and Sassandra). A few of the animals that travel from Boundiali toward Mankono are slaughtered in Mankono; most continue on to Tiéningboué and Bouaké. Bouaké is the second largest consumption center for meat in Ivory Coast and the country's most important cattle redistribution market. Out of a total of 25,990 head of cattle recorded as arriving in Bouaké in 1976, 10,841 were slaughtered for local consumption and 15,149 were sent on to other markets in the southern and central regions of the county (78). Yamoussoukro, Divo, Toumodi, Dimbokro, Daoukro, Oumé, and Bouaflé are the most important secondary markets served by Bouaké, and some cattle are also shipped from Bouaké to Abidjan.[1] Shipments of cattle from Bouaké to Abidjan are very seasonal, taking place mainly from April through July. This period corresponds to the end of the dry season and the beginning of the rainy season in Upper Volta, when few animals are offered for sale in the markets in Ouagadougou and Bobo-Dioulasso. During most of the year, these markets supply most of the cattle sold in Abidjan. From April through July, however, Voltaic livestock owners hold their cattle off the market anticipating that the animals will regain weight lost during the dry season (and hence increase in value) once the rains begin.[2] Since few animals are available in the markets of Upper Volta, the number of cattle exported by rail from Upper Volta to Abidjan falls sharply, reducing the supply of slaughter animals in Abidjan. During this same period, Bouaké is receiving many well-fed cattle from northern Ivory Coast and southern Mali. (The rains begin earlier in these regions than in the areas around Bobo-Dioulasso and Ouagadougou, so the animals have been gaining weight since May.) Cattle traders in Bouaké and Abidjan take advantage of the adequate supply in Bouaké to buy and ship well-fed animals from Bouaké to Abidjan. Cattle travel from Bouaké to Abidjan mainly by truck, although some also go by train. Animals are sometimes

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[1] See Appendix 2B for the numbers of cattle shipped from Bouaké to other markets in 1976.

[2] Cattle merchants in Abidjan say that another reason for this seasonal shortage is that once the rains begin, most people in Upper Volta, including many of the smaller cattle merchants, are busy cultivating their fields and have no time to trade cattle. Herman (29) discusses in detail the seasonal patterns of cattle sales by Voltaic livestock owners.

trekked to some of the secondary markets within 200 km of Bouaké
(e.g., Yamoussoukro). Merchants are not allowed to trek animals all the
way to Abidjan, however, and they rarely trek them south of Toumodi.[1]

In addition to the trade corridor that runs through Tingrela, a
second central corridor passes through the border town of Niéllé.
Animals from Sikasso, San, and Mopti in Mali enter Ivory Coast at Niéllé,
then travel southwest to Ouangolodougou. At Ouangolodougou, animals also
enter Ivory Coast from Upper Volta, both on hoof and by rail. Malian
animals that arrive at Ouangolodougou generally continue south on hoof to
Ferkéssédougou, where those destined for Abidjan and some of those
destined for Bouaké are loaded on the train for the trip south.[2] The rest
continue south on hoof, passing through Tafiré and Katiola before arriving
at Bouaké. The two central livestock corridors account for the bulk of
the animals imported into Ivory Coast every year. In 1976, roughly
100,000 head passed through these corridors, out of a total of about
112,000 head moving over all corridors.

Seasonality of Cattle Flows

This section analyzes the seasonality of cattle flows in Ivory
Coast using data on monthly recorded imports of cattle and recorded
cattle slaughter in Bouaké and Abidjan. The seasonality of cattle flows
results from climatically-determined production patterns in the north and
seasonal variations in the demand for beef in the south.

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[1] See Chapter 5, pp. 182.

[2] The rail rates per kilometer are higher from Ouangolodougou than
from other cities in northern Ivory Coast and southern Upper Volta. The
RAN, being partly owned by Upper Volta, sets its rates so as to favor
Voltaic products relative to Malian products, and it considers merchandise
and animals loaded at Ouangolodougou to be almost exclusively Malian.
Malian cattle merchants avoid these higher rates, however, by simply
walking their animals 44 km south from Ouangolodougou to Ferkéssédougou,
where the rates per kilometer are lower.

Cattle travel by rail from Ferkéssédougou to Bouaké mainly during the
dry season. During this time, animals arrive in Ferkéssédougou already
weak from a lack of grazing, and little grazing or water is available be-
tween Ferkéssédougou and Bouaké. During the rainy season, most merchants
trek their cattle between Ferkéssédougou and Bouaké.

Recorded Imports.--Data on recorded monthly imports of cattle are available from the Ministry of Animal Production only for 1974 onward. It is therefore difficult to analyze the seasonality of imports, especially since 1975 was a highly abnormal year, with imports falling rapidly from January through October. The decline in imports in 1975 makes it difficult to interpret the seasonality of imports not only in 1975, but also in 1974 and 1976, since imports in late 1974 and early 1976 may have been lower than usual. Nonetheless, a few conclusions can be drawn from the data.

Figure 2.2 presents graphically the data on total recorded monthly cattle imports into Ivory Coast and on recorded monthly imports from the two largest supplying countries, Mali and Upper Volta. The statistics on which Figure 2.2 is based are presented in Table 2.1. Certain patterns can be seen in Figure 2.2 in spite of the general downward trend in recorded imports. In 1974 and 1976, there is a marked seasonal peak in recorded imports in December. December is a period of strong demand for beef because of religious and other festivals, such as Christmas, New Year's, and the harvest festivals in the forest zone. Total recorded imports fall in January and then rise slowly until about April or May.[1] Recorded imports from Upper Volta start to fall around April, rise slightly in June and then fall off again in July or August. This period corresponds to the beginning of the rainy season, when cattle owners hold their animals off the market waiting for them to fatten up on the new pastures. Demand for meat in Abidjan also drops during this period because many of the expatriates leave for vacation and Ivorian students and teachers often return to their villages for vacations.

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[1]Part of the apparent fall in imports from December to January is due to the way in which the Veterinary Service reports its statistics. The Veterinary Service's reporting period runs from the twenty-first of one month to the twentieth of the following month. (E.g., the April report covers the period March 21-April 20.) This is true except for the reports of December and January. December's report covers the period November 20-December 31, while January's report only covers the period January 1-20. Recorded imports for December are therefore overstated and those for January are understated. Even taking this into account, there is a jump in recorded imports in December.

FIGURE 2.2

RECORDED MONTHLY CATTLE IMPORTS: 1974-1977

Figure shows three line graphs labeled "Total Imports", "Imports from Mali", and "Imports from Upper Volta" plotted monthly (J F M A M J J A S O N D) across years 1974, 1975, 1976, and 1977. The y-axis is labeled "Cattle" with values 500, 1,000, 1,500, 2,000, 2,500, 3,000.
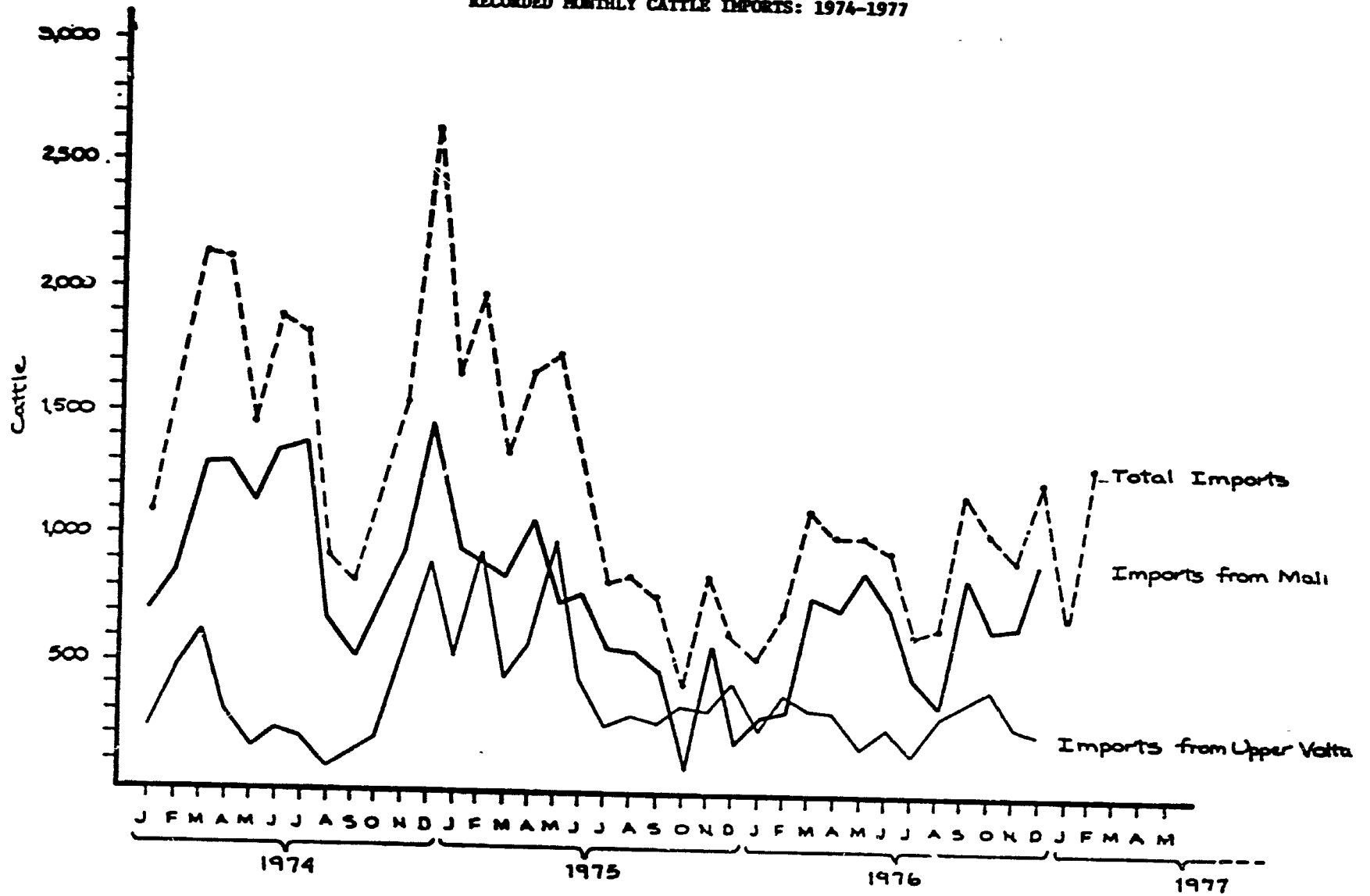
TABLE 2.1

RECORDED MONTHLY CATTLE IMPORTS INTO IVORY COAST 1974-77
(number of head)

Year/Country	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1974													
Upper Volta	2,077	4,456	6,048	2,904	1,528	2,121	1,936	811	1,166	1,769	5,253	9,015	39,084
Mali	6,995	8,356	12,885	12,974	11,391	13,337	13,382	6,595	5,573	7,424	9,675	14,561	123,148
Mauritania	2,628	4,024	2,233	5,193	1,790	3,524	2,936	1,821	1,499	2,112	1,012	2,625	31,397
Niger	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	11,700	16,836	21,166	21,071	14,709	18,982	18,254	9,227	8,238	11,305	15,940	25,201	193,629
1975													
Upper Volta	5,271	9,321	4,272	5,894	9,865	4,731	2,521	2,972	2,741	3,348	3,172	4,333	58,441
Mali	9,555	9,314	8,553	10,736	7,279	7,610	5,550	5,492	4,878	870	5,342	1,866	77,065
Mauritania	1,871	1,038	753	280	370	160	160	44	65	54	98	176	5,069
Niger	—	94	11	—	—	—	—	—	200	90	—	—	395
Total	16,697	19,757	13,589	16,910	17,514	12,501	8,231	8,508	7,884	4,362	8,612	6,395	140,970
1976													
Upper Volta	2,484	3,946	3,336	3,090	1,750	2,536	1,447	2,937	3,532	4,018	2,843	3,345	35,264
Mali	2,900	3,234	7,841	7,283	8,735	7,332	4,488	3,653	8,414	6,387	6,529	9,055	75,851
Mauritania	—	105	97	104	—	91	56	—	109	—	137	131	830
Niger	—	—	—	—	—	—	—	—	—	—	—	—	—
France	—	—	—	—	—	.—	369	—	—	—	—	—	369
Total	5,384	7,285	11,274	10,477	10,485	9,959	6,360	6,590	12,055	10,405	9,509	12,531	112,314
1977													
Total	7,075	13,138	n.a.	7,285	7,885	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

SOURCE: République de Côte-d'Ivoire,Ministère de la Production Animale, unpublished data.

NOTES: — None
n.a. Not available

-81-

TABLE 2.2

INDEXES OF VARIATION OF RECORDED MONTHLY IMPORTS OF
CATTLE INTO IVORY COAST FROM 1974 THROUGH 1976[a]

Year/Country	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1974												
Upper Volta	64	137	186	89	47	65	59	25	36	54	161	277
Mali	68	81	126	126	111	130	130	64	54	72	94	142
Mauritania	124	189	105	244	84	166	138	86	71	99	48	123
Total	73	104	131	131	91	118	113	57	51	70	99	162
1975												
Upper Volta	108	191	88	121	203	97	52	61	56	69	65	89
Mali	149	145	133	167	113	118	86	86	76	14	83	29
Mauritania	443	246	178	66	88	38	38	10	15	13	23	42
Total	142	168	116	144	149	106	70	72	67	37	73	54
1976												
Upper Volta	85	134	114	105	60	86	49	100	120	137	97	114
Mali	46	51	124	115	138	116	71	58	133	101	103	143
Mauritania	0	152	141	151	0	132	81	0	358	0	199	190
Total	58	78	120	112	112	106	68	70	129	111	102	134
1977												
Total	80	149	—	82	89							
Average of 1974 and 1976												
Upper Volta	75	136	150	97	54	76	54	63	78	96	129	155
Mali	57	66	125	116	125	123	101	61	94	87	99	142
Mauritania	62	171	123	198	42	149	110	43	115	50	124	157
Total[b]	70	110	126	108	97	112	91	64	90	91	101	148

SOURCE: Table 2.1

[a] The index for a given month equals recorded imports for that month divided by the mean of recorded monthly imports for that year (i.e. total recorded imports for the year divided by 12). See text for details.

[b] For January, February, April, and May the figures for total imports shown are the means of the indexes of 1974, 1975 and 1977.

Recorded imports from Mali remain fairly steady from March through June, while those from Upper Volta are falling; thus, total recorded imports decline more slowly than do imports from Upper Volta. After having fallen to a low point in August, total recorded imports start to pick up again during the last quarter, building toward the seasonal peak in December.

Figure 2.2 also shows the dramatic fall in recorded cattle imports during 1975. From a monthly peak of 26,201 head of cattle reportedly imported in December, 1974, recorded imports fell steadily to a low of 4,362 head in October, 1975. Recorded monthly imports increased gradually thereafter, but even by late 1976 they were still below the levels of 1974. (See Table 2.1.)

The seasonal variation in recorded imports is easier to see when monthly import figures are expressed as percentages of the average level of recorded monthly imports for the year in which they occur.[1] Table 2.2 presents the figures from Table 2.1 as percentages of the average monthly imports for the years 1974-76. For example, recorded imports from Upper Volta in 1974 totaled 39,084 head; hence, the average monthly recorded import from Upper Volta in 1974 was $39,084 \div 12 = 3,257$ head. Recorded imports from Upper Volta in January, 1974 totaled 2,077 head, or $\frac{2077}{3257} \times 100 = 64$ percent of the average monthly imports for that year; therefore in Table 2.2 the figures for Upper Volta for January, 1974 read 64. The other figures in Table 2.2 were calculated in the same manner. A figure of less than 100 indicates that imports for that month were below the average of monthly imports for the year; a figure greater than 100 indicates imports for the month were above the average.

Table 2.2 indicates that in 1974 and 1976 recorded imports were at their highest in December. They fell below average in January, rose in February and stayed above average from March through June (except in May, 1974). Recorded imports fell to a low in August or September and then climbed back to the seasonal peaks in December. Figure 2.3 presents graphically the mean monthly indexes of variation listed Table 2.2 for 1974 and 1976.

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[1]The average level of recorded monthly imports for a given year equals total recorded imports for that year divided by twelve.

Data from 1975 are excluded from the analysis because 1975 was such an unusual year. The mean index for Mauritania is not shown because few animals were imported from that country.[1]

Figure 2.3 shows that total recorded imports in 1974 and 1976 were near or above average from February through June and were below average from July through October (with a seasonal low in August). They rose to a peak in December, and then fell below average in January. Recorded imports from Upper Volta showed a different pattern of seasonal variation from recorded imports from Mali. Recorded imports from Upper Volta dropped off earlier in the year than recorded Malian imports, falling sharply in April and remaining below average from April through October. Recorded Malian imports remained above average through July, and this kept total recorded imports near or above average from February through July. Recorded Malian imports fell sharply in August, during the height of the rainy season in Mali. During this time, most Malians are busy planting and cultivating their crops; consequently, they have little time to trade cattle. Travel in rural areas is difficult during this period as well because of the rains, and this impedes the collection and exportation of animals. Recorded imports from Mali pick up in September, but remain below average during most of the period October-February,[2] which corresponds to the dry season in Mali, when many of the herds go on transhumance. Herds are scattered throughout the interior delta of the Niger River and southern Mali during this time, making it difficult for cattle merchants to collect animals for export since they must search out each herd individually. In contrast, during the first part of the dry season Voltaic animals are usually near their home villages, grazing off crop stubble. While cattle from northern Upper Volta may later move to dry-season camps situated near wells, the camps are well-known and the animals are easier to find and buy than the Malian cattle, which are scattered throughout the delta. From August through January,

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[1] Because few animals were imported from Mauritania in 1974 and 1976, the index of variation for imports from Mauritania shown in Table 2.2 varied widely; small monthly variations in the numbers imported corresponded to large percentage changes.

[2] The mean of the monthly indexes of variation of recorded imports from Mali for the months October-February, 1974 and 1976 (shown in Table 2.2) was 90. The corresponding mean for imports from Upper Volta was above average, 126.

FIGURE 2.3

INDEXES OF VARIATION: MONTHLY RECORDED IMPORTS OF CATTLE INTO IVORY COAST
AVERAGE FOR 1974 AND 1976
(yearly average: 100)
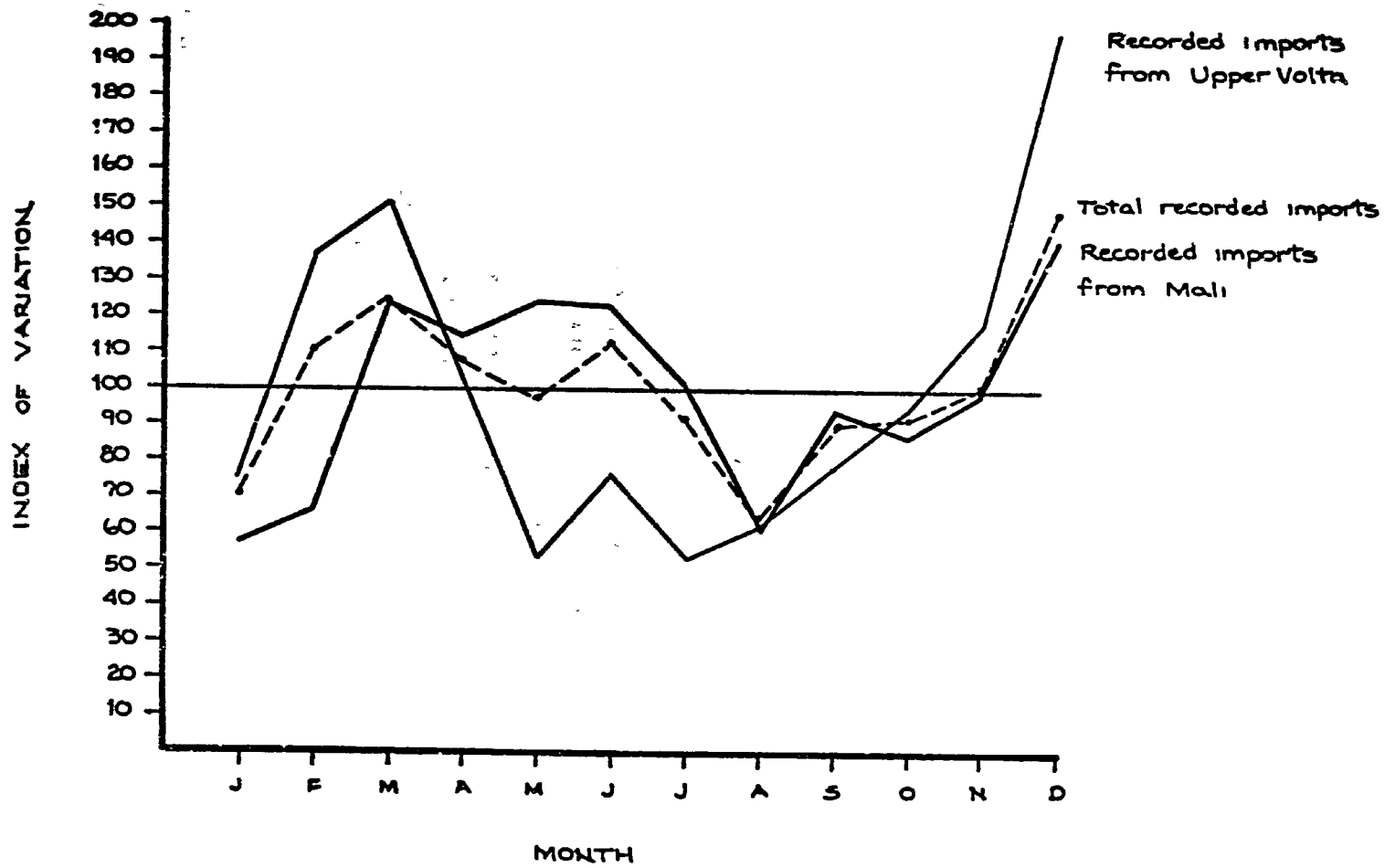
total recorded imports follow the same general pattern as recorded imports from Upper Volta, rising throughout the last quarter and then falling off in January.

Recorded Slaughter.--Recorded monthly cattle slaughters in Bouaké and Abidjan show much less seasonal variation than do recorded imports. This is because beef consumption in rural areas, hence total beef consumption, is much more seasonal than beef consumption in major urban areas. Beef consumption in rural areas is directly related to seasonal variations in cash income, which are a function of the crop calendar. In contrast, there is much less seasonal fluctuation in the cash income of urban dwellers. Although there are no detailed studies of meat consumption in rural Ivory Coast, casual observation and studies from similar areas in Nigeria (9, 46) support the view that meat consumption in rural areas is highly seasonal.

Table 2.3 presents data on monthly recorded cattle slaughters in Abidjan and Bouaké from 1970 through 1976 along with indexes of seasonal variation of slaughters for these years. Figure 2.3 graphs the mean monthly indexes of variation for 1970-74. Data for 1975 and 1976 were excluded from the analysis because recorded slaughter fell sharply between mid-1975 and early 1976, which obscured normal patterns of seasonal variation. In contrast to Figure 2.3, which graphed the indexes of variation of recorded imports for only 1974 and 1976, Figure 2.4 graphs mean monthly indexes that cover five years. The use of five years' data makes it more difficult to see some of the seasonality in recorded slaughter. Slaughter in Abidjan and Bouaké varies in response to seasonal patterns of supply and demand. Among the more important demand factors are the major Moslem holidays.[1] Moslem holidays do not occur on fixed dates, however; they are scheduled according to an uncorrected lunar calendar, and the dates of celebration shift by approximately twelve days each year. When one takes account of this shift, the effect of the Moslem

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[1] Roughly a third of Ivory Coast's population is Moslem. Data from the 1950s (59, p. 50; 60, p. 29), the only data available, indicate that roughly 37 percent of Abidjan's population and 59 percent of Bouaké's population are Moslem.

TABLE 2.3

MONTHLY RECORDED CATTLE SLAUGHTER IN ABIDJAN AND BOUAKE
AND INDEXES OF SEASONAL VARIATION, 1970-76[a]

Year	__	Month											Total
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
Abidjan													
1970													
Number	4,521	3,70d	4,078	4,005	2,847	3,905	4,177	3,975	4,332	4,659	4,721	4,368	50,296
Index	108	88	97	96	92	93	100	95	103	111	113	104	
1971													
Number	3,876	3,775	3,820	4,869	5,024	3,645	3,788	3,445	3,587	4,371	5,052	4,403	49,655
Index	94	91	92	118	121	88	92	83	87	106	122	106	
1972													
Number	4,134	3,979	4,407	5,529	5,758	4,676	4,369	3,982	4,292	4,790	4,616	4,545	55,077
Index	90	87	96	120	125	102	95	87	94	104	101	99	
1973													
Number	4,532	4,035	4,854	4,772	4,442	4,161	3,819	4,134	4,393	4,671	3,902	4,358	52,073
Index	104	93	112	110	102	96	88	95	101	108	90	100	
1974													
Number	3,992	3,858	3,930	3,600	3,640	3,114	3,062	2,870	3,311	4,124	4,139	3,470	43,110
Index	111	107	109	100	101	87	85	80	92	115	115	97	
1975													
Number	3,798	3,307	3,462	3,232	3,252	2,984	2,920	2,511	2,393	2,673	2,355	1,534	34,421
Index	132	115	121	113	113	104	102	88	83	93	82	53	
1976													
Number	2,080	1,294	1,729	2,100	1,906	2,062	1,916	1,720	2,773	3,094	2,931	1,336	
Index	100	62	83	101	92	99	92	83	133	149	141	64	
Average Indexes													
1970-76	106	92	101	108	107	96	93	87	99	112	109	89	
1970-74	101	93	101	109	108	93	92	88	95	109	108	101	

TABLE 2.3 (cont'd.)

MONTHLY RECORDED CATTLE SLAUGHTER IN ABIDJAN AND BOUAKE
AND INDEXES OF SEASONAL VARIATION, 1970-76[a]

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
							Bouaké						
1970													
Number	1,302	1,164	1,271	1,174	1,110	1,134	1,099	1,039	1,055	1,187	1,168	888	13,591
Index	115	103	112	104	98	100	97	92	93	105	103	78	
1971													
Number	1,267	1,125	840	1,310	1,198	868	1,355	1,127	843	742	1,252	839	12,816
Index	119	105	79	123	112	81	127	106	79	69	117	83	
1972													
Number	1,420	1,249	895	1,461	1,387	874	1,409	1,279	892	1,485	801	1,028	14,380
Index	120	106	76	124	117	74	119	108	75	126	58	87	
1973													
Number	1,251	800	640	1,227	1,358	1,015	1,075	1,115	1,060	1,150	1,080	1,120	12,891
Index	116	74	60	114	126	95	100	104	99	107	101	104	
1974													
Number	1,096	1,094	870	1,266	1,287	1,140	c	c	c	c	c	c	c
Index[c]	97	97	77	112	114	101							
1975													
Number	586	1,266	1,374	1,060	1,293	1,021	1,105	871	1,290	876	879	772	12,343
Index	55	123	134	103	126	99	107	85	225	85	85	70	
1975[b]													
Number	794	1,270	1,216	1,172	1,172	1,064	1,151	1,147	1,202	952	926	1,108	13,174
Index	72	116	111	107	107	97	105	104	109	87	84	101	
1976													
Number	472	793	825	916	870	925	919	952	998	959	993	1,219	10,641
Index	52	88	91	101	96	102	102	105	111	106	110	135	
Average index													
1970-74	113	97	81	115	113	90	111	103	87	102	97	88	

SOURCE: République de Côte-d'Ivoire, Ministère de la Production Animale, unpublished data and Mairie de la Ville de Bouaké, unpublished data.

[a] Indexes of seasonal variation calculated as in Table 2.2.

[b] The data for Bouaké listed first (for 1970-75) are from records of slaughter taxes collected by the municipal government of Bouaké. Data are for calendar months. The data for 1975 and 1976 listed at the bottom of the table are from records of the Veterinary Service. Data are for reporting periods running from the twenty-first of one month to the twentieth of the following month. (See p. 7 note 1)

[c] Reliable figures July-December are not available. The indexes for 1974 are based on the January-June average.

FIGURE 2.4

INDEX OF VARIATION OF RECORDED MONTHLY CATTLE SLAUGHTER IN ABIDJAN AND BOUAKE
AVERAGE FOR 1970-1974

Recorded slaughter in Abidjan

Recorded slaughter in Bouaké
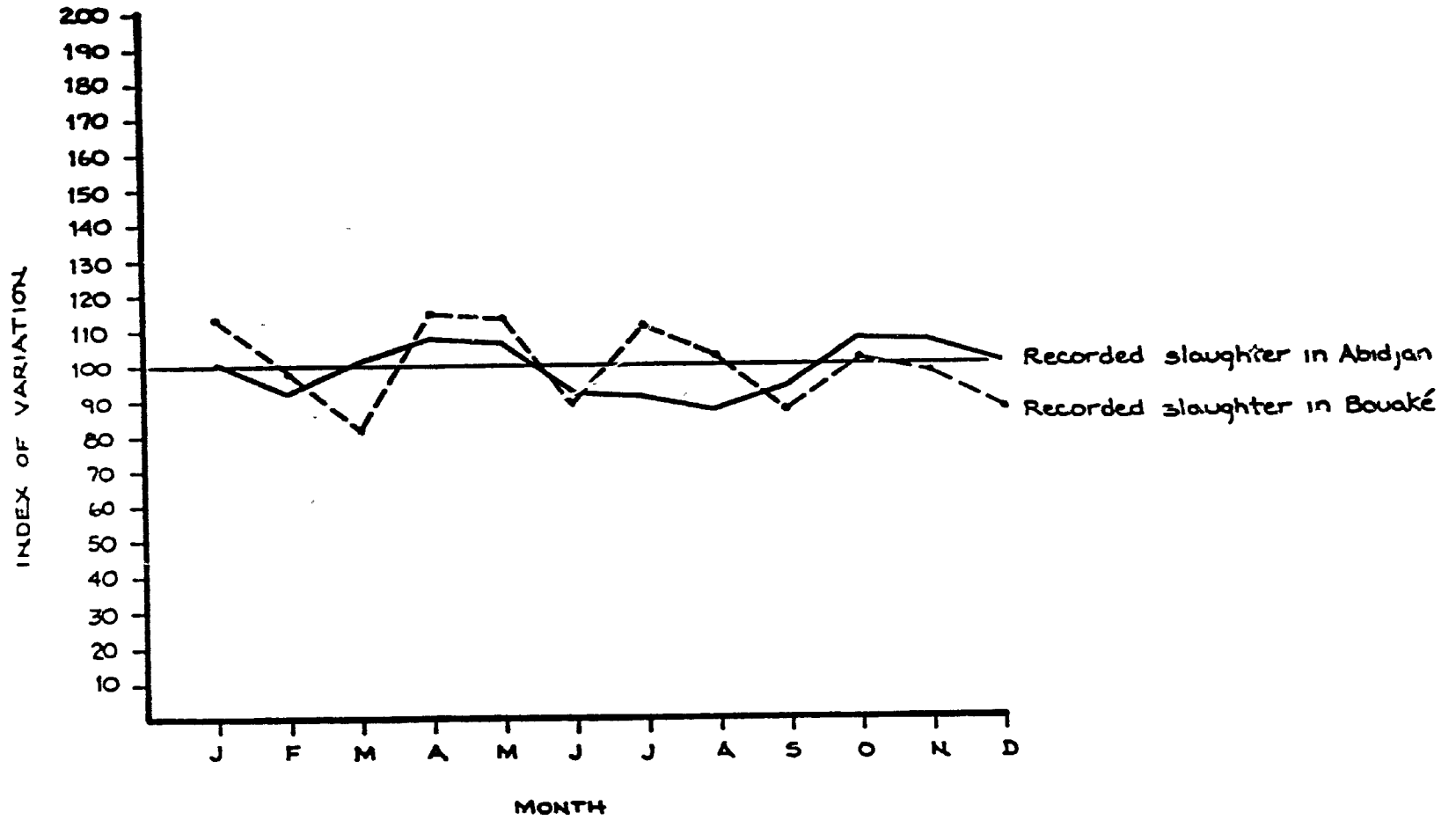
holidays can be seen. For example, beef consumption in Abidjan falls around the time of Tabaski, the Moslem feast of sacrifice, when most Moslem households sacrifice a ram. Beef consumption falls for two reasons: few cattle arrive in Abidjan because most of the available livestock transport is being used to move sheep to the major cities, and Moslem consumers spend less money than usual in the weeks immediately preceeding Tabaski because they are saving to purchase a ram. In 1970 and 1971, Tabaski occurred in February. Table 2.3 shows that recorded slaughter in Abidjan during February was below average in both of these years. In 1972 and 1973, Tabaski was celebrated in January; recorded slaughters were below average in January, 1972, but were slightly above average in January, 1973. However, in 1973, Tabaski fell early in January (January 9); its effect probably was felt most in December, 1972, when recorded slaughters were slightly below average. From 1974 through 1976, Tabaski occurred in December; in all three of these years, slaughters were below the monthly averages of those years.

The pattern of seasonal variation in recorded slaughters in Abidjan also seems to follow the pattern of recorded imports, lagged by about one month. This shows the importance of supply as well as demand factors. Recorded imports rise in December and recorded slaughters are higher than average in January; recorded imports fall in January and recorded slaughters fall in February; and so forth. The lagged pattern does not hold up during the last quarter of the year, however, when recorded imports rise sharply but recorded slaughters remain fairly steady. The pattern breaks down because many of the animals imported in November and December are sold in rural areas. Demand for meat is high in rural areas at this time because farmers have just been paid for their coffee and cocoa crops and because many harvest and religious festivals are taking place. Sales of animals to rural residents are, of course, not reflected in the recorded slaughter data for Abidjan and Bouaké.

Types of Cattle Markets in Ivory Coast

Authors have usually classified West African livestock markets into
three types: collection markets (marchés de collecte), redistribution
markets (marchés de regroupement), and consumption markets (marchés de
consommation). Collection markets are generally small markets in the
producing areas where animals first enter the marketing chain. In
collection markets, livestock raisers sell cattle to merchants and to
other livestock raisers. Merchants who specialize in buying animals
directly from cattle raisers in the countryside sell to long-distance
traders who ship the animals· south. Redistribution markets are larger
markets where animals bought farther north are resold and herds are re-
organized. Local butcher⁴ buy off the weaker animals for slaughter,
other animals are purchased for shipment to surrounding markets, and the
largest and healthiest animals are grouped into herds for shipment to
the major consumption markets farther south. Consumption markets are
located in major cities, most of them in the coastal countries. Animals
arriving in these markets are mainly slaughtered for local consumption.

These definitions of market types are not mutually exclusive. For
example, local producers living near a redistribution market may sell
their livestock there rather than in a collection market, and there may
be some redistribution of animals from consumption markets to surrounding
areas. This blurring of distinctions between types of markets is
especially strong in Ivory Coast. There are a number of markets in
central Ivory Coast which could be accurately termed "consumption-
redistribution markets."

In Ivory Coast, collection markets are located almost exclusively
in rural areas of the north, where most of the country's cattle are
produced. Several redistribution markets in the north and west of the
country also provide places where local producers can sell their animals
and where merchants can re-sell imported animals, which are then shipped
farther south. The most important of these redistribution markets are
Tingrela, Boundiali, and Odienné in the north and Waninou and Touba in
the west (the latter handle mainly imported Guinean animals). The major
consumption-redistribution markets are Korhogo, Man, Daloa, Bouaké,

and Abengourou. These cities serve as major centers of meat consumption as well as markets from which animals are redirected to surrounding cities. From Man, cattle are redistributed to markets both within Ivory Coast and in Liberia. The major consumption markets in the country, in addition to those just identified, are located in the south of the country. They include Gagnoa, San Pedro, Sassandra, Aboisso, and Abidjan.

Because Bouaké is both a major consumption market and the largest redistribution market for cattle in Ivory Coast, it exhibits characteristics found in large consumption markets like Abidjan and in redistribution markets like Tingrela. For this reason, Bouaké was chosen as the major research site for this study. Much of the analysis in the study is therefore based on data collected in Bouaké, complemented by less detailed information for Abidjan.

PART II

THE ORGANIZATION OF CATTLE AND
MEAT MARKETING

CHAPTER 3

THE STRUCTURE OF CATTLE AND MEAT MARKETS: PART 1

The following two chapters examine the organization of cattle and
beef marketing in Abidjan and Bouaké. This chapter looks at the role
played by cattle merchants and intermediaries, and Chapter 4 discusses the
organization of the butchering trade, the employment generated in cattle
and meat marketing, and differences in the structure and performance of
the cattle markets in Bouaké and Abidjan.

This chapter is divided into three parts. The first part discusses
the prevailing government view that the traditional marketing system is
disorganized and in need of reform. The following two parts of the chapter
examine this hypothesis by presenting data on the activities, background,
and market organization of cattle merchants and intermediaries in Bouaké
and Abidjan. Since most critiques of the present marketing system focus
on the presence of intermediaries in the trade, the chapter devotes con-
siderable attention to the intermediaries' role in livestock marketing.
A classification of the types of intermediaries in the Bouaké and Abidjan
markets is developed, and the background and activities of a sample of
these agents are examined. The chapter then discusses the role intermed-
iaries play in extending and guaranteeing credit, and measures the degree
of market concentration among intermediaries in Bouaké and Abidjan in
order to test the hypothesis that a few intermediaries exercise monopoly
control over these markets. Finally, the incidence of abuses of market
power by intermediaries is discussed.

The chapter shows that there is a definite structure to cattle
marketing in Bouaké and Abidjan, and that most market participants have
many years of experience and specialized (though nonwestern) training
in the trade. Intermediaries play important roles in providing credit
to buyers, facilitating the flow of market information, and speeding the
sale of cattle in southern markets. Data on market concentration indicate
limited scope for collusive behavior by intermediaries, especially in
Abidjan. Abuses of confidence by intermediaries do occur, but are the
exception, not the rule.

Introduction

Many government officials and foreign advisors in West Africa feel that the traditional livestock marketing system is inefficient and that it hinders the development of a modern livestock sector. Three charges are frequently leveled against the traditional system: 1) Cattle merchants are said to use their superior knowledge of market conditions to take advantage of less-informed cattle raisers. Officials charge that merchants offer prices to producers that are far below the true value of their animals and that these low prices discourage producers from adopting modern management practices. 2) Cattle merchants and intermediaries are said to collude to restrict the volume of animals entering certain markets in order to artificially raise prices. 3) Officials charge that the large number of market participants in the traditional system, particularly intermediaries, serves only to raise cattle prices, as animals change hands several times before being sold to butchers, and at each transaction somebody makes a profit. Lacrouts' statements (39, pp. 34ff) are typical:

> I remain convinced that it will be impossible to improve any aspect of domestic Ivorian livestock production or the quality of the [livestock] trade with neighboring countries unless the livestock and meat marketing system is reorganized.
> Enormous disorganization and waste characterize every stage of marketing...The current situation...is indeed catastrophic: this market is totally disorganized. The presence of intermediaries between butchers makes it impossible to organize a well structured wholesale market.

A number of studies (e.g., 102, 117) have suggested that the traditional marketing system is fairly competitive and efficient. Nonetheless, government policies in much of West Africa continue to be based on the assumption that the traditional marketing system must be reformed. Ghana has gone farther than other countries, creating a state trading monopoly (the Ghana Cattle Development Board) to replace the traditional system. Ivory Coast does not propose to replace the traditional marketing system with a state monopoly, but the government clearly desires a greater degree of state control over cattle and meat marketing than in the past.

Most proposals for reorganizing livestock marketing involve at least some of the following:

1) Definition of the activities that different professions involved in livestock and meat marketing (butchers, merchants, etc.) may exercise, and licensing of all people involved in the trade.[1]

2) Reduction or elimination of the number of intermediaries (brokers) involved in the trade.

3) Requiring all sales to be made for cash in order to prevent butchers from defaulting on debts.

4) Equiping markets with cattle scales and moving toward sales on a per kg. liveweight basis.

5) Providing training programs to teach market participants, especially butchers, basic accounting and technical skills.

Advocates of reorganizing livestock marketing apparently feel that stricter licensing requirements would prevent irresponsible people from engaging in livestock marketing, thus reducing the incidence of default on credit sales; that reorganization would facilitate the collection of market and slaughter taxes; and that by replicating the structure of livestock markets in developed countries, the efficiency of those markets could be replicated.

Clearly, before deciding whether to reorganize the traditional cattle marketing system, one should have a clear understanding of how the traditional system works. The following two sections of the chapter describe how cattle marketing in Bouaké and Abidjan takes place and examine the role of livestock merchants and intermediaries in the marketing system.

Cattle Merchants

Cattle merchants buy animals in one market for resale either in a different market or in the same market at a later time. They perform both arbitrage and speculation, hoping to benefit from spatial and temporal prices differences. This section describes the types of cattle merchants

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[1]Ivory Coast subscribes to the Entente Council's agreement to reorganize and license all participants in livestock and meat marketing (16a).

active in Abidjan and Bouaké, what their background and training are, and how they organize their businesses. This information is crucial to an understanding of how the traditional marketing system works and what the contraints are to expanding or modifying it.

Merchants Based in Northern Exporting Areas.-- Most cattle arriving in Bouaké and Abidjan belong to merchants based in the northern exporting regions (Mali, Upper Volta, and northern Ivory Coast). These merchants buy animals either directly from producers in the countryside or in the collection and redistribution markets of the north.[1] When a merchant has assembled a herd, usually from 20 to 60 animals,[2] he hires a team of drovers and arranges to ship the animals south by truck , by rail, or on hoof.

In addition to individual cattle merchants, several Malian import-export companies ship animals to Bouaké and Abidjan. This is often done on a profit-sharing arrangement with the companies' representatives, who arrange to transport and sell the animals. For these services the representatives usually receive about 20 percent of the profits. The companies export cattle not only to earn profits in the cattle trade, but also to earn the right to import merchandise into Mali. Under Malian foreign trade regulations, by exporting cattle (or any other domestically produced good) and repatriating the money earned the companies gain the right to import goods worth 75 percent of the value of the cattle exported (95). Stryker (117, pp. 42-3) suggests that merchants may accept very low margins in the cattle trade in order to gain an import license. During the ELP study, instances were recorded of Malian import-export companies allowing

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[1]Of 40 northern cattle merchants interviewed in Bouaké between October, 1976 and July, 1977, 30 (75 percent) had purchased all their animals in the countryside, either directly from producers or in small rural collection markets; one had purchased his animals in a major redistribution market; and 9 (23 percent) had purchased animals both in the countryside and in redistribution markets. Twenty-one of these merchants were from northern Ivory Coast, fifteen were from Mali, and four were from Upper Volta.

[2]Of 244 herds recorded as arriving in Bouaké between November, 1976 and July, 1977, the average size was 40 head and the standard deviation was 18 head. Trekked herds were larger than railed or trucked herds, averaging 42 head, compared with 31 head for railed herds and 29 head for trucked herds.

private merchants to export cattle using the companies' export licenses. (They usually charged the merchant 1,000-2,000 Malian francs per animal exported.) This permitted the companies to gain the right to import goods into Mali without actually exporting cattle themselves, and the private merchants avoided buying export licenses and paying Malian income taxes on the profits they earned in cattle trade.

Rarely does a northern cattle merchant personally accompany his animals south. This job is left to a team of drovers, usually hired, but which sometimes includes unpaid members of the merchant's family. The merchant or his representative usually travels to the market of destination a few days before the scheduled arrival of the herd in order to evaluate prices and make arrangements for the sale. In Bouaké, the merchant or his representative is almost always present when the animals are sold. Merchants who export cattle regularly by train from Ouagadougou and Bobo-Dioulasso to Abidjan do not go south for each sale of animals, however. They leave the selling to the drovers who accompanied the animals south and to their intermediaries or agents in Abidjan.

Northern cattle merchants often carry on other economic activities in addition to cattle trading. Fourteen of the forty northern cattle merchants interviewed in Bouaké reported they were also farmers, six said they raised cattle, one was a butcher, and one owned houses which he rented.

Merchants Based in Bouaké and Abidjan.-- In addition to the cattle merchants who live in the producing areas, a number of cattle merchants live in Bouaké and Abidjan. These merchants carry on two types of activities. A few send representatives north to the producing zones to buy cattle for shipment south. Most, however, buy animals in Abidjan or Bouaké for reshipment to surrounding markets.[1] Of the eleven most active cattle merchants resident in Bouaké during 1976-77, only four regularly imported from the north. The others specialized in reshipping animals to surrounding areas.

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[1] This second type of activity is more common in Bouaké than in Abidjan.

In order to learn more about the background and activities of the cattle merchants resident in Bouaké and Abidjan, indepth interviews were conducted with five merchants in Bouaké and four in Abidjan. Table 3.1 summarizes some of the results. These merchants were typical of those found in Ivory Coast: all were northerners, all were Moslem, and all had been cattle merchants for many years (the mean time was 19.9 years). Five of the seven non-Ivorians had been cattle merchants in their home countries before settling in Ivory Coast. Most had worked in the cattle or meat industry before becoming livestock traders, either as herders, butchers, or agents for relatives who were cattle merchants. Most reported income-earning activities in addition to cattle trading, although cattle trading was the main activity of all but one of them. Three were licensed butchers,[1] four were merchants of goods other than cattle, and one also owned several trucks which he rented out. The merchants interviewed had relied on different sources of capital to begin cattle trading: three had been financed by relatives in the cattle trade, two had inherited their fathers' butchering businesses and had used earnings from butchering to begin cattle trading, two had relied on earnings from general commerce, and two had used money saved while employed as drovers.

The picture that emerges from these interviews is one of a group of men with strong ties to and long experience in the livestock sector. Several had previously been butchers or drovers and had "moved up" (in their view) to become cattle merchants. Most had been in Bouaké or Abidjan for several years; the average length of residence was 22 years.

a. Sources of Supply.-- All nine merchants reported purchasing many of their animals in the markets in which they were based (Bouaké or Abidjan), although six also purchased animals in the producing areas of the north. These six merchants all had buying agents in the north (the number of agents per merchant ranged from one to sixteen), and three of them had regular, teams of drovers which worked exclusively for them.

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[1] Only one of whom was still an active butcher. The other two rented out their butchers' licenses to non-licensed butchers (see Chapter 4, pp. 147-48).

TABLE 3.1

CHARACTERISTICS OF RESIDENT CATTLE MERCHANTS INTERVIEWED IN BOUAKE AND ABIDJAN IN 1977

Characteristic	Cattle Merchants								
	1	2	3	4	5	6	7	8	9
Residence	Bouaké	Bouaké	Bouaké	Bouaké	Bouaké	Abidjan	Abidjan	Abidjan	Abidjan
Nationality	Voltaic	Ivorian (Malian parents)	Ivorian (Malian parents)	Malian	Malian	Voltaic	Mauritanian	Malian	Malian
Religion	Moslem	Moslem	Moslem	Moslem	Moslem	Moslem	Moslem	Moslem	Moslem
Ethnic Group	Fulani	Sarakolé	Sarakolé	Bambara	Bambara	Mossi	Mauritanian Arab	Fulani	Bambara
Age	49	45	55	52	60	24	45	29	40
Father's Profession	Agriculturalist	Butcher	Butcher	Agriculturalist	Soldier	Chef du Canton	Herdsman	Cattle & Kola Merchant	Cattle Merchant
Years of Schooling	6	0	0	0	0	9	6	7	0
No. of Yrs. in Bouaké or Abidjan	17	45	37	35	25	7	18	17	9
No. of Yrs. in Cattle Trade	25	NR	37	19	15	8	28	15	11
Other Countries Where Worked in Cattle Trade	Upper Volta	None	None	None	None	Upper Volta	Mauritania, Upper Volta	Mali	Mali

TABLE 3.1 - CONTINUED

Characteristic					Cattle Merchants				
	1	2	3	4	5	6	7	8	9
First Job	Herder	Apprentice Butcher	Apprentice Butcher	Cloth,Cola & Bicycle Merchant	Gold Miner	Agent for Brother Who Was Cattle Merchant	Herder	Agent for Father (Cattle & Cola Trade)	Agent for Father (Cattle Trade)
Other Income - Earning Activities Besides Cattle Trade	Butcher Intermediary	Licensed Butcher (Rents out License)	Licensed Butcher (Rents out License)	Kola Merchant	Kola & Bicycle Merchant Owns Trucks (Transporter)	Sells Construction Material (Cement, etc.)	Owns Small Store	None	None

NR = no response

Most purchases were for cash, but three of the nine merchants reported buying some of their animals on credit in Abidjan and Bouaké (between one-fourth and one-half of their total purchases).[1] The normal duration of this credit was 15 days. Three of the four Abidjan merchants reported they sometimes pooled their resources with other cattle dealers to buy animals in the producing areas for shipment south. None of the Bouaké merchants reported such cooperative ventures, although one sometimes bought animals in Mali using money lent him by another cattle merchant.

b. Sales.-- Seven of the nine merchants interviewed reported they sold some of their animals on credit. The Bouaké merchants tended to extend longer-term credit (ranging from 5 to 40 days) than the Abidjan merchants, who seldom gave credit for more than a week. The Abidjan merchants, however, reported that the credit they extended was often not repaid on time, so that in reality they often ended up giving credit for a month or more. Two of the Bouaké merchants who extended credit for between 20 and 40 days reported that they usually charged 2,000 CFAF more per animal sold on credit than for animals sold for cash. Assuming an average sale price of 59,000 CFAF per animal,[2] this implies a monthly interest rate of 3.4 percent. The other seven merchants, including all four Abidjan merchants interviewed, said they did not charge more for animals sold on credit than for animals sold for cash. Several, however, said they only extended credit when there was a temporary glut of animals on the market. The presence or absence of credit thus substituted for short term price fluctuations.[3]

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[1]Throughout the entire study most market participants were reluctant to discuss their use of credit. The questionnaire results probably understate the use of credit.

[2]The average price of 2,089 head of cattle head of cattle recorded in the Bouaké price survey from July, 1976 through July, 1977 was 59,457 CFAF.

[3]Stryker (117, p. 47n) reports being told the same thing by Malian merchants who sold cattle in Abidjan.

All the merchants interviewed reported selling most of their animals in the markets in which they were based (either Bouaké or Abidjan). Sales were to local butchers and traders, as well as to butchers and traders from other cities who came to these markets looking for animals. Two of the Bouaké merchants also sold animals in other towns around Bouaké, and one of the Abidjan merchants also traded cattle between Upper Volta and Ghana and Upper Volta and Niger.

Appendix 3A presents case studies of two highly successful long distance cattle merchants, one based in Bouaké and the other based in Abidjan, and one small-scale trader based in Bouakè.

Intermediaries[1]

The term intermediary is commonly used in West Africa to describe a wide range of cattle marketing agents whose economic activities vary considerably. In its broadest use the word refers to anyone who comes between the northern cattle merchant and the southern butcher who buys animals for slaughter. It thus encompasses both cattle brokers and small-scale merchants who buy animals to resell a short time later. In a narrower sense, the word refers only to cattle brokers, who arrange to sell a cattle merchant's animals but do not actually buy the animals themselves. Rather, they find buyers for the animals, negotiate the terms of sale, and may provide a number of other services to both buyer and seller. For their services they receive a commission on each animal sold, paid by the buyer; they may also receive a cash gift from the seller once the entire herd is sold.[2] Intermediaries are found throughout the marketing chain.

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[1] Often called _courtiers_ in the francophone countries and "landlords" in the anglophone countries.

[2] In Abidjan and Bouaké the purchaser is obligated to pay the intermediary 200 CFAF for each animal purchased. If the purchaser feels he got a particularly good buy, he may pay more (up to 1,000 CFAF) in the hope of getting more such buys in the future. The 200 CFAF commission paid intermediaries in Abidjan and Bouaké is less than that generally paid intermediaries in the producing areas, who assume a greater risk that the animal is stolen and may be reclaimed by its owner.

The cash gift presented to the intermediary by the seller is entirely voluntary. In Abidjan and Bouaké it usually varies between nothing and 5,000 CFAF . The commission paid by buyers is a more important source of income for the intermediaries than is the gift from the seller. For a herd of 40 head the commission paid by buyers would total a minimum of 8,000 CFAF , while the gift from the seller would normally vary between 3,000 and 5,000 CFAF .

In the northern collection markets they link cattle producers to cattle buyers (livestock merchants, local butchers, and other producers), and in southern markets they arrange sales between northern cattle merchants, butchers, and local merchants.

Controversy surrounds the role of intermediaries in the cattle marketing system. Many government officials charge that intermediaries are "parasites" who engage in a number of superfluous transactions that only serve to raise the price butchers eventually pay for cattle. Several authors (e.g., 12, 13, 31), however, have suggested that intermediaries play a crucial role in cattle marketing, especially in providing credit to buyers. This section evaluates the role of intermediaries in the marketing system and discusses some of the controversies surrounding their activities. Before making any evaluation of the role played by intermediaries, however, it is necessary to clearly define the different types of intermediaries involved in the trade. The first part of this section does this, developing a taxonomy of intermediaries involved in the cattle trade in Bouaké and Abidjan. The next subsection describes the background, training, and business activities of a sample of intermediaries active in Bouaké and Abidjan. These descriptions allow one to develop a composite picture of a typical intermediary. The following subsection examines the role intermediaries play in extending and guaranteeing credit in the marketing system. Data are presented on the amounts of credit extended in Bouaké and Abidjan, the implicit rates of interest charged, the incidence of default, and the role intermediaries play in debt collection. The following subsection measures the degree of market concentration among intermediaries in Bouaké and Abidjan in order to evaluate the frequently-made charge that a few intermediaries monopolize the cattle trade. The final subsection examines the incidence of several of the alleged abuses of market power by intermediaries, including collusion to restrict the volume of trade and artificially raise prices, and possible conflicts of interest between intermediaries and the cattle merchants who use their services.

Taxonomy.-- The activities of intermediaries in the Bouaké and Abidjan markets range from acting simply as cattle brokers to actually financing the purchase of cattle in the north and arranging their shipment

south. This section develops a taxonomy of the intermediaries in Bouaké and Abidjan, describing the activities of each type of intermediary.[1]

The following is a characterization of the activities of an intermediary in the coastal states, based on descriptions in the literature (12, 12, 31, 117). The archetypal intermediary in the southern markets is described as a northerner who has lived in the south for several years. He serves not only as a cattle broker for merchants from producing areas, but also as their trusted advisor, helping them conduct their business in an unfamiliar market, sometimes in an unfamiliar language. A northern cattle merchant almost always deals with the same intermediary, and strong personal ties link the intermediary with his client. These bonds of trust make written contracts between intermediary and client unnecessary. A northern cattle merchant arriving in a southern market is fed and lodged by his intermediary, as are the merchant's assistants and drovers. The intermediary contacts prospective cattle buyers and negotiates terms of sale for the merchant's animals (subject to approval by the merchant). If the sale is on credit, the intermediary negotiates the conditions (period of credit; interest, if any; etc.) and acts as a guarantor of the buyer's credit. If the buyer fails to pay the credit at the agreed time, the intermediary threatens, cajoles, and harasses the buyer and may try to convince other intermediaries to refuse to sell to him until he pays. If his efforts fail, the intermediary is obligated to pay the seller for his animals.

This idealized picture is subject to several modifications in Bouaké and Abidjan. In general, intermediaries in Bouaké and Abidjan can be classified into two large groups, with each group having several sub-categories. The first group includes most of the older, well-established intermediaries. These men receive and lodge northern cattle merchants and act as cattle brokers for them; they are referred to as intermediary-landlords in this study.[2] The second group includes smaller-scale

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[1] Intermediaries, butchers, and traders usually do not distinguish between all the different types of intermediaries described below. They generally describe intermediaries as either courtiers-logeurs or petits-inter__ laires. (See below for details).

[2] In Ivory Coast they are known as courtiers-logeurs.

intermediaries who perform one or more of the tasks described above, but who do not lodge northern cattle merchants in their homes. In this study, people in this group are referred to as <u>intermediary-sellers</u>.[1]

Intermediary-landlords can be further classified according to their economic activities. <u>Landlord-brokers</u> act only as livestock brokers; their activities are similar to those of the idealized intermediary described above. <u>Landlord-financers</u> not only carry out the activities of a landlord-broker, they also use their own capital to finance the operations of some of the northern merchants who sell through them. A landlord-financer sends money north with a merchant to finance the purchase of animals, which the merchant then ships south. Once the animals are sold, the profits are split between the intermediary and the cattle merchant. <u>Landlord-agents</u> are landlords who, in addition to their role as cattle brokers, act as salaried selling agents for certain northern cattle traders. The traders send animals south to their agents, who supervise the sale of the animals and then send the receipts north. Final'y, <u>landlord-traders</u> act as both brokers and traders, using their own capital to buy and re-sell animals, as well as arranging the sale of their clients' cattle to other buyers.[2]

Intermediary-sellers also fall into several different categories, depending on their activities. <u>Seller-brokers</u> carry out the most of the functions of a <u>landlord-broker</u> except they do not deal directly with northern cattle merchants. Rather, landlords consign animals to them to sell. The seller-broker finds a buyer, negotiates the terms of sale, guarantees the buyer's credit, and receives the commission paid by the buyer. The landlord who consigned the animal receives any gift paid by the seller, however. There are relatively few seller-brokers in Abidjan and Bouaké. Generally these are older, more established men, who may have been landlords previously but who have lost money because of unpaid debts. Their

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[1]In Ivory Coast they are known as <u>petits-intermediaries</u>.

[2]Intermediaries are often loathe to admit that they sometimes buy and sell animals themselves because this implies a potential conflict of interest between the landlord and the northern cattle merchants who sell through him. The landlord may not always try to get the highest price possible for the merchants' animals if he himself is interested in buying the animals. This potential conflict of interest is discussed below (pp. 137-38).

work as guarantors of buyers' credit tends to diffuse risk in the system, as the landlords do not end up bearing all the risk of buyers defaulting on their debts. Much more common than seller-brokers are <u>seller-go-betweens</u>. These are usually young men, often related to the landlords, who normally work with little or no capital. Their function is to help landlords sell their clients' animals. When a herd of cattle arrives in a market, usually in the morning or early afternoon, the go-betweens crowd around both the herd and the landlord shouting their offers for specific animals. If the landlord accepts a go-between's offer, the latter "buys" the animal on credit and then tries to re-sell it that same evening to another buyer, usually a butcher, for a profit which normally ranges between 1,000 and 5,000 CFAF . The go-between also receives the "obligatory" 200 CFAF commission paid by the buyer. If the go-between does not find a buyer after a day or two, he may give the animal back to the landlord and be relieved of his debt. Credit is thus extended to the go-betweens for no more than one or two days. The go-betweens are not allowed to guarantee a buyer's credit; if a go-between wants to sell an animal on credit he must have the approval of the landlord who consigned him the animal. The landlord then acts as the guarantor of the buyer's credit.

According to butchers in Bouaké and Abidjan, prior to 1968 there were few seller-go-betweens in these markets. The increase in the number of seller-go-betweens (there were approximately 40 active in the Bouaké market in 1977) may have resulted from the Sahelian drought, which reduced herd sizes in the north and forced many people previously dependent on livestock raising to look elsewhere for work. Butchers and government officials often charge that go-betweens are "parasites" who serve only to boost cattle prices, without rendering any services to buyer or seller. This charge is discussed on pages 138-140.

<u>Seller-agents</u> are paid employees of either landlords or northern cattle merchants. Their job is to help the merchant or landlord sell his own or his clients' animals. A seller-agent working for a landlord does not buy animals on credit to re-sell himself. Rather, his employer assigns him several animals to sell. He negotiates the terms of sale and then presents the proposed deal to both the landlord and the landlord's client for their approval or modification. A seller-agent who works for a

northern cattle merchant performs many of the same services that a landlord-
agent does, supervising the sale of the merchant's cattle in the southern
market when the merchant is not present. Seller-agents sometimes work with
a landlord who lodges the drovers that accompanied the merchant's animals
south. For his services, an agent may receive some or all of the commission
paid by the buyer, a salary, or both. He may also occasionally succeed in
making some profit of his own on a sale by selling an animal for more than
he reported to his employer, and pocketing the difference. A final
category of intermediary-seller is the seller-trader. This category
includes small-scale intermediaries who have acquired enough capital to
purchase one or more animals for cash. They ship these animals to other
markets for resale or hold the animals in the same market for resale at
a later date.[1] They are thus speculators, small-scale merchants who risk
their own capital in the cattle trade. They are discussed here as inter-
mediaries because they often resell animals in the same market in which
they bought them, thus earning an intermediary's commission in addition to
whatever profit they make, and because they normally work part of the time
as go-betweens.

The roles just described are not mutually exclusive. Many seller-
traders also work as go-betweens, for example. A landlord-financer may
also act as an agent for a northern cattle merchant, and a landlord temporarily
without clients may act as a seller-broker, selling animals consigned to
him by other brokers.[2] Figure 3.1 summarizes the activities of the different
types of intermediaries found in Abidjan and Bouaké.

Sellers are not obligated to use an intermediary in selling their
animals. If they feel they have sufficient knowledge of local market
conditions to handle their own sales they are free to do so. Almost all

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[1]They often transport the animals to other markets in herds cooperatively
owned by several seller-traders.

[2]This latter situation happens regularly in Abidjan. There is a
seasonal shortage of Voltaic animals in Abidjan from around mid-May through
August (see pp. 84-6), and during this time many Voltaic landlords sell
animals consigned to them by their Malian counterparts. Arrivals of
Malian cattle in Abidjan fall off from October through February because many
of the Malian herds are on transhumance, and during this period many Malian
landlords sell animals consigned to them by their Voltaic colleagues.

FIGURE 3.1

ECONOMIC ACTIVITIES OF DIFFERENT TYPES OF INTERMEDIARIES FOUND IN ABIDJAN AND BOUAF⁻

Type of Intermediary	Lodges and feeds northern cattle merchants	Acts as cattle broker for northern merchants	Guarantees buyer's credit	Finances cattle traders	Acts as sales agent for northern cattle traders	Buys and re-sells cattle on both cash and credit basis	Buys and re-sells cattle only on short-term credit	Arranges sales for other intermediaries
Landlords								
Broker	U	U	U	-	-	-	-	-
Financer	U	U	U	U	S	S	-	-
Agent	U	U	U	S	U	S	-	-
Trader	U	U	U	S	S	U	-	-
Sellers								
Broker	-	U	U	S	S	S	S	-
Co-Between	-	-	-	-	-	S	U	-
Agent	-	-	-	-	U	-	-	U
Trader	-	-	-	-	-	U	S	-

Legend: U - usually performs this function
S - sometimes performs this function
- - does not perform this function

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northern cattle merchants arriving in Abidjan and Bouaké choose to sell through an intermediary, although cattle merchants based in Abidjan and Bouaké often sell directly to butchers and other merchants.[1] When a merchant sells directly to a buyer, he usually receives the 200 CFAF- - per animal commission normally paid the intermediary. Thus, when a merchant decides to sell his animals through an intermediary he implicitly values the services received from the intermediary at a minimum of 200 CFAF per animal.

Background and Activities of Abidjan and Bouaké Intermediary-Landlords.—
In early 1977 there were 15 active intermediary-landlords in the Bouaké market. In addition, four cattle merchants based in Bouaké received and lodged northern cattle traders, usually in the hope of striking a deal for the purchase of the entire herd. All but one of the landlords in Bouaké were Malian (the other was Voltaic); this reflects Bouaké's dependence on Mali for its cattle supply. Twelve of the landlords were Fulani, two were Dioula, and one was Sarakolé. All were Moslem. In Abidjan sixteen main landlords were active in early 1977, of whom nine were Malian, six were Voltaic, and one was Mauritanian. There were more Voltaic landlords in Abidjan than in Bouaké because Abidjan is supplied largely by Voltaic cattle shipped south by rail.

In order to get a better understanding of the role played by intermediary-landlords in the marketing system, in-depth interviews were conducted with eight landlords in Bouaké and eight landlords in Abidjan. Tables 3.2 and 3.3 present some characteristics of the men interviewed. From Tables 3.2 and 3.3 several facts become evident. Landlords tend to be older, well-established men who have had long experience in the cattle trade. The average age of the landlords interviewed in Bouaké was 51.8 years; in Abidjan it was 55.8 years. The Bouaké landlords had lived an average of 21.3 years in Bouaké and the Abidjan landlords had spent an average of 15.8 years in Abidjan. None of the intermediary-landlords

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[1]Some cattle merchants from Upper Volta and Mali sell directly to large cattle merchants in Abidjan with whom they have long-standing personal ties. Such sales are often made without the aid of an intermediary.

TABLE 3.2

CHARACTERISTICS OF INTERMEDIARY-LANDLORDS INTERVIEWED IN BOUAKE IN 1977.

Characteristic	Intermediaries							
	1	2	3	4	5	6	7	8
Nationality	Malian	Malian	Malian	Malian	Malian	Voltaic	Malian	Malian
Ethnic group	Fulani	Fulani	Fulani	Sarakolé	Fulani	Fulani	Fulani	Fulani
Age	45	47	50	65	45	45	55	62
Father's profession	Cattle raiser	Cattle raiser	Cattle raiser	Agriculturalist	Cattle raiser and cattle merchant	Agriculturalist	Cattle raiser	Cattle raiser
Years of schooling	0	0	0	0	0	6	0	0
Number of years in Bouaké	7	12	19	35	35	17	30	15
Number of years as intermediary or cattle merchant	20	N.R.	29	20	20	25	37	46
Other countries or cities where worked as intermediary or cattle merchant	Mali	Ghana, northern Ivory Coast	Mali, Senegal, Togo, Upper Volta	None	None	Upper Volta	Mali, Guinea, Ghana, Senegal	Mali, Upper Volta, Abidjan
First job	Herder for family	Herder for uncle	Herder for father	Cloth merchant	Drover of trade herds	Drover of trade herds	Herder for uncle (cattle merchant)	Tailor
Other income earnings activities besides cattle trade	None	None	None	Agriculturalist	Cattle raiser	Butcher	None	None

NOTE: N.R. = no response

TABLE 3.3

CHARACTERISTICS OF INTERMEDIARY-LANDLORDS INTERVIEWED IN ABIDJAN IN 1977

Characteristics	Intermediaries							
	1	2	3	4	5	6	7	8
Nationality	Voltaic	Voltaic	Voltaic	Voltaic	Malian	Malian	Malian	Mauritanian
Ethnic group	Mossi	Mossi	Mossi	Mossi	Sonerai	Fulani	Fulani	Mauritanian Arab
Age	52	60	73	58	63	53	42	45
Father's profession	Agriculturalist	Cattle merchant	Agriculturalist and livestock raiser	Agriculturalist and cattle merchant	Kola merchant	Herder	Cattle raiser	Herder
Years of schooling	0	6	0	0	0	0	0	6
Number of years in Abidjan	14	17	19	21	16	14	7	18
Number of years as intermediary or cattle merchant	26	28	28	21	24	19	12	28
Other countries or cities where worked as intermediary or cattle merchant	Upper Volta	Upper Volta, Ghana	Upper Volta	Upper Volta	Mali	Mali	Man (Ivory Coast)	Mauritania, Upper Volta, Bouaké
First job	Drover	Assistant to father (cattle merchant)	Herder for family	Assitant to father (cattle merchant)	Assistant to father (kola merchant)	Herder	Drover	Herder
Other income earnings activities besides cattle trade	None	None	None	None	None	None	None	None

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interviewed had spent fewer than 12 years as a cattle merchant or inter-
mediary and most had worked as cattle merchants or intermediaries in other
countries before moving to Ivory Coast. The Bouaké landlords had spent an
average of 21.8 years in the trade; the Abidjan landlords had spent an
average of 23.3 years. Few had any formal Western education, although many
had attended Koranic schools. Almost all grew up around livestock (as
evidenced by their father's professions) and began their working lives in
the livestock sector. Several were taught the trade by their fathers or
uncles. Most of the landlords interviewed claimed to rely solely on the
cattle trade for their livelihood. This usually included their acting as
both brokers and cattle merchants. In short, the picture emerges of a
highly experienced group of men having a very specialized knowledge of their
trade.

All the landlords interviewed claimed to lodge and feed the cattle
merchants whose animals they sold. (Usually, however, the merchants would
pay between 125 and 200 CFAF per day to the landlords' wives to cover the
cost of food.) Six of the eight landlords interviewed in Bouaké said they
guaranteed the buyer's credit when animals were sold on credit. The re-
maining two said they no longer sold on credit because they had lost too
much money in unpaid debts. Six of the eight landlords interviewed in
Abidjan also said they guaranteed the credit of buyers when animals were
sold on credit, they also guaranteed to the buyer that the animal was not
stolen. They usually also guaranteed that it was in "good health".[1] If
either of these conditions were not met, the landlord was liable for any
loss suffered by the buyer. In Abidjan, landlords made no such guarantees.
Animals often arrive very weak in Abidjan after having spent several days
on the train or in trucks without food or water, and intermediaries would
be taking a large risk were they to guarantee the health of these animals.

Appendix 3A presents case studies of two intermediary-landlords, one
based in Bouaké and the other based in Abidjan.

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[1] When intermediaries guaranteed that an animal was in "good health"
they were only guaranteeing that it would not die before being slaughtered.
They were not guaranteeing that it was free of diseases that could result
in condemnation of the meat or offals by the Veterinary Service. As
shown below (pp. 170-71), the risk of condemnation was borne entirely by the
butchers and butchers' apprentices.

Landlords and Credit.-- Investigators such as Cohen (12, 13) and
Hill (31), who feel that intermediaries play a crucial role in cattle
marketing, have stressed the landlord-intermediary's function as a
guarantor of cattle buyers' credit. These authors feel that intermedi-
aries, by guaranteeing to the seller that the buyer will not "default on
credit extended to him, reduce the risk to the northern cattle merchants.
By reducing cattle merchants' risk of loss through default, intermedi-
aries encourage the flow of animals southward. At the same time, the
availability of credit to butchers allows butchers to operate with less
capital than they would otherwise need. This eases entry into the but-
chers' trade, encourages competition, and helps keep butchers' net margins
low.[1] Other observers (e.g., 47), however, believe that the intermedi-
aries' role as guarantors of credit is less important than is often
asserted. They claim that the incidence of credit sales has fallen in
recent years, and that when a buyer does default, intermediaries often
fail to fulfill their pledge to reimburse the seller. In short, they
say, landlords could be removed from the cattle trade without much dis-
ruption of the market.

This section focuses on the role of landlords in the provisions and
guaranteeing of credit. It aims at providing information on how im-
portant intermediaries are in providing credit and whether, indeed, they
might be removed from the marketing system without disrupting the trade.
The section is divided into three parts. The first part examines the
amounts and terms of credit extended in Bouaké and Abidjan. It shows that
between a quarter and a half of all sales in these cities are made on
credit, with landlords guaranteeing most of this credit. The second part
looks at the incidence of default by buyers and the reasons why buyers
default. It shows that default is a more serious problem in Abidjan than
in Bouaké, a situation that in part results from the highly fluctuating
cattle supply in Abidjan. The final part of the section examines the
role landlords play in debt collection, and describes the individual and
collective actions intermediaries may take to force repayment of debts.

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[1]One might argue that it makes sense for landlords to extend credit
to butchers in that as competition among butchers increases (because of
ease of entry into the trade), the butchers' bargaining power vis-a-vis
the intermediaries falls.

a. Amounts and terms of credit extended.-- Landlords and seller-
brokers provide most of the credit used in cattle marketing in Bouaké and
Abidjan. No merchant or butcher contacted during the study used bank
credit. Some cattle merchants extended credit directly to buyers without
an intermediary's guarantee of repayment, and occasionally butchers would
finance purchases by borrowing money from other butchers. Most buyers,
however, relied on intermediaries to guarantee their credit so that they
could buy animals without tying up large sums of capital.

According to older butchers and intermediaries interviewed in
Abidjan and Bouaké, the use of credit was much more widespread during the
1950s and early 1960s than in 1976-77. According to those interviewed,
almost all sales of cattle in Abidjan and Bouaké during the 1950s were
on credit, with the credit lasting from three days to two months. All
but one of the landlords and cattle merchants interviewed in Bouaké during
1977, however, claimed that no more than one-fourth of their current sales
were on credit.[1] In Abidjan, where sales of entire lots of animals were much
more frequent than in Bouaké, the use of credit in 1977 was more wide-
spread. Most landlords and merchants interviewed in Abidjan said that

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[1]The one exception was the highly successful cattle merchant des-
cribed in the case study in Appendix 3A, who said that all his sales were
on credit.

roughly half their sales were on credit.[1] All the intermediaries inter-
viewed agreed that the reason why the use of credit had declined was that
many merchants and intermediaries had lost a lot of money in unpaid
debts.[2] The ease with which buyers could obtain credit in the 1950s and
1960s made it easy to enter the butcher's trade, and may have encouraged

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[1] It proved extremely difficult during the study to get precise infor-
mation on the use of credit. Butchers were often reluctant to discuss
credit for two reasons: 1) some considered that admitting they purchased
animals on credit implied that they were poor. They therefore considered
it a point of honor to state that they always purchased animals for cash;
2) those who had not paid all their debts were afraid of being denounced
to the authorities and having their licenses suspended. This was especially
true in Bouaké where, a few months before the study began, several butchers
had had their licenses suspended for not paying their debts. (The govern-
ment, through the Veterinary Service, tries to force butchers to pay their
debts, apparently out of a fear that if butchers accumulate large debts,
cities in Ivory Coast might get a reputation as "bad risks" and be boy-
cotted by northern cattle merchants.)
     Cattle merchants and landlords, on the other hand, when asked how
much they were owed in unpaid debts, often stated what seemed to be
exaggerated figures. They usually refused to provide details of any
debts they still had hopes of recovering because they feared the investi-
gators would denounce the debtors to the veterinary authorities. If this
happened, the authorities might prevent the debtors from carrying out their
activities at the cattle market, and the landlords would lose any chance
they had of recovering the debts. Landlords also often refused to discuss
the use of credit even by buyers who normally repaid the credit on time,
stating that this was confidential information between the buyer and the
intermediary. They said that it was not the intermediary's place to
reveal such information.
     Most people who extended credit said they charged no interest on the
credit (i.e., that they did not charge more for an animal sold on credit
than for an animal sold for cash.) This response may reflect their
unwillingness to admit charging interest on a loan, which is forbidden by
Islam.

[2] Fraternité Matin (26, p. 9), Ivory Coast's semi-official newspaper,
stated that in 1975 the total unpaid debt of Abidjan butchers exceed_d 400
million CFAF. No source was given for this figure. Based on his survey
(see p.118), the investigator feels that the debt, although large, is
probably no more than half this figure. Lacrouts (39, p. 39) put the
debt of Abidjan butchers in 1975 at over 60 million CFAF.

people who lacked the necessary skills to enter the trade. These people could not make a profit butchering and ended up defaulting on their debts. All the merchants and intermediaries interviewed said that unpaid debts were still a major problem, and most felt the problem was worse in Abidjan than in Bouaké. When asked to state the largest single problem in livestock marketing, all but two of the landlords and cattle merchants interviewed in Bouaké mentioned the problem of buyers defaulting or not paying back credit on time.[1]

In addition to a reduction in the use of credit in recent years, the length of credit has decreased. Merchants and intermediaries reported that in the early 1960s credit was often extended for two weeks to a month. In 1977, the normal length of credit was from three to five days in Bouaké and two days in Abidjan. As mentioned earlier, however, the credit often was not repaid by the agreed date, so the actual period of credit was often longer than that which was agreed upon. Credit of one to two months was still sometimes extended to buyers who purchased a large number of animals. These buyers were usually well-established cattle merchants or butchers.

For both short and long-term credit sales, most sellers in Abidjan and Bouaké required a down payment of between one-third and one-half the total purchase price. Most intermediaries and merchants claimed they charged no interest on credit (i.e., that they charged the same price for animals sold on credit as for animals sold for cash). Credit is sometimes used as a substitute for short-term price fluctuations, however, being extended more widely when there is a temporary glut of animals on the market.[2] Two merchants based in Bouaké admitted charging more for animals sold on credit than for those sold for cash. As mentioned above (p. 101), these higher prices were the equivalent of a rate of interest of about 3.4 percent

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[1] In Abidjan, the most frequently mentioned problems were those related to rail transport (lack of cattle cars in Upper Volta, which reduced the number of animals shipped to Abidjan; long delays in transit; poor treatment of the animals during transit, etc.). This does not mean that credit was not a problem in Abidjan. It only means that rail transport was perceived as an even bigger problem.

[2] See p. 101. Intermediaries are also reluctant to extend credit when cattle prices are high, because as prices rise, so does the incidence of default by buyers. (See p. 118 below.)

per month.[1] In Abidjan, two of the landlords interviewed said they charged more for animals sold on credit than for those sold for cash. One said he only charged more if the sale involved more than about ten animals, i.e., only if a large amount of money was involved. In such cases, he added 3,000 CFAF to the price of each animal. The credit was normally extended for three to five days. Assuming an average sale price per animal of 67,000 CFAF[2], this implies a rate of interest of 27 to 45 percent per month, if the credit was repaid on time. The other intermediary charged more, 5,000 to 6,000 CFAF per animal. He said that he normally extended credit for two days, but that in reality buyers took a week or more to repay. Assuming a week's repayment time and an average sale price per animal of 67,000 CFAF, this implies an interest rate of 30 to 36 percent per month. It is not clear why the effective rate of interest for credit sales should be ten times higher in Abidjan than in Bouaké. In part, the higher rate probably reflects the higher risk of default borne by Abidjan landlords and merchants, but these costs probably do not justify a ten-fold difference in interest rates. Perhaps the Abidjan landlords who admitted charging more for credit sales sold animals to butchers with poor repayment records, which led the landlords to charge high rates of interest.

b. Default on credit.-- There are two main reasons why buyers delay repayment or default on credit. First, since animals are sold by sight rather than on a per-kg basis, buyers sometimes misjudge the animals' weights, hence their value.[3] A buyer may pay too much for an animal and then take a loss when he resells it, either live or as meat. Unable to repay the credit, he is forced to defer repayment of at least part of his

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[1] One case was also recorded in Bouaké of interest being charged by a northern cattle merchant who sold 81 animals on credit to a trader from Bongouanou, Ivory Coast. The effective rate of interest was ten percent per month.

[2] The average sale price of 948 head of cattle recorded in the Abidjan price survey between November, 1976 and June, 1977 was 67,485 CFAF.

[3] All animals sold in Abidjan and Bouaké are destined for slaughter; therefore, their value is primarily a function of their carcass weight.

debt. Butchers, whose margins are sometimes squeezed by rising cattle prices and relatively stable retail meat prices[1], may decide to buy animals at high prices and take losses on the resale of the meat rather than not butcher at all on certain days. In the short run butchers will continue to slaughter at a loss if they can cover their variable costs and some of their fixed costs (license, stall rental, etc.). They may also do so if they fear that by not slaughtering on days when cattle prices are high they might lose some of their regular customers. (In the long run, butchers may be slow to move out of the profession even if they consistently lose money because they may know no other trade.) If a butcher intentionally buys and slaughters an animal at a loss, he may then try to shift part of his loss back onto the merchant or intermediary who sold him the animal by defaulting on part of his debt. This usually happens when there is a shortage of animals on the market and cattle prices are high. (In Abidjan this is usually the result of an insufficient number of cattle arriving by rail.) Sellers try to minimize this problem by not extending much credit during cattle shortages.

The second reason why buyers default or defer repayment of credit is that many of them are short of working capital. They may buy animals on credit, resell them, either live or as meat, and then use the receipts to finance other business transactions. Again, fluctuating cattle prices play a role, particularly with small-scale butchers in Abidjan. A butcher may buy an animal on credit, slaughter it, and then sell the meat. If he then discovers that the price of cattle has risen, he may decide not to risk losing money by repaying his debt and then buying another animal on credit. Rather than repaying his debt, he uses his receipts to buy meat for cash from wholesale butchers, which he then sells retail. He continues doing this until the price of cattle falls, at which time he may repay his debt and begin buying and slaughtering cattle again.

During the interviews with cattle merchants and intermediaries in Abidjan and Bouaké, the respondants were asked to provide information on the amount of money owed them in unpaid debts. Many respondants were hesitant to provide this information, both for the reasons discussed earlier

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[1] For a discussion of why retail meat prices do not rise as rapidly as cattle prices during periods when few cattle are on the market, see Chapter 12.

(p. 115) and because they themselves owed many people money. The data
cussed below are based only on those cases where the respondant provided
information on the amount of the debt, the date at which it was contracted,
and either the name of the debtor or the number of animals involved. To
make sure the credit involved was unlikely to be recovered, only debts
contracted six months or more prior to the interview are considered.

Only two of the landlords (and none of the cattle merchants) inter-
viewed in Bouaké provided the detailed information requested. One was
owed 400,000 CFAF and the other was owed 426,900 CFAF. The debts were
between one and three years old. Two respondants stated that nobody owed
them money, and the others either did not respond or gave only global esti-
mates of the debt owed them. These ranged from 500,000 CFAF to 74,000,000
CFAF [1].

The Abidjan landlords provided much more detailed information.
Table 3.4 presents the results.

TABLE 3.4

UNPAID DEBTS OWED TO A SAMPLE OF ABIDJAN INTERMEDIARIES AND CATTLE MERCHANTS, 1977
(CFAF)

Agent Owed Debt	Average Unpaid Debt	Minimum Debt Owed	Maximum Debt Owed	Average Loss in Unpaid Debts per Year In Abidjan
Landlord-Intermediaries (N=7)	1,698,000	200,000	4,800,000	566,000
Cattle Merchants (N=3)	3,143,300	170,000	8,060,000	576,000
Seller-Traders (N=2)	133,000	95,300	170,000	133,000

[1] The landlord who claimed he was owed 74 million CFA F said he con-
tracted that debt while working as a landlord in Abidjan during the 1950's.
Interviews with other landlords in Bouaké and Abidjan confirmed that the
man had been one of the most important landlords and cattle merchants in
Abidjan during the 1950's and that he had lost a large amount of money in
unpaid debts. It was not possible to confirm the amount owed him, however.
When interviewed in Bouaké he was one of the least important landlords
in the market, often working as a seller-trader and seller-go-between.

Seven of the eight landlords interviewed claimed they were owed debts that were over six months due. The average amount owed was 1,698,000 CFAF These debts had been contracted over several years; the average debt per intermediary for each year in business was 566,000 CFAF This figure was similar to the average yearly loss through unpaid debts of Abidjan-based cattle merchants (576,000 CFAF). The average loss for the two intermediary-sellers who provided detailed information was much less, 133,000 CFAF per year. This reflects the smaller amount of credit extended by these agents than by landlords and Abidjan-based cattle merchants.

The average debt figures shown in Table 3.4 should be considered the minimum amounts owed to intermediaries and merchants in Abidjan, as they represent only the debts for which the respondants would provide details. The debts were owed by livestock traders as well as butchers, and some of the debtors were from cities other than Abidjan. In addition to nonpayment of debts, buyers often fail to repay credit on time, even if they do eventually repay it all. This reduces the number of times a merchant can rotate his capital per year and thus reduces his yearly profits.

The data presented in Table 3.4 can be used to derive a rough estimate of the total unpaid debt owed to Abidjan landlords. In early 1977 there were 16 major landlords active in the Abidjan market, and Table 3.3 shows that on the average they had spent 15.8 years as landlords in Abidjan. Assuming a yearly loss in unpaid debts of 566,000 CFAF per intermediary, this implies the total debt to Abidjan landlords in 1977 equaled 143 million CFAF. Since debts were also owed to Abidjan-based cattle merchants and seller-traders, the total unpaid debt in Abidjan in 1977 probably totaled close to 200 million CFAF. Not all of this debt, however, was owed by Abidjan butchers. Some was owed by buyers (butchers and traders) from outside of Abidjan and some represented debts contracted between Abidjan-based cattle traders.

Intermediaries can be viewed as providers of default insurance. In 1976, official records (10) show that 27,123 head of cattle arrived at the Abidjan cattle market. As mentioned in Appendix 1E, this figure probably understates the true volume of arrivals by about 15 percent; thus the number of cattle that arrived was probably about 31,200

head. Assuming that these animals were sold by the 16 Abidjan landlords,
this implies that the average landlord sold about 1,950 head per year.
The annual loss in unpaid debts per animal was thus 566,000 CFAF ÷ 1,950 =
290 CFAF.   This is not an enormous cost per animal; the problem is that
in the absence of a guarantee of repayment, the loss would be concentrated
in the hands of a few northern cattle merchants. The function of the land-
lords is to provide default insurance, spreading the risk of default among
all the market participants. Viewed in this way, the gift paid to the
landlord by the seller and the intermediary's commission paid by the
buyer can be considered as insurance premiums.[1]

   c. Debt collection by landlords.-- When a buyer does not repay
his credit on time, the intermediary who is in charge of collecting the
debt for the merchant may take a number of actions himself to collect
the debt, or he may try to organize collective action on the part of all
intermediaries to force the buyer to repay. Usually, the first step
taken is to constantly remind the buyer of his debt, plead with him to
pay it, and threaten more serious action if he does not. In Bouaké inter-
mediaries often go to the meat market in the morning and stand near the
butchers to whom they have sold animals on credit. When the butchers
finish selling the meat, the intermediaries demand repayment of the credit.
If these techniques fail, the landlord may threaten to denounce the debtor
to the police. The threat often convinces the buyer to repay. If not,
the intermediary may actually go to the police, who then convoke both the
debtor and creditor. If the police establish that the debt is valid,
they establish a repayment schedule that the debtor is obligated to follow.

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[1]The average "premium" per animal in 1977 was roughly 367 CFAF
(The commission paid by the buyer was 200 CFAF per head, and the gift
from the seller averaged about 5,000 CFAF for a herd of 30 head.
This implies a net profit for the landlord of 77 CFAF per animal, or
roughly 150,000 CFAF per year (assuming an annual volume of 1,950 head).
This represents a monthly income of only 12,500 CFAF which seems very low
given the landlords' standard of living. The apparent low income earned
in guaranteeing credit suggests that landlords have other sources of income
(e.g., interest earnings on the credit extended, or profits earned by
buying and selling cattle for themselves), or that they do not always
repay the full amount of defaulted credit they guarantee. These possi-
bilities are discussed below.

If the debtor fails to meet the schedule, the intermediary can file a complaint and the debtor will be jailed. Intermediaries consider going to the police only as a last resort. It is risky because the debtor may flee the area, leaving the intermediary no chance of recovering his money. Similarly, intermediaries rarely try to have a debtor jailed because once he is jailed he cannot earn money to repay the debt. Although licensed wholesale butchers in Ivory Coast are required to post a bond to cover bad debts,[1] the investigator is unaware of any instance in which the authorities actually used this bond to pay a creditor.

The actions an individual intermediary can take against his debtors are thus limited. Most intermediaries interviewed said that patience was the key to recovering money owed them. They would constantly remind the debtor of his debt and try to collect it a little at a time.[2]

Intermediaries and cattle merchants often work collectively to try to reduce the risk of default by buyers and to force repayment when default occurs. The most common collaboration is sharing information on who is a bad credit risk. All but one of the intermediaries and cattle merchants interviewed in Abidjan and Bouaké stated they regularly discussed the solvency of different buyers with other intermediaries and merchants. This sharing of information obviously reduces the risk of default borne by intermediaries. It also puts pressure on debtors to repay, as it becomes more difficult for them to obtain animals on credit if they have large outstanding debts. Sometimes an intermediary will try to convince his colleagues to refuse to sell to a buyer who owes him money. Such boycotts may even preclude selling to solvent buyers (e.g., large butchers) who buy several animals at a time and then resell one or two to the person owing the debt. Several of the more important landlords in Abidjan, Bouaké, and Man reported that they had tried several times to

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[1] In Bouaké during 1976-77, licensing regulations required butchers to place 300,000 CFAF in an escrow account in a local bank.

[2] One intermediary in Abidjan said that he often continued to sell to people who owed him money, but at increased prices, hoping to recover the unpaid debt through increased profits on subsequent sales.

forge an agreement among all the intermediaries in the market to refuse to sell to any buyer who had an unpaid debt to one of their members. They said that such agreements inevitably broke down because of competition among the intermediaries. Each intermediary hoped that in selling an animal he would earn a profit, and hence he would overlook a few unpaid debts on the part of the buyer. If buyers <u>consistently</u> failed to pay their debts, however, they were soon blacklisted by the intermediaries. During the study a few cases were recorded of butchers having to quit slaughtering because nobody would sell them animals. Most of these men began selling frozen meat.

If a buyer does not repay the credit extended him, the landlord or seller-broker is theoretically obligated to pay the cattle merchant for his animals. Actually, the landlord or seller-broker may end up not absorbing the entire loss. Normally if a debt is not repaid on time, the cattle merchant allows the intermediary several days to try to recover the debt. If the merchant has unsold animals he may continue selling in the same market or move on to another market and try to pick up his money from the intermediary before returning home. During this time the merchant, not the intermediary, pays the implicit cost of having the capital tied up in the unpaid debt. If the debt remains unpaid when the merchant wishes to return home, the intermediary may try to convince him to leave without the money, promising to either send it north once it is collected or hold it until the merchant or one of his agents return to the market.[1] If the merchant agrees, he again bears the cost of having his capital immobilized. Obviously, if the debt covers many animals, only merchants with a lot of working capital can afford to delay collection of the debt. If a merchant insists on immediate repayment, the intermediary may default on part or all of the debt, usually promising to repay it at a later date. A landlord or seller-broker cannot default on his debts very often, however, without tarnishing his reputation among cattle merchants and risking the loss of future clients. Northern cattle merchants contacted during the

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[1]Voltaic merchants who regularly export several carloads of cattle to Abidjan per month often have their drovers return north with only part of the receipts from the sale of a herd. Collection of the rest is left to the team of drovers that accompanies the next load of cattle south.

study said that intermediaries defaulted more frequently in Abidjan than in other markets. This probably resulted from buyers defaulting on credit more frequently in Abidjan than in other markets.

Market Concentration Among Intermediaries.-- It is sometimes asserted that a few large cattle merchants and intermediaries control such a high proportion of sales in certain markets that they can restrict the number of animals sold, thus forcing up prices and earning monopoly profits. Data collected during the field studies in Bouaké and Abidjan can be used to measure the degree of market concentration among major intermediaries in these two cities and to draw inferences about the likely degree of competition among them.

a. Theoretical considerations.[1]-- Economic theory suggests that a high degree of market concentration[2] is often associated with non-competitive pricing arrangements. If a few firms control a large proportion of a market's total sales, each firm perceives that it cannot act independently of its competitors. Any attempt by a firm to increase its market share by cutting prices will be noticed by the firm's competitors (since the price reduction markedly and adversely affects their sales), and they will likely retaliate, possibly leading to a mutually destructive price war. Market participants thus have a strong incentive to pursue, either tacitly or explicitly, joint profit-maximizing policies that restrict sales and raise prices. The larger the number of sellers on the market, however, and the smaller their individual market shares, the stronger is the incentive for an individual firm to deviate from the joint profit-maximizing policies by cutting prices in an attempt to increase its market share. If there are many sellers in the market, each having a small market share, an increase in the market share of any one firm (e.g., as the result of price-cutting) represents a very small decrease in the market shares of the other firms. The other firms are unlikely to notice, or

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[1] The following discussion is based mainly on 4a, pp. 112-124.

[2] i.e., a high proportion of total sales being controlled by a few firms or individuals.

at least identify the reason for, their decreased market shares, and thus are unlikely to retaliate. Therefore, as the number of sellers in a market becomes larger and as their individual market shares become smaller, there is an increasing tendency for the sellers to act independently of each other, and this tendency usually breaks down tacit or explicit collusive pricing arrangements. While a high degree of market concentration does not prove the existence of collusive pricing in a market, there are strong theoretical reasons to believe that the presence of few sellers in a market, each having a large market share, is often associated with noncompetitive pricing.

A question arises as to whether this theoretical argument is applicable to cattle intermediaries, who serve mainly as brokers, not merchants. Since intermediaries in Abidjan and Bouaké receive a 200 CFAF commission for every animal they sell, one would expect them to try to sell as many animals as possible. Restricting the volume of animals sold in order to boost prices would lower the intermediaries' earnings from commissions. There are two considerations, however, that might induce intermediaries to restrict the number of animals sold in order to raise prices. First, if an intermediary succeeds in getting high prices for his client's animals, the client (a northern cattle merchant) may respond by giving the intermediary a larger-than-normal cash gift once the herd is sold. The intermediary thus faces a tradeoff between his earnings from the 200 CFAF commissions paid by the purchaser (these earnings increase as the number of animals sold increases) and his earnings from the gift from the seller.[1] Normally, however, the commission paid by the buyer represents a larger part of the landlords income than does the gift from the seller (see p. 102n.); therefore, in most instances intermediaries have an interest in maximizing, not restricting. the volume of animals sold. The second situation that might induce intermediaries to restrict

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[1] As long as tʰ demand curve for cattle is downward sloping, then an increase in cattle prices cannot yield an increase in the number of animals marketed and therefore cannot yield an increase in the intermediaries' revenue from commissions. If, however, the demand for cattle is very inelastic, then an increase in price will not reduce the number of animals sold very much and might increase the gifts the intermediaries receive from their clients by more than enough to compensate for the intermediaries' lower income from commissions.

the volume of animals sold would be if the intermediaries were not only acting as brokers, but were also selling cattle on their own account. As mentioned earlier, many landlord-intermediaries sometimes buy and sell cattle on their own, acting as cattle merchants as well as cattle brokers. For intermediaries to have an incentive to act collusively to restrict trade and boost prices, however, it would be necessary for a majority of them to be selling cattle for themselves at the same time. It is not clear that cattle trading (as opposed to cattle brokering) by intermediaries is sufficiently widespread for this condition to be met. In short, although there may be some instances in which it would be in the intermediaries collective interest to restrict the number of animals sold in order to artificially raise prices, in most cases it is not. Therefore, even if there is a high degree of market concentration among intermediaries, it is not clear that this implies that prices are not competitively determined. Given the way in which landlord-intermediaries are paid, a high degree of market concentration need not be inconsistent with competitive pricing.

b. Criteria for judging market concentration.-- There is no clear-cut relationship between the degree of seller concentration in a market and the amount of noncompetitive pricing that occurs. It is impossible to say, for example, that if four firms control 80 percent of sales, pricing will be noncompetitive. It is possible, however, to classify different degrees of market concentration and describe the characteristic of each class. Bain (4a) has developed a six-fold classification of market concentration, which is presented in Table 3.5.

The classification scheme presented in Table 3.5 ranges from very highly concentrated oligopolies, where the largest four firms control 80 to 95 percent of total sales and the total number of sellers is low, to atomistic industries, where no firm controls more than a few percent of total sales and the total number of sellers is large. Pricing is typically competitive in atomistic industries, and many authors argue that it is also very difficult to maintain non-competitive pricing arrangements in Type IV and V oligopolies (4a, pp. 142-144). In Type I through Type III oligopolies, however, sellers recognize their mutual inter-

TABLE 3.5

CLASSIFICATION OF MARKET CONCENTRATION

Market Type	Description	Percentage of Total Sales Handles By		Other Characteristics
		Largest 4 Firms	Largest 8 Firms	
Type I-a Oligopoly	Very highly concentrated	80-95	90-100	Small competitive fringe of firms in addition to the largest firms
Type I-b Oligopoly	Very highly concentrated	70-85	80-100	Slightly larger number of firms than Type I-a. Larger competitive fringe
Type II Oligopoly	Highly concentrated	65-75	85-90	Competitive fringe of 20 to 100 other firms
Type III Oligopoly	High-moderate concentration	50-65	70-85	Large competitive fringe
Type IV Oligopoly	Low-moderate concentration	35-50	45-70	Large number of total sellers
Type V Oligopoly	Low concentration	<35	<45	Largest firms each control more than a few percent of total sales
Atomistic	Very low concentration	<10		Very large number of firms, none of which controls more than a few percent of total sales

SOURCE: Adapted from Bain, Joe. S., Industrial Organization, Second Edition (New York: John Wiley and Sons, 1968), pp. 112-144.

dependence,[1] and this may foster non-competitive pricing arrangements. The degree of market imperfection that prevails, however, depends on the individual conditions in each market. As was argued above, with any given level of market concentration one would expect a higher degree of price competition among intermediaries than among other types of sellers because the way in which intermediaries are paid often encourages them to maximize their volume of sales.

c. The data.-- Data collected during the field studies in Bouaké and Abidjan allow calculation of concentration ratios for the major intermediaries in these two markets. For Bouaké two sets of data are available. The first set refers exclusively to landlords and seller-brokers. For each of the 244 herds of cattle recorded as arriving at the Bouaké market between December, 1976 and June, 1977[2], an enumerator noted the principal intermediary handling the sale. (If the cattle owner did not use an intermediary to sell his animals, the owner's name was recorded.) The second data set refers to all intermediaries and merchants who offered two or more animals for sale on any given day between September, 1976 and June, 1977. These data not only include landlords and seller-brokers, but also some smaller-scale intermediaries to whom the landlords had consigned animals to sell. These data came from market reports which the study's enumerators filled out five days per week. The enumerators noted the number of herds offered for sale, the number of animals in each herd, and the name of the intermediary handling the sale.[3]

Most decisions regarding the extension of credit to buyers are made by the landlords and seller-brokers. The first set of Bouaké data,

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[1] i.e., they recognize that they cannot make pricing and sales decisions without considering the reaction (and possible retaliation) of their competitors.

[2] The herds included 9,821 head of cattle.

[3] Included were all intermediaries who held their animals apart in distinct herds during the market. Seller-go-betweens who left "their" animals in the herds of the major intermediaries who had consigned them the animals were excluded from the analysis because it was impossible to distinguish the go-betweens' animals from those of the main intermediaries. The go-betweens' animals were thus counted as being sold by the major intermediaries in whose herds they were found.

which measures the degree of market concentration among landlords and seller-brokers,may therefore be useful in drawing inferences about degree of competition in the <u>credit market</u> for livestock sales in Bouaké. Decisions regarding what price to charge for cattle, on the other hand,. are made by the agents actually selling the animals (landlords, seller-brokers, and smaller-scale intermediaries). The second set of Bouaké data, which measures the degree of market concentration among these cattle-selling agents, may be useful in drawing inferences about the degree of price competition in the Bouaké cattle market.[1] Table 3.6 presents the concentration ratios for intermediaries in Bouaké calculated using the two different sets of data.[2] Table 3.6 indicates that when the entire period of observation is considered, both data sets indicate only a low to moderate degree of market

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[1] Concentration ratios calculated using the two different sets of data are not strictly comparable. In the data on herd arrivals in Bouaké (the first data set),a given animal was recorded only once, on the day it arrived in Bouaké. In the daily market reports (the second data set), however, the same animal was recorded every day it appeared on the market. For example, if it appeared on the market three days before being sold, it was recorded (next to the name of the intermediary who was selling it) three different times. Thus, if certain intermediaries took longer than others to sell their animals, their calculated market shares, as measured using the data from the market reports, were overestimated.

[2] Concentration ratios were calculated from the arrival report data (data set 1) by dividing the total number of animals handled by a given intermediary (or merchant, if the merchant sold his animals himself) by the total number of animals entering the market on days when the enumerators recorded intermediaries on the arrival reports. (On some days intermediaries were not noted on the arrival reports because the enumerators were busy with other work. Intermediaries were noted for 85 percent of the herds entering the Bouaké market during the survey period, however.) Similarly, concentration ratios were calculated from the daily market report data (data set 2) by dividing the total number of animals recorded for each intermediary by the total number of animals recorded for all intermediaries.

TABLE 3.6

CONCENTRATION RATIOS FOR INTERMEDIARIES IN BOUAKE

Number of Sellers	Percentage of Total Sales[a]	
	Landlords and Seller Brokers (Data Set 1)	All Large and Medium-Scale Intermediaries (Data Set 2)
	Entire Period of Observation	
	(Dec., 1976-June, 1977)	(Sept., 1976-June, 1977)
Largest 1	14.8	20.1
Largest 4	45.7	45.3
Largest 8	65.2	63.5
Largest 20	90.9	87.8
Total Number of Sellers	34	62
	Month of Highest Concentration[b]	
	(December, 1976)	(January, 1977)
Largest 1	23.7	23.6
Largest 4	66.4	69.0
Largest 8	91.9	86.7
Total Number of Sellers	10	17
	Month of Lowest Concentration[b]	
	(April, 1977)	(November, 1976)
Largest 1	23.8	12.4
Largest 4	51.6	43.6
Largest 8	69.6	64.5
Total Number of Sellers	18	24

[a]Concentration ratio is defined as the number of animals sold by an intermediary divided by the total number of animals sold (for which an intermediary was recorded).

[b]Degree of concentration measured by the percentage of total sales handled by the four largest intermediaries.

concentration among intermediaries in Bouaké.[1] The degree of concentration for the period as a whole corresponds to the Type IV oligopoly described in Table 3.5, a form of market organization in which it is difficult to maintain collusive pricing arrangements. The degree of market concentration in any one month, however, was much greater than that for the survey period as a whole. During the study period several intermediaries and northern merchants sold cattle in Bouaké only occasionally, and their inclusion in the study makes it appear as if there were more intermediaries active in the Bouaké market (and hence market shares were smaller) than typically was the case. Looking at the data for individual months gives a more realistic picture of what the typical situation was like.

Table 3.6 shows that in the months of highest market concentration,[2] one intermediary controlled almost a quarter of total sales, the four largest intermediaries controlled about two-thirds of total sales, and the eight largest intermediaries handled about 90 percent of total sales. While no single intermediary dominated the market, there was still a high degree of seller concentration, corresponding to the Type II oligopoly described in Table 3.5. This suggests that during at least part of the year there was scope for noncompetitive pricing and credit decisions in the Bouaké cattle market. During the months of lowest market concentration, however, the market structure was close to that of Type IV oligopoly (low to moderate concentration), in which it would be difficult to maintain collusive pricing behavior. The two months of highest concentra-

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[1] Normally one would expect the concentration ratios calculated for large intermediaries alone (using data set 1) to be greater than those calculated for both large and medium-scale intermediaries combined (data set 2), since as the large intermediaries consigned some of their animals to medium-scale intermediaries, the large intermediaires' market shares would fall. There are two reasons, however, why the concentration ratios calculated using data set 2 may exceed those calculated using data set 1. First, the intermediaries with the largest market shares as measured by data set 2 (the daily market reports) may have sold their animals more slowly than the other intermediaries, leading to more double-counting of their animals in the daily market reports. (See footnote 1, p. 129). This would inflate their calculated market shares. Second, the largest intermediaries may have bought animals from other intermediaries to resell themselves. This would result in their share of total sales being larger than their share of total arrivals.

[2] The degree of market concentration was measured by the percentage of total sales handled by the four largest intermediaries.

tion cited in Table 3.6 were the only months in which market concentration, as measured by either set of data, reached the level of a Type II oligopoly. In all other months, market concentration corresponded to either a Type III oligopoly (high to moderate concentration) or a Type IV oligopoly (low to moderate concentration).

The data clearly refute the hypothesis that one or two intermediaries completely dominated the Bouaké cattle market, either in the provision of credit or in the determination of prices. In most months, the level of seller concentration was moderate, and even in the months of highest seller concentration, no single intermediary was in a strong enough position to dictate prices to buyers. Although the data indicate that in some months there was scope for noncompetitive market behavior by the intermediaries in Bouaké, strong theoretical arguments (see p. 126) suggest that intermediaries have an incentive to maximize, not restirct, the volume of animals sold.

For Abidjan only one source of data, the daily market reports, is available to measure the degree of market concentration among intermediaries. These data refer to all intermediaries and merchants[1] recorded as selling herds of cattle in the Abidjan market between December, 1976 and June, 1977. Table 3.7 presents the results. It indicates that there were many more sellers active in Abidjan than in Bouaké, both during the overall study period and in any given month. Many of these sellers were Voltaic exporters, their drovers, or agents, who sold without the aid of an intermediary. Table 3.7 indicates not only a much larger number of sellers active in Abidjan than in Bouaké, but also a much lower level of market concentration. Even in the month of highest concentration, the largest intermediary controlled only 12.4 percent of total sales, the four largest controlled slightly over a third, and the top eight controlled 55.6 percent. This degree of concentration corresponded to a Type IV oligopoly (low to moderate concentration), while in the month of least concentration the market resembled a Type V oligopoly (low concentration). As mentioned above, sellers would find it very difficult

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[1] Merchants who did not sell through an intermediary.

TABLE 3.7

CONCENTRATION RATIOS FOR LARGE AND MEDIUM-SCALE
INTERMEDIARIES IN ABIDJAN

Number of Sellers	Percentage of Total Sales[a]
December, 1976 - June, 1977	
Largest 1	6.8
Largest 4	23.2
Largest 8	37.1
Largest 20	64.4
Total Number of Sellers	140
Month of Highest Concentration (February, 1977)[b]	
Largest 1	12.4
Largest 4	35.7
Largest 8	55.6
Largest 20	76.4
Total Number of Sellers	62
Month of Lowest Concentration (May, 1977)[b]	
Largest 1	7.6
Largest 4	26.6
Largest 8	44.4
Largest 20	77.0
Total Number of Sellers	61

[a]See note a, Table 3.6

[b]See note b, Table 3.6

to maintain collusive pricing arrangements with this degree of market concentration.

The data for Abidjan clearly refute the assertation that one or a small group of intermediaries dominated the Abidjan cattle market and dictated prices to buyers. The low level of market concentration indicates that even if the larger intermediaries were inclined to form collusive agreements to restrict trade, these agreements would almost surely break down because of competition among the large number of sellers on the market. Thus, at the level of the intermediaries, the Abidjan market probably operates in a fairly competitive manner.

Possible Abuses by Intermediaries.-- Government officials often charge that intermediaries collude to raise cattle prices, that they take unfair advantage of cattle owners, and that they perform no useful economic purpose, serving only to raise cattle prices. Usually the officials making these charges do not distinguish among the different types of intermediaries described above, labeling them all "parasites". This section examines some of these charges.

a. Collusion.-- Collusion by intermediaries could be of two types: collusion aimed primarily at restricting who has the right to buy cattle in the market (e.g., in order to force buyers to pay off their debts to sellers) and collusion aimed at raising cattle prices by restricting the volume of animals sold. The first type of collusion is fairly widespread in Bouaké and Abidjan. As mentioned earlier, intermediaries share information on the solvency of buyers and sometimes agree not to sell to a buyer who has not repaid his debts. Such collusion is aimed at reducing the risk of default borne by landlords and seller-brokers rather than at price-raising.

Many butchers complain, however, that landlords often refuse to sell directly to them even when the butchers do not have any outstanding debts. Rather, they say, the landlords insist on selling to go-betweens, often during the morning when the butchers are in town selling meat. The butchers charge that this needlessly raises cattle prices because go-betweens add a margin of 1,000 - 5,000 CFAF per animal without pro-

viding any services to the butcher. The landlords' preference for
dealing with go-betweens m·y be based on two considerations. First, in
selling to go-betweens, a landlord speeds up the sale of his herd.
Both the landlord and the go-between may know how much the cattle owner
has invested in the animals (see p. 136n· below), and this, combined with
the lack of negotiations over credit terms, speeds up the bargaining.[1]
The work of the landlord is reduced (as the detailed price negotiation
with the butchers is left to the go-betweens) and the sale of the herd
is expedited. The second reason why landlords may prefer to deal with
go-betweens rather than with butchers is that the relatively well-off
landlords may be socially obligated to provide employment to their less-
fortunate kin.[2] By refusing to deal directly with butchers, the land-
lords permit some of these relatives to earn livings as go-betweens.
Whether the existence of go-betweens raises the price butchers eventually
pay for their animals (or whether in the absence of go-betweens the
margin they earn would be captured by the landlord or the cattle merchant)
depends on the relative bargaining power of the butchers and the land-
lords. To the extent that there is perfect competition at each stage of
the marketing chain (cattle merchants, landlords, and butchers) sellers
at each stage have no choice but to pass on the cost of maintaining go-
betweens to their customers. If any seller has a degree of monopoly
power, however, he will not pass on the entire increase in cost, but will
absorb part of it out of his monopoly profits in order to maintain his
volume of sales. (The amount of the extra cost a monopolist will absorb
depends on the price elasticity of demand for his product.) Given the
generally high level of competition in cattle and beef marketing, it is
likely that in the short run most of the cost of supporting go-betweens
is passed on to meat consumers in the form of higher prices. In the
long run, however, consumers may benefit from the activities of go-betweens.

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[1] Landlords "sell" animals to go-betweens on credit, but go-betweens do
not take possession of the cattle until they have found a buyer for them.
The landlord therefore bears no risk that the go-between will default, and
this simplifies the bargaining.

[2] As mentioned earlier, butchers reported that the number of go-betweens
active in Abidjan and Bouaké increased dramatically after the Sahelian drought
of the late 1960s, when many herders lost their animals and were forced to
find work elsewhere.

By speeding up the sale of herds in the south, and thus allowing northern cattle merchants to rotate their capital more quickly, go-betweens increase the profitability of the north-south cattle trade. This encourages the shipment of animals south and may lead to lower meat prices.

There is no evidence that intermediaries restrict the number of animals sold in Bouaké and Abidjan in order to raise prices. Intermediaries do share price information among themselves, but there is no evidence that they use this information to fix prices.[1] Indeed, since a l_ge part of intermediaries' incomes comes from the fixed commission they receive for each animal sold, intermediaries usually have an interest in maximizing, not restricting, the number of animals they sell. When acute shortages of cattle occasionally occurred in the Bouaké market during 1976-77, intermediaries sent representatives or traveled themselves to surrounding markets to lock for animals. Some of the intermediaries were acting as arbitragers, actually buying the animals themselves and then reselling them in Bouaké. Many acted only as brokers, however, trying to convince merchants in other markets to ship their animals to Bouaké. As mentioned earlier, one of the main complaints of the Abidjan intermediaries was the shortage of cattle cars in Upper Volta, which, by forcing Voltaic cattle merchants to wait weeks (or pay bribes to rail employees) to get cattle cars, discouraged merchants from shipping animals to Abidjan.

Even if intermediaries wanted to restrict the number of cattle sold, structural characteristics of the Bouaké and Abidjan markets for cattle and beef would make it difficult for them to do so. The degree of market concentration among intermediaries, particularly in Abidjan, is low enough to make any sort of collusive pricing arrangement inherently unstable. The amount of price-fixing intermediaries in Abidjan and Bouaké could engage in was further limited by the availability to butchers of inexpensive frozen beef. If butchers found cattle prices too high, they could se l frozen meat instead of slaughtering cattle.

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[1] All the landlords and brokers interviewed in Abidjan and Bouaké said they shared information given them by northern cattle merchants on the prices paid for particular animals in the producing regions and on the costs incurred in shipping the animals to market.

In short, there is some evidence that intermediaries in Abidjan and Bouaké colluded in deciding to whom they would sell animals, but there is no evidence they colluded to restrict the number of animals sold.

b. Conflicts of interest between intermediaries and cattle merchants.-- Several potential conflicts of interest can arise between intermediaries acting as brokers and the merchants for whom they sell cattle. Since intermediaries earn a large part of their income from the commission paid by buyers, they may be tempted to favor the buyer in price negotiations, in hopes of being paid a higher commission. An intermediary cannot do this often, however, without risking both his gift from the seller and his reputation among cattle merchants as honest broker.

A second way in which an intermediary may profit at a merchant's expense is by reporting to the merchant that a buyer has offered less for an animal than he actually has. If the merchant accepts the reported offer, the intermediary pockets the difference. The frequency with which this can occur in Abidjan and Bouake is limited because price negotiations normally take place within earshot of the merchant. Negotiations are conducted most frequently in Dioula, a trading language very widely understood in West Africa. If the merchant is not present when the price is discussed or if he does not understand the language in which negotiations take place, it is easier for the intermediary to defraud him in this manner. By engaging in any deceptive practices, however, the intermediary risks his reputation among cattle merchants as an honest broker. Since an intermediary must rely on his reputation to bring him future clients, he cannot afford to defraud clients very often.

If an intermediary acts as both a cattle trader and a broker, other potential conflicts of interest arise. A broker may not always try to get the highest price for his client's animals if he himself is interested in buying them, either directly or through an agent posing as

an independent buyer.[1] If a broker arranges the sale of his clients' animals on credit, he may make the seller wait longer than necessary to receive his money, even if the buyer pays the broker on time. The broker may use the receipts of the sale to finance his own (usually short-distance) cattle trading before returning the money to the merchant. He may delay repayment to his client by reporting the credit has not been repaid on time or by arranging longer-term credit than was really needed. If the buyer then repays the credit before the due date, the intermediary uses the capital to finance his own operations until he is obligated to return the money to his client.

The preceding discussion suggests the scope of possible conflicts of interest between intermediaries and their clients. Undoubtedly some abuse of confidence occurs. It obviously cannot be quantified because intermediaries will not admit taking advantage of clients, and cattle merchants may be unaware that they have been treated unfairly by their intermediaries, or they may be too embarrassed to admit it. Abuses of confidence probably are the exception, however, because intermediaries cannot afford to sully their reputations. An intermediary relies on his reputation to bring him clients, and if he takes advantage of his clients very often he risks putting himself out of business.

c. **Are intermediaries parasites?**--The most commonly made charge against intermediaries is that they contribute no services to either buyer or seller, only raising cattle prices by selling animals among themselves before finally selling them to long-distance cattle merchants or butchers. Butchers contacted in Bouaké and Abidjan often voiced

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[1]Hill (31, p. 8) reports that during the early 1960s, intermediaries in Kumasi, Ghana sometimes paid agents to pose as independent merchants and secretly buy animals for them. The intermediaries would sell their clients' cattle to these agents at low prices, and then resell the animals themselves once the northern merchants had returned home.

The investigator once observed an intermediary in Bouaké buying animals directly from one of his clients "as a favor" to the client after having falsely told him that butchers were offering very low prices for his animals. The intermediary then resold the animals for a considerable profit the next day after the merchant had left Bouaké.

this complaint about intermediaries, especially go-betweens. Government officials voice this complaint about all intermediaries.

In evaluating this charge, one must distinguish carefully among the different types of intermediaries. Clearly, landlords provide several important economic services, especially extending and guaranteeing credit. They act as "information brokers"[1], telling sellers who is and is not creditworthy and bearing the sometimes heavy costs of collecting credit. Eliminating landlords from the marketing system and moving to sales solely on a cash basis, as is sometimes advocated, would greatly increase the amount of working capital needed by butchers and would force many smaller butchers to quit slaughtering. This would reduce compeition in the butchers' trade and could therefore lead to higher meat prices.

Many of the intermediary-sellers also perform important economic functions. Seller-brokers extend and guarantee credit as do landlords, and this reduces the risk of default borne by landlords. Seller-agents, by freeing the intermediary or merchant from negotiating each sale himself, speed up the sale of a cattle merchant's animals, allowing him to rotate his capital more quickly. The more rapid rate of capital rotation allows northern merchants to ship more animals south per year, thus increasing their earnings. Seller-traders (and landlord-traders) perform both spatial and temporal arbitrage. They thus insure that rural areas and smaller towns are supplied with beef and reduce seasonal variations in the cattle supply.

The charge of parasitism, if it has any merit at all, may be applicable only to go-betweens. Go-betweens do not extend or guarantee credit themselves, nor do they engage in arbitrage. Their activities resemble those of a salesman earning a variable commission on each sale. The commission is equal to the difference between the price they offer the landlord for the animal and the price they receive from the buyer. Yet, as indicated above, in carrying out their activities, go-betweens perform the useful economic function of speeding up the sale of cattle, which allows livestock merchants to rotate their capital more rapidly and earn a higher profit in the cattle trade. This, in turn, encourages the flow of animals southward.

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[1] The term is Stryker's (117).

Clearly, then, most intermediaries are not parasites. They perform useful economic functions, particularly in providing credit and facilitationg the flow of market information. Even where the charge of parasitism appears strongest (the case of go-betweens), it is far from proven. Policy-makers should therefore be cautious about suggestions to eliminate intermediaries from the cattle trade.

CHAPTER 4

THE STRUCTURE OF CATTLE AND MEAT MARKETS: PART 2

This chapter continues the discussion of market structure begun in Chapter 3, focusing on the role of butchers in the trade, the amount of employment generated in cattle and beef marketing, and how differences in market structure in Bouaké and Abidjan affect the functioning of the cattle markets in these two cities. The bulk of the chapter deals with the role of butchers in the cattle trade and examines the competitiveness of the butchers' trade. To evaluate market competition, the chapter looks at market structure (e.g., the number of butchers in the trade and their relative market shares), barriers to entry into the trade (licensing, capital, and training requirements), sources of meat supply, the importance of credit in purchases and sales, and the prevalence of cooperative arrangements among butchers.

The chapter is divided into seven parts. The first part briefly describes the different classes of butchers and meat sellers active in Ivory Coast. The second part examines the wholesale trade in frozen beef carried out by AGRIPAC and DISTRIPAC, the two parastatal companies in charge of importing frozen meat. The third and largest part of the chapter, examines the wholesale trade in fresh beef and addresses the question of market competition. The next section examines the retail meat trade and the relative importance of the class 1 (European-style) and class 2 (traditional) markets for beef. The chapter next explores the apprenticeship system for butchers in Abidjan and Bouaké, describing the organization and importance of the indigenous training program for butchers. The sixth part of the chapter looks at the employment generated in cattle and beef marketing and discusses the employment implications of constructing capital-intensive abattoirs. Finally, the last section of the chapter compares the structure and functioning of the cattle and meat markets in Bouaké and Abidjan.

The chapter shows that the wholesale and retail butchering trades are fairly competitive. There is little scope for collusion among butchers because there are many participants in the trade and market shares are typically small. Although butchers do cooperate among themselves, this cooperation is aimed more at diffusing market information and easing entry into the trade than at fixing prices. The major barrier to entry into butchering is the capital requirement, estimated at a minimum of 60,000 CFAF. Licensing requirements, while they do not pose an absolute barrier to entry, have created a black market for licenses, which significantly raises butchers' costs. Given the competitive nature of the butchering trade, these costs are passed on to consumers in the form of higher meat prices. Credit is important to butchers, both in purchasing animals and in wholesaling meat, and restrictions on the use of credit in the marketing system would probably lead to a reduction in slaughters and a higher degree of market concentration among butchers.

The chapter shows that the apprenticeship system for butchers provides basic training in the skills of the trade, and that almost all wholesale butchers spend several years as apprentices before beginning to slaughter on their own. The chapter also shows that the traditional cattle and meat marketing system is labor-intensive, and that constructing modern, capital-intensive abattoirs can lead to substantial unemployment among marketing agents. Finally, the lack of holding near the Abidjan cattle market and unreliable rail transport for livestock are shown to be responsible for many of the problems of cattle marketing in Abidjan.

Types of Butchers in Ivory Coast

Ivorian licensing regulations define three types of butchers. Wholesale butchers (bouchers-chevillards) are authorized to buy animals, slaughter them, and sell the meat wholesale. Retail butchers (bouchers-detaillants) are not allowed to slaughter animals. They are authorized only to buy meat from wholesale butchers, cut it, and resell it retail. A third type of butcher, the slaughtering-retail butcher (boucher-abattant-detaillant), is

authorized to practice his trade mainly in smaller towns. He buys animals, slaughters them, and sells all of the meat retail. Although wholesale butchers technically are not allowed to sell meat retail, many of them do. Those who do so are termed "wholesale-retail butchers" in this study.

Official regulations futher distinguish two types of retail butchers. Class 1 retailers (bouchers-detaillants de première classe) include supermarkets and European-style butcher shops, establishments with refrigeration equipment selling European-style cuts of meat. Class 2 retailers (bouchers-detaillants de deuxième classe) include butchers who sell meat in stalls in open-air markets. They own no refrigeration equipment and sell fewer distinct cuts of meat than do the class 1 butchers.[1] The bulk of the meat sold in the country is handled by class 2 retailers, with the class 1 retailers catering mainl. to high-income consumers in the major cities.

In addition to the class 2 retailers, there exists in Abidjan and Bouaké a large number of meat vendors. These people have no market stalls; they walk around the markets and neighborhoods carrying pallets of meat. They sell the meat in small unweighed piles (tas) for between 25 and 100 CFAF. Often the vendors are agents of wholesale-retail butchers or class 2 retailers and receive a commission on the meat they sell. In most cities there are also many sellers of grilled meat. These people usually buy from 5 to 20 kg of meat each morning. They grill it over charcoal and sell it on street corners during the afternoons and evenings.

The Wholesale Trade in Frozen and Chilled Beef

As shown in Chapter 1, most of the beef sold in Abidjan in 1976 and roughly 40 percent of that sold in Bouaké was imported frozen meat. All of this meat was wholesaled by AGRIPAC and DISTRIPAC, the two parastatal companies authorized to import meat into Ivory Coast.

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[1] See Chapter 12 for a discussion of the types of meat sold by class 2 retailers.

Up until 1976 butchers were free to import meat from overseas them-
selves. Normally, they would place orders through one of four large
private meat importers. Prior to 1975 only class 1 retailers sold im-
ported chilled and frozen meat. Class 2 retailers supplied themselves
with locally-slaughtered fresh meat. In March 1976 the government
granted AGRIPAC, a parastatal company specializing in marketing imported
vegetables and certain staple crops (e.g., yams), the exclusive right
to import meat into Ivory Coast. Later in the year, DISTRIPAC, a para-
statal company specializing in the retail marketing of household goods
and processed agricultural products, was granted permission to import meat
in competition with AGRIPAC.[1]

In 1976, AGRIPAC handled slightly under half the total frozen and
chilled meat imported into the country, including most of the meat
imported for the class 1 retailers. AGRIPAC did not sell directly to the
class 1 retailers. It sold the meat wholesale to the four private compan-
ies and individuals who formerly were the largest meat importers in Ivory
Coast. AGRIPAC retained these former importers as distributors because
of their contacts with the class 1 retailers. The distributors resold the
meat to the retailers. AGRIPAC sold meat to class 2 retailers in two dif-
ferent ways. It sold much of its meat to large-scale wholesalers who in
turn resold to individual retailers. AGRIPAC also sold directly to indivi-
dual retailers in Abidjan through its limited wholesale (demi-gros) outlet
in Abobo-Gare, to the north of Abidjan.

DISTRIPAC originally sold meat to class 2 retailers through the butchers'
union. Individual butchers would place orders for meat with DISTRIPAC,
which would then deliver the meat to the union on credit. The union would
then distribute the meat to the butchers on credit, collecting the money for
it later to repay DISTRIPAC. The union thus acted as a guarantor of its
members' credit. DISTRIPAC abandoned this method of sales after several

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[1]AGRIPAC and DISTRIPAC lost their exclusive import rights to meat in
early 1978, when the government authorized a return to free trade in imported
meat.

butchers defaulted on their debts to the union. The union, having few financial reserves itself, was forced in turn to default to DISTRIPAC. DISTRIPAC now sells through a series of large wholesale butchers, as does AGRIPAC. Both companies still sell some meat on credit, but less than when they first began selling meat.

Some class 1 retailers charge that the granting of exclusive import rights to AGRIPAC and DISTRIPAC raised prices and reduced competition in the class 1 market. They said that any savings these companies might have gained by ordering large quantities of meat overseas were more than offset by AGRIPAC's refusal to sell directly to the class 1 retailers, passing instead through its distributors. The retailers claimed that by granting exclusive import rights to AGRIPAC and DISTRIPAC, the government had just added a superfluous link to the marketing chain. Whereas previously class 1 retailers bought directly from importers, they were now forced to buy from a distributor who in turn bought from the importer. Furthermore, since almost all class 1 butchers dealt with the same importer (AGRIPAC), they all received meat from the same overseas suppliers. This, the butchers said, effectively ended quality competition among class 1 retailers.

The Wholesale Trade in Fresh Beef

In spite of the recent inroads made by frozen beef into the Ivorian market, fresh beef remains the most widely consumed red meat in Ivory Coast. All this beef is handled by wholesale and wholesale-retail butchers, so the degree of competition in the wholesale beef trade has strong implications for the welfare of both producers and consumers of beef. This section examines the competitiveness of the wholesale trade by looking at the structure of the wholesale beef market (e.g., market concentration and barriers to entry) and uses interview data to look at cooperative arrangements among butchers, butchers' sources of meat supply, and their reliance on credit.

Market Concentration Among Butchers. -- During 1976-77, approximately 55 wholesale and wholesale-retail butchers were buying and slaughtering cattle in Abidjan, and roughly 45 wholesale-retail butchers were active in Bouaké. There were also several butchers in Abidjan who were wholesalers of frozen meat, buying carcasses from the two parastatal importing companies (AGRIPAC and DISTRIPAC) and wholesaling quarters of frozen beef to other butchers. In Bouaké there was only one major frozen-meat wholesaler, other than AGRIPAC.[1] Most of the wholesale butchers in Bouaké slaughtered only one animal per day, although a few (e.g. those who sold to supermarkets) slaughtered two. Market concentration in Bouaké was thus very low, approaching the perfectly competitive model of many buyers, each with equally small market shares. In Abidjan there was more market concentration among butchers. Roughly ten wholesalers each slaughtered between four and ten head per day (out of a total daily slaughter of about 100 to 110 head). No single butcher, however, controlled more than about 15 percent of total purchases, and the total amount of market concentration appeared no higher than that among Abidjan intermediaries.[2] Although 12 class 1 retailers in Abidjan were also licensed to slaughter, in 1976-77 none of them did so. They preferred to buy meat from African wholesale and wholesale-retail butchers.

The low levels of market concentration among wholesale butchers in both Abidjan and Bouaké suggest a high level of price competition for cattle. No single butcher was in a position to dictate prices to buyers, and there was not a high enough level of concentration to permit the formation of a stable cartel among butchers that could force down cattle prices.

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[1]This wholesaler held the contract to supply most of the institutions of Bouaké with meat (the schools, the hospital, the army, etc.). Until mid-1975 he was the largest boucher-chevillard in Bouaké, slaughtering up to 20 head of cattle per day (out of a total slaughter of around 40). He reportedly switched to selling frozen meat after having amassed a large debt with one of the Bouaké landlords, which resulted in many of the landlords refusing to sell to him. He was, however, still licensed to slaughter and occasionally did so if he could not buy enough frozen meat to fulfill his contract obligations.

[2]Due to limitations on time and manpower, the data needed to calculate concentration ratios for butchers in Abidjan and Bouaké were not collected. The above description of market concentration is drawn from the investigator's personal observations.

Licensing Requirements. -- All wholesale butchers must, in principle, be licensed. Many, however, are not, but the costs of operating without a license are often high. Licensing requirements (and the black market for licenses they generate) do not pose an absolute barrier to entry, but they do significantly raise the cost of butchering.

Both the Abidjan and Bouaké abattoirs are municipally owned, and the licensing of wholesale butchers is handled by the municipal governments. The number of licenses issued is strictly limited, presumably to help insure good hygiene in the abattoirs by restricting access to them. At the time of the study, Bouaké licensing officials updated their list of wholesale butchers every year; Abidjan officials had not done so since 1970. In neither city, however, did officials establish who among the licensed wholesale butchers were actually practicing the profession. This allowed many licensed butchers who had retired or gone into other professions (e.g. selling cattle) to continue to pay for their licenses each year and then rent them out to younger butchers who were unable to get licenses because all the authorized places had been taken. (Once a butcher has a license he has the option of renewing it every year. Only if he decides not to or has his license revoked for violation of certain regulations does a place on the official roster become available.)

Rental of licenses is illegal but very widespread. A licensed wholesaler butcher who leaves the profession has a strong incentive to continue to purchase his license every year and rent it out. In Bouaké during 1976 and early 1977, the normal rental fee for a license costing between 105,000 CFAF and 110,000 CFAF per year was 1,500 CFAF per day, or roughly 540,000 CFAF per year. As a result of this situation, in 1977 most of the wholesale butchers on the official roster in Abidjan and many of those on the list in Bouaké were either retired, in other professions, or dead. (When butchers die their families sometimes continue to buy their licenses every year and rent them out.) By limiting the number of licenses issued, the municipal governments have made it very costly for younger butchers to practice the profession; and their increased costs are reflected in the price of meat.

Even if the number of licenses issued were increased, however, there probably would still exist a small rental market for licenses because not all the people who want to be wholesale butchers can meet the legal requirement of placing 300,000 CFAF in an escrow account as a financial guarantee against unpaid debts. These individuals have no alternative but to rent a license or not slaughter.[1]

Capital Requirements for Butchering. -- A major barrier to entry into butchering is the capital required to buy and slaughter animals. Butchers reported that in the 1950s and early 1960s animals were usually sold on credit and the capital requirement to enter butchering was low, on the order of 10,000 to 20,000 CFAF.[2] The increase in cattle prices and slaughter taxes and the tightening of credit availability since the late 1960s (see Chapter 3, pp. 114-15) have raised considerably the amount of capital needed to enter butchering. Most butchers just starting out in the trade cannot buy animals on credit because they are relatively unknown to the landlords. In 1977 they therefore needed a minimum of about 60,000 CFAF to buy an animal, rent a license (the fee for license rental can be paid daily, which reduces the initial capital requirement), pay the slaughter tax, rent a market stall, and pay for equipment (scales, knives, etc.).[3] Given that most apprentice butchers earn between 15,000 and 25,000 CFAF per month, and assuming that they save 10 percent of their monthly income, this implies that they must work a minimum of two years as apprentices to accumulate enough capital to begin butchering. Data presented below indicate that most wholesale butchers active in Abidjan and Bouaké during 1977 spent more than two years as apprentices, during which time they accumulated capital and learned

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[1] The widespread renting out of licenses suggests that were the government to grant butchers' licenses exclusively to Ivorians so that the industry would be controlled by Ivory Coast nationals, many of the new butchers might rent out their licenses to non-Ivorian Africans who had butchered previously.

[2] This covered a down payment on an animal, market stall and license rental, slaughter taxes, and miscellaneous costs.

[3] Most young butchers began by slaughtering small or young cattle which sold for between 35,000 and 45,000 CFAF per head. This left 15,000 to 25,000 CFAF to cover the other expenses.

the basic skills of the trade.[1]

Interview Data. -- In order to get detailed information on several issues that influence the functioning of the wholesale beef market (e.g., the background and training of wholesale butchers, credit constraints in the trade, and cooperative agreements among butchers that might constitute collusion), in-depth interviews were conducted with 27 wholesale-retail butchers in Bouaké and 8 wholesale butchers in Abidjan during 1976 and 1977. The Bouaké sample included nearly two-thirds of the active wholesale butchers in Bouaké. The breakdown of the Bouaké sample by nationality and ethnic group is compared below to that of the entire population of Bouaké wholesale butchers active in December, 1976.[2]

	Sample	Population
Number	27	45
Nationality:		
Voltaic	15 (56%)	19 (42%)
Guinean	5 (19%)	9 (20%)
Malian	5 (19%)	9 (20%)
Other	2 (7%)	8 (18%)
Ethnic Group:		
Fulani	14 (52%)	19 (42%)
Nounouma	6 (22%)	9 (20%)
Malinké-Bambara	4 (15%)	12 (27%)
Other	3 (11%)	5 (11%)

Random sampling could not be used in selecting respondants because some butchers were suspicious of the interviewers and refused to participate. Nonetheless, over 60 percent of the wholesale butchers in Bouaké agreed to be interviewed, and the sample generally reflected the ethnic and national

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[1] If a novice butcher had to purchase a butcher's license rather than renting one (assuming licenses were available) the capital requirement for entering the trade would be much higher, on the order of 460,000 CFAF (100,000 CFAF for the license itself and 300,000 CFAF for the bond against bad debts.)

[2] Excluding the wholesale butcher who sold only frozen meat.

background of the Bouaké butchers as a whole. Voltaics were over-represented in the sample, while "other" nationalities (Ivorians, Ghanaians, and Mauritanians) were under-represented. Similarly, Fulani butchers were over-represented, and Malinké and Bambara butchers were under-represented.

Comparable data are not available on the ethnic groups and nationalities of the roughly 55 wholesale butchers active in Abidjan in 1977. The Abidjan sample is known to exclude one important group, however: Yoruba butchers originally from Nigeria. Roughly 10-15 Yoruba wholesale butchers were active in Abidjan in 1977. Most of the remaining butchers in Abidjan were Malians. Because some of the butchers in both Bouaké and Abidjan were suspicious of the interviewers, one should interpret their responses with caution.

a. Background of wholesale butchers in Abidjan and Bouaké. --

The interviews provided detailed background information on the sample butchers which is summarized in Tables 4A.1 and 4A.2 in Appendix 4A.[1] The interviews revealed that most of the sample butchers had several years' experience in the trade, but that they were generally younger than the landlords who sold them animals. The average age of the sample butchers in Bouaké was 39.7 years, compared with 51.8 years for the landlords interviewed. Although all but one of the butchers interviewed in Bouaké was a non-Ivorian, most had lived in Bouaké for a long time, the average being 20 years. The number of years they had been independent butchers, buying and slaughtering animals on their own, varied between 1 and 40 years; the average was 12.9 years.

There were two broad classes of wholesale butchers in Bouaké: Fulani butchers, most of whose families were involved in the livestock and meat trades (their fathers were livestock raisers, cattle merchants, or butchers), and non-Fulani butchers, most of whose families were agriculturalists. Most of the non-Fulanis had relatives who were butchers, however, and had begun their careers as apprentices to these relatives. Fourteen of the twenty in the total sample who responded said that their first job was

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[1]Appendix 4B presents case studies of several of these butchers.

as an apprentice butcher; two others had worked as retail meat vendors.

The eight butchers interviewed in Abidjan were generally younger than those interviewed in Bouaké although one was 66 years old. The average age of the sample (excluding the oldest butcher) was 29.7 years. The seven youngest butchers in the sample had spent an average of 8.7 years in Abidjan and had been independent butchers for an average of 6.1 years. Five of the eight sample butchers came from families involved in the livestock or meat trades. Two others had fathers who were merchants, and only one butcher came from a strictly agricultural background. Two of the five who responded said they had begun their working lives as apprentice butchers; the other three had begun as vendors. As with the Bouaké butchers, most entered the meat trade as apprentices to relatives who were butchers.

Only one of the butchers interviewed in Abidjan and Bouaké actually dressed out the carcasses of his animals himself. The rest employed apprentices to do this, although the butchers sometimes supervised. All but two butchers interviewed claimed to work exclusively for themselves; the other two worked in partnerships with relatives. Seven of the eight butchers interviewed in Abidjan and twelve of the twenty-seven interviewed in Bouaké were not licensed; they rented the licenses of others. Most expressed a desire to have their own licenses, but said this was impossible because the municipalities limited the number of licenses issued.

b. **Training of butchers.** -- Veterinary officials in Ivory Coast occasionally state that the reason why butchers default on debts to landlords is that butchers typically enter their profession with very little background or training in the livestock and meat trades. Not having the basic skills necessary to succeed in butchering (the ability to estimate the carcass weights, basic accounting skills, etc.' these butchers lose money and accumulate debts.

The interview data collected in Abidjan and Bouaké belie this stereotype. Not only had most of the sample butchers grown up around the livestock and meat trades, almost all had spent several years as apprentice butchers before beginning to slaughter on their own. The butchers in the

Bouaké sample had spent an average of 7.5 years as apprentices, and only one butcher in the Bouaké sample had not worked as an apprentice. He had spent several years, however, as a retail meat vendor before becoming a wholesale butcher. Eight of the butchers interviewed in Bouaké (30 percent of the sample) had worked as butchers or apprentices in other cities before moving to Bouaké.[1] The Abidjan sample butchers had spent an average of 4.5 years as apprentices before beginning to slaughter on their own. Half had worked as butchers or apprentices elsewhere before moving to Abidjan. During their apprenticeships, butchers learn the basic skills of the trade and accumulate the capital needed to begin slaughtering. The apprenticeship system is discussed in more detail later in this chapter.

c. Other sources of income. -- Most of the butchers interviewed relied entirely on the meat trade for their livelihood. Only 7 of the 26 butchers in the Bouaké sample reported any income-earning activities outside of butchering: two sold cattle, two owned taxis, one continued to work as an apprentice butcher, one was a vegetable farmer, and one sold ice cream. Only two slaughtered more than one animal per day. Both these men often sold meat to hotels and class 1 retailers in Bouaké. The butchers in the Abidjan sample generally slaughtered more animals than the Bouaké butchers, averaging about 3.4 head per butcher per day. Only two of the Abidjan sample claimed to derive any income from sources outside of butchering. It thus appears that wholesale butchers in Abidjan and Bouaké are both very experienced and very specialized in the meat trade.

d. Sources of supply: cattle and fresh beef. -- If butchers are contractually tied to certain suppliers of cattle or meat (e.g., because of indebtedness), the suppliers may be able to extract monopoly profits from the butchers. If, on the other hand, butchers are free to buy from any

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[1] A ninth butcher began working as a butcher in Bouaké, then moved to Abidjan. He returned to Bouaké after several years in Abidjan. Most of the butchers who had worked outside of Bouaké were Guineans; all the Guineans in the sample had worked in Guinea before moving to Ivory Coast.

supplier, cattle prices are much more likely to be competitively determined. This section looks at where wholesale butchers in Abidjan and Bouaké bought their cattle and meat and analyzes how dependent they were on certain suppliers.

All of the butchers interviewed in Abidjan and most of those interviewed in Bouaké said they bought animals exclusively in the cattle markets of their respective cities. Eight of the Bouaké butchers said they also occasionally purchased animals on a per-kilogram-liveweight basis from government development agencies (AVB, CIDT, IRCT)[1] and from the local livestock research station.[2] Purchases from the research station and development agencies, however, represented a minor part of these butchers' total purchases. Only one butcher claimed to have ever purchased animals outside of Bouaké for slaughter in Bouaké.[3]

All of the butchers in the Bouaké sample and five of the eight butchers in the Abidjan sample said they always purchased animals through an intermediary. The three who did not said they sometimes purchased directly from other butchers, particularly if they were in debt and were being boycotted by the intermediaries. Although the sample butchers almost never purchased animals outside of Bouaké or Abidjan, most butchers bought from **different** intermediaries each day. Butchers were not tied, either through debt or traditional obligation, to any particular intermediary. The butchers' freedom to buy from any intermediary helped insure competition among the intermediaries: butchers typically would go from one seller to another looking for the best deal.[4]

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[1]AVB = Authorité pour l'Amenagement de la Vallée du Bandama
CIDT = Compagnie Ivoirienne de Développement des Textiles
IRCT = Institut de Recherche sur la Cultivation des Textiles

[2]The Centre de Recherches Zootechniques (CRZ), part of the Institut des Savannes, located in Bouaké.

[3]One of the Bouaké butchers who was not interviewed owned a pickup truck and specialized in buying trade animals that had fallen ill or been injured between Bouaké and Katiola (55 km to the north of Bouaké). He would transport these animals in his truck to Bouaké, for slaughter.

[4]Three of the Bouaké sample butchers, however, said they almost always dealt with the same intermediaries and that these intermediaries often extended credit to them. Two of these three butchers were having financial difficulties and might not have been able to get credit elsewhere.

Few of the butchers interviewed employed buying agents regularly, preferring to deal directly with the intermediaries. Eleven of the Bouaké butchers, however, said they sometimes approached intermediaries (usually seller brokers or go-betweens) and asked them to either negotiate the terms of sale of a particular animal for them or find a certain type of animal for them. In return, they would pay the intermediaries between 500 and 4,000 CFAF. These butchers felt that the intermediaries, having close ties with the landlords, could negotiate more favorable terms of sale than could the butchers themselves. They also felt that employing an intermediary could assure that even if several people wanted the same animal, they would end up getting it. Two of the Abidjan butchers reported regularly buying animals from large butchers who bought many animals at a time. One did this in order to benefit from the discounts the large butchers received for buying in volume, and the other did it in order to get animals when the intermediaries refused to sell to him because of his indebtedness.

Twelve of the Bouaké sample, but none of the Abidjan sample, said they normally held one or more animals in a reserve herd. The Bouaké butchers would buy several animals on days when the supply of cattle was high and prices were consequently low. They would hold the animals in grazing areas around the cattle market, slaughtering them when the supply diminished and prices rose. The number of reserve animals held per butcher ranged between one and five. By keeping a reserve of animals, butchers helped to insulate themselves from price fluctuations, and thus reduced the bargaining power of cattle merchants and intermediaries during times of cattle shortages. The main cost to the butchers of maintaining a reserve herd was the implicit cost of the capital tied up in the animals, and only butchers with considerable working capital could afford to keep more than one or two animals in the reserve herd.[1] In Abidjan, the lack of grazing

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[1] The butchers pooled their animals into a single herd and hired two herders to guard it. The herders charged 100 CFAF per animal guarded, with no limit on the amount of time an animal could remain in the herd. Thus, the marginal cost of keeping an animal in the herd for an extra day was simply the opportunity cost of the capital plus the risk that the animal might lose weight or die. Since adequate grazing and water were available during most of the year, the risk of weight loss was small.

around the cattle market prevented butchers from holding animals for more
than a few days. Butchers therefore could not reduce their vulnerability
to price fluctuations by creating a reserve herd.

In addition to buying cattle, six of the twenty-seven butchers
interviewed in Bouaké and six of the eight interviewed in Abidjan reported
buying meat wholesale from other butchers to resell themselves. This meat
complemented that of the animals they slaughtered themselves. These pur-
chases were normally made on credit, the credit lasting between one and
three days. Few of the butchers reported buying from a single supplier.
As they did in the cattle market, most butchers shopped around for the
best deal.

e. Purchases on Credit. -- As mentioned in Chapter 3, government
officials sometimes suggest that cattle sales on credit should be outlawed in
order to eliminate the problem of butchers defaulting on their debts to
landlords. In order to assess the impact such a move would have on cattle
marketing in Abidjan and Bouaké, it is first necessary to know how widespread
the use of credit is. The interviews with landlords discussed in Chapter 3
indicated that roughly half the cattle sales in Abidjan and a quarter of
the sales in Bouaké were on credit. The interviews with wholesale butchers
confirmed these figures. All but one of the Abidjan butchers interviewed
said they purchased about half their animals on credit from intermediaries.
Only 13 of the 27 butchers in the Bouaké sample, however, admitted buying
animals on credit.[1] Among the Bouaké butchers who said they bought on
credit, the proportion of total purchases that were on credit ranged from
25 to 100 percent, averaging 58 percent. The overall proportion of total
credit purchases by the Bouaké sample was therefore about 28 percent
(13/27 x 58%).

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[1] A fourteenth butcher often bought animals using money advanced to him
by the supermarkets to which he sold meat.

Given butchers' heavy reliance on credit, particularly in Abidjan, eliminating credit from the marketing system would be quite disruptive. Butchers rely on credit to reduce the amount of working capital needed in butchering. Outlawing credit sales would cause most large-scale butchers in Abidjan to reduce the number of animals they slaughtered (since, on the average, they have only enough capital to pay cash for about half their total purchases). It would probably also cause some smaller-scale butchers who rely on credit to cease butchering altogether. In the short run, at least, the total number of cattle slaughtered, therefore, would fall, meat prices would rise, and the butchering trade would become more concentrated. Credit, for all the problems of indebtedness it engenders, reduces the amount of working capital needed by butchers and thus encourages competition within the trade.

f. Sales of frozen beef. -- The butchers interviewed specialized in selling fresh meat. Only one member of the Bouaké sample and two members of the Abidjan sample reported selling frozen meat at the time of the interview. Sixteen of the twenty-seven butchers in the Bouaké sample, however, reported they had sold frozen meat previously but had quit doing so because they had lost money selling it. Examining the reasons why the frozen beef trade had proved unprofitable for the Bouaké butchers sheds light on the factors that limit the expansion of frozen meat sales, particularly in the interior of Ivory Coast.

The Bouaké butchers voiced six main complaints about the frozen meat:

1) Many of their customers did not like the look or taste of the frozen meat and refused to buy it. Dislike of the meat was particularly strong among Moslem consumers, who often doubted that the animals had been killed in the prescribed Moslem fashion.

2) The carcasses were large and the bones were very thick. Cutting up the carcasses was therefore difficult and time consuming. (All cutting in class 2 butcher shops is done

by hand.) Unless butchers who sold frozen meat began
cutting up the carcasses much earlier than their col-
leagues who sold fresh meat, they would be late in get-
ting their meat on the market and would be likely to
have unsold meat at the end of the day. This meat would
probably have to be sold at a discount.

3) Frozen meat left over at the end of the day did not
store as well as fresh meat. Several butchers stated
that if re-refrigerated, the frozen meat often turned black.

4) Several butchers charged that AGRIPAC often delivered
less meat than they had paid for. This problem arose because
the wholesale price of the frozen meat was calculated using
the weight of the frozen quarters of beef, including the
plastic wrappings. Butchers picked up the meat, however,
after it had been thawed. During thawing there was a consi-
derable loss of water, perhaps 5 percent of the total weight.

5) The wholesale price of frozen meat rose sharply in early
1977, while retail meat prices rose much more slowly, cutting
the gross margins of butchers selling frozen meat in Bouaké
by over half.

6) Frozen meat could not be purchased on credit. AGRIPAC
officials in Bouaké said they had quit selling on credit
after several butchers defaulted on their debts.

The factors that limited the profitability of the frozen beef trade
in Bouaké can be summarized as consumer resistance to the frozen meat, parti-
cularly among Moslems, and a selling price that did not cover, in the butchers'
view, the higher costs of selling frozen meat (including the value of the
extra labor time involved). Butchers in Bouaké could not pass on these extra
costs to consumers because, given c.   'rs' preference for fresh beef,
butchers were forced to sell frozen   more cheaply than locally slaughtered
beef. In Abidjan, however, where there was a large non-Moslem population and

where the retail prices of both fresh and frozen meat were higher (thus allowing a higher gross margin to be earned selling frozen meat), fewer complaints were voiced by the sellers of frozen meat.

B. __Sales of fresh beef__. -- In order to establish the costs incurred by wholesale-retail butchers (as a first step in calculating their net margins[1]) and in order to understand the problems these butchers faced in selling fresh beef, it is necessary to examine their wholesale and retail selling practices. This section describes the clientele of wholesale-retail butchers, the typical terms of sale, and the costs butchers incur in their selling operations.

The sales pattern of wholesale-retail butchers was different in Bouaké than in Abidjan. Although authorized to work only as wholesale butchers, every butcher interviewed in Bouaké also sold some meat retail, with six of the twenty-seven selling exclusively retail. On the average, the Bouaké sample sold almost 65 percent of its meat retail. In Abidjan, where the larger number of animals handled per butcher allowed more specialization, only two of the sample sold any meat retail. Meat was sold wholesale to both class 1 and class 2 retailers, vendors of fresh and grilled meat, hotels, and restaurants. Three of the Bouaké sample and four of the Abidjan sample said they had verbal contracts to regularly supply certain retailers with meat.

Ten of the twenty-five Bouaké butchers who responded to the question reported that when they sold meat retail, they did so only on a weight basis.[2] The other fifteen butcher reported that they sold meat both by weight and in small unweighed piles (__tas__). As explained in Chapter 12, meat sold by __tas__ is purchased mainly by lower-income consumers who cannot afford to buy much meat. Only one of the Bouaké butchers reported that as much as half of his total retail sales were accounted for by tas sales, however.

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[1] Butchers'.net margins are calculated in Chapter 12.

[2] Meat sold on a weight basis typically was not a single cut, such as __biftek__, but a combination of meat, bones, and stomach.

On the average, sales by _tas_ represented only 28 percent of the retail
sales of those who sold by _tas_ and 17 percent of the retail sales of
all butchers interviewed in Bouaké. The two butchers in the Abidjan
sample who reported selling retail sold all their meat on a weight basis.
In both cities most retail sales of beef by weight were of _viande avec_
_os_, a mixture of skeletal meat, bones, fat, and stomach. The _filet_ and
kidneys were usually sold to large wholesale butchers who in turn resold
them to class 1 butcher shops. The hide was sold at the abattoir to a
private company, and the rest of the fifth quarter[1] was sold to the
apprentices, who cut it up and sold it retail. (See pp. 170-71 for details.)

The terms of sale typically involved payment in cash for meat
sold retail. Large sales to retailers and vendors, however, were normally
on credit, with the credit lasting from one to three days. Twenty of the
twenty-two Bouaké butchers who sold wholesale reported selling on credit,
with an average of 80 percent of their total wholesale sales being on
credit. In Abidjan, seven of the sample reported selling meat wholesale
on credit. Most said that roughly half the meat they sold wholesale was
sold on credit. Buyers of meat sometimes defaulted on the credit extended
them. Seventeen of the Bouaké wholesalers claimed to be owed debts, which
ranged from 50,000 CFAF to 8,000,000 CFAF.[2] The average loss per year
in unpaid debts to butchers who sold meat wholesale in Bouaké was 18,880
CFAF.[3] The incidence of default by meat buyers in Abidjan appeared to be
somewhat lower. Five of the sample butchers claimed to be owed money, but
the average loss per butcher per year was lower than in Bouaké, 13,000
CFAF.

The variable costs butchers incurred in selling meat, in addition
to their losses through default on credit sales of meat, involved the wages
of any selling agents they employed, losses suffered by having unsold meat

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[1]The term "fifth quarter" refers to all salable offals, including the
hide, head, tail, hooves, and internal organs.

[2]The 8,000,000 CFAF figure is probably exaggerated. The next largest
debt claimed was 1,300,000 CFAF.

[3]This average was calculated excluding the case where an 8 million
CFAF debt was claimed.

left at the end of the day, the costs of wrapping materials for the meat, and the costs of maintaining their equipment.[1]

Seventeen of the twenty-seven butchers in the Bouaké sample employed one or more agents who sold meat retail for them, either in stalls in the market or as meat vendors. In only two instances were the agents also apprentice butchers. The agents were paid either a daily wage or a commission on the meat they sold. Often they were paid in kind. Their daily earnings usually totaled about 500 CFAF.

In Bouaké animals are slaughtered early in the morning, from 5:00 to 7:30 a.m. Butchers rush to get their meat to market early so as to sell it quickly and not be left with unsold meat at the end of the day. Many butchers pay an extra 300 CFAF per carcass to have taxis transport their meat to market rather than waiting for the municipal truck which delivers meat from the abattoir to the market about an hour later. In spite of this, 22 of the 27 butchers in the Bouaké sample reported they sometimes had unsold meat left at the end of the day. The reported amounts varied from 6 to 100 kg per week, averaging about 25 kg per week. Most of the butchers said they sold this meat in the late afternoon or the next day at a discount (usually about 50 CFAF per kg less than "fresh" meat). Only one butcher in the Bouaké sample reported ever throwing out meat at the end of the day. Most kept the meat overnight, either in the open air, on ice, or in the cold rooms of AGRIPAC or one of the supermarkets. (Most cold rooms charged about 100 CFAF for storing the meat overnight.) In Abidjan, the butchers interviewed reported a much larger amount of unsold meat, averaging 140 kg per butcher per week. They all reported storing unsold meat in cold rooms, either at the abattoir or at one of the breweries in town. They too, reported selling "old" meat at a discount of about 50 CFAF less per kg.

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[1] The variable costs of butchering (as opposed to selling meat) included the purchase price of the animal, the slaughter tax, losses due to condemnation of the meat for disease, and payments to apprentices. Butchers fixed costs included license fees, union dues, and stall rental. Chapter 12 discusses all these costs in detail.

The cost to butchers of materials used to wrap meat sold retail (either paper or leaves) and the cost of maintaining their equipment (sharpening knives, etc.) were both low. Butchers estimated the combined cost of these items at about 200 CFAF per day.

h. Cooperation among butchers. -- Cooperative arrangements among butchers can affect the competitiveness of cattle marketing in three ways. First, if butchers succeed in forming a strong bloc (e.g., a union), they may be able to act as a cartel and force down cattle prices. This obviously reduces the competitiveness of the trade. Paradoxically, however, cooperation among butchers can also foster competition. If butchers share price information, knowledge among cattle buyers is increased and there is less likelihood of traders exploiting buyers, since most buyers are aware of prevailing prices. Family ties among butchers may also foster competition. To the extent that butchers help relatives get started in the trade, entry into butchering is made easier and the potential for competition among butchers is increased. This section examines the amount of cooperation that existed among butchers in Abidjan and Bouaké during 1976-77 and analyzes the effect it had on market competition.

A butchers' union existed in both Abidjan and Bouaké, but was not active in either city during 1976-77. Only two butchers in the Abidjan sample and five butchers in the Bouaké sample said they were union members. When asked what services the union provided them, all seven union members said it provided no services. The butchers probably belonged to the union, however, in order to facilitate their dealings with government agencies (e.g., the Veterinary Service). All unions in Ivory Coast are organized by the government, and it may be politically wise to be a union member if one has many dealings with government agencies. Butchers had no other organization to which most of them belonged that could act as a cartel to force down cattle prices. As mentioned above, given the low level of market concentration among wholesale butchers in Abidjan and Bouaké, any such cartel would be inherently very unstable.

Informal ties united butchers much more than did any profes-
sional organization, and these ties facilitated the flow of market
information. All of the Abidjan sample and all but three of the Bouaké
sample reported that whenever they considered buying an animal, they
would discuss the proposed deal with one or more other butchers. The most
commonly cited reason for doing this was to get other butchers' estimates
of the carcass weight of the animal, so that the buyer could more accurate-
ly calculate whether it would be profitable to buy and slaughter the
animal. Most butchers discussed sales that had been proposed to them with
two or three close friends. Through this asking and giving of advice,
price information was diffused among butchers.

Ethnic and kinship ties were important in easing entry into the
trade. The interview data presented earl'er indicated that many of the
wholesale butchers in Abidjan and Bouaké had entered the trade as appren-
tices to relatives who were already butchers. The Abidjan and Bouaké
butchers, in turn, helped other relatives enter the trade. Seventeen of
the twenty-six butchers in the Bouaké sample who responded to the question
said that they had relatives in the butchering trade.[1] These relatives
included wholesale and retail butchers, apprentice butchers, and meat vendors.
(None of the butchers interviewed, however, claimed to have any relatives
who were cattle merchants or intermediaries.) Several of the butchers in
the sample employed relatives and frères du village as apprentices or
selling agents, but few butchers intended to pass on their businesses to
their sons or other relatives. Only three of the seventeen butchers in the
Bouaké sample who had relatives in the trade said that their relatives
would take over their businesses when they retired. Two said that their
relatives definitely would not succeed them, and the rest were undecided.
Most butchers expressed a willingness to help relatives get the necessary
training and business connections to enter the trade, but said that the
relatives themselves would have to acquire the necessary capital to begin
butchering.

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[1]One should remember, however, that the term "relative" (parent) is
very broadly defined in West Africa.

Cooperation among butchers in Abidjan and Bouaké was thus based more on social relationships (friendship and kinship) than on professional organizations. The cooperation was aimed primarily at helping each other accurately judge the weight of animals and at aiding relatives to enter the trade, not at forming a cartel of cattle buyers. The net affect of the cooperation was to foster, not restrict, competition in the cattle and meat trades.

1. Butchers' perceptions of problems in the trade. -- During the interviews, butchers in both Bouaké and Abidjan were asked to name the largest problem in the cattle and meat trades.[1] Most respondants listed more than one problem. The responses, shown in Table 4.1, reflect butchers' concerns about the structure of the cattle and beef trades.

The problem most frequently mentioned in Bouaké was the presence of a large number of intermediaries in the market, especially go-betweens. The butchers charged that the intermediaries needlessly raised the price of animals by selling animals several times among themselves before finally selling them to the butchers. Several butchers said that this was especially unfair because butchers were required to pay heavy license fees and taxes while intermediaries paid none. Over 80 percent of the respondants in Bouaké and 38 percent of those in Abidjan mentioned the problem of inter- mediaries. This reflected the adversary relationship that existed between most butchers and intermediaries.[2] Butchers felt that the increase in the number of go-betweens in recent years had raised the income of intermediaries (as a class) at the expense of butchers, forcing butchers to either raise their selling prices or reduce their net margins. (See Chapter 3, p. 106 for details.)

The second most frequently mentioned problem in Bouaké and the most frequently mentioned problem in Abidjan was that the costs borne by butchers (cattle prices, license fees, and taxes) were high and constantly

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[1]The question asked was open-ended: "What in your opinion is the largest problem in the butchering trade?" ("D'après vous, quel est le plus grand problème de l'industrie de la boucherie?")

[2]When intermediaries were asked to name the largest problem in the trade, they almost all mentioned the problem of butchers defaulting on their debts.

TABLE 4.1

FREQUENCY WITH WHICH WHOLESALE BUTCHERS MENTIONED SPECIFIC PROBLEMS
IN THE CATTLE AND MEAT TRADES: BOUAKE AND ABIDJAN, 1976-77

Problem	Number of Butchers Who Mentioned this Problem			
	Bouaké (N = 26)		Abidjan (N = 8)	
	Number	Percent	Number	Percent
Large number of intermediaries serves only to raise cattle prices	21	81	3	38
Price of cattle and costsof butchering (taxes, etc.) are too high and continue to rise while the retail price of meat remains stable	14	54	5	63
No solidarity among butchers - too much competition	7	27	1	13
Young butchers cannot get licenses	3	12	0	0
Too much competition from sales of frozen meat	0	0	4	50
Not enough animals offered for sale	1	4	2	25
Other problems	1	12	3	38

rising, while the retail price of meat remained fairly stable. Butchers said that as a result, they currently earned much less money than they had several years earlier, when cattle prices were fairly stable. Retail meat prices in Ivory Coast are officially fixed, and although butchers in Abidjan and Bouaké do not sell at the official prices, they cannot raise retail prices as much as they would like for fear of being fined by the price control officials.[1] Therefore, in periods of rapidly increasing cattle prices, retail meat prices do not increase as quickly as do butchers' costs, leading to a reduction in butchers' net margins.

Seven of the Bouaké sample, but only one of the Abidjan sample, mentioned a lack of solidarity among butchers and too much competition among butchers as a major problem. Most frequently cited was the inability of butchers to form a united front to force intermediaries to lower prices. Other problems mentioned under this rubric were butchers slaughtering animals clandestinely in order to avoid slaughter taxes (butchers who slaughtered in the abattoir viewed this as unfair competition) and licensed butchers "causing problems" for younger butchers who could not obtain themselves. Three of the Bouaké sample also mentioned the difficulties young butchers had in obtaining licenses because of the restriction on the number of licenses issued. Most of these complaints reflected the competitive nature of the Bouaké cattle and meat markets.

Half of the Abidjan sample said that competition from sellers of frozen beef made it difficult to sell fresh meat, and they claimed to have lost many of their customers to butchers selling frozen meat. None of the Bouaké sample said this was a problem. Frozen beef was much more widely available in Abidjan than in Bouaké, and the price of frozen beef relative to fresh beef was lower in Abidjan than in Bouaké. The lower relative price of frozen beef probably accounted for the greater competition between fresh and frozen beef in Abidjan.

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[1]Price control officials usually turn a blind eye to butchers selling meat for more than the official price, realizing that butchers would lose money if constrained to sell at the official price. Rapid increases in retail meat prices, however, may provoke consumer complaints to the authorities, leading price control officials to impose fines.

The only other problem mentioned more than once by the wholesale butchers was an insufficient number of animals offered for sale on the market. This problem was cited by one member of the Bouaké sample and two members of the Abidjan sample.

1. Conclusions.

-- The interview data from Bouaké and Abidjan show that most wholesale butchers in these two cities have a long background in the cattle and meat trades and several years experience as wholesale butchers. Almost all consider butchering their full-time profession, having few other income-earning activities. There is a high degree of competition among wholesale butchers in Abidjan and Bouaké, with a large number of butchers active in both cities and market shares that are typically small. Most butchers are not tied to any one intermediary, and this independence helps insure competition among sellers. Butchers cooperate among themselves, but the cooperation results mainly in a wider diffusion of market information among buyers and easier entry into butchering, not collusion that forces down cattle prices. Complaints by wholesalers in Bouaké of "too much competition among butchers" testifies to the competitiveness of the trade.

Credit is important to butchers in the purchasing of animals and in selling meat wholesale. Roughly a quarter of all cattle purchased in Bouaké and half of those purchased in Abidjan are bought on credit, and about 50 percent of all fresh meat sold wholesale in Abidjan and 80 percent of that sold wholesale in Bouaké is delivered on credit. Eliminating credit sales from cattle and meat marketing, as is sometimes advocated, would therefore be highly disruptive. The use of credit does engender problems of default, but it also, by reducing the amount of working capital needed to be a butcher, encourages competition and helps hold down meat prices.

Finally, wholesale butchers in Abidjan and Bouaké find themselves in an adversary position with intermediaries. Few butchers have relatives or friends who are intermediaries (in contrast to the many butchers who have relatives in the butchering trade), and most butchers feel that intermediaries, particularly go-betweens, serve no useful purpose. Intermediaries, for their

part, often complain about butchers defaulting or delaying repayment of their debts, and claim that many butchers are basically dishonest. To some extent, both sets of views reflect the conflicts of interest inherent between buyers and sellers.

Retail Butchers

Wholesale butchers in Abidjan sell a large proportion of their meat to class 1 and class 2 retailers. In Bouaké, however, most wholesalers retail a large proportion of their meat themselves. This section describes the activities of class 1 and class 2 retailers and examines their relative importance in the trade.

Class 1 Retailers. -- Class 1 retailers (supermarkets and European-style butcher shops) generally do not buy and slaughter animals themselves. They normally have verbal contracts with some of the larger wholesale butchers who supply them with locally slaughtered rear quarters of beef, filets, and offals. The class 1 retailers sometimes extend credit to the wholesalers to permit them to purcnase choice animals, the rear quarters of which are sold to the retailers. This fresh beef complements the imported chilled meat sold by the class 1 retailers, which they order through DISTRIPAC and AGRIPAC. In 1977 there were 26 class 1 retailers in Abidjan and 3 in Bouaké. The clientele of the butcher shops was primarily European, while the supermarkets catered to both Europeans and upper-income Africans.

Pauvert (47), a wholesale butcher and the largest meat distributor for AGRIPAC ¬ Abidjan, estimated the weekly volume of beef handled by class 1 retailers in Abidjan during early 1977 as follows:

400 imported rear quarters @ 55 kg. per quarter =		22.00 tons
150 locally-slaughtered rear quarters @ 55 kg. per quarter	=	8.25 tons
Total	=	30.25 tons per week

= 1,573 tons per year.

In addition, Pauvert estimated that these establishments sold approximately 300 tons of lamb and mutton per year, most of it imported. Table 1.28 in Chapter 1 showed that approximately 17,600 tons of beef were sold in Abidjan in 1976. Of this, then, roughly 9 percent passed through class 1 retail establishments. The class 1 market in Bouaké was even more limited than in Abidjan. Based on interviews with cl-.,a 1 retailers in Bouaké, the investigator estimates they sold approximately 82 tons of beef and 17 tons of mutton per year in 1976-77. Most of the beef was locally slaughtered, but roughly half the mutton was imported. The class 1 retailers therefore accounted for a little more than 2 percent of the beef sold in Bouaké. Outside of Bouaké and Abidjan there are few class 1 retailers, and the total volume of sales of all class 1 retailers in the country probably does not exceed 1,820 tons of beef per year.[1] The class 1 retailers thus accounted for only about 4 percent of the total 43,610 tons of beef consumed in Ivory Coast in 1976.

Some investigators (e.g. 18, pp. 104-6; 55, p. 74) have advocated removing price controls from beef sold by class 1 retailers in order to raise cattle prices and thus stimulate domestic cattle production as well as make Ivory Coast a more attractive market for the cattle-exporting countries of the Sahel. These investigators advocate keeping price controls on beef sold by class 2 retailers, or removing them only slowly, in order to keep down inflation. It is clear, however, that given the relatively small volume of meat handled by the class 1 establishments and the high proportion of it that is imported from overseas, removing price controls only from class 1 retailers would have only a small impact on cattle prices in Ivory Coast. It probably would not be sufficient by itself to stimulate much additional domestic production or increase imports from the north.

Class 2 Retailers. -- Roughly 91 percent of the beef sold in Abidjan and 98 percent of that sold in Bouaké passes through the class 2 market (i.e., is sold either by wholesale-retail butchers or by class 2 retailers).

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[1] I.e., 110 percent of the total amount sold in Abidjan and Bouaké.

The interview data revealed that in 1976-77 wholesale-retail butchers handled about 65 percent of the retail sales of fresh beef in Bouaké. In Abidjan, however, the larger number of animals slaughtered led to more specialization among wholesale butchers, and a smaller proportion of wholesalers sold meat retail. Instead, wholesalers in Abidjan sold their meat to class 2 retailers, who resold it retail, either by weight or in small unweighed piles (tas). The retailers also bought frozen meat, either from wholesalers or directly from AGRIPAC.[1]

During the ELP field studies it proved impossible to conduct a detailed census of class 2 retailers in Abidjan or Bouaké. SIGES (109b, p. 68), however, reported that in 1974 there was more than one class 2 retailer for every 2,000 inhabitants of Abidjan. Given that the population of Abidjan in 1975 was 927,000, this implies a minimum of 463 class 2 retailers in Abidjan. Table 1.28 in Chapter 1 estimated the annual beef consumption in Abidjan at 17,604 tons; assuming that 90 percent of the class 2 retailers sold beef and 10 percent sold small ruminant meat, this implies that the average class 2 beef retailer sold roughly 116 kg of beef and offals per day, the equivalent of slightly less than one animal. Given the large number of class 2 retailers active in Abidjan and their low average sales volume, it is likely that the class 2 retail market is highly competitive.

Apprentice Butchers

An apprenticeship system in Abidjan and Bouaké trains future wholesale butchers while providing most of the labor needed in butchering. This section describes how the system works and discusses the implications for the system of constructing modern, capital-intensive abattoirs.

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[1]Wholesalers and intermediaries in Abidjan reported that a number of former wholesale butchers had become retailers of frozen meat beginning in 1975. Several of these butchers had reportedly amassed large debts with landlords in the Abidjan cattle market and could not find people willing to sell them slaughter animals.

Each wholesale butcher is assisted by one or more apprentices, who do the actual slaughtering and dressing of the animals. The apprentices are organized into teams, with one team often working for several wholesale butchers.[1] Each team has a leader (chef) who acts as its spokesman in dealings with the butchers.

Most of the apprentice butchers aspire to become wholesale butchers. While the apprentices are often of the same ethnic group as the butchers for whom they work, few of the apprentices in Bouaké and Abidjan are sons of wholesale butchers.[2] It appears that in Bouaké and Abidjan it is less common for butchers to pass on their trade from father to son than it is for cattle merchants to do so. In the absence of a father-to-son tradition of butchering, the apprenticeship system plays an important role in training future butchers in the skills of the trade (estimating carcass weights, doing basic accounting, etc.). Almost all the wholesale butchers interviewed in Abidjan and Bouaké had spent several years as apprentices.[3] Many of these butchers probably could have begun butchering on their own earlier if they had had enough capital. Nonetheless, an apprenticeship of at least a year is probably needed to master the basic skills of butchering.

In Abidjan, each team of apprentices usually received 500 CFAF per animal slaughtered. This was paid either in cash or in the equivalent amount of meat. In Bouaké some apprentices received a small cash wage. Most of their income, however, came from the sale of the fifth quarters of the animals they slaughtered. Each team of apprentices bought the fifth quarter[4] of every animal slaughtered for a fixed price from the wholesale butcher. The team then cut up the fifth quarter and sold it retail. The team's wage was any profit it made over the purchase price of the fifth quarter. The fixed purchase price had to be paid to the butchers for every animal slaughtered,

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[1] In Bouaké the teams ranged in size from 1 to 8 men, averaging about 4.

[2] In Bouaké only 2 sons of wholesale butchers were working as apprentice butchers in 1976-77.

[3] The average was 4.5 years for the Abidjan butchers and 7.5 years for the Bouaké butchers.

[4] All offals except the hide, stomach, and internal fat, which were sold by the wholesale butcher.

even if some of the internal organs were seized because of disease. There-
fore, in Bouaké the apprentices, and not the wholesale butchers, took most
of the risk if an animal was sick. The butcher lost only if the entire car-
cass was seized.

When modern capital-intensive abattoirs such as those in Bamako and
Ouagadougou are constructed, the traditional apprenticeship system is des-
troyed, as the apprentices are replaced by a few abattoir employees and a
lot of capital equipment. Herman (30) estimates that when the new abattoir
in Ouagadougou opened in 1976, roughly 300 apprentices lost their jobs.
It is not clear in such situations how new butchers will be trained to re-
place those who retire or die.

Employment Generated in Cattle and Beef Marketing

In addition to cattle merchants, intermediaries, butchers, and appren-
tices, a number of other people in Abidjan and Bouaké earn part or all of
their living from cattle and beef marketing. These include herders based in
the two cities,who load and unload cattle into trucks and cattle cars,
guard animals awaiting sale or slaughter, and accompany herds sent to other
markets by local merchants. They also include many people not directly
involved in cattle marketing who earn part of their income providing services
to butchers and cattle merchants. Numbered among these people are vendors
of food and drink at the cattle markets, griots, taxi drivers and push-cart
operators who transport meat to the various markets, and sellers of leaves
and paper used to wrap meat.

The professions described in this chapter and in Chapter 3, howeve., are
not mutually exclusive. It is not uncommon for a butcher, for example, to
buy several animals, resell some and slaughter the rest himself, thus acting
as both a cattle merchant and butcher. Several butchers are also intermedia-
ries. Sometimes older butchers, after having acquired suificient capital,
cease butchering, rent out their licenses, and become cattle merchants.

Data collected during the study allow estimation of the amount of employment generated by cattle and beef marketing in Bouaké. This estimate, presented in Table 4.2, includes only those people who earn most of their livelihood from marketing cattle and uncooked beef. It thus excludes many people who sell prepared meat, as well as those who earn only part of their income from the cattle and meat trade (e.g., taxi drivers and push-cart operators who transport meat to different markets). The estimate shown in Table 4.2 includes only residents of Bouaké. It excludes all northern cattle merchants and drovers.

Despite these restrictions, Table 4.2 shows that roughly 348 people earned their livings from cattle and fresh beef marketing in Bouaké in 1976-77. These people handled the sale of about 26,000 animals in 1976 (and the slaughter of about 11,000). This corresponds to one job created for every 75 animals sold. If the employment generated in the marketing of small ruminants, goat meat, and mutton were added to Table 4.2, the total employment figure would be over 400, out of a total male labor force in Bouaké of roughly 45,000.[1]

Livestock and meat marketing thus employed slightly under one percent of the total male labor force in Bouaké. While this may not seem like a large number, only three modern sector industries in Bouaké, the textile industry,[2] the oilseed and soap industry, and the tobacco industry generated more employment than did livestock and meat marketing (61, p. 174). Like most traditional marketing systems, the livestock marketing system is labor-intensive, using little capital other than the animals themselves. The investigator hopes that when officials consider plans to reorganize livestock marketing, they consider carefully the employment effects their actions would have.

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[1] The figure for the total male labor force is calculated from data in the 1975 population census (58a, p. 8; 58b, p. 81). The census showed that the male population of Bouaké was 89,257, and that 50.2 percent of the Ivorian male population fell between the ages of 15 and 55.

[2] Bouaké's textile industry is Ivory Coast's largest modern sector employer.

TABLE 4.2

EMPLOYMENT GENERATED IN CATTLE & BEEF MARKETING IN BOUAKE
IN 1976-1977

Profession	Number
Cattle market:	
Cattle Merchants	1'[a]
Intermediary-landlords	15[a]
Intermediary-sellers	40
Wholesale Butchers (including inactive butchers who rent out their licenses)	51
Herders	14
Vendors of food, drink, etc.	6
Griot	1
Subtotal:	134[b]
Abattoir:	
Apprentice Butchers	60
Veterinary Assistants and Municipal Abattoir Employees	8
Employees of company that buys hides	4
Subtotal:	72
Retailers:	
Vendors/Agents of Wholesale-retail Butchers	40
Class 1 Retailers: 4 employees per establishment	12
Class 2 Retailers: approximately two retailers for every one practicing wholesale butcher	90
Subtotal:	142
Grand total:	348

[a]Four of the cattle merchants were also landlords.

[b]Total reflects note a above.

Differences in Market Structure Between Abidjan and Bouaké

The markets for cattle and beef in Abidjan are structurally different from those in Boauké, and these differences in market structure explain why the markets in the two cities function differently. Six major structural differences exist between the Abidjan and Bouaké markets:

1) Abidjan is a larger market for meat and there are more high-income consumers in Abidjan willing to pay a premium for high-quality meat.

2) Abidjan is a seaport, while Bouaké is located in the interior. This makes it much easier to supply Abidjan with imported frozen meat.

3) It is possible to trek cattle to Bouaké, while all animals shipped to Abidjan arrive by truck or by rail.

4) There is sufficient pasture around the Bouaké cattle market to held cattle off the market for serveral days or even weeks. In Abidjan it is not possible to hold cattle off the market for more than a few days because of a lack of grazing.

5) There are major cattle markets to the south of Bouaké; there are none to the south of Abidjan.

6) Butchers pay higher taxes and license fees in Abidjan than in Bouaké.

The larger size of the Abidjan market permits more specialization among butchers than in Bouaké. Many of the Abidjan wholesale butchers slaughter several animals per day and sell no meat retail. As shown earlier, few of the Bouaké butchers slaughter more than one animal per day, and all sell some of their meat retail. The larger market for high-quality meat in Abidjan leads to higher premiums being paid for choice cuts of meat. For example, in early 1977 wholesale butchers in Abidjan received 50 CFA F per kg. more for rear quarters of beef (sold mainly to class 1 retailers) than they did for front quarters (sold mainly to class 2 retailers). In Bouaké no such price differential existed.

Most of the differences in the functioning of the Abidjan and Bouaké
markets, however, result from differences in the geography of Abidjan and
Bouaké and differences in the physical layouts of their cattle markets.
Because of Bouaké's geographic location, cattle merchants arriving   _
there are in a stronger bargaining position vis-à-vis butchers than are
those arriving in Abidjan. If buyers in Bouaké do not offer a merchant
prices he considers fair for his animals, he can ship the animals to other
markets farther south. The merchant will have to spend more to ship the
animals farther south, but he is likely to recover these expenses because
cattle prices increase as one goes south. In Abidjan, a cattle merchant
does not have this option. There are no markets farther south, and if he
decides to ship his animals to a market north of Abidjan, his transport costs
will rise but the price he receives for his animals is likely to fall.
Furthermore, the availability of large quantities of frozen meat in Abidjan
means that butchers need not rely on cattle merchants as their main source
of meat. They can buy from cattle merchants when they feel cattle prices
are advantageous and switch to selling frozen meat when cattle prices rise.
Even if the butchers default on their debts to cattle merchants, they can
continue to buy frozen meat from AGRIPAC and DISTRIPAC and keep on practicing
their profession.

The physical layouts of the two markets accentuate these tendencies.
The Bouaké cattle market and abattoir are located at the northern edge of
the city in a region that is not very built-up. Adequate grazing and water
are available near-by during most of the year. This allows both merchants
and butchers to hold animals as a hedge against price fluctuations. If a
merchant feels prices are too low, he may hold his animals off the market,
waiting for supplies to diminish and prices to rise. Similarly, when many
animals are on the market and prices are relatively low, a butcher may buy
several animals and hold them in a reserve herd to slaughter when few animals
are offered for sale and prices are high.

It is possible to trek cattle from the producing regions to Bouaké; therefore, arrivals of cattle in Bouaké are not dependent on the availability of trucks and rail cars.[1] Merchants who trek their cattle to market can often time the arrival of their herds to correspond to favorable market conditions. These merchants usually come to the market a few days before the scheduled arrival of their herds in order to evaluate market conditions. If they find a shortage of animals and high prices being offered for cattle, they send word back to their drovers to rush the herds to market, allowing the merchants to benefit from the high prices. If the merchants find prices are low, they tell their drovers to slow down and wait for market conditions to improve. Merchants shipping cattle to Abidjan, however, must depend on the sometimes unpredictable availability of trucks and rail cars to ship cattle, so it is often impossible to coordinate the animals' arrival with favorable market conditions. Since there are often shortages of rail cars in Upper Volta and northern Ivory Coast, arrivals are irregular. It is also impossible to hold animals in Abidjan as a hedge against irregular arrivals. The Abidjan cattle market is located in the industrial zone of Port Bouët. Little grazing space is available around the market, and in the dry season there is little pure water. As a result, merchants cannot hold animals in Abidjan for more than a week without their losing a lot of weight. This is especially true in the dry season. Animals from the Sahelian countries arriving in Abidjan during the dry season are not used to the green grass they find in Abidjan after having had very sparse, dry grazing in the north. As a result, most come down with diarrhea. During the dry season, the only water available for cattle near the Abidjan market is from the slightly saline lagoon; therefore, in addition to losing weight from diarrhea, the animals also lose weight from dehydration.

The inability to hold animals in Abidjan results in cattle supplies and prices fluctuating more in Abidjan than in Bouaké. This results in both traders' and butchers' margins varying widely, and may account for the higher

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[1] Official statistics (78) indicate that in 1976, 73 percent of the cattle arriving in Bouaké came by hoof, 17 percent came by train, and 10 percent by truck. In Abidjan all cattle arrive either by train or by truck.

rate of default on debts by butchers in Abidjan as compared to Bouaké.
Until means are found to hold animals at the Abidjan market without their
losing a lot of weight (either relocating the cattle market to a place
where there is adequate grazing and water for the animals, or providing
cut forage and water to the animals at the present location) the problems
of highly fluctuating cattle supplies and prices and a high incidence of
default by butchers are likely to continue.

One would expect butchers in Abidjan to be in a very strong position
relative to cattle merchants. Merchants cannot ship their animals to mar-
kets farther south or hold them off the market very long once they have
arrived in Abidjan. The butchers, on the other hand, have an alternative
source of supply, imported frozen meat. While it is true that Abidjan
butchers probably enjoy more market power relative to cattle merchants
than do their Bouaké counterparts, two factors limit the degree to which
they can benefit from this. Many butchers have clients who insist upon
buying fresh rather than frozen meat. As shown in Chapter 12, many consumers
refuse to purchase frozen meat, either because they do not like its taste
or because they have doubts about its origins or purity. In addition,
class 1 retailers buy only fresh meat from local butchers. They buy im-
ported frozen meat directly from AGRIPAC distributors or from DISTRIPAC.
To the extent that their clients insist on buying fresh meat, wholesale
butchers are forced to buy cattle regularly and are thus faced with the
same problems of fluctuating cattle supplies and prices that confront the
cattle merchants. Furthermore, the costs supported by the butchers in
Abidjan, especially slaughter taxes, market taxes, and license fees, are
higher than those in Bouaké. Many of the benefits of market power that
the Abidjan butchers might otherwise enjoy are thus taxed away.

PART III

PROBLEMS OF TRANSPORTING
CATTLE AND MEAT

CHAPTER 5

TRANSPORTATION INFRASTRUCTURE FOR CATTLE AND MEAT

This chapter exai nes the transportation infrastructure for cattle and meat in Ivory Coast. It looks at how cattle and meat are currently transported in Ivory Coast, what the capacity of the existing infrastructure is, whether or not a lack of transport capacity constrains expansion of the cattle trade, and what the medium-term outlook is for improvements in livestock and meat transport. The chapter is divided into three parts. The first part examines current flows of cattle in Ivory Coast by different means of transport, showing the relative importance of trek, truck, and rail transport. The second part looks at the existing transport infrastructure for cattle (trek routes and entry posts, roads and number of trucks, cattle cars and rail infrastructure) and discusses projected improvements in each. Because of Abidjan's heavy reliance on rail transport of cattle, special attention is given to problems of rail shipment of cattle. The final section examines the existing infrastructure for the transport of meat by rail, truck, air, and sea and discusses the relative importance of each in the frozen and chilled meat trades.

The chapter shows that trekking is the most widely used form of cattle transport in Ivory Coast, followed by rail shipment. There is little long-distance trucking of cattle in Ivory Coast, although intermediate-distance trucking within the forest zone is important. The low reliance on trucking seems attributable more to the high costs of trucking than to a lack of trucks or poor roads. Trucks are available to transport cattle at least during certain times of the year. A large increase in the demand for truck transport, however (e.g., as the result of mandatory trucking of cattle), would probably lead to serious capacity constraints. Despite the heavy reliance placed on trekking, trekking infrastructure is less developed than rail or trucking infrastructure, there being no improved trek routes in the country. Rail transport is characterized by long delays en route, due in part to having only a single track along most of the line, and seasonal shortages of cattle cars, due to slow rotation

of rolling stock. The latter problem could be solved through a change in the rate structure for unloaded cars.

The chilled meat trade between Upper Volta and Ivory Coast has fallen off markedly in recent years because of a deterioration in the quality of refrigerated rail transport. At the same time, road improvements in Ivory Coast and the expansion of cold storage facilities throughout the country has favored the growth of frozen meat sales. This meat is imported to Abidjan by sea and is trucked to cities in the interior. Without improvements in refrigerated rail transport, meat exports from Upper Volta to Ivory Coast are likely to remain small.

Volume of Cattle Moved by Different Means of Transport

Trekking is the most widely used method of transporting cattle in Ivory Coast, followed in importance by rail transport. Long-distance trucking appears to be used only rarely. It is not possible to give a precise estimate of the number of cattle trucked into the country, however, because Ivorian government statistics on cattle imports do not distinguish between animals imported by hoof and those imported by truck. Cattle are recorded as entering the country either by train or by road, the latter including both trekked and trucked animals.

Table 5.1 shows the official figures on imports for 1973-76. It indicates that between 18 and 40 percent of recorded imports were transported by rail during the period 1973-1976, the remainder coming either on hoof or by truck. In reality, a larger percentage of total imports entered the country by road, as the rail figures include many Malian animals that trekked to either Ouangolodougou or Ferkéssédougou and traveled south from there by train. The increase in the proportion of total imports transported by rail during 1975 and 1976 compared to 1973-74 may be more illusory than real. Beginning with the 1975 statistics, the Ministry of Animal Production began adding all reported arrivals in Abidjan to the import statistics. Officials did this because they discovered that many of the cattle imported by rail were not being counted at the border. Adding all arrivals in Abidjan to the import statistics had

the effect of increasing the percentage of recorded imports arriving by rail, although it probably involved double-counting some animals.

TABLE 5.1

OFFICIALLY RECORDED CATTLE IMPORTS BY MEANS OF TRANSPORTATION, 1973-76

YEAR	TRAIN		ROAD[a]		TOTAL	
	Number	Percent	Number	Percent	Number	Percent
1973	64,850	29.0	159,085	71.0	223,935	100.0
1974	33,792	17.5	159,837	82.5	190,629	100.0
1975	55,760	40.0	85,210	60.0	140,970	100.0
1976	37,311	33.2	74,634	66.5	112,314[b]	100.0

SOURCE: République de Côte-d'Ivoire, Ministère de la Production Animale, unpublished.

[a]Includes animals transported by truck and on hoof.

[b]Included 369 cattle imported by ship from France.

Few data are available on the number of cattle trucked in the country, but the use of long-distance trucking of cattle seems limited.[1] SEDES (102, p.456) estimated that 13,000 of the roughly 200,000 cattle imported in 1970 (i.e. 6.5 percent of the total) entered the country by truck. Discussions with truckers and other evidence suggest that the number of cattle imported by truck has declined in recent years. A study conducted in 1975 by SETEC International (98) indicated that approximately 8,030 tons of livestock entered Ivory Coast by truck in 1975. In the same year, the Veterinary Service recorded 236,175 small ruminants as entering the country by truck (71). Assuming an average liveweight of 34

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[1]In contrast, trucking is widely used to transport small ruminants. Few small ruminants are trekked into the country; most enter by truck or train.

kg per animal,[1] the small ruminants account for the entire 8,030 tons of livestock imported by truck. Obviously some cattle entered Ivory Coast by truck in 1975, but the SETEC data suggest the number was small, probably under 5,000 head.

Other data point to a decline in long-distance truck transport of cattle in recent years. Statistics show that in 1972, 1,634 cattle arrived by truck at the Abidjan cattle market (2.7 percent of total arrivals); by 1976, the figure had fallen to 459 head (1.7 percent of total arrivals) (10; 97, p.5). In Bouaké the Veterinary Service recorded 2,225 head of cattle arriving by truck between February and July, 1976 (14.9 percent of total arrivals), compared to 760 head (4.0 percent of total arrivals) in the same period in 1977.[2] The apparent decline in long-distance truck transport in recent years may be due to increased fuel costs, which have made trucking more expensive relative to trekking and mixed trek-rail transport.

Although it is rare for merchants to truck cattle all the way from the producing areas in the north to the major markets in the south, many merchants do truck animals within the forest zone of Ivory Coast (i.e., south of Bouaké). Trekking in this zone is difficult because of dense forest and heavy tsetse infestation, and in some areas trekking is forbidden by law, e.g., in the area around Abidjan. Therefore, traders often load cattle on trucks once they reach the edge of the forest zone. Of 14,419 head of cattle recorded as leaving Bouaké for other markets farther south between September 7, 1976 and June 30, 1977, 3,519 (24.4 percent) traveled by truck; 8,691 (60.3 percent) walked; and 2,215 (15.3 percent) went by train (79). Most of the trekked animals went to markets within 120 km of Bouaké, and no animals trekked all the way to Abidjan. Trekking was obviously the most important means of transport used; nonetheless, these figures indicate that intermediate-distance trucking plays an important role in cattle distribution in Ivory Coast.

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[1] The 34 kg liveweight figure is based on the SEDES figure of an average carcass weight of 17 kg for small ruminants imported into Ivory Coast (102, p.121) and a killing-out rate of 50 percent (83, pp.1057-58).

[2] The February-July period was used since figures on the arrivals by type of transport were unavailable for January 1977.

The Available Infrastructure: Cattle Transport

Cattle move to the major markets in Ivory Coast on hoof, by truck, by rail, or by some combination of these methods. Almost all animals except those coming from government ranches and feedlots trek part of the way to market. This section looks at the infrastructure available for trekking, trucking, and rail shipment of cattle.

Trekking.-- Although trekking is the most widely used means of transporting cattle in Ivory Coast, there is little developed infrastructure in the country to facilitate trekking. Indeed, the Ivorian government has expressed a desire to discourage trekking, mainly on the grounds that trade cattle often damage crops while trekking to market. Unlike some West African countries, Ivory Coast does not have a network of clearly marked cattle trails along which cattle have a right-of-way and in which cultivation is restricted. In principle, cattle trekked in Ivory Coast are restricted to certain routes, however. These are shown in Figure 5.1 and listed in Appendix 5.A. For example, it is forbidden to trek animals south of Tiébissou, a town 64 km south of Bouaké. In reality, traders trek animals outside these corridors, but certain zones remain closed to trekking. Traders are not allowed to trek animals into Abidjan, and they rarely trek them south of Toumodi on the Bouaké-Abidjan axis. Trekked animals generally travel along roads, grazing in the surrounding bush. The drovers are responsible for keeping the animals out of cultivated fields and are liable for damages the animals cause. Crop damage (caused by herds on transhumance and by trade cattle) became a political issue in Ivory Coast, particularly in the north, following the influx of Fulani herds into the country in 1974-75. As a result, there was strong pressure to outlaw trekking except for short distances.

The Ivorian government recently began building five entry stations for cattle (portes d'entrée) along Ivory Coast's northern border. These were orginally aimed at facilitating the trekking of cattle in the country. The stations are being built at Tingrela, Niéllé, Ouangolodougou, Tiénko (near Odienné), and Doropo (near Bouna). Four of them were scheduled to go into operation at the end of 1977, with the station at Doropo opening later. Originally, these stations were to be tied into a system of offi-

FIGURE 5.1

AUTHORIZED TREKKING CORRIDORS IN IVORY COAST
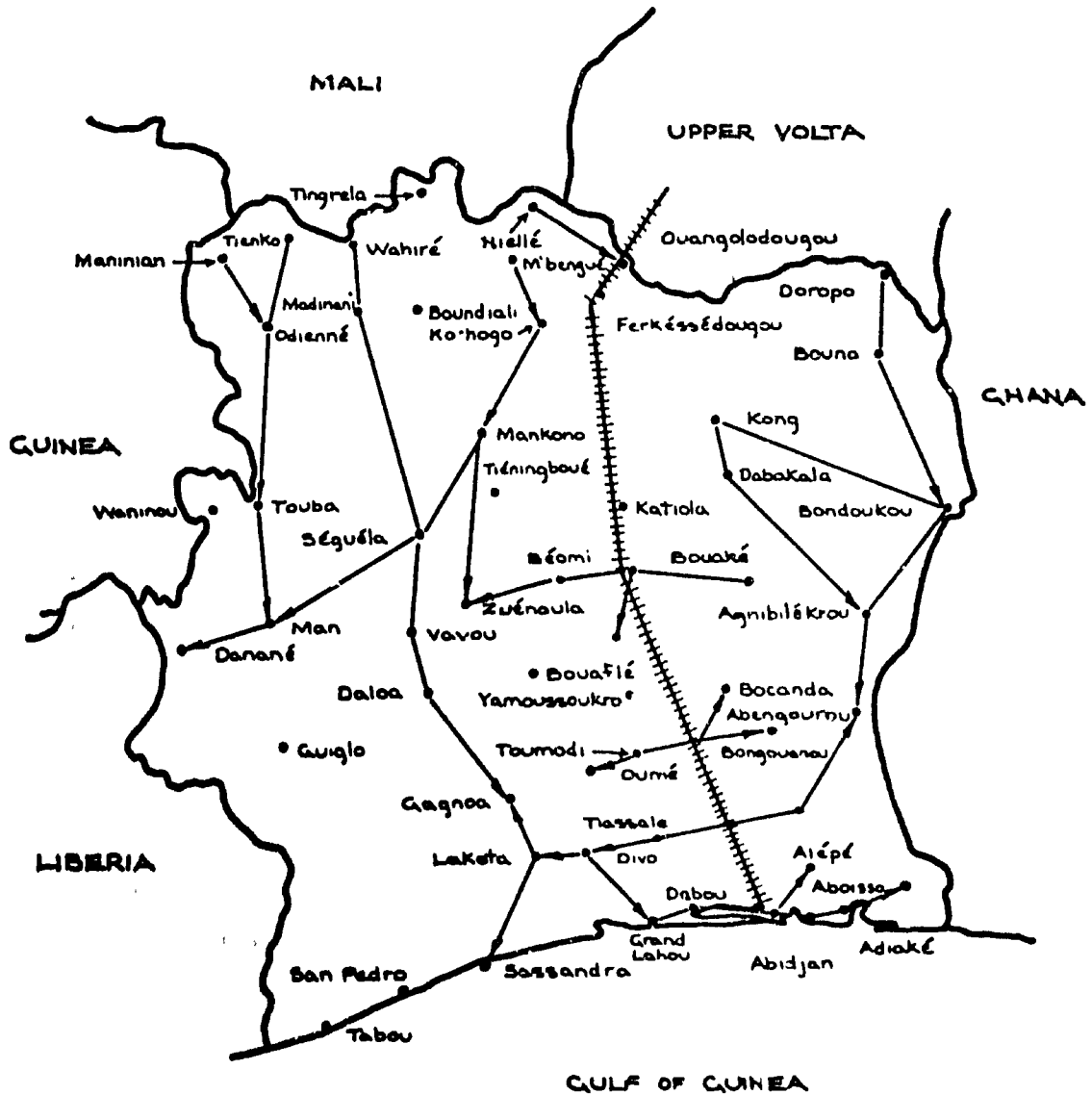
cially marked and cleared cattle trails. Officials abandoned this plan, however, in favor of mandatory trucking of cattle within Ivory Coast (except those being transported short distances, e.g., between Niéllé and the rail line at Ouangolodougou) beginning in 1978 (62, pp.15-6; 22). Cattle would be loaded onto trucks at the entry stations or trekked to the rail line for the trip south.[1]

In principle, starting in 1978 all animals entering the country will be required to pass through one of the entry stations. The government hopes this will increase its control over the state of health of imported animals and will permit a better enumeration of animals entering the country. The entry stations are equipped with dipping tanks, vaccination chutes, living quarters for veterinary personnel, and small abattoirs. All animals passing through these stations would be inspected for disease, vaccinated if needed, and de-ticked. In addition, the government would provide each station with the facilities of a major cattle market (holding pens, scales, and loading chutes). The government hopes that such markets will centralize cattle marketing, and by bringing together many buyers, make the Ivorian market more attractive to Voltaic, Malian, and northern Ivorian livestock producers. The implicit assumption is that the traditional marketing system is not competitive and that low prices offered by cattle merchants act as a major brake on sales and production by northern livestock owners.

Trucking.-- Ivory Coast has a fairly well-developed road network and enough trucks to allow more merchants to truck their cattle to market than currently do so. The low reliance on long-distance trucking seems due more to the high cost of trucking relative to trekking than to a lack of equipment or poor roads. Although the paving of certain roads in the north in the next few years may lower trucking costs and encourage merchants to ship cattle by truck, the outlook is for only modest expansion

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[1]As of August 1978, however, trekking was still allowed. Officials are beginning to realize that it would be difficult to ban trekking effectively in Ivory Coast. Given the government's priority of providing inexpensive meat to consumers, the economic effects of mandatory truck or train transport also raise difficult questions.

of long-distance trucking in the near future. In contract, trucking with-
in the forest zone, where trekking is difficult, is important and will
continue to expand.

By the end of 1975, Ivory Coast had a total of 40,000 km of roads,
of which 2,123 km were paved and 13,000 km were improved all-weather
laterite roads (61, p. 234; 33). (See figure 5.2.) As of mid-1978 the
major north-south road between both the Malian and Voltaic borders and
Abidjan was paved between Ferkéssédougou and Korhogo. There are still
127 km of unpaved road between Ferkéssédougou and the Malian border and
74 km of unpaved road between Ferkéssédougou and the Voltaic border. The
1976-80 National Plan also calls for building a four-lane road between
Abidjan and Sikensi (a distance of 60 km), with an eventual extension to
N'douci. This should reduce travel time and congestion in the area around
Abidjan.

Besides this major north-south axis, there are a number of paved
roads in the forest zone of the country, running both north-south and
east-west. (See Figure 5.2.) In the late 1960s and early 1970s the
government emphasized construction of heavy-duty roads in the forest zone
capable of supporting a heavy traffic in logging trucks. Since the open-
ing of the port of San Pedro in 1971, the government has also pushed
construction of both feeder roads and main roads in the southwest of the
country in order to develop San Pedro's hinterland.

In addition to paving the road linking Ferkéssédougou and
Korhogo, and constructing the Abidjan-Sikensi highway, the 1976-80 Plan
calls for paving 688 km of previously unpaved road and repaving 205 km
of major highways currently in poor condition (65, Vol. III, Part 2, p.
358-359). From the point of view of livestock transport, the most impor-
tant project will be the paving of 270 km of the 466 km road between
Man and Odienné. This will probably reduce the cost of trucking cattle
along the route Mali-Odienné-Man-Danané-Liberia.

Ivory Coast also has an extensive network of improved laterite roads.
All roads in the northern part of the country (the main livestock produc-
ing region) are unpaved, including the major roads to Mali and Upper Volta.
These roads are usually well-maintained, but heavy truck traffic on the

FIGURE 5.2

IVORY COAST'S TRANSPORT NETWORK
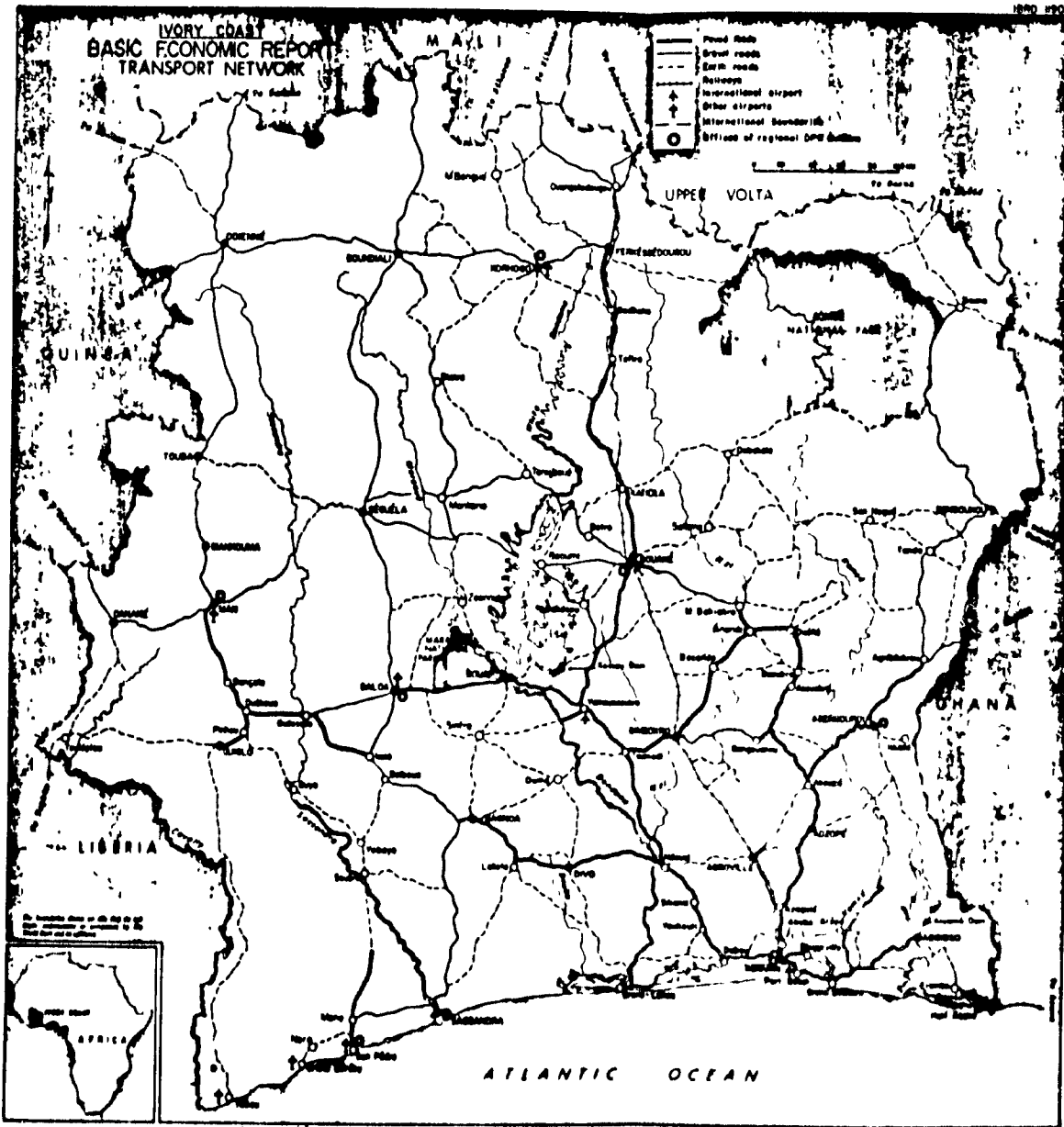
SOURCE: IBRD (1976)

road between Ferkéssédougou and the Malian border results in this road being in poor shape, especially during the rainy season. The major laterite roads are passable all year long.

The number of trucks available for freight transport in Ivory Coast (excluding tanker and logging trucks) and the estimated demand for their services are shown in Table 5.2.

TABLE 5.2

TRUCKING CAPACITY AVAILABLE FOR GENERAL FREIGHT
TRANSPORT IN IVORY COAST: 1969 and 1975

	1969	1975	Annual Rate of Increase (percent)
Number of Vehicles			
Small and Medium Trucks (8 tons)	6,070	6,770	2.0
Tractor-trailers	583	760	4.5
Capacity (tons)	60,200	69,400	2.5
Capacity (millions of ton-kms)[a]	810	940	2.5
Demand for Services (millions of ton-kms)	450	735	8.5
Excess Capacity			
Millions of ton-kms)	360	205	
Percent	80	28	

SOURCE: International Bank for Reconstruction and Development (1976), based on a 1975 study by SETEC International.

[a]Assumes 30,000 km per vehicle per year (i.e. a high number of urban deliveries), an average load equal to 60 percent of the truck's capacity, and 5 percent of the trucks traveling empty.

Table 5.2 shows that while total trucking capacity in tons-kms rose at an annual rate of 2.5 percent between 1969-1975, demand rose more quickly, leading to a reduction in excess capacity from 80 percent to 24 percent. This excess capacity exists only seasonally; during periods of peak de-

mand (e.g. during the tree crop harvests in December) almost all the available trucks are in use. The figures in Table 5.2 suggest, however, that during at least part of the year trucks are available for livestock transport.

Rail Transport.-- Most cattle shipped from Upper Volta to Ivory Coast travel by rail. Abidjan is particularly dependent on rail transport, with over 98 percent of all cattle arriving Abidjan in 1976 coming by train (10). Rail transport is characterized by long delays en route (due to having only a single track along most of the line) and seasonal shortages of cattle cars. This section discusses both these problems.

Ouagadougou and Abidjan are linked by a narrow-guage railway, the Régie de Chemin de Fer Abidjan - Niger (RAN). The railroad is run by a semi-autonomous agency owned jointly by the governments of Ivory Coast and Upper Volta. The line, the only railroad in Ivory Coast, covers a distance of 1,145 km along the route Ouagadougou-Bobo-Dioulasso-Ouango-lodougou-Ferkéssédougou-Bouaké-Dimbokro-Abidjan (see Figure 5.2). The principal loading points for cattle are Ouagadougou, Bobo-Dioulasso, and Ferkéssédougou. The major unloading points are Abidjan, Bouaké, and Dimbokro.

Rail transport of livestock between Upper Volta and Ivory Coast is hindered because only a single track exists along most of the route. This means that most trains, especially those with low priority, spend a lot of time on sidings waiting for other trains to pass in both directions. This increases the time animals spend in transit, and since they are neither fed nor watered en route, the result is increased weight loss and higher mortality. In principle, the RAN gives priority to trains carrying livestock over those carrying other merchandise (but not over passenger trains); nonetheless, delays of trains carring livestock are frequent.

The RAN's service reportedly deteriorated during the late 1960s and early 1970s, partly due to a failure to maintain tracks and rolling stock (5, 33). In 1971, the RAN launched a ten-year modernization program aimed at renewing much of the rolling stock and bringing tracks up to "modern

standards" (i.e., welded long-rail tracks, wide curves). By 1977 the entire line in Ivory Coast had been brought up to these standards except for the section of track between Tafiré and Bouaké (172 km). The RAN is currently modernizing this section and is scheduled to complete the job by 1980. The 1976-80 Plan calls for constructing a double track between Abidjan and Yapo (south of Agboville). The RAN hopes this will reduce the time trains spend on sidings waiting for other trains to pass and will permit more flexible scheduling of itineraries. The RAN's longterm hope is to construct a double track all the way to Bouaké (82, pp.57-9).

In 1975, the RAN possessed 40 locomotives, 120 passenger cars, and 1,250 freight cars (61, p.239). Table 5.3 presents the number of cattle cars in service as of June, 1977. In addition to the cattle cars shown in Table 5.3, the RAN is seeking financing to purchase 70 additional J14 cars, which it hopes to have in service by 1979 (17).

TABLE 5.3

NUMBER OF CATTLE CARS IN SERVICE: RAN, JUNE, 1977

Type of Car	Number of Cars	Capacity (tons)[a]	Volume	Number of Animals per Car[b]
H12	116	15 (6)	$48m^3$	25
H13	16	30 (8)	$69m^3$	30-35
J14	70	35 (9)	$80m^3$	35
Total	202			

SOURCE: RAN, Service Commercial, unpublished data.

[a]The figures in parentheses are the number of tons for which cattle merchants are charged (in calculating the rental fee of the car).

[b]The RAN does not fix the number of animals transported by car. The figures shown in the table are the numbers Herman (30) reports are normally loaded in Upper Volta.

Although the RAN classifies the cars described in Table 5.3 as cattle cars, these cars do not have open-slatted sides like American cattle cars. Rather, they are closed metal boxcar-style wagons. The H12 and H13 cars have no openings for ventilation. Drovers are obliged to tie the 'oors open so that the animals can have fresh air. Occasionally this allows animals to escape; and often doors jam as a result of being tied part-way open, which makes loading and unloading difficult. The sides of the J14 cars have open metal grating near the top that allow some fresh air to enter, but ventilation is much less than with American-style cattle cars. The lack of ventilation probably accounts in part for the heavy mortality and weight losses of cattle shipped by the RAN (see chapter 6, pp. 236 ff.).Tyc (119) claims that the RAN prefers the closed cars because they can also be used to haul cargoes other than cattle. According to Tyc, the RAN feels that it is too easy to pilfer goods from open-slatted cattle cars.

a. Rotation times for cattle cars. -- Cattle traders complain that they often have to wait a week or more to get cattle cars to ship their animals south. The RAN says that one reason for the shortage of cars is that merchants who ship goods from Ivory Coast to Upper Volta often use the cars to store their goods once they arrive in the north.[1] Shippers are often slow to unload the cars because of a shortage of warehouse space in Upper Volta. Cars spend a lot of time on sidings waiting to be unloaded; therefore, they make fewer trips per year than they would if they unloaded quickly. This slow rotation of cattle cars reduces the annual volume of cattle the RAN can transport.

In order to estimate the rotation time of cattle cars and the mortality losses of cattle shipped by rail, the investigator conducted a survey in Abidjan between mid-October 1976 and the end of April, 1977. This survey covered almost all arrivals of cattle cars in Abidjan during

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[1]As of May, 1977, the RAN's regulations concerning unloading were the following: shippers were given between 4 and 9 hours to unload the cars, depending on what time the cars arrived at their destination. After that the RAN charged 1,355 CFAF for the first half-day's use of the car, 2,765 CFAF for the second half-day's use, and 4,120 CFAF for every subsequent half-day's use.

this period.[1] An enumerator noted the identification number and point of departure of each cattle car that arrived and asked the drovers accompanying the cars about the number of animals in their herds that had died during the trip south. Table 5.4 shows the number of arrivals recorded during the survey, broken down by point of departure and type of cattle car.

Table 5.4 reveals that roughly 70 percent of the cattle cars recorded during the survey came from Upper Volta. Ouagadougou was the most important point of departure, accounting for 42 percent of the recorded arrivals of cattle cars, while Bobo-Dioulasso accounted for 22 percent. In Ivory Coast, Ferkéssédougou was the most important loading point, accounting for 22 percent of the total cattl cars arriving in Abidjan and 75 percent of those shipped from Ivory Coast. Table 5.4 also shows that most of the larger cars (the H13s and J14s) were used to ship cattle from Upper Volta to Abidjan. Eighty percent of the H13 shipments and eighty-four percent of the J14 shipments originated in Ouagadougou and Bobo-Dioulasso. The small H12 wagons had greater use farther south, with Ouagadougou and Bobo-Dioulasso accounting for only 55 percent of the H12 shipments recorded during the survey.

One can use data collected during the survey to estimate the rotation times of the RAN's cattle cars. The rotation time of a cattle car is defined here as the number of days needed for the car to travel from the north to Abidjan, return to its point of departure, be unloaded, and become available for shipping cattle south again.[2] In principle, the minimum rotation time for a car shipped from Upper Volta to Abidjan, given current train schedules, would be about eight days: three days for the trip south, one day for cleaning and reloading, three days for the trip back north, and one day for unloading in the north. The RAN's estimate of the actual rotation time for cattle cars is ten to twelve days (64).

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[1] All cattle cars arriving in Abidjan between Monday and Saturday were included in the survey.

[2] Actually, the survey data measured the time between when the car first arrived in Abidjan and when it next appeared in Abidjan. It can be shown that this rotation time is equal to the one described above if one assumes that it takes the same amount of time to load cattle in the north as it takes to unload them in Abidjan.

TABLE 5.4

NUMBER OF CATTLE CARS RECORDED DURING ABIDJAN SURVEY OF
ROTATION TIMES AND MORTALITY DURING TRANSPORT
OCTOBER, 1976 - APRIL, 1977

Point of Departure	Type of Car			Total No. of Cars	Estimated No. of Cattle[a]
	H12	H13	J14		
Upper Volta					
Ouagadougou	194	26	137	357	10,477
Koudougou	51	1	8	60	1,587
Bobo-Dioulasso	133	33	21	187	5,116
Banfora	2	1	0	3	82
Ivory Coast					
Ouangolodougou	30	1	1	32	817
Ferkéssédougou	158	8	18	184	4,836
Tafiré	13	2	0	15	389
Bouaké	14	1	2	17	452
Totals	595	73	187	855	23,756

[a]Estimated assuming the following average number of animals per wagon:
H12 - 25; H13 - 32; J14 - 35.

Rotation times for each cattle car were calculated by counting the number of days between the first appearance of the car in Abidjan and its second appearance, between its second appearance and its third appearance, and so forth. These rotation times were then averaged to get an overall estimate of the rotation times of cattle cars used by the RAN. According to the RAN (64), nothing but cattle traveled south in these cars;[1] therefore all these cars arriving in Abidjan between Monday and Saturday went to the cattle market and were recorded in the survey. Since no arrivals were recorded on Sunday, the estimated rotation times should be reduced by one-seventh to compensate for wagons that arrived on Sundays. Roughly 80 percent of all cattle transported by the RAN travel to Abidjan;[2] the rotation times therefore should be reduced by an additional 20 percent to take account of wagons unloaded at other destinations.

The survey results indicate that the rotation times are more than twice what the RAN estimates. Table 5.5, which presents the estimated rotation times by car-type, shows that the mean rotation items varied from 22.7 days for the H13 wagons to 40.9 days for the J14 wagons. It appears that the cattle cars, especially the larger, newer J14s, are not rotated nearly as rapidly as they could be. The J14s probably have longer rotation times because they are used mainly to ship cattle between Ouagadougou and Abidjan rather than for shorter hauls within Ivory Coast. The shortage of warehouse space in Upper Volta, particularly in Ouagadougou where most of the J14s are shipped, accentuates this problem. Merchants probably prefer to store goods in the J14s rather than in the other cars because the J14s are larger. The RAN charges the same rental rate for all unloaded wagons sitting on sidings, so the effective rental rate per ton is lower for the J14s.

The rotation times shown in Table 5.5 can be used to calculate the maximum number of animals the RAN could transport per year. These

[1]Small ruminants were shipped south in open livestock cars (64).

[2]The figure of 80 percent is the investigator's estimate based on data on arrivals in Abidjan and Bouaké and assuming that all cattle slaughtered in Dimbokro and Agboville arrive by train. Abidjan, Bouaké, Dimbokro, and Agboville are the only unloading points of any importance for cattle shipped by rail.

TABLE 5.5

ESTIMATED ROTATION TIMES FOR RAN CATTLE
CARS BY CAR TYPE: OCTOBER, 1976 - APRIL, 1977

Car Type	Mean Rotation Time (days)[a]
H12	25.5
H13	22.7
J14	40.9

[a]Mean rotation times calculated for cattle cars arriving in Abidjan.
The figures are adjusted downward to take account of rail shipments of
cattle to markets other than Abidjan and non-recorded arrivals in Abidjan
(see text).

TABLE 5.6

ESTIMATE OF THE RAN'S AVAILABLE CAPACITY FOR CATTLE TRANSPORT: 1977

	Car Type			Total
	H12	H13	J14	
1. Average Rotation Time (days)	25.5	22.7	40.9	
2. Number of Trips Possible per Year	14.3	16.1	8.9	
3. Average Number of Animals per Car	25	32	35	
4. Number of Cars in Service in June, 1977	116	16	70	202
5. Maximum Annual Volume (head of Cattle) (2) x (3) x (4)	41,470	8,243	21,805	71,518

SOURCE: Table 5.3 and 5.5.

calculations are shown in Table 5.6. The figures in Table 5.6 indicate that given the existing rotation times and patterns of cattle shipment, the RAN could carry a maximum of 71,518 head of cattle per year. Because of their slow rotation times, the J14s would account for only 30 percent of this volume, despite their making up 34 percent of the total cattle cars and holding more animals per car than either the H12s or the H13s.

Official Ivorian import statistics (71) state that in 1976, 37,311 cattle "entered" the country by rail, including those Malian cattle trekked to Ouangolodougou and Ferkéssédougou and shipped south from those points by rail. This indicates that even given the long rotation times for cattle cars, in 1976 the RAN was handling only about 52 percent of the volume of cattle it theoretically could. The official import figures, however, understate the volume of animals shipped by rail at the time of the survey. The official figures are low for two reasons: few cattle were shipped south during the early part of 1976, apparently because of a shortage of slaughter animals in the producing areas; and most merchants who ship cattle by rail declare fewer animals than they actually ship in order to evade market taxes (see Appendix 1E). A more reliable estimate of the number of animals handled by the RAN is available from the survey results. During the 6 1/2 month survey in Abidjan, approximately 23,756 head of cattle arrived in cattle cars covered by the survey.[1] Inflating this figure to compensate for the survey taking place only six days per week and to take account of the estimated 20 percent of the RAN's cattle shipments that go to markets other than Abidjan yields an estimate of 34,644 head of cattle moved by the RAN over the 6 1/2 month period. This implies an annual volume of roughly 63,690 head. This, in turn, implies that on the average the RAN was carrying about 90 percent of its theoretical capacity of cattle.

Table 2.2 in Chapter 2 showed that shipments of cattle from Upper Volta to Ivory Coast are very seasonal, being concentrated in the period from September to March. If the rotation time of cattle cars was fairly

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[1]The survey covered periods of both seasonally heavy and light shipments of cattle to Abidjan.

constant throughout the year and if, on average, the RAN was carrying 90 percent of its theoretical capacity, it is likely that in periods of peak demand for cattle cars (e.g., in December) demand exceeded the available supply, forcing merchants to wait several days for cattle cars. The almost universally-expressed complaint by cattle merchants about it being difficult to get cattle cars during certain times of the year suggests that the slow rotation time of cattle cars was due to factors other than a lack of demand for them.

Two actions by the RAN could reduce the rotation time of cattle cars and relieve this bottleneck. The first would be to investigate whether cattle cars are rapidly backhauled to the north, and if they are not, take steps to insure that they are in the future. Second, if the RAN sharply raised its daily rental rates for cars on sidings, merchants would have an incentive to unload the wagons quickly once they arrived in Upper Volta. In the long run, the RAN could also add more cattle cars to its fleet, but this would be much more expensive than the two alternatives just mentioned.

b. Railroad development projects.-- The 1976-80 National Plan calls for constructing a second rail line in Ivory Coast, running between San Pedro on the southwest coast and Bangolo, 50 km south of Man. The main purpose of the line is to permit the exploitation of iron deposits near Bangolo. Branch lines running to Man and Issia/Daloa are also planned. The Plan calls for the main line to be completed in 1980, but completion may be delayed, as the problem of financing is not yet resolved. In its initial years of operation, this line would not be very important in carrying livestock, as the effective demand for meat along the southwest coast is low because of low population and the availability of inexpensive fish. If the area around San Pedro continues to grow as fast as it has in recent years, however, this railroad, combined with a paved road between Odienné and Man, could become an important cattle trade route by 1990.[1]

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[1]San Pedro grew from a very small fishing village in 1970 to a city of 31,500 in 1975 (61, p.31). The Ivorian government has designated San Pedro the major "development pole" of the southwest and has invested a large amount to develop both the city and its hinterland.

Another development in rail transport, although not in Ivory Coast, will affect the Ivorian cattle trade: the extension of the RAN lines from Ouagadougou to Tembao, north of Markoye in Upper Volta. This extension, also being built to allow exploitation of mineral deposits (manganese), should be very important in transporting livestock between northeastern Upper Volta and Ouagadougou. Given the existing conditions of livestock transport on the RAN (frequent delays, no feeding or watering of the animals en route), it is extremely unlikely that animals would survive direct shipment all the way from Markoye to Abidjan. Nonetheless, by facilitating the flow of animals from the Markoye area to Ouagadougou the new line should channel livestock more effectively from the Markoye region to the Ivorian market.

The Available Infrastructure: Meat Transport[1]

Chilled and frozen meat enters Ivory Coast by rail, road, air, and sea. Until 1975 the quantities of chilled and frozen meat imported were small. Improvements in roads and storage facilities, however, facilitated the expansion of frozen meat imports by sea beginning in 1975. At the same time, a deterioration in refrigerated rail transport contributed to a decline in the chilled meat trade between Upper Volta and Ivory Coast.

Prior to 1975 chilled and frozen meat imported into Ivory Coast came mainly from Upper Volta, Mali, and Niger. It entered Ivory Coast at its northern border and traveled south to the major markets of Bouaké and Abidjan. Since 1975 the direction of the chilled and frozen meat trade has reversed, with frozen meat arriving by sea in Abidjan and some of it traveling north by truck to Ivory Coast's inland markets.

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[1]The following discussion focuses exclusively on the infrastructure for transporting chilled and frozen meat. There are no canning facilities for meat in Ivory Coast or in its major northern trading partners, and although some canned meat is imported from overseas, the amount is small. There is also very little trade in dried meat.

Rail Transport. -- Until 1975 the bulk of Ivory Coast's frozen and chilled meat imports came from Upper Volta and traveled south in refrigerated rail cars. The refrigerated cars belong to a private company, the Fruitière Ivoirienne (formerly CODAPAG[1]), which leases them to the RAN. Under the lease agreement, the RAN charges users for transporting the cars, and the Fruitière Ivoirienne charges for the refrigeration. In practice, the RAN collects the entire rental fee and splits it 50-50 with the Fruitière Ivoirienne (106, pp. 35-7). The Fruitière Ivoirienne owns five refrigerated cars of eight tons capacity each, although in 1977 only one was in service. The car made one round trip per week between Abidjan and Upper Volta (Bobo-Dioulasso and Ouagadougou), carrying dairy products, fruit, and fish north, and meat south. As mentioned in Chapter 1, the condition of the refrigerated cars has deteriorated sharply in recent years. As a result, the volume of meat transported between Upper Volta and Ivory Coast fell markedly between 1974 and 1976.

Because of the deterioration in refrigerated rail service, the governments of Upper Volta and Ivory Coast created a new publicly owned company for refrigerated rail transport in 1976, the Société pour le Transport Frigorifique (SOTRAF).[2] This company was scheduled to begin trial shipments of meat from Bobo-Dioulasso and Ouagadougou to Abidjan in late 1977, using refrigerated containers owned by AGRIPAC, the Ivorian state-owned company sharing duopolistic import rights for meat.[3] If these trials were successful, plans called for purchasing several containers and instituting regular service between Upper Volta and Ivory Coast in 1978.[4] In theory,

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[1]Compagnie Dakaroise de Produits Agricoles.

[2]Of the total initial capital of SOTRAF (81,500,000 CFAF), the Ivorian government contributed 24.5 percent; the Voltaic government, 31.5 percent; the RAN, 36.8 percent; and the Société Africaine de Groupement, a private Ivorian company, 7.1 percent.

[3]The president of SOTRAF is also the president of AGRIPAC.

[4]As of August, 1978, however, SOTRAF had not even made its trial shipments of meat between Upper Volta and Ivory Coast.

the Fruitière Ivoirienne would be free to compete with SOTRAF. Nonetheless, the RAN, the single largest contributor of capital to SOTRAF, proposes to favor the new company with preferential tariffs (17). The likely result will be the replacement of the Fruitière Ivoirienne's monopoly on refrigerated rail transport by one controlled by SOTRAF.

Truck Transport. -- Currently there is no regular refrigerated truck service between Ivory Coast and its northern trading partners. In the early and mid-sixties, SONEA,[1] a Malian state-owned cattle and meat company (now defunct) sent some meat to Abidjan by truck, but these shipments ceased in 1970. SONERAN,[2] the Nigerien state agency for meat exports, ships some meat to Ivory Coast by truck, but the quantity is small (44 tons in 1976).

In contrast, since 1975 a considerable amount of imported frozen meat has traveled north by truck from Abidjan to cities in the interior of Ivory Coast. This meat arrives by sea from Latin America and Europe and is stored in privately-owned cold rooms at the Port of Abidjan. From there, the importers (AGRIPAC and DISTRIPAC) distribute it both within Abidjan and to cities in the interior. Deliveries within Abidjan are made by insulated truck, as are deliveries to cities accessible from Abidjan only by unpaved roads. For deliveries to cities linked to Abidjan by paved roads, AGRIPAC and DISTRIPAC use several large (tractor-trailer) refrigerated trucks. These two companies do not run refrigerated trucks on unpaved roads because they feel this would lead to frequent breakdowns of the refrigeration equipment. In 1976, AGRIPAC and DISTRIPAC regularly distributed frozen meat to 15 cities in the interior of Ivory Coast.[3] The total volume of frozen meat transported to these inland markets in 1976 was ap-

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[1] Société Nationale d'Exploitation des Produits Animaux.

[2] Société Nationale pour l'Exploitation des Resources Animales du Niger.

[3] AGRIPAC served Abengourou, Agboville, Bouaké, Bouaflé, Bondoukou, Bouna, Daloa, Dimbokro, Gagnoa, Korhogo, Man, and San Pedro; DISTRIPAC sold meat in Aboisso, Bongouanou, Bouaké, and Divo.

proximately 3,400 tons, out of a total of 17,030 tons imported.[1] The distribution of frozen meat in the interior of the country has been facilitated by the country's extensive road network and by a series of small cold-storage lockers constructed throughout the country in the early 1970s for the distribution of frozen fish. By 1975, 128 such cold-storage lockers existed, 99 of which were outside of Abidjan (66, p.4).

Air Transport.-- Ivory Coast imports chilled meat by air from Europe, Latin America, Southern Africa, and West Africa. Imports from Latin America and Southern Africa come on chartered airlines, while imports from Europe and West Africa arrive on regularly scheduled cargo and passenger flights. Only top-quality meat is imported by air, and the bulk of it is consumed in Abidjan. Distribution and storage therefore do not pose large problems. The meat is stored either in the cold rooms of the class 1 butcher shops that sell it or in the cold storage facilities at the Port.

Sea Transport and Port Facilities.-- Almost all frozen meat destined for the class 2 market arrives in Abidjan by sea. During 1976 refrigerated ships normally arrived with meat every two weeks. Unloading delays were rare.

The frozen meat is stored in privately-owned cold rooms at the Port of Abidjan. There are 10 cold rooms at the Port, with a total capacity of 43,000 m^3. This corresponds to 1,000 tons of frozen meat or 2,000 tons of frozen fish. Normally the rooms are used to store both meat and fish, with the relative amounts depending on arrivals. During 1976, average monthly consumption of frozen meat in Ivory Coast was 1,277 tons per month, thus requiring at least two deliveries per month in order to avoid exceeding the available storage capacity at the Port. An increase in frozen meat consumption over 1976 levels would require more frequent deliveries and possibly the expansion of cold store facilities at the Port.

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[1] AGRIPAC sales in these markets for the first 11 months of 1976 averaged 20.5 tons per month, while DISTRIPAC estimates its monthly sales in the interior at approximately 77 tons (17, 19).

CHAPTER 6

THE COSTS OF TRANSPORTING CATTLE

Cattle marketing in West Africa is characterized by long distances between the areas of livestock production in the Sahelian countries and the major meat-consuming regions in the coastal countries. Because of the distances involved, transport costs for livestock become important components of the retail price of meat in the coastal areas. Therefore, a reduction in transport costs would be of considerable benefit to consumers and producers of beef. Before transport costs can be reduced, however, a firm knowledge is needed of what these costs are. This chapter looks at the costs of shipping cattle between Ivory Coast, Mali, and Upper Volta, as well as within Ivory Coast, examining both the direct cash outlays involved and the indirect costs, such as weight losses and mortalities en route.

The chapter is divided into six parts. Because most of the cattle shipped to Bouaké are trekked, the first two parts of the chapter devote special attention to the costs of trekking. The first part examines the direct costs of shipping cattle to Bouaké from the major producing areas of the north, comparing the cash outlays required for trekking, trucking, and mixed trek-rail transport. The second part looks at the indirect costs of shipping cattle to Bouaké, including losses of animals and forced sales en route, weight losses during trekking, and the costs of waiting for cattle cars at railroad loading points. The third section examines the costs of intermediate-distance trucking within the forest zone of Ivory Coast. Since most cattle shipped to Abidjan arrive by rail, the fourth and fifth parts of the chapter give special emphasis to the costs of rail and mixed trek-rail transport. The fourth section deals with the direct costs of shipping cattle to Abidjan from northern Ivory Coast, Mali, and Upper Volta, comparing the costs of truck, rail, and mixed transport. The fifth section examines the indirect costs of shipping cattle to Abidjan, especially weight losses and mortalities en route. The final section draws conclusions about the relative costs of different means of cattle transport, and based on these findings makes

policy recommendations aimed at reducing transport costs.

The chapter shows that trekking is a relatively inexpensive way of moving cattle within the Sudanese and Guinea savanna zones, in terms of both the cash outlays required the indirect costs involved, such as mortalities and weight losses en route. In contrast, trucking, although it permits merchants to react quickly to market conditions and have a rapid capital rotation, is very expensive, and because of this, few merchants in Ivory Coast truck cattle long distances. The major costs of trucking are the rental fee for the truck and the bribes truckers r forced to pay en route. Intermediate-distance trucking within the forest zone, however, is important. The cost of shipping cattle by rail is intermediate between the cost of trucking and the cost of trekking cattle. Rail shipment is used primarily by merchants who ship cattle from Mali and Upper Volta to Abidjan. The major costs of rail shipment are the rental of the cattle cars, weight losses en route, and (for cattle shipped from Upper Volta) mortalities en route. Weight losses and mortalities result from the long periods cattle spend in transit without feed or water. The costs from weight losses are much higher than those from mortalities. The value of the weight lost by a 150 kg carcass-weight steer shipped from Ouagadougou to Abidjan in early 1977 was about 5,700 CFAF, or nearly nine times the average loss per animal due to mortalities. Weight losses represented the single largest cost of shipping cattle between Ouagadougou and Abidjan, except for export taxes. Export taxes represented a high proportion of the total cost of shipping cattle from Upper Volta and Mali to Ivory Coast. They accounted for almost half the cost of shipping cattle by train from Ouagadougou to Abidjan, and 64 percent of the cost of trekking cattle from Koutiala, Mali to Bouaké.

The Direct Costs of Shipping Cattle to Bouaké

. This section examines the cash outlays required to ship cattle to Bouaké from northern Ivory Coast and Mali by truck, by trek, and by a combination of trekking and rail transport. Transport costs between

Upper Volta and Bouaké are not analyzed, because few cattle are shipped
along this route. Most of the data presented in this section come from
interviews conducted in Bouaké with cattle merchants and drovers.[1]

The Data.-- The data presented below on the costs of trekking and
mixed trek-rail transport come from interviews carried out with forty-
two cattle merchants and chief drovers who arrived in Bouaké between
November, 1976 and June, 1977. The characteristics of the herds they
accompanied are shown in Table 6.1. Because cattle merchants tended to
be suspicious of outsiders, it was impossible to use random sampling in
selecting respondents for these interviews. Nonetheless, the
distribution of the sample by country of origin was roughly the same as
that of all trade herds arriving in Bouaké. Forty-five percent of all
recorded arrivals of trade herds in Bouaké in 1976 came from Mali,
thirteen percent came from Upper Volta, and forty-two percent came from
Ivory Coast. In the sample, 45 percent came from Mali, 9 percent came
from Upper Volta, and 46 percent came from Ivory Coast. Since few
animals arrive in Bouaké by truck, the information presented below on
long-distance trucking costs comes primarily from informal discussion with
truckers.[2] Data on rail transport costs come from information and
documents provided by officials of the RAN and from interviews with
drovers of herds arriving by rail in Bouaké. The reader should note
that the transport costs presented in this chapter are average or typical
figures that are subject to considerable variation.

Cost of Shipping Cattle from Northern Ivory Coast to Bouaké. --
Table 6.2 compares the typical costs of trekking and trucking cattle
to Bouaké from two markets in northern Ivory Coast, Tingrela and

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[1]The terms "drover" and "herder" are used interchangably in this
study to indicate a person who accompanies cattle to market by trek,
truck, or rail. The term herder, as used here, does not indicate a cat-
tle raiser. The term convoyeur is also used to indicate a drover who
accompanies cattle shipped by rail.

[2]Only one of the cattle merchants interviewed in Bouaké had
transported his animals by truck.

TABLE 6.1

CHARACTERISTICS OF HERDS COVERED BY INTERVIEWS ON TRANSPORT COSTS: BOUAKE, NOVEMBER 1976 - June 1977

Point of Departure[a]	Number of herds	Number of Animals		Transport			
		Departed[b]	Arrived in Bouaké[c]	Trek		Trek Plus Rail	
				Herds	Animals[d]	Herds	Animals[d]
Mali							
Koutiala	12	567	553	7	338	5	179
Sikasso	6	291	271	4	191	2	100
Djenné	1	50	38	1	50	-	-
Subtotal Mali:	19	908	862	12	629	7	279
Upper Volta							
Orodara	2	85	85	1	59	1	26
Bobo-Dioulasso	1	38	38	-	-	1	38
Tougon	1	47	45	1	47	-	-
Subtotal Upper Volta	4	170	168	2	106	2	64
Ivory Coast							
Boundiali	6	374	346	6	374	-	-
Niellé	5	244	216	3	145	2	99
Tingrela	3	117	114	3	117	-	-
Korhogo[e]	4	214	185	4	214	-	-
Katiola	1	33	22	1	33	-	-
Subtotal Ivory Coast	19	982	883	17	883	2	99
Total	42	2,060	1,915	31	1,618	11	442

a. Refers to town or sub-prefecture.
b. Number of animals leaving point of departure
c. Number of animals arriving in Bouaké. Takes account of losses and sales of animals en route.
d. Number of animals leaving point of departure
e. Includes 1 herd each from the sub-prefectures of Napieolédougou and Dikodougou.

TABLE 6.2

COST OF TRANSPORTING FIFTY HEAD OF CATTLE FROM TINGRELA OR BOUNDIALI TO BOUAKE
BY TREKKING AND BY TRUCK: 1976-77 (in CFAF)

Expense	Trek		Truck	
	Total	Per Animal	Total	Per Animal
1. Salary of drovers	3 @ 10,000 = 30,000	600	2 @ 5,000 = 10,000	200
2. Food for drovers	15,000	300	—	—
3. Return trip for drovers	3 @ 2,500 = 7,500	150	2 @ 2,500 = 5,000	100
4. Round-trip for owner	5,000	100	5,000	100
5. Food for owner in Bouaké 7 days @ 200 CFAF/day	1,400	28	1,400	28
6. Health certificate	2,000	40	2,000	40
7. Vaccination	1,750	35	1,750	35
8. Amortization of cattle merchant's license	12,100	242	12,100	242
9. Indemnity for damaged fields	475	10	—	—
10. Loss of animals	1.0% of 50 animals @ 40,000 CFAF per animal = 20,000	400	1.6% of 50 animals @ 40,000 CFAF per animal = 32,000	640
11. Forced sales	0.6% of 50 animals @ 20,000 CFAF loss per animal = 6,000	120	0.6% of 50 animals @ 20,000 CFAF loss per animal = 6,000	120
12. Truck rental	—	—	2 trucks @ 87,500 CFAF each = 175,000	3,500

TABLE 6.2 CONTINUED

Expense	Trek		Truck Transport	
	Total	Per Animal	Total	Per Animal
13. Unofficial costs	—	—	10,000	200
14. Cattle market tax: Bouaké	10,000	200	10,000	200
15. Gift to landlord	0-5,000	0-100	0-5,000	0-100
Total Cost (excluding weight loss)	111,225 - 116,225	2,225 - 2,325	270,250 - 275,250	5,405 - 5,505
Days in transit from: Boundiali		25		1
Tingrela		30		1

Boundiali. Tingrela and Boundiali are both in north-central Ivory Coast. Interviews with drovers indicated that even though Tingrela lies 117 km. north of Boundiali, the cost of transporting cattle from the two towns to Bouaké was roughly the same.

Table 6.2 indicates that on a per-trip basis it cost roughly 2.5 times as much to truck cattle from northern Ivory Coast to Bouaké as it did to trek them, but transit time was only one day by truck and 25 to 30 days by trek. The cost items for each means of transport were the following:

1) Drover' wages.-- Merchants typically hire a team of drovers to trek the animals to market. The merchant or his representative then travels by train or bush-taxi to the market of destination, arriving a few days before the herd in order to contact an intermediary and evaluate market conditions. Typically, one drover is required for every ten to twenty head of cattle; therefore a herd of fifty head usually requires three drovers.[1] Among the drovers interviewed from Boundiali and Tingrela, the modal wage was 10,000 CFAF per person per trip. When cattle are trucked, one herder accompanies each truck. He rides with the driver, and checks the animals frequently to make sure none have been injured or have fallen down. For his services he usually receives 5,000 CFAF. His higher salary per day probably reflects the greater care that a herder must exercise to prevent injury to cattle that are trucked rather than trekked to market.[2]

2-3) Food and return trip for the drovers.-- Typically, the cattle owner pays for the drovers' food between the time the herd leaves

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[1] The average number of animals per herder in the herds covered by the interviews in Bouaké was 15.6; the standard deviation was 5.5.

[2] On the average, a drover accompanying animals by truck would spend about nine days earning his 5,000 CFAF wage: one day loading the animals and traveling with them by truck to Bouaké, seven days watching them in Bouaké while they were sold, and one day returning to the north. Therefore, his daily wage would be 556 CFAF. A drover who trekked animals south from Tingrela would spend thirty-eight days earning 10,000 CFAF; therefore his daily wage (excluding food) would be 263 CFAF.

the north and the time it is sold. He also usually pays the drovers' return fare to the north by truck or bush-taxi, although these payments are sometimes just implicitly included in a higher cash wage paid to the drovers. When animals are trucked, the owner does not pay food expenses. The trip is short and the drovers pay these costs themselves.

4) Round trip for the owner between his point of departure and Bouaké.-- When cattle are sold in Bouaké, the owner of the animals or his representative is almost always present. In contrast to Abidjan, where convoyeurs who accompany herds south often sell animals for 'heir employers (usually cattle merchants from Upper Volta), drovers are rarely authorized to sell animals in Bouaké. Rather, the owner or his representative makes the trip to Bouaké to supervise the selling. If the herd is owned by a merchant based in Bouaké, he or his representative usually makes a trip north to buy the animals and arrange for their shipment south.

5) Food for the owner in Bouaké.-- When a cattle merchant arrives in Bouaké, he normally stays with an intermediary-landlord. The intermediary lodges and feeds the merchant and arranges the sale of his animals. In return, the merchant reimburses the landlord for the cost of his food (roughly 200 CFAF per day) and may present him with a gift of up to 5,000 CFAF when he leaves (item 15 in Table 6.2).[1] Table 6.2 assumes that it takes a week to sell and receive payment for the entire herd. This time can vary widely, from one day to three weeks, depending on the supply of animals on the market and the demand for them. One week would probably be the norm.

6) Health Certificate.-- Ivorian law demands that all livestock moved within the country be accompanied by a health certificate (laissez-passer sanitaire) attesting that the animals are free of contagious diseases. These certificates are issued by agents of the Veterinary Service, who usually charge 1,500 CFAF per herd for inspecting the animals.

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[1]Cohen (12; 13) and Hill (31) report that in southern Nigeria and Ghana, landlords feed and lodge cattle merchants for free and present merchants with gifts at their departure. This is not true in Abidjan or Bouaké.

and issuing the certificate. The certificate must be presented to all veterinary stations en route; the veterinary agents at these stations are supposed to re-inspect the animals and stamp the certificate. Typically they charge 500 CFAF for doing so. The 2,000 CFAF listed in Table 6.2 indicates that most herders coming from Boundiali and Tingrela paid 1,500 CFAF for the certificate and presented the certificate to one veterinary post en route, which charged 500 CFAF to re-inspect the animals and stamp the certificate.[1]

7) Vaccinations.-- The Ivorian Veterinary Service and SODEPRA usually vaccinate cattle from northern Ivory Coast against rinderpest and contagious bovine pleuro-pneumonia at no charge. When the Veterinary Service is out of the required vaccines or when the owner wants them vaccinated against other diseases, such as trypanosomiasis, he must buy the vaccine himself, which the Veterinary Service then administers. Twenty-seven percent of the cattle merchants from northern Ivory Coast who were interviewed in Bouaké had purchased vaccine for their animals, at an average cost of 130 CFAF per animal. For the herds arriving from northern Ivory Coast, the average cost of vaccination per head was therefore .27 x 130 = 35 CFAF, or 1,750 CFAF for a herd of 50 head.

8) Amortization of cattle merchant's license.-- The annual cost of a license for an Ivorian cattle merchant selling over 100 head of cattle per year is 96,800 CFAF. The amortization figure given in Table 6.2 assumes an annual volume of 400 animals for both truck and trek transport. To the extent that truck transport permits a more rapid rotation of capital and a higher annual volume, the cost of the license per animal sold would be less for merchants who trucked their cattle to market.

9) Indemnity for damaged fields.-- When cattle walk to market, they occasionally damage crops in fields along the route. The owner of

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[1] There was considerable variation, however, in the amount charged the drovers interviewed. The total amount varied from 500 CFAF to 4,000 CFAF.

the animals is liable for any damage caused by his animals. If the chief drover and the farmer cannot agree on the value of the crops destroyed, agents of the Agriculture Ministry evaluate the damage and fix the indemnity to be paid by the cattle owner. Of the forty-two cattle herds covered by the transport cost interviews in Bouaké, forty had trekked over 100 km to market.[1] Of these, two herds (5 percent) had damaged fields for which fines were paid. The average fine was 9,500 CFAF;[2] therefore the average fine per herd was .05 x 9,500 CFAF = 475 CFAF.[3] This figure probably underestimates the cost of crop damage, as thirty-one of the forty interviews (78 percent) took place in the dry season, when crop damage is at a minimum, whereas the dry season accounts for less than 50 percent of total trekking traffic.[4] Nonetheless, even if the crop damage figure were double that shown in Table 6.2, it would still be very low on a per animal basis, and would not, by itself, justify trucking animals from an economic standpoint.

10-11) Loss of animals and forced sales.-- Losses of animals include animals that die en route and those that escape from the herd and cannot be recovered. When an animal is lost, the merchant loses his entire investment in the animal. Table 6.2 assumes an initial purchase price of 40,000 CFAF. Forced sales are sales en route of animals that are too weak, injured, or ill to continue, or sales at the final destination of animals that have fallen ill or have been injured during the trip. Since injured and ill animals must be sold quickly before they die, the seller is at a disadvantage, particularly if he is eager to continue on to another market. Table 6.2 assumes that forced sales involve the loss

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[1] The two other herds (one from Katiola and one from Bobo-Dioulasso) had trekked only short distances and are therefore excluded from the following analysis.

[2] One fine totaled 7,500 CFAF; the other was 11,500 CFAF.

[3] This may be viewed as an expected value in the framework of risk analysis.

[4] Officially recorded cattle arrivals by hoof in Bouaké between June, 1976 and June, 1977 totaled 29,610 head. Of these, only 13,648 head (46 percent arrived during the dry season [October through March]). (79)

of half the purchase price of the animal. Data on the incidence of losses
and forced sales are discussed below in the section on the indirect
costs of shipping cattle to Bouaké.

12) Truck rental.-- Few cattle merchants own their own trucks;
rather, they rent the services of a truck and driver when they want to
ship cattle by truck. Trucks are privately owned in Ivory Coast.
Although in principle the government sets trucking rates, the actual
rental fee charged is subject to negotiation between the owner of the
truck and the person renting it. Rental rates fluctuate, reaching a
peak from November to January, when there is a heavy demand for trucks
to haul agricultural products, particularly cocoa and coffee. The rental
rate listed in Table 6.2 (3,500 CFAF per head of cattle transported
between Tingrela and Bouaké) is the normal off-season rate. In December
the rate may rise by 1,000 - 1,500 CFAF per head. These rates refer to
trucks loaded to a capacity of about twenty-five head.

The trucks used for livestock transport are general cargo
vehicles with no special modifications for transporting livestock.
Discussions with truckers revealed that most truckers consider cattle
a back-haul cargo, which pays some of the costs of the return trip south.
Most of the profit, however, is made in hauling goods north. There is
little profit in hauling cattle, and truckers prefer cargoes with higher
weight-to-volume ratios than cattle. An eight-ton truck typically hauls
no more than thirteen steers, which, at an average liveweight of 300 kg,
represent 3.9 tons, less than 50 percent of the weight capacity of the
truck. Data from the SETEC study of transport costs in Ivory Coast (98)
show that given current tariffs for truck transport of cattle, truckers
lose money transporting cattle between Tingrela and Bouaké. In 1976 the
total cost of operating an 18-ton truck (capable of carrying 25 head of
cattle) between Tingrela and Bouaké was roughly 117,000 CFAF. This was
29,500 CFAF more than what could be earned hauling cattle along this
route. It is clear why truckers agree to transport cattle only when
the alternative is to return south with an empty truck.

13) Unofficial costs.-- Truckers report that they are
frequently stopped en route by customs and police agents and forced to

pay bribes in order to continue on their journey. The cost of these illegal charges is usually split between the trucker and the owner of the animals. These charges vary widely. One trucker interviewed reported being stopped at 23 separate roadblocks between the Malian border and Bouaké and paying bribes of between 500 CFAF and 2,000 CFAF at each stop. Table 6.2 assumes an average of 10,000 CFAF is paid between Tingrela and Bouaké. No such unofficial costs were reported for trekked herds since these are not so sensitive to roadblocks.

14) Cattle market tax. -- Cattle sold in the Bouaké market are subject to a municipal tax of 200 CFAF per head for using the market facilities.

15) Gift to the landlord. -- As mentioned above, if cattle merchant feels he received a good price for his animals, he may give his landlord a gift of up to 5,000 CFAF. This gift is optional.

Table 6.2 shows that a much larger cash outlay was required to ship cattle by truck than on hoof. For a cash outlay of 86,000 CFAF (total costs excluding weight losses, mortalities, and forced sales) a merchant could transport a herd of 50 animals on hoof from Tingrela to Bouaké and sell them in the Bouaké market. To ship the same animals by truck and sell them in the Bouaké market required a cash outlay of 233,000 CFAF. By far the largest component of this was the rental fee for the two trucks (175,000 CFAF). This accounted for 75 percent of the cash outlay and 65 percent of the total cost (excluding weight losses) of shipping cattle by truck. The largest single cost in trekking was herders' wages (30,000 CFAF), accounting for 35 percent of the total cash outlay and 27 percent of total costs excluding weight losses. Trekking costs vary considerably, depending on the number of drovers who are unpaid family members, the number of animals lost, whether the animals cause crop damage, etc. Some cattle merchants try to cut costs by underpaying market taxes and not buying traders' licenses. Among the nine merchants from Boundiali and Tingrela interviewed in Bouaké, the average cash outlay per animal (excluding purchase price, the merchant's food expenditure in Bouaké, amortization of the trader's license, and gift to the landlord) varied between 1,130 CFAF and 2,167 CFAF (with a mean of 1,524 CFAF), compared to 1,473 CFAF shown in Table 6.2.

The low cash outlay and low total cost of trekking explain why most cattle merchants prefer to trek rather than truck their animals between northern Ivory Coast and Bouaké. The main advantages of truck transport are that it allows merchants to react quickly to shortages of cattle in the consumption markets (if they can quickly find trucks to transport their animals) and it permits a more rapid rotation of capital. For example, instead of trekking his animals for thirty days between Tingrela and Bouaké, a merchant can truck them to Bouaké in a single day. Even if it takes him a week to assemble the herd in Tingrela, three days to find a truck, a week to sell the animals in Bouaké, and a day to return to Tingrela, his rate of capital rotation will be two and a half times that of a merchant who trekked his cattle to market (eighteen days versus forty-five days).[1]

Weight losses during transport appear to vary both seasonally and by means of transport, but data on these losses are scarce. The data that exist are discussed below in the section on the indirect costs of shipping cattle to Bouaké. Given a price for cattle in Bouaké of 368 CFAF per kg carcass weight,[2] trucking became less costly than trekking per rotation of capital only when net carcass weight losses with trekking were nine kg more per head than with trucking.

Costs of Shipping Cattle from Mali to Bouaké.-- Table 6.3 compares the cost of transporting cattle from Koutiala, Mali to Bouaké on hoof and using mixed trek-rail transport. The route between Koutiala and Bouaké is a major trade corridor for cattle, funneling animals from the interior delta of the Niger River and southern Mali to the major markets

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[1]See Chapter 11 for a discussion of whether this faster rotation time makes trucking more profitable than trekking.

[2]This was the average price per kg carcass weight of 2,064 head of cattle recorded during the price survey in Bouaké between July, 1976 and July, 1977.

TABLE 6.3

COST OF TRANSPORTING FIFTY HEAD OF CATTLE FROM KOUTIALA, MALI TO BOUAKE ON HOOF AND BY MIXED HOOF-TRAIN TRANSPORT: 1976-77 (IN CFAF)

Expense	Trek		Trek from Koutiala to Ferkéssédougou Train from Ferkéssédougou to Bouaké	
	Total	Per Animal	Total	Per Animal
1. Salary of drovers	3 @ 13,750 = 41,250	825	2 @ 13,750 + 1 @ 10,000[a] = 37,500	750
2. Food for drovers	18,000	360	15,000	300
3. Return trip for drovers	3 @ 5,000 = 15,000	300	3 @ 2,500[b] = 7,500	150
4. Round-trip for owner	10,000	200	10,000	200
5. Food for owner in Bouaké 7 days @ 200 CFAF/day	1,400	28	1,400	28
6. Health Certificate	3,500	70	1,000	20
7. Indemnity for damaged fields	475	10	250[c]	5
8. Salt for the animals	500	10	500	10
9. Loss of animals	1.0% of 50 animals @ 40,000 CFAF per animal = 20,000	400	1.2% of 50 animals @ 40,000 CFAF per animal = 24,000	480
10. Forced sales[d]	0.6% of 50 animals @ 20,000 CFAF loss per animal = 6,000	120	2.0% of 50 animals @ 20,000 CFAF loss per animal = 20,000	400
11. Cattle market tax: Bouaké	10,000	200	10,000	200
12. Malian cattle merchant's license, vaccination, and export taxes	220,000	4,400	220,000	4,400
13. Rail Transport				
a. Rental of car	—	—	2 H12 cars @ 39,638 CFAF = 79,276	1,586
b. Straw	—	—	1,000	20
c. Loading/Unloading	—	—	2,500	50
d. Other[e]	—	—	2,000	40

TABLE 6.3 CONTINUED

Expense	Trek		Trek from Koutiala to Ferkéssédougou Train from Ferkéssédougou to Bouaké	
	Total	Per Animal	Total	Per Animal
14. Gift to landlord	0 – 5,000	0 – 100	C – 5,000	0 – 100
Total Cost (excluding weight losses)	346,125–351,125	6,923–7,023	431,926–436,926	8,639–8,739
Days in transit	40		30	

a. Three drovers accompany the animals from Koutiala to Ferkéssédougou but only two continue on to Bouaké by train.

b. The RAN provides free return passage from Bouaké to Ferkéssédougou for the drovers who accompanied the animals by train. The cattle merchant has only to pay their passage between Ferkéssédougou and Koutiala (2,500 CFAF per person).

c. The incidence of crop damage using mixed transport is assumed to be 50 percent of that encountered in trekking.

d. The incidence of losses and forced sales is taken from Table 6.2. The total value of an animal (purchase price plus export taxes paid on it) is assumed to be 40,000 CFAF.

e. Includes unofficial payments to RAN employees for reserving a train car and other services.

in Ivory Coast. Table 6.3 shows that on a per-trip basis trekking was again the cheaper way of moving cattle, costing roughly 80 percent as much as mixed transport. Malian licenses and export taxes represented a high fixed cost in each of the two methods, and explain why total costs for the two methods were similar. The export taxes and licenses accounted for 51 percent of the total costs of mixed transport (excluding weight losses and the gift to the landlord) and 64 percent of the total cost of trekking. It is clear that Malian cattle merchants had a strong monetary incentive to export illegally in order to avoid these costs.[1] One of the advantages of trekking from the exporter's point of view is that it is easier to evade Malian customs officials when trekking cattle than when shipping cattle by truck, since one need not trek cattle along main roads.

After license and taxes, the costs involved in rail shipment were the next largest expense in mixed transport, accounting for 20 percent of the total transport costs. After these, in order of importance, came drovers' wages (8.7 percent of the total), mortality losses (5.6 percent of the total), and forced sales (4.6 percent of the total). In trekking the most important costs after taxes and licenses were drovers' wages (11.9 percent of total costs), losses of animals (5.8 percent of the total), and the food for the drovers (5.2 percent of the total).

Normally mixed transport between Koutiala and Bouaké took about three-fourths as much time as did trekking, but this varied widely, depending on the availability of train cars in Ferkéssédougou. Among the five merchants interviewed who had shipped cattle from Koutiala to Bouaké by mixed trek-rail transport, the time en route varied from twenty-one to sixty days. (The mean was 36.6 days and the standard deviation was 17.3 days). One trader waited over a month for a train car in Ferkéssédougou. Long waits for train cars prompted some merchants to bribe RAN employees in hopes of getting cars more quickly. Many merchants preferred mixed transport at the end of the dry season, however,

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[1] OMBEVI (94, p. 37) estimates that in fact roughly 60 percent of the cattle exported from Mali leave the country without the export taxes being paid on them.

because they felt it significantly reduced weight losses and mortalities during this time of the year, when cattle were often weak from lack of food and water by the time they reached Ferkéssédougou.

The difference in cost between trekking and mixed transport of cattle between Koutiala and Bouaké was not great, and some merchants shifted between these methods depending on the season. During the dry season, when weight losses during trekking increased. these merchants used mixed transport.   When net carcass-weight losses during trekking exceeded those of mixed transport by more than 5 kg per animal, it became cheaper to use mixed transport than to trek animals all the way to Bouaké.[1] In addition, during the dry season animals were often weak from lack of grazing by the time they reached Ferkéssédougou, and it might have been impractical to continue on hoof, as the risk of mortality would have been high. In contrast, during the rainy season, when animals trekked from Koutiala to Bouaké could sometimes gain weight because of good grazing en route, mixed transport of animals between the two cities virtually ceased.

The costs of transporting cattle varied considerably from herd to herd. Among the six cattle merchants interviewed who had trekked their animals from Koutiala to Bouaké, the total cash outlay per animal (excluding purchase price, the owner's food costs in Bouaké, license, export taxes, vaccinations, and gift to the landlord) varied from 885 CFAF to 2,300 CFAF, with a mean of 1,693 CFAF and a standard deviation of 610 CFAF. This compares with a "typical" figure of 1,975 CFAF shown in Table 6.3.[2] For mixed trek-rail transport,[3] the figures varied from 2,679 CFAF to 5,104 CFAF, with a mean of 3,807 CFAF and a standard deviation of 1,203 CFAF. (Table 6.3 indicates a total of 3,331 CFAF).

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[1]Assuming a price for cattle in Bouaké of 368 CFAF per kg carcass weight.

[2]The figure listed in Table 6.3 is greater than the mean of the sample because one of the herds in the sample was herded enti· ly by unpaid family members.

[3]N = 5.

Since losses and forced sales of animals also differed from herd to herd,
total transport costs varied even more. Appendix 6A presents case
studies of herds shipped to Bouaké from northern Ivory Coast and Mali
that illustrate the variability that existed in transport costs.

The Indirect Costs of Shipping Cattle to Bouaké

In addition to direct cash outlays, merchants incur several indirect
costs in shipping cattle to market. These include losses of cattle
en route, losses through forced sales of sick and injured animals, the
value of the weight lost by the animals during shipment, and the costs
incurred while waiting for cattle cars at railroad loading points
(including the opportunity cost of the capital immobilized while
waiting). This section examines these costs for merchants who shipped
cattle to Bouaké during the study period.

Losses of Animals and Forced Sales.-- Cattle transported in the
humid tropics are a perishible commodity; a merchant may lose animals
to injury, disease, exhaustion, lack of food and water (this is especially
true during rail and truck shipments), or the animals may escape from
the herd and become lost in the surrounding countryside. Other animals
may fall ill or be injured and have to be sold at a loss. Data on the
incidence of losses and forced sales of cattle during trekking and
mixed trek-rail transport are available from the interviews conducted
in Bouaké with merchants and drovers, and are presented in Table 6.4.

Table 6.4 indicates that among the sample, 1.1 percent of the
animals trekked and 1.2 percent of those shipped by mixed trek-rail
transport were lost en route. Mortality losses per se among the trekked
animals were extremely low, in contrast to rather high mortality rates
reported for cattle trekked in Nigeria (25, pp. 85-87; 99, pp. 82, 87;
126, pp. 163-67). Of the seventeen animals listed in Table 6.4 as lost
en route, only three died. The remaining fourteen escaped from the
herds and were not recovered. Two of the three mortalities resulted from

TABLE 6.4

LOSSES AND SALES OF CATTLE EN ROUTE: 41 HERDS ARRIVING IN BOUAKE BETWEEN OCTOBER, 1976 AND JULY 1977[a]

Type of Transport/ Point of Departure	Number of herds	Number of animals leaving point of departure	Animals lost[b]	Forced Sales	Oti Sal
Trek Transport					
Mali	12	629	7	5	26
Percent of total		100.0	1.1	0.8	4.1
Upper Volta	2	106	1	0	1
Percent of total		100.0	0.9	0	0.9
Ivory Coast	16	849	9	4	68
Percent of total		100.0	1.1	0.5	8.0
All herds: trek	30	1,584	17	9	95
Percent of total		100.0	1.1	0.6	6.0
Mixed trek-train transport					
Mali	7	279	4	5	0
Percent of total		100.0	1.4	1.8	0
Upper Volta	2	64	0	0	0
Percent of total		100.0	0	0	0
Ivory Coast	2	99	1	4	12
Percent of total		100.0	1.0	4.0	12.1
All herds: mixed transport	11	442	5	9	12
Percent of total		100.0	1.2	2.0	2.7

a. Includes all herds listed in Table 6.1 except the one from Katiola, Ivory Coast. This herd was excluded from the analysis because of the short distance (55 km) between Bouaké and Katiola.

b. Includes mortalities and animals that escaped from the herds.

accidents; only one animal died of disease. Intuitively, this low mortality rate makes sense. One of a drover's main jobs is to judge accurately the condition of animals in his herd and sell sick ones before they die. Forced sales represented 0.6 percent of the animals trekked and 2.0 percent of those shipped by mixed transport. The higher incidence of forced sales with mixed transport occurred for two reasons: animals injure themselves more frequently during rail transport than when they trek to market, and mixed transport of animals to Bouaké is more frequent during the dry season, when animals are generally weak from a lack of grazing. Several of the merchants who used mixed transport sold their weakest animals at the railroad loading points because they feared these animals would not survive the train trip south. The "other sales" listed in Table 6.4 include animals sold voluntarily en route, usually because buyers offered attractive prices. The incidence of "other sales" was much higher for herds coming from northern Ivory Coast than for herds from Upper Volta and Mali. This probably resulted from cattle merchants and drovers from northern Ivory Coast having a better knowledge of local market conditions throughout northern and central Ivory Coast than their Malian and Voltaic counterparts.

Firm data on losses of cattle during trucking are not available. Most cattle merchants interviewed in Bouaké claimed that losses in truck transport were roughly double those encountered in trekking cattle. Table 6.2 uses this estimate, and also assumes that the incidence of forced sales of trucked animals is the same as that for trekked animals.

Weight Losses in Transit.-- Weight lost during shipment is of two types: loss of water and intestinal contents (excretory shrinkage) and loss of musculature (meat) and fifth quarter metabolized by the animal during the journey (tissue shrinkage). Since butchers in the major consumption markets of Ivory Coast normally purchase cattle on the basis of their estimates of the animals' carcass weights rather than on a per kilogram liveweight basis, only tissue shrinkage represents an economic loss to cattle merchants. Butchers take account of excretory shrinkage

when estimating the carcass weights of the animals.

Excretory shrinkage is sometimes high, even for short trips by truck and train. AVB data (48) indicate that cattle trucked between Bouaké and Abidjan may lose up to 25 kg liveweight per head. This is almost all excretory shrinkage, however, and the animals quickly regain the lost weight. On longer truck and train trips, during which the animals receive neither food nor water, and during long treks when grazing is sparse, tissue shrinkage may become important.

Weight losses in transit are a function of the means of transport used, the time en route, the season, and the condition of the animals. Data on weight losses are scarce, however, partly because until recently there were few cattle scales in the exporting areas of the north. The data that are available are reviewed below.

a. Weight losses during trekking.-- Weight losses during trekking are probably more variable than those during truck and train transport, being highly dependent on range conditions en route and the speed at which the animals are trekked. Most authors have assumed that weight losses during trekking are high, and in some cases, they may be. Pauvert (47) estimated a weight loss of approximately 15 percent in a herd of zebus he had purchased in Markove, Upper Volta, at the end of the dry season (April-May) in 1968 and trekked to Ouagadougou.[1] Other data suggest, however, that weight losses during much of the year may be minimal. Cabaret (84 , pp. 2-3) reports that fifty head of cattle trekked the 400 km from Markoye to Saria, Upper Volta, over twenty-one days in January and February, 1972 (i.e. during the middle of the dry season) actually gained an average of five kg per head. Although this gain was not statistically significant, it points out that not all animals lose weight during trekking.

Data collected by the investigator in collaboration with OMBEVI[2] support the view that not all animals lose weight during trekking. Cattle in three herds trekked from Sikasso, Mali to Bouaké during May-

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[1] This figure was based on Pauvert's estimates of carcass weights in Markoye and actual carcass weights in Ouagadougou.

[2] Office Malien du Bétail et de la Viande.

July, 1977 (i.e. during the beginning of the rainy season) were weighed at the time of their departure from Sikasso and at the time of their arrival in Bouaké. (A lack of functioning scales in Sikasso during the dry season prevented measurement of dry-season weight losses). The cattle were weighed at the same time of day in Sikasso and in Bouaké, so the changes recorded in liveweights should not reflect differences in gut fill. Since the cattle had access to grazing and water during the trip south, these changes probably corresponded to changes in carcass weights. Table 6.5 indicates that one herd gained a significant amount of weight during the trek, another lost weight, and a third showed no statistically significant change in weight. A major difference between the herd that lost weight and the one that gained weight was the time spent en route. Normally herds cover the 476 kilometers between Sikasso and Bouaké in about thirteen days (i.e. sixteen km per day). The herd that gained weight went slower, covering the distance in thirty-six days (i.e. thirteen km per day). The slower trekking gave the animals more time to graze en route.

Assuming a 49 percent killing-out rate,[1] the first herd gained approximately 11 percent in carcass weight, while the second herd lost approximately 7 percent in carcass weight. These results indicate the great variability in weight changes among trekked herds. Since the average price for cattle in Bouaké during early July, 1977, when the herds arrived, was 375 CFAF per kg carcass weight, animals in the first herd gained in value an average of 3,032 CFAF per head, while those in the second herd lost in value an average of 2,095 CFAF per head. Discussions with cattle merchants indicated that it is common for trekked animals to gain weight en route during the rainy season if they are trekked slowly.

There are no data on weight losses of animals trekked in Ivory

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[1]The average killing-out rate of 208 animals weighed during the price survey in Bouaké between July, 1976 and July, 1977 was 49.2 percent. See Appendix 10.A.

TABLE 6.5

LIVEWEIGHT CHANGES AMONG CATTLE TREKKED FROM SIKASSO, MALI TO BOUAKE DURING MAY - JULY, 1977
(WET SEASON)

Number of Animals Weighed	Days En Route	Average Liveweight in Sikasso(kg)	Average Weight Loss or Gain per Animal(kg)	Loss/Gain as a Percentage of Original Liveweight
25	36	308.4	+16.5[a]	+5.4
11	30	324.0	-11.4[a]	-3.5
6	29	298.3	+3.7[b]	+1.2

[a]Result significantly different from zero at the .005 level.

[b]Result not significantly different from zero at the .10 level.

Coast during the dry season. Since many of the fields in northern Ivory Coast are burned beginning in December, weight losses during the end of the dry season may be importa t, due to a lack of grazing. Merchants seem to be aware of this, as many switch from trekking to mixed transport during the dry season.

b. Weight losses during intermediate-distance trucking.-- Data collected by the investigator on the weight lost by cattle trucked from Ferkéssédougou to Abidjan (a distance of 683 km) in April, 1977 can be used to estimate the weight lost by cattle trucked from Tingrela to Bouaké (a distance of 412 km).[1] Thirteen animals were weighed in Ferkéssédougou after having fasted for twenty-four hours. They were then allowed to eat and drink for a few hours before being shipped to Abidjan. They were reweighed on their arrival in Abidjan approximately eighteen hours later. Differences between their fasting weights in Ferkéssédougou and their weights in Abidjan represented net weight losses not attributable to excretory shrinkage. The 13 animals had an average liveweight in Ferkéssédougou of 328 kg. On their arrival in Abidjan they showed an average net weight loss of 5.4 kg.[2] This corresponded to a 1.6 percent loss in liveweight. According to Dr. Pierre Aloui of the Ivorian Ministry of Animal Production (3), who has conducted similar experiments in Madagascar, approximately 60 percent of this net loss is attributable to a loss of meat, while 40 percent represents metabolism of carbohydrates from the fifth quarter. The average net carcass weight loss was therefore about 3.2 kg, or about 2 percent of the original carcass weight (assuming a 49 percent killing-out rate). Given a price of cattle in Bouaké of 368 CFAF per kg carcass

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[1]Although the distance from Tingrela to Bouaké is much shorter than that between Ferkéssédougou and Abidjan, the time spent en route is similar because the roads are poorer between Tingrela and Bouaké than between Ferkéssédougou and Abidjan.

[2]This loss was significantly different from zero at the .001 level.

weight, this implies that the value of the weight lost by a 150 kg carcass-weight steer trucked from Tingrela to Bouaké was about 1,100 CFAF. Data on weight losses during long-distance trucking are presented below in the section on the indirect costs of shipping cattle to Abidjan.

c. Weight losses in rail transport.-- There are no data available on the weight lost by cattle shipped fairly short distances, e.g., between Ferkéssédougou and Bouaké (235 km). The net carcass weight loss is probably on the order of 1 to 2 percent. Data on weight losses during long-distance rail shipment are presented below in the discussion of the indirect costs of shipping cattle to Abidjan.

Costs of Waiting.-- As mentioned above, merchants who use mixed trek-rail transport often have to wait several days at railroad loading points before cattle cars become available. During this time they incur additional costs, including salary and food allowances for drovers, the risk of weight loss and mortality among their animals, and the opportunity cost of the capital immobilized. Data from the interviews conducted in Bouaké with merchants and drovers were used to estimate some of these costs. The merchants' total variable costs per animal of transporting cattle to Bouaké (excluding export taxes, which presumably were not affected by the amount of time a merchant had to wait for a cattle car, and the opportunity cost of his capital, which is analyzed separately) were regressed against a number of independent variables, including the length of time the merchants had to wait for a rail car.[1] The regression is presented in Appendix 6B. The coefficient of the waiting time variable indicates the implicit cost per animal to a merchant of spending an

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[1] Included as independent variables, in addition to waiting time, were the total number of animals in the herd, the distance trekked, the distance traveled by rail, the speed at which the cattle were trekked, the number of drovers that accompanied the herd and the proportion of them that were unpaid family members, and a dummy variable indicating the wet season. Total variable costs per animal, the dependent variable, included both cash costs and the estimated costs of lost animals and forced sales.

additional day waiting for a cattle car. (This cost excludes the opportunity cost of his capital). The equation estimated in Appendix 6B indicates that this cost was approximately 102 CFAF per animal per day.[1] The ten herds in the sample that used mixed trek-rail transport waited an average of 11.7 days before getting cattle cars. This implies an average cost of 1,193 CFAF per animal, excluding the opportunity cost of the merchant's capital. Assuming an opportunity cost of capital of 20 percent per year (see Chapter 11, p. 377) and an average investment per animal of 40,000 CFAF, the cost to the merchant of immobilizing his capital can be calculated as 22 CFAF per animal per day, or 257 CFAF for the 11.7 days. The average total cost of waiting was thus 124 CFAF per animal per day, or 1,450 per animal for the average wait of 11.7 days. Since the average herd that arrived in Bouaké by rail included 31 head of cattle (see Chapter 3, p. 96n.), the total cost to merchants of waiting for cattle cars can be estimated at roughly 45,000 CFAF per herd. It is clear why merchants complain when rail cars are not available and why many merchants are willing to bribe RAN employees to expedite getting a car; long waits for train cars significantly raise merchants' costs.

Costs of Intermediate-Distance Trucking

Although merchants rarely truck cattle all the way from the producing zones in the Sahelian countries to the consumption markets in the coastal states, merchants often truck cattle within the forest zone of Ivory Coast. Data on the costs of trucking cattle within the forest zone were gathered by interviewing thirty-eight merchants who shipped cattle by truck from Bouaké to other markets between December, 1976 and June, 1977. Table 6.6 shows the destination of the herds covered by these interviews. Over half the herds went to Abidjan or Yamoussoukro;

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[1] The coefficient of the waiting time variable was significant at the .01 level.

the rest went to eleven different markets. Merchants used two different
types of trucks to ship their animals: eight-to ten-ton trucks holding
between ten and fourteen head of cattle and twenty-five-to thirty-ton
trucks holding between twenty-five and thirty head of cattle. The
smaller trucks predominated; the average number of animals shipped per
truck was 17.2.

TABLE 6.6

HERDS LEAVING BOUAKE COVERED BY INTERVIEWS ON INTERMEDIATE-DISTANCE
TRUCKING COSTS: DECEMBER 1976 - JUNE 1977

Destination	Distance from Bouaké (km)	No. of Herds	No. of Animals	No. of Trucks
Abidjan	378	11	336	15
Yamoussoukro	111	10	153	10
Bouaflé	169	3	74	6
Abengourou	383	2	28	2
Oumé	216	2	13	2
Gagnoa	282	2	46	3
Sinfra	175	2	33	2
Toumodi	157	1	15	1
Divo	289	1	10	1
San Pedro	498	1	13	1
Bonon (between Bouaflé and Daloa)	204	1	11	1
Niablé (Ghana border)	414	1	12	1
Daloa	238	1	25	1
TOTAL		38	789	46

The merchants interviewed gave information on the cash costs in-
curred in shipping cattle from Bouaké by truck. Since the interviews
took place at the point of departure, the enumerators could gather no
information on mortalities, forced sales, or unofficial costs incurred
en route or on the merchants' expenses in the final market. The data
collected thus corresponded to items 1-4, 6-7, 9, and 12 in Table 6.2.
Inspection of the data revealed that the cost of shipment per animal
did not vary significantly according to the size of the truck used.

Table 6.7 presents typical costs of trucking cattle from Bouaké to Yamoussoukro and from Bouaké to Abidjan in late 1976 and early 1977. The truck rental rates are those charged during most of the year. They rose by about 500 CFAF per animal in December and January, when trucks were in high demand to haul the coffee and cocoa harvests.

Table 6.7 shows that the rental of the truck represented 75 percent of the cash cost of trucking cattle to Abidjan and 66 percent of the cash cost of trucking cattle to Yamoussoukro. After truck rental, the most important costs were the payment to herders to help load the animals, the salary of the drover, the cost of the health certificate, and (for Abidjan) unofficial charges. It cost only about 56 percent as much to ship animals from Bouaké to Yamoussoukro as it did to ship them from Bouaké to Abidjan, but the cost per animal per kilometer was much higher for the short trip to Yamoussoukro (13.6 CFAF) than for the longer trip to Abidjan (7.1 CFAF). In hauling cattle to Abidjan the fixed costs of loading and unloading the animals, the health certificate, etc., were spread out over a longer distance, thus reducing costs per kilometer. Rental rates for trucks were also higher per kilometer for short hauls than for long hauls, as truckers, too, had certain fixed costs they had to cover. Data from the interviews with merchants who shipped cattle to markets other than Abidjan and Yamoussoukro confirmed that as the distance traveled increased, the cost per kilometer of trucking fell.[1]

Even for the longer trip to Abidjan, however, the cash cost per kilometer of trucking was over twice the cost of trekking an equivalent distance in the savanna zone (e.g., from Tingrela to Bouaké).[2] Merchants

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[1] Almost all these interviews, however, covered cattle that were trucked on paved roads. It is likely that the cost of long-distance trucking of cattle in central-west Africa (e.g., between Bamako and Abidjan) are higher than indicated here because some of this trucking would involve travel on unpaved roads, and because weight losses and mortalities would increase as the distance traveled increased.

[2] The data from Table 6.2 indicate that the average cash cost per animal of trekking cattle from Tingrela to Bouaké, excluding unofficial charges and the costs incurred in Bouaké, was 1,235 CFAF, or 3.0 CFAF per km for the 412 km trip.

TABLE 6.7

TYPICAL CASH COSTS OF TRUCKING 25 HEAD OF CATTLE FROM
BOUAKÉ TO YAMOUSSOUKRO AND TO ABIDJAN: 1976-77 (IN CFAF)

Expense	Yamoussoukro		Abidjan	
	Total	Per Animal	Total	Per Animal
Truck rental[a]	25,000	1,000	50,000	2,000
Straw	500	20	500	20
Salary of drover	3,000	120	5,000	200
Health certificate	2,000	80	2,000	80
Loading the animals	6,250	250	6,250	250
Unloading the animals	1,000	40	500	20
Unofficial costs	-	-	2,500	100
TOTAL	37,750	1,510	66,750	2,670
Distance from Bouaké	111 km		378 km	
Cost per animal per kilometer	13.6 CFAF		7.1 CFAF	

[a]Truck rental fees in December and January, the period of peak
demand for trucks, are about 500 CFAF per animal above the level shown
here.

nonetheless often used trucking within the forest zone because trekking
in this zone is difficult (due to dense vegetation and heavy tsetse
infestation), and because in some areas trekking is prohibited.

The Direct Costs of Shipping Cattle to Abidjan

This section examines the direct costs of shipping cattle from
northern Ivory Coast, Mali, and Upper Volta to Abidjan. No cattle are
trekked all the way to Abidjan. All arrive either by rail or by truck,
although many have trekked part of the way south. The data discussed here

on mixed transport and on trucking costs come from the interviews
carried out in Bouaké on the costs of trekking and mixed transport of
cattle, the information just reviewed on the costs of intermediate-
distance trucking, information on trucking costs compiled by OMBEVI,
discussions with truck drivers, and data on rail rates supplied by the
RAN. Information on the costs of transporting cattle between Upper Volta
and Abidjan comes from interviews carried out with convoyeurs of herds
arriving in Abidjan, information supplied by the RAN, and information
provided by Herman from his study in Upper Volta (28).

Costs of Shipping Cattle from Northern Ivory Coast to Abidjan.--
Table 6.8 presents typical costs in 1976-77 of shipping cattle from
Tingrela in northern Ivory Coast to Abidjan by truck and by mixed trek-
truck transport. The definition of the cost items in Table 6.8 are the
same as in the previous tables presented for Bouaké. Table 6.8 demon-
trates that, ignoring weight losses, mixed transport involving some
trekking was cheaper on a per trip basis than trucking cattle all the way
to market. Trucking cattle from Tingrela to Abidjan was roughly 1.6
times more expensive than trekking them from Tingrela to Bouaké and then
trucking them from Bouaké to Abidjan. The major cost in both alternatives was
the rental of the trucks. It accounted for 66 percent of the cost of
trucking cattle from Tingrela to Abidjan and 36 percent of the cost of
mixed transport. The next most important costs for truck transport were
the loss of animals (9 percent of the total cost), the cattle market
tax in Abidjan (6 percent of the total), unofficial costs (3 percent of
the total), and incidental charges related to truck transport (3 percent
of the total). For mixed transport the most important costs after truck
rental were drovers' wages (13 percent of the total costs), loss of
animals (11 percent of the total costs), the Abidjan cattle market tax
(9 percent of total costs), and food for drovers (7 percent of total costs).

As was true for Bouaké, the higher costs of truck transport were
associated with a much shorter time en route than with mixed transport.
Table 6.8 estimates that truck transport of cattle from Tingrela to
Abidjan involved only two days en route whereas mixed transport involved

TABLE 6.8

COST OF TRANSPORTING FIFTY HEAD OF CATTLE FROM TINGRELA TO ABIDJAN BY TRUCK
AND BY MIXED HOOF-TRUCK TRANSPORT: 1976-77 (IN CFAF)

Expense	Truck		Trek from Tingrela toBouaké Truck from Bouaké to Abidjan	
	Total	Per Animal	Total	Per Animal
1. Salary of drovers	2 @ 5,000 = 10,000	200	2 @ 12,500 + 1 @ 10,000[a] = 35,000	700
2. Food for drovers	—	—	20,000	400
3. Return trip for drovers	2 @4,000 = 8,000	160	2 @ 4,000 + 1 @ 2,500[b] = 10,500	210
4. Round-trip for owner	8,000	160	8,000	160
5. Food for owner in Abidjan:7 days @ 200 CFAF/day	1,400	28	1,400	28
6. Health certificate	3,500	70	3,500	70
7. Vaccination	1,750	35	1,750	35
8. Amortization of cattle merchant's license	12,100	242	12,100	242
9. Indemnity for damaged fields	—	—	475	10
10. Loss of animals	2.0% of 50 animals @ 40,000 CFAF per animal = 40,000	800	1.5% of 50 animals @ 40,000 CFAF per animal = 30,000	600
11. Forced sales	1.5% of 50 animals @ 20,000 CFAF loss per animal = 15,000	300	1.5% of 50 animals @ 20,000 CFAF loss per animal = 15,000	300
12. Truck transport Truck rental	2 trucks @ 150,000 CFAF = 300,000	6,000	2 trucks @ 50,000 CFAF = 100,000	2,000

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TABLE 6.8 CONTINUED

Expense	Truck		Trek from Tingrela to Bouaké Truck from Bouaké to Abidjan	
	Total	Per Animal	Total	Per Animal
12. Truck transport (cont.) Other charges (straw, loading, unloading)	12,250	245	12,250	245
13. Unofficial costs	15,000	300	5,000	100
14. Cattle market tax : Abidjan	25,000	500	25,000	500
15. Gift to landlord	0 – 5,200	0 – 100	0 – 5,000	0 – 100
Total Cost (excluding weight loss)	452,000 – 457,000	9,040 – 9,140	279,975 – 285,975	5,600 – 5,600
Days in transit	2		32	

a Three drovers from Tingrela to Bouaké but only two continue on from Bouaké to Abidjan.
b Two return trips from Abidjan, one return trip from Bouaké.

32.[1] The main advantages of truck transport are that it permits
a rapid rotation of capital and that it allows merchants to respond
rapidly to temporary shortages of cattle in the consumption markets
that result in large inter-market price differentials. (This assumes
that trucks are available when the merchants need them.) As shown in
Chapter 11, however, under normal conditions during 1976-77 it was not
profitable to truck cattle all the way from Tingrela to Abidjan. As
a result, cattle were trucked between these two cities only when the
price differential between the two markets was unusually high.

Costs of Shipping Cattle from Mali to Abidjan. -- Table 6.9 compares
the cost in 1976-77 of trucking cattle from Koutiala, Mali to Abidjan
with the cost of trekking them from Koutiala to Ferkéssédougou and
then sending them by train from Ferkéssédougou to Abidjan. Again, truck
transport was more expensive, ignoring weight losses. As in the previous
examples, the rental fee of the trucks was the largest single cost,
accounting for 61 percent of the total cost of trucking cattle from
Koutiala to Abidjan. In constrast, the rental fee of the train cars
accounted for only 24 percent of the cost of mixed transport. In both
alternatives, Malian export taxes, license fees, and vaccinations
represented high fixed costs; they made up 19 percent of the cost of truck
transport and 43 percent of the cost of mixed transport. After truck
rental and Malian taxes, the most important costs in truck transport were
unofficial charges (9 percent of the total),[2] loss of animals (3 percent

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[1]This included 30 days trekking between Tingrela and Bouaké (Table
6.2), one day in Bouaké arranging truck transportation, and one day
traveling by truck from Bouaké to Abidjan.

[2]The estimate of unofficial costs in Table 6.9 is intermediate
between the cost OMBEVI (88, p. 6) reports as "usual" for the route Mali-
Abidjan (75,000 CFAF per truck) and the cost actually recorded by a truck
traveling between Niono, Mali and Abidjan (40,000 CFAF) (88, p. 5). The
level of unofficial charges probably varies considerably.

TABLE 6.9

COST OF TRANSPORTING FIFTY HEAD OF CATTLE FROM KOUTIALA, MALI TO ABIDJAN BY TRUCK
AND BY MIXED HOOF-RAIL TRANSPORT: 1976-77 (IN CFAF)

Expense	Truck		Trek from Koutiala to Ferkéssédougou Rail from Ferkéssédougou to Abidjan	
	Total	Per Animal	Total	Per Animal
1. Salary of drovers	2 @ 5,000 = 10,000	200	2 @ 15,000 + 1 @ 12,500[a] = 42,500	850
2. Food for drovers	1,000	20	25,000	500
3. Return trip for drovers	2 @ 6,000 = 13,000	260	3 @ 2,500[b] = 7,500	150
4. Round trip for owner	13,000	260	13,000	260
5. Food for owner in Abidjan: 7 days @ 200 CFAF/day	1,400	28	1,400	28
6. Health certificate	4,000	80	4,000	80
7. Indemnity for damaged fields	—	—	250	5
8. Salt for animals	—	—	500	10
9 Loss of animals	2.0% of 50 animals @ 40,000 CFAF per animal = 40,000	800	1.5% of 50 animals @ 40,000 CFAF per animal = 30,000	600
10. Forced sales	2.0% of 50 animals @ 20,000 CFAF loss per animal = 20,000	400	2.0% of 50 animals @ 20,000 CFAF loss per animal = 20,000	400
11. Cattle market tax: Abidjan	25,000	500	25,000	500

TABLE 6.9 CONTINUED

Expense	Truck		Trek from Koutiala to Ferkéssédougou Rail from Ferkéssédougou to Abidjan	
	Total	Per Animal	Total	Per Animal
12. Malian cattle merchants' license, vaccination, and export taxes	220,000	4,400	220,000	4,400
13. Transport charges Rental of truck/train car	2 trucks @ 350,000 CFA F = 700,000	14,000	2 H12 cars @ 62,558 = 125,116	2,502
Straw	—	—	1,000	20
Loading/unloading	2,500	50	2,500	50
Other c	—	—	2,500	50
14. Unofficial charges	100,000	2,000	—	—
15. Gift to the landlord	0-5,000	0-100	0-5,000	0-100
Total cost (excluding weight losses):	1,149,900-1,154,900	22,998-23,098	517,266 - 522,266	10,345-10,445
Days in transit	3		31	

SOURCE: Field research data and République du Mali, Ministère du Développement Rural, Office Malien du Bétail et de la Viande, "La commercialisation des animaux d'embouche de l'ECIBEV." Document no. 89, Economie (Bamako: 1977).

a Three drovers accompany the cattle to Ferkéssédougou but only two continue on from Ferkéssédougou to Abidjan by train.

b The RAN provides free return transit to Ferkéssédougou for the two drovers who accompanied the animals to Abidjan by train. The cattle merchant has only to pay their passage between Ferkéssédougou and Koutiala (2,500 CFAF per person).

c Includes unofficial payments to RAN employees for reserving a train car and other services.

of the total). For mixed transport the most important costs after export taxes and train car rental were drovers' wages (8 percent of the total), loss of animals (6 percent of the total), food for drovers (5 percent of the total), and the Abidjan cattle market tax (5 percent of the total).

The truck rental rates shown in Table 6.9 are the amounts charged by Malian truckers as of March, 1977 (88, p. 6). As mentioned earlier, truck rates vary considerably, depending on the number of Ivoiian trucks in Mali looking for backhauls and on the demand for trucks to haul cargoes other than cattle. Even if truckers were to charge only half the rate listed in Table 6.9, however, truck transport would still have been over 50 percent more expensive per trip than mixed trek-rail transport. Table 6.9 also shows that unofficial charges increase the cost of trucking cattle considerably. Some police and customs agents apparently consider truckers fair game for extorting money. Because of the high transport cost, cattle were rarely trucked between Mali and Abidjan during the study period (July, 1976-July, 1977). Price differentials between Mali and Abidjan usually did not justify the higher cost of trucking, even taking into account the more rapid rotation of capital permitted by truck transport.

Costs of Shipping Cattle from Upper Volta to Abidjan. -- Table 6.10 estimates the cost in 1977 of shipping cattle by rail from Ouagadougou to Abidjan. For much of the year, Ouagadougou is the single largest source of animals sold in Abidjan. For example, of an estimated total of 23,756 head of cattle arriving by rail in Abidjan between mid-October 1976 and April 1977, 10,477 head (44 percent) were loaded in Ouagadougou. (See Table 5.4 in Chapter 5). During this period virtually all cattle arriving in Abidjan came by train, with only forty-four head of cattle recorded as arriving by truck (10).

Most of the items in Table 6.10 are similar to those presented in earlier tables. Table 6.10, however, presents more data than previous tables on costs incurred at the point of departure (i.e., items 1-3 in Table 6.10). These were available from Herman (28, pp. 119-40).

TABLE 6.10

COST OF TRANSPORTING FIFTY HEAD OF CATTLE FROM
OUAGADOUGOU TO ABIDJAN BY RAIL (IN CFAF)

Expense	Total Cost	Cost per Animal
1. Marking animals to denote ownership (Ouagadougou)	500	10
2. Landlord's commission in Ouagadougou	12,500	250
3. Payment to herders to watch animals before shipment	7,500	150
4. Export license	4,150	83
5. Veterinary inspection of animals	7,500	150
6. Certificate of origin (100 CFAF per herd)	100	2
7. Salary of drovers 2 @ 5,000 CFAF	10,000	200
8. Food for drovers 2 @ 2,000 CFAF	4,000	80
9. Authorization to export	200	4
10. Voltaic export tax 6,519 CFAF per animal	325,950	6,519
11. Rail transport 2 HIz cars @ 104,666 CFAF	209,332	4,187
Straw for cars	8,000	160
Loading of cars 2 @ 750 CFAF	1,500	30
Unloading of cars 2 @ 500 CFAF	1,000	20
Other charges	0-40,000	0-800
12. Loss of animals 1.6% of 50 animals .8% thrown out for loss of 54,000 CFAF per head	21,600	
.8% sold at an average loss of 27,000 CFAF per load	10,800	
Total loss mortality	32,400	648
13. Forced Sales 3% of 50 animals at an average loss of 18,000 CFAF per animal	27,000	540
14. Market tax Abidjan	25,000	500
15. Gift to the landlord	0-5,000	0-100
Total (excluding weight losses)	676,632-721,632	13,533-14,433
Days in transit	2-5	

SOURCE: Field study results; Larry Herman, personal communication;
and Larry Herman, "Cattle and Meat Marketing in Upper Volta," Report to
U.S.A.I.D., (Ann Arbor: 1977), pp. 119-40.

Three items in Table 6.10 need special explanation: "other charges" involved in rail shipment, losses of animals, and forced sales. "Other charges" include tips to RAN employees to reserve a cattle car and to expedite shipment of the cattle once they are on the train, and gratuities paid to customs officials. These charges are highly variable, depending on the demand for cattle cars, whether the merchant is caught under-declaring the number of animals he is exporting, etc. The mortality figure used in Table 6.10 comes from the survey on the arrivals of cattle in Abidjan by rail described in Chapter 5. These data are discussed below in the section on the indirect costs of shipping cattle to Abidjan. Table 6.10 assumes that half of the animals that died en route were thrown out, with the merchant losing his entire investment in them.[1] The other half are assumed to have arrived in Abidjan and to have been sold, with the merchant losing half of his investment in them. The incidence of forced sales is estimated from a survey conducted by Herman on cattle shipped by rail from Ouagadougou to Abidjan in 1976-77 (28, p. 131). These data are discussed below in the section on the indirect costs of shipping cattle to Abidjan. Table 6.10 assumes that on the average a merchant lost one third of his investment in an animal when forced to sell it en route.

Table 6.10 indicates that the cost of shipping cattle between Ouagadougou and Abidjan in early 1977 was about 14,000 CFAF per head, excluding weight losses. Of this, Voltaic export taxes accounted for 6,519 CFAF (47 percent) and other taxes and official fees accounted for about 790 CFAF (5 percent). Thus, taxes alone accounted for over half the cost of transporting cattle between Ouagadougou and Abidjan, excluding weight losses. Renting the train cars cost 4,187 CFAF per head (30 percent of total costs), and other costs made up the remaining

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[1]The merchant's investment was estimated at 54,000 CFAF per animal. This assumes an animal with a carcass weight of 160 kg purchased in Ouagadougou for 260 CFAF per kg carcass weight. (This is slightly above the price of 252 CFAF per kg carcass weight Herman (28, p. 99) reports was paid for steers slaughtered in Ouagadougou in early 1977). To the purchase price is added the transport fees and taxes paid by the merchant, giving a total of 54,000 CFAF.

18 percent. Of these other costs, mortality losses and forced sales were
the most important, together accounting for about 8 percent of total costs.

The Indirect Costs of Shipping Cattle to Abidjan

The indirect (noncash) costs of shipping cattle to Abidjan include
losses of animals en route, losses through forced sales, weight lost by
the cattle during shipment, and the costs of waiting at rail loading
points for cattle cars. Several of these costs, including losses of
animals during mixed trek-rail transport, weight losses during trekking
and intermediate-distance trucking, and the costs of waiting for cattle
cars already have been discussed in the section on the indirect costs of
shipping cattle to Bouaké. This section therefore concentrates on the
indirect costs involved in long-distance rail and truck shipment of
cattle.

Losses of Animals.-- Interviews with cattle merchants in Bouaké
indicated that mortality losses during trucking were about twice the level
encountered when trekking animals comparable distances. Since few cattle
were trucked long distances to Abidjan it was impossible to confirm this
figure. Lacking other information, mortalities during trucking were
estimated at 2 percent in Table 6.9, double the rate encountered in
trekking animals a comparable distance.

Data on losses of cattle during rail shipment to Abidjan were gathered
during the survey described in Chapter 5 on rail shipments of cattle to
Abidjan. This survey covered almost all arrivals of cattle in Abidjan by
rail between mid-October, 1976 and April, 1977 (see Table 5.4). The data
indicated that very few animals died when shipped by rail to Abidjan
from northern and central Ivory Coast. Only when cattle were shipped long
distances and spent more than two days in cattle cars did mortality
losses become important. Table 6.11 shows the mortality rates estimated

TABLE 6.11

ESTIMATED MORTALITY RATES OF CATTLE DURING RAIL SHIPMENT TO ABIDJAN: 1976-77
(PERCENT)

Point of Departure	Distance from Abidjan (km)	Average Trip Length (days)[a]	Number of Cars in Survey				Estimated Mortality Rate (Percent)			
			H12	H13	J14	Total	H12	H13	J14	Overall
Upper Volta[b]										
Ouagadougou	1,155	3.5	194	26	137	357	1.3	1.9	1.8	1.6
Koudougou	1,062	3.4	51	1	8	60	1.3	0	2.5	1.4
Bobo-Dioulasso	806	3.1	133	33	21	187	0.9	1.5	2.3	1.2
Ivory Coast										
Ouangolodougou	616	1.7	30	1	1	32	0	0	0	0
Ferkéssédougou	560	1.6	158	8	18	184	0.1	0	0.8	0.1
Tafiré	498	1.6	13	2	0	15	0	0	0	0
Bouaké	326	1.8	14	1	1	16	0	0	0	0

[a] Results from survey.

[b] Banfora is excluded because of the small number of observations.

from the survey data.[1]

Table 6.11 shows that mortality losses were practically nil among animals shipped from northern Ivory Coast to Abidjan by rail. Mortality losses became important only for animals shipped from Upper Volta, with the mortality rate estimated at 1.2 percent of the animals shipped from Bobo-Dioulasso, 1.4 percent of the animals shipped from Koudougou, and 1.6 percent of the animals shipped from Ouagadougou. The average time en route among sample herds was high: 3.5 days from Ouagadougou, 3.4 days from Koudougou, and 3.1 days from Bobo-Dioulasso. This compares with the 2.5 days the RAN says the trip from Ouagadougou to Abidjan is scheduled to take (64).[2] Animals are neither fed nor watered en route, and this undoubtedly contributes to the mortality losses.

Table 6.11 also shows that among the sample wagons, the mortality rate was slightly higher for the larger cars (the H13's and J14's) than for the H12 wagons. Analysis of variance, however, revealed that the differences in the mean mortality rates by car-type were not significantly different at the .05 level. Since the death rates in the newer J14's are not significantly lower than those in the H12's and H13's, the RAN should not expect that its current plan of replacing the H12's and H13's with J14's will significantly reduce deaths in transit.

Forced Sales.-- Data on the incidence of forced sales among cattle shipped from Ouagadougou to Abidjan by rail are available from a survey conducted by Herman in 1976-77 (28, p. 131). Herman found that of a total of 2,930 head covered by his survey, forced sales en route accounted

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[1]The mortality rates were estimated assuming that on the average an H12 car carried 25 head of cattle, an H13 carried 32 head, and a J14 carried 35 head. These figures are the numbers that Herman (30) reports are usually loaded in these cars in Upper Volta. These figures were used, rather than the number of animals the drovers reported to be in the cars in Abidjan, because drovers often under-declared the number of animals in hopes of evading some of the Abidjan market tax.

[2]Table 6.11 shows that it took an average of 3.1 days to travel 806 km from Bobo-Dioulasso to Abidjan, while it took only 1.7 days to travel 616 km from Ouangolodougou to Abidjan. This reflects the delays often encountered in clearing customs at the Voltaic-Ivorian border.

for eighty-two head (2.8 percent). Since some animals also arrive injured in Abidjan and have to be sold at a loss, total forced sales are estimated here at a minimum of 3 percent of the animals shipped.[1] If, on average, merchants lost a third of their investment in an animal during a forced sale, forced sales cost merchants who shipped cattle between Ouagadougou and Abidjan an average of 540 CFAF per head, slightly less than they lost through mortalities.

Weight Losses in Transit.-- Net carcass-weight loss during long truck and train trips appears to be very high, representing one of the major cost of shipping cattle.

a. Weight losses during truck transport.-- Data presented above indicated that cattle trucked between Ferkéssédougou and Abidjan lost approximately 2 percent of their carcass weight during the eighteen-hour trip. Assuming that loss of carcass weight per hour in transit was fairly constant, this implies that animals would lose about 2.7 percent of their net carcass weights for each day in transit. Data collected by OMBEVI on cattle shipped from Niono (near Ségou) to Abidjan in January, 1977, tends to confirm this finding. OMBEVI weighed seventeen animals at the time of their departure from Niono and on their arrival in Abidjan two and a half days later. The average liveweight in Niono was 338 kg and the distance traveled was 1,145 km. Total weight loss per animal averaged 54 kg. This included both excretory shrinkage and tissue shrinkage. Seven animals were re-weighed after forty-eight hours. By this time they presumably had re-gained their losses of water and intestinal content. They still showed an average weight loss of 20 kg liveweight. Assuming that approximately 60 percent of this net loss was attributable to a loss of meat, while 40 percent represented a

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[1] Herman's survey indicated a slightly higher mortality rate for cattle shipped between Ouagadougou and Abidjan (1.9 percent) than is shown in Table 6.11.

metabolism of carbohydrates from the fifth quarter,[1] and assuming a 49 percent killing-out rate, this implies a 7 percent loss of carcass weight, or a loss of 2.8 percent per day in transit. Given that the average price of cattle in Abidjan in January, 1977 was 393 CFAF per kg carcass weight, the animals shipped from Niono fell in value an average of 4,716 CFAF per head because of weight loss en route.

One reason for the sizeable weight loss during trucking is that cattle spend a long time in the trucks without food or water. Numerous police and customs checks en route prolong this period. Bocoum (6, p. 28) estimates these "contrôles et pseudocontrôles" take about ten hours for the trip between Bamako and Abidjan, and Koné (38, p. 20) says they take between fifteen and twenty-five hours for the trip between Mopti and Abidjan. Assuming that carcass weight losses are about 2.8 percent per day, these delays alone result in carcass weight losses of between 1.8 and 2.9 percent.

b. Weight losses during rail transport.-- Data on weight losses during rail transport are scarce. A lack of functioning cattle scales in Ouagadougou throughout the study period prevented the investigator from measuring weight losses between Ouagadougou and Abidjan. These weight losses can be estimated, however, using data from Nigeria. Larson and Ndanako (40) found that net carcass weight losses averaged 7.7 percent for cattle shipped between Kano and Lagos, a fifty-hour train trip. Losses were 10.7 percent for the sixty-six-hour Gusau to Lagos trip. Since the Ouagadougou-Abidjan trip takes a minimum of fifty-five to sixty hours, net carcass weight losses can be estimated at a minimum of 9 percent. This implies a very heavy cost. Given the average price of medium-sized steers in Abidjan from January through April, 1977 (422 CFAF per kg carcass weight), a 9 percent loss of carcass weight for an animal with an initial carcass weight of 150 kg implies a cost of roughly 5,700 CFAF per head.

It is thus clear that any actions that would reduce weight losses

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[1] See p. 224.

during truck and train transport (e.g., reducing transit time by giving
priority at border points to trucks and trains transporting cattle, or
providing better-ventilated cattle cars) would likely have a large
economic payoff.

Conclusions and Policy Implications

Several conclusions can be drawn from the preceding discussion of
transport costs. First, trekking is a relatively low-cost way of
transporting cattle in the Sudanese and Guinea savanna zones. Trekking
requires a low cash outlay, but results in a slower rotation of capital
than either truck or train transport. Although trucking allows a faster
rotation of capital, intermarket price differentials usually were not
large enough during the study period to make trucking more profitable than
trekking or mixed trek-rail transport, even taking account of the faster
capital rotation. The major costs of trucking were the rental fee of the
truck and unofficial costs (bribes) incurred en route. Within the
Sudanese and Guinea savanna zones, injuries and mortalities also appeared
to be higher with truck transport than with trekking. Furthermore, from
an economic standpoint, the incidence of crop damage by herds trekked in
the savanna zone of Ivory Coast does not appear large enough, by itself,
to justify trucking cattle. Trucking is an important means of moving
cattle within the forest zone, however, because trekking in this zone is
often difficult due to dense forest and heavy tsetse infestation and
because trekking is forbidden in certain areas. The real costs of
trekking within the forest zone are therefore high (in terms of difficulties,
risk of disease, etc.), unlike in the savanna zone.

In addition to the small cash outlay required, trekking also involves
small indirect costs in terms of mortalities, weight losses, etc. About
1 percent of the animals trekked in the savanna zone of Ivory Coast are

lost en route, and mortality losses per se are very low.[1] Weight losses during trekking also appear to be low during most of the year, and during the rainy season some animals even gain weight on the trip south. Furthermore, since trekking is not dependent on the availability of trucks or cattle cars, merchants incur no costs while waiting for these vehicles. The indirect costs to merchants of lost animals and forced sales accounted for only 8 percent of the total cost of trekking cattle from Koutiala to Bouaké. Since during much of the year weight losses en route were probably small, total indirect costs represented a small proportion of total costs. In contrast, during long truck and rail shipments indirect costs become a sizeable part of total costs. Mortality losses become important for cattle shipped by rail for more than two days. For example, approximately 1.6 percent of the cattle shipped from Ouagadougou to Abidjan die before reaching their destination. Weight losses during long-distance truck and train shipments are even more important than mortality losses. The value of the weight lost by animals shipped from Ouagadougou to Abidjan was almost nine times the value lost through mortalities en route. Weight losses represented the single largest cost of shipping cattle between Ouagadougou and Abidjan, except for export taxes. The indirect costs of mortalities, forced sales, and weight losses accounted for 35 percent of the total cost of shipping cattle between Ouagadougou and Abidjan.

The cost of waiting at rail loading points for cattle cars to become available add significantly to cattle merchants' costs. The mean cost of waiting was estimated at 124 CFAF per head per day, or over 3,800 CFAF per day for an average-sized herd of thirty-one head. For herds shipped to Bouaké the average wait was 11.7 days, implying a total cost of about

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[1] Only mortality losses represent net losses to society. Animals lost in the bush during trekking represent losses to cattle merchants, but not to society as a whole because someone presumably finds the lost animals and either raises them or slaughters them.

45,000 CFAF per herd.

Finally, taxes, particularly export taxes, represent a high proportion of the total cost of shipping cattle from Mali and Upper Volta to Ivory Coast. Taxes accounted for about half the cost of shipping cattle between Ouagadougou and Abidjan.

Several policy recommendations can be drawn from these conclusions. First, it would be inadvisable at this time to outlaw trekking of cattle in Ivory Coast. Cattle merchants are quite sensitive to relative transport costs and will shift to long-distance trucking when it becomes profitable for them to do so. Requiring merchants to ship their cattle by truck or rail at this time would lead to several problems:

1. Since trucking and rail shipment cost considerably more than trekking, requiring merchants to ship by truck or rail would raise the cost of transporting cattle from north to south, and merchants would pass on these higher costs to consumers in the form of higher meat prices.

2. Since truckers currently consider cattle a backhaul cargo of last resort, they would probably agree to carry large numbers of cattle only if they could raise the rates they currently charge for hauling cattle. This would further raise transport costs and, ultimately, meat prices.

3. Seasonal shortages of trucks and rail cars already exist, particularly before Tabaski, when the vehicles are used to haul sheep, and during the tree-crop harvests in December and January, when they are used to haul the harvest to market. Requiring cattle to be trucked or shipped by rail would exacerbate this seasonal transportation bottleneck (particularly since demand for beef is very heavy in December and January), leading to shortages of cattle and higher meat prices during certain times of the year.

4. During the wet season cattle may gain weight while trekking south. These weight gains represent a form of "meat production during transport." Outlawing trekking would deny Ivory Coast this additional meat production.

Rather than imposing mandatory truck and rail shipment at this

time, it would be more advisable to improve trek routes, e.g., through clearly marking them, providing dipping tanks (to reduce tick-borne diseases), and providing watering points en route. These measures would help minimize both weight losses during the dry season and crop damage during the rainy season without causing the problems that would be associated with mandatory truck or rail shipment.

Although trekking should not be discouraged, intermediate-distance trucking and rail shipment of cattle (particularly from Upper Volta to Abidjan) will continue to play important roles in cattle marketing in Ivory Coast. Several measures could be taken to reduce rail and truck transport costs. Most of these measures would involve reducing the time cattle spend in transit, in order to lower weight losses and mortalities en route. For example, the RAN should insure that trains carrying livestock are given priority over trains carrying other merchandise.[1] The possibility of creating express trains for livestock, either separately or as part of passenger trains, should also be explored. The RAN should also take steps to reduce the amount of time cattle spend in cars both at the beginning and at the end of their journey. Herman (30) reports that cattle are typically loaded in Ouagadougou in the early evening but do not leave the station until early the next morning. Similarly, cattle cars that arrive in Abidjan after 6 P.M. are usually not unloaded until about 11 A.M. the next morning.[2] By reducing the amount of time animals spend in the cattle

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[1] In principle the RAN does this, but interviews with convoyeurs indicated that the rule is not always observed.

[2] Market officials in Abidjan refuse to allow cattle cars to unload after 6 P.M. because the unloading area at the market is poorly lighted and cattle sometimes wander onto the nearby highway and cause accidents. The cattle are not unloaded early the following morning because the RAN requires merchants to pay rail charges at the Treichville station in the morning before shipping the cattle from Treichville to the cattle market at Port Bouët. Since there is only a single track between Treichville and Fort Bouët, the shipment is often delayed because the track is occupied with other traffic. By improving unloading facilities at the market so that animals could disembark at night, and by allowing merchants either to pay for the rail transport in advance or pay as soon as they arrive in Abidjan, officials could often reduce the amount of time cattle spend in the train cars by 12 hours or more.

cars, weight losses and mortalities probably could be reduced significantly. The RAN should also study the possibility of purchasing better ventilated rail cars and providing feed and water to the animals en route, either in the cattle cars themselves or by disembarking the cattle at rest stops. Weight and mortality losses during trucking could be lowered by reducing the number of police and customs checkpoints along the route and by giving trucks carrying livestock priority at such checkpoints as are necessary.

The cost of waiting for cattle cars at railroad loading points significantly increases the cost of shipping cattle south. As explained in Chapter 5, this problem results from the RAN's slow rotation of cattle cars. By taking the steps described in Chapter 5 to speed up the rotation of cattle cars, the RAN could reduce the costs of shipping cattle south by rail.

Export taxes represent an important part of the cost of shipping cattle from Mali and Upper Volta to Ivory Coast. They represent a much larger cost, for example, than do drovers' wages or intermediaries fees. If the exporting countries are interested in maximizing their livestock exports, they should weigh the tradeoff between the government revenue generated by high export taxes and the effect these taxes have on discouraging exports (or at least exports through official channels). It is possible that lower export taxes might encourage expanded exports (or expanded exports through official channels) to such a degree that total government revenue might not fall, while total export earnings would rise.

CHAPTER 7

THE COSTS OF TRANSPORTING MEAT

Faced with the weight and mortality losses involved in transporting live animals, many development projects in West Africa have tried to promote slaughter in the cattle-producing areas of the north and shipment of meat south to the major meat-consuming regions. Most of the modern abattoirs built in the Sahelian countries in recent years have had as one of their goals the export of meat to the coastal states. Transporting a commodity as perishable as meat over long distances in West Africa has proven very costly, however, and as a result, the chilled meat trade has not developed as much as the Sahelian countries had hoped that it would. This chapter discusses the costs of transporting meat in central West Africa and examines the conditions under which slaughtering in the north and shipping meat south could become a viable alternative to shipping cattle south for slaughter.

The chapter is divided into two parts. The first part examines the costs of shipping chilled meat to Abidjan from Bamako, Ouagadougou, and northern Ivory Coast. The second part presents a model which specifies the conditions under which slaughter in the north would be more profitable than the current system of shipping cattle south for slaughter. The chapter shows that given the transport costs and price of beef in 1977, it was much more profitable to ship live animals south for slaughter than to slaughter the animals in the north and ship the meat south. Furthermore, the relative profitability of slaughtering in the north compared to slaughtering in the south depends not only on the transport costs for cattle and meat, but also on the price of the fifth quarter in the north and south.[1] Given transport costs, the higher the price of the fifth quarter in the south as compared to the north, the more profitable

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[1] The term "fifth quarter" refers to all salable offals of the animal.

it is to ship live animals south rather than slaughter them in the north. When the price of the fifth quarter is much higher in the south than in the north, the merchant gains more by sending the fifth quarter south (in the form of a live animal) than he loses because of the higher carcass shrinkage involved in shipping live animals. This finding implies that if officials want to expand the chilled meat trade between the Sahelian and coastal states, they should plan projects (e.g., establishing processing facilities for offals) that will augment the value of the fifth quarter in the north.

Costs of Shipping Chilled Meat to Abidjan

This section examines the costs of shipping chilled meat to Abidjan from Ferkéssédougou, where the Ivorian government is planning to build a refrigerated abattoir, and from Bamako to Ouagadougou, two cities that have exported chilled meat to Abidjan in the past. The profits that can be earned shipping this chilled meat are compared to those involved in shipping cattle along the same routes. In the analysis it is assumed that the fifth quarters of animals slaughtered in the north are sold in the north and are not shipped south. Typically, slaughterhouses in the north do not export offals (other than hides) because without processing, offals tend to spoil quickly. Mittendorf (42a, p. 16) reports that even when offals are frozen for shipment south, they lose from 25 to 50 percent of their retail value because of West African consumers' preference for fresh offals.

Shipments from Bamako. -- Given the cost of transport and the price of meat in Abidjan in early 1977, it was not profitable to ship ordinary quality chilled beef from Bamako to Abidjan. This is clearly shown in Table 7.1, which shows the expenses and receipts such a shipment by refrigerated truck would involve.[1] As can be seen, such a shipment would

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[1] Van de Putte (124) has shown that it is cheaper to ship meat from Bamako to Abidjan by refrigerated truck than by air.

TABLE 7.1

PROFITABILITY OF SHIPPING MEAT BETWEEN BAMAKO AND
ABIDJAN BY REFRIGERATED TRUCK (IN CFAF)[a]

Expenses/Receipts	Shipment of Entire Carcass	Shipment of Rear Quarters Only[b]
Expenses:		
Purchase of an animal having 160 kg carcass weight in Kati @ 300 CFAF per kg carcass weight	48,000	48,000
Shipment of Animal from Kati to Bamako	300	300
Slaughter Expenses at Bamako		
Slaughter Tax	1,343	1,343
Wrapping: 7.5 CFAF per kg[c]	1,200	675
Amortization of butcher's license: Approximately 0.5 CFAF per kg	80	80
Sale of fifth quarter in Bamako	-3,840	-3,840
Sale of front quarters in Bamako: 70 kg @ 300 CFAF per kg	--	-21,000
Losses due to seizures (2%)	960	960
Total slaughter cost minus the value of the meat and offals sold in Bamako	-257	-21,782
Export Taxes and License[e]	2,480	1,395
Truck Transport Fee: 60 CFAF/kg	9,600	5,400
Veterinary Inspection Tax in Ivory Coast: 10 CFAF per kg	1,600	900
Total Expenses	61,723	34,213
Weight loss of the meat during transport: 4 percent[f]	6.4 kg	3.6 kg
Weight of meat arrived in Abidjan	153.6 kg	86.4 kg
Sale price per kg in Abidjan	400 CFAF	425 CFAF
Gross Receipts	61,440	36,720
Profit per Animal	-283	2,507

SOURCES: Meat prices in Abidjan from the investigator's field study, Abidjan. Price of animals in Mali and export costs from Robert Van de Putte, "Organisation des Exportations," unpublished paper (Bamako: OMBEVI, 1977).

[a] Prices and costs as of December, 1976 - January, 1977.

[b] Rear quarters weighing a total of 90 kg.

[c] Applies only to meat exported from Bamako.

[d] Estimated at 8 percent of the purchase price of the animal.

[e] The export tax for meat is 15 CFAF per kg. The amortization of the exporter's license is estimated at 0.5 CFAF per kg.

[f] Weight loss figures from experiments carried out at the Bamako abattoir by OMBEVI.

result in a loss. If only higher-valued rear quarters rather than
entire carcasses were shipped, a profit of roughly 2,507 CFAF per ani-
mal would result. These figures, however, include no allowance for the
risk of spoilage due to failure of the refrigeration equipment. If a
risk premium equal to 5 percent of the exporter's costs is included in
the calculation, the net margin falls to about 800 CFAF per animal,
which is much less than the margin a merchant can earn by shipping live
animals between Mali and Abidjan.

Shipments from Ouagadougou. -- The existence of a rail link between
Ouagadougou and Abidjan and the lower price of cattle in Ouagadougou as
compared to Bamako make chilled meat shipments between Ouagadougou and
Abidjan po entially profitable. This is shown in Table 7.2, which com-
pares the costs and receipts of shipping live animals and meat from
Ouagadougou to Abidjan. The theoretical net margin for shipping meat is
considerably above that for shipping animals. In reality, however, the
costs of shipping meat from Ouagadougou to Abidjan are much higher than
indicated in Table 7.2, due to frequent breakdowns of the refrigerated
rail cars. Many exporters, for example, buy large amounts of ice in
Ouagadougou, which they load into the cars to help keep down the temper-
ature if the compressors fail. Even so, losses of meat are frequent,
and as mentioned in Chapter 1, this explains why rail exports of meat
from Upper Volta have fallen in recent years. Given the figures in
Table 7.2, when losses of meat in transit (excluding shrinkage) exceed
14 percent, it becomes more profitable to ship live animals between
Ouagadougou and Abidjan than to ship meat.

Charges for air transport of meat from Ouagadougou to Abidjan are
much higher than for rail transport. Freight charges alone in 1977 were
80 CFAF per kg, and transport to and from the airport cost roughly 10
CFAF per kg (4;124). The total freight charge for a 160 kg carcass was
therefore 14,400 CFAF (160x90), compared to 6,017 CFAF for rail shipment.[1]

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[1]Including unloading costs.

TABLE 7.2

COMPARISON OF THE THEORETICAL PROFITABILITY OF EXPORTING MEAT
AND CATTLE FROM OUAGADOUGOU TO ABIDJAN (IN CFAF)

Expenses/Receipts	Cost per Animal
Export of Meat	
Expenses	
Purchase of animal having 160 kg carcass weight	
in Ouagadougou @ 250 CFAF per kg carcass weight	40,000
Intermediary's commission	250
Fee for holding the animal before slaughter	100
Slaughter Expenses in Ouagadougou	
Slaughter tax and license fee	1,000
Refrigeration tax: 4 CFAF per kg	640
Veterinary inspection tax: Upper Volta	
1 CFAF per kg	160
Labor to prepare carcass for export	
2 CFAF per kg	320
Sale of fifth quarter in Ouagadougou[b]	-6,560
Loss through seizures (0.5 percent)	219
Total slaughter cost minus the value of offals sold in Ouagadougou	-4,221
Voltaic Export Tax: 8 CFAF per kg	1,280
Refrigerated Rail Shipment 37,541 CFAF per ton	6,007
Unloading of Car: 500 CFAF/car of 50 carcasses	10
Veterinary Inspection Tax. Ivory Coast 10 CFAF per kg	1,600
Round Trip Ticket for Exporter, Ouagadougou - Abidjan -- Cost per animal	1,000
Lodging and Food for Exporter in Abidjan[d] Cost per animal	750
Total Expenses	47,236
Weight Loss per Carcass: 4 percent[e]	6.4 kg
Weight of Meat Arrived in Abidjan	153.6 kg
Sale Price per kg in Abidjan	400 CFAF
Gross Receipts	61,440
Profit per Animal	14,204
Export of Live Animals	
Expenses	
Purchase of animal having 160 kg carcass weight in Ouagadougou @ 250 CFAF per kg carcass weight	40,000
Total transport costs by rail (from Table 6.)	
Total Expenses	
Loss of Carcass Weight (9 percent)[f]	16.4 kg
Carcass Weight of the Animal in Abidjan	175.6 kg
Sale Price of the Animal per kg Carcass Weight in Abidjan	421 CFAF[g]
Gross Receipts	
Profit per Animal	7,443

See following page for continuation of Table 7.2.

TABLE 7.2 - CONTINUED

SOURCES: Larry Herman, "Cattle and Meat Marketing in Upper Volta,"
• Report to USAID (Ann Arbor: Center for Research on Economic Development,
1977), pp. 144-159; Conseil de l'Entente, Communanté Economique du Bétail
et la Viande. Secretariat Executif, <u>Transport frigorifique sur les axes
Ouagadougou-Bobo-Abidjan et Bamako-Bobo-Abidjan</u>, report by J.P. Arnal
(Abidjan (?): 1974), Vol. II, p. 13; SEDES, <u>Note sur le transport des
viandes par chemin de fer entre la Haute Volta et la Côte-d'Ivoire</u> (Paris:
1973); RAN, Service Commercial, rate data; Table 6.10; and the investigator's
field research data on cattle and meat prices in Abidjan.

[a]Prices and costs as of early 1977.

[b]The value of the fifth quarter was estimated at the equivalent of
41 CFAF per kg dressed carcass weight. This figure is taken from Herman
(28, p. 148).

[c]Based on data on the condemnations of meat in the Ouagadougou
abattoir during 1976 (28, p. 148).

[d]These items cover the cost of the exporter or his agent coming to
Abidjan to arrange the export of meat from Upper Volta for AGRIPAC. Most
exporters ship small quantities (5 to 10 carcasses). It is assumed that
one trip is made for every 10 carcasses exported and that the exporter
spends 3 days in Abidjan. The round-trip ticket costs 18,000 CFAF, and
food and lodging is estimated at 2,500 CFAF per day.

[e]See Note f, Table 7.1.

[f]See Chapter 6, p.243 for explanation.

[g]The price of live animals expressed in terms of CFAF per kg carcass
weight exceeded the wholesale price of meat in Abidjan in early 1977
because of the value of the fifth quarter. As shown in Chapter 12, the
fifth quarter sold wholesale for about 12,100 CFAF. For a 150 kg carcass
weight animal, this represented receipts equal to an "extra" 80 CFAF per
kg carcass weight for the butcher.

The theoretical net margin for air shipment is 5,911 CFAF per animal, excluding risk. This is below what a merchant can earn exporting live animals from Ouagadougou to Abidjan. Inclusion of a 5 percent risk premium drops this margin even lower, to 3,130 CFAF per animal.

The figures just presented demonstrate that high transport costs for meat, both freight charges and losses due to breakdown of refrigeration equipment, act as a major barrier to expansion of the chilled meat trade between Ivory Coast and its northern trading partners. Although the figures show that shipping meat from Bamako and Ouagadougou to Abidjan could be profitable under certain conditions, one of the conditions is that the refrigeration equipment breaks down only rarely. Once allowance is made for breakdowns, the potential profitability of this trade falls rapidly.

Shipments from Ferkéssédougou. -- The question remains whether it would be more profitable to slaughter animals in northern Ivory Coast and ship the meat to Abidjan than to slaughter the animals in Abidjan itself. In 1977, the Ivorian government let a contract for construction of a refrigerated abattoir in Ferkéssédougou. This abattoir will handle the slaughter of cattle from SODEPRA's large feedlot in Ferkéssédougou. It may also be used to slaughter trade animals from the north with the meat being sent to Abidjan. SODEPRA supported this project because it felt that carcass shrinkage in transit would be much less for chilled meat than for live animals, and because it would be easier to produce a high quality product in a new abattoir than in the old abattoir of Abidjan.

Table 7.3 compares the profits that could be earned slaughtering animals in Ferkéssédougou and shipping the meat to Abidjan with those that could be earned by shipping live animals from Ferkéssédougou to Abidjan. Table 7.3 demonstrates that given prices and costs of early 1977, a merchant could earn over twice as much shipping live animals between Ferkéssédougou and Abidjan than he could slaughtering animals in Ferkéssédougou and sending the meat to Abidjan. Furthermore, the margins calculated for meat shipment in Table 7.3 assume no losses due to spoilage on

TABLE 7.3

COMPARISON OF THE PROFITABILITY OF SHIPPING MEAT
AND CATTLE FROM FERKESSEDOUGOU TO ABIDJAN (IN CFAF)[a]

Expenses/Receipts	Cost per Animal
Meat Shipment	
Expenses	
Purchase of Animal having 160 kg carcass weight in Ferkéssédougou @ 337 CFAF per kg carcass weight[b]	53,920
Slaughter Expenses	
Slaughter tax, veterinary inspection, and cold room fees[c]	2,500
Amortization of butcher's license and union fees	347
Preparation of the carcass for shipment 2 CFAF per kg[e]	320
Loss through seizures (0.5 percent)	282
Sale of fifth quarter in Ferkéssédougou[f]	-5,000
Total Slaughter Cost Minus Value of Offals Sold in Ferkéssédougou	-1,551
Refrigerated Rail Shipment: 23,155 CFAF per ton	3,705
(**Refrigerated Truck Shipment:** 30 CFAF per kg)[g]	(4,800)
Unloading of Train Car or Truck: 500 CFAF per car of 8 tons (50 carcasses)	10
Veterinary Inspection Tax in Abidjan: 10 CFAF per kg	1,600
Total Expenses: Train	57,684
Total Expenses: Truck	58,779
Weight Loss in Transit: 1.5 percent[h]	2.4 kg
Weight of Meat Arrived in Abidjan	157.6 kg
Sale Price per kg in Abidjan	400 CFAF
• Gross Receipts	63,040
Profit per Animal	
Rail Transport	5,356
Truck Transport	4,261

TABLE 7.3 - CONTINUED

Expenses/Receipts	Cost per Animal
Live Animal Shipment (25 head)	
Expenses	
Purchase of Animal of 160 kg carcass weight in Perkéssédougou @ 337 CFAF per kg carcass weight[b]	53,920
Salary of Drover 5,000 CFAF for 25 head	200
Food for Drover: 1,000 CFAF	40
Return Passage for Drover[c]	--
Round Trip for Owner: 4,000 CFAF	160
Food for Owner in Abidjan: 7 days @ 200 CFAF = 1,400 CFAF	56
Health Certificate: 3,500 CFAF	140
Loss of Animals[c]	--
Forced Sales: 1.5 percent of 25 animals @ 20,000 CFAF loss per animal = 7,500 CFAF	300
Amortization of Cattle Merchants License[d]	242
Rail Transport	
1 H12 car @ 62,558 CFAF	2,502
Straw: 500 CFAF	20
Loading/Unloading: 1,000 CFAF	40
Other: 1,000 CFAF	40
Abidjan Cattle Market Tax	500
Gift to Landlord	0-100
Total Expenses	**58,160 to 58,260**
Loss of Carcass Weight (2 percent)[1]	3.2 kg
Carcass Weight of Animal in Abidjan	156.8 kg
Sale Price of the Animal per kg Carcassweight in Abidjan	422 CFAF[m]
Gross Receipts	67,738
Profit per Animal	9,458 to 9,558

SOURCES: Tables 6.9, 7.2; RAN, Service Commerical (rate information), Mr. Ahonssou, director of meat sales for DISTRIPAC (trucking cost information); SODEPRA, Projet d'Embouche Bovine de Perkéssédougou unpublished data (cattle prices in Perkéssédougou); and investigator's field data.

[a]Prices and costs as of early 1977.

[b]Average price per kg paid by SODEPRA's Centre d'Embouche Bovine in Perkéssédougou for 749 head of cattle purchased between November, 1976 and June, 1977. Assumes a 49 percent dressing percentage.

[c]Assumed to be the same as in Abidjan.

[d]License costs 120,000 CFAF per year. Assumes 360 animals slaughtered per year. Union fees are 5,000 CFAF per year.

[e]Assumed to be the same as in Ouagadougou.

[f]Author's estimate.

[g]Estimate based on DISTRIPAC's transport allowance of 20 CFAF per kg of meat shipped by truck between Abidjan and Bouaké. The distance between Abidjan and Bouaké is 378 km; that between Perkéssédougou and Abidjan is 613 km.

[h]Author's estimate assuming transit time between Perkéssédougou and Abidjan is about 40 percent that between Ouagadougou and Abidjan.

[i]Provided free by the RAN.

[j]From Table 6.11.

[k]See Chapter 6, p. 207.

[1]Assumed to be the same as in truck transport between Perkéssédougou and Abidjan; Chapter 6, pp. 224.

[m]See note g, Table 7.2.

route. Inclusion of a risk factor for spoilage (i.e. allowing for breakdowns of the refrigeration equipment) reduces even further the margins that could be earned shipping meat.

The implication of Table 7.3 is that given prices in 1977, it was preferable to ship live animals to Abidjan for slaughter rather than slaughtering them in Ferkéssédougou and shipping the meat south. If SODEPRA desires to produce a better quality product than is currently produced at the Abidjan abattoir, the money spent on the Ferkéssédougou abattoir would be better spent improving the slaughterhouse in Abidjan.

The above discussion has shown that given current prices and costs, it is more economical to ship live animals than to ship meat from northern producing areas to Abidjan. The question arises: under what price and cost conditions would it become more profitable to ship meat than to ship live animals?

Meat Versus Live Animal Shipments[1]

This section presents a model that specifies the conditions under which it is more profitable to slaughter cattle in the north and ship their carcasses south than to ship the cattle south for slaughter. The model shows that the factors that determine whether it is more profitable to slaughter in the north than in the south are:

(a) shrinkage during shipments of live animals and meat;

(b) prices of meat and fifth quarter in the north and the south; and

(c) transfer costs for cattle and meat between the north and the south.

As in the previous analysis, it is assumed that the fifth quarters of animals slaughtered in the north are sold in the north and are not shipped south.[2]

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[1] The author is grateful to Edgar Ariza-Nino for help in developing the model presented in this section.

[2] See p. 250.

The profit from slaughtering an animal in the north and shipping the meat south to Abidjan is given by the equation:

$$M_M = DW_{LN} (1-L_M) P_{MA} + F_N P_{FN} - W_{LN} P_{LN} - C_M \quad (7.1)$$

$$\begin{bmatrix} \text{Margin earned} \\ \text{shipping meat} \end{bmatrix} = \begin{bmatrix} \text{Receipts from} \\ \text{meat sold in} \\ \text{Abidjan} \end{bmatrix} + \begin{bmatrix} \text{Receipts from} \\ \text{fifth quarter} \\ \text{sold in north} \end{bmatrix} - \begin{bmatrix} \text{Purchase price} \\ \text{of animal} \end{bmatrix} - \begin{bmatrix} \text{Slaughter} \\ \text{and transfer} \\ \text{costs} \end{bmatrix}$$

where

M_M = net margin earned in shipping the meat to Abidjan;

D = dressing-out proportion of the animal (the carcass weight divided by the liveweight);

W_{LN} = liveweight of the animal in the north;

L_M = shrinkage of the refrigerated carcass during transit, expressed as a proportion of the original carcass weight;

P_{MA} = wholesale price per kg of meat in Abidjan;

F_N = weight of the fifth quarter in the north;

P_{FN} = average price per kg of the fifth quarter in the north;

P_{LN} = price per kg liveweight of the animal in the north; and

C_M = costs of slaughtering the animal in the north and shipping the meat to Abidjan.

Equation 7.1 states that the margin earned from shipping meat is equal to the value of the meat that arrives in Abidjan $[DW_{LN} (1-L_M) P_{MA}]$ plus the value of the fifth quarter sold in the north $[F_N P_{FN}]$ minus the purchase price of the animal in the north $[W_{LN} P_{LN}]$ and the costs incurred in slaughtering the animal and shipping the carcass to Abidjan $[C_M]$.

Similarly, the profit margin earned by shipping a live animal south to Abidjan is given by the equation:

$$M_L = DW_{LN} (1-L_L) P_{MA} + (1-L_L) F_N P_{FA} - W_{LN} P_{LN} - C_L \quad (7.2)$$

$$\begin{bmatrix} \text{Margin earned} \\ \text{shipping} \\ \text{live animal} \end{bmatrix} = \begin{bmatrix} \text{Receipts from sale of} \\ \text{animal in Abidjan} \end{bmatrix} - \begin{bmatrix} \text{Purchase price} \\ \text{of animal} \end{bmatrix} - \begin{bmatrix} \text{Transfer} \\ \text{costs} \end{bmatrix}$$

where

M_L = net margin earned shipping the animal to Abidjan;

L_L = shrinkage of carcass and fifth quarter during shipment to Abidjan, expressed as a proportion of the original weights of the carcass and the fifth quarter [N.B. the percentage shrinkage is assumed to be the same for the carcass and the fifth quarter];

P_{FA} = average price per kg of the fifth quarter in Abidjan;

C_L = transfer cost of exporting the animal to Abidjan; and

D, W_{LN}, P_{MA}, F_N, and P_{LN} are as defined earlier.

Equation 7.2 states that the margin earned exporting an animal from the north to Abidjan is equal to the amount received in Abidjan for the animal's carcass $[DW_{LN} (1-L_L) P_{MA}]$ and for its fifth quarter $[(1-L_L) F_N P_{FA}]$[1] minus the purchase price of the animal in the north $[W_{LN} P_{LN}]$ and the costs incurred in exporting the animal to Abidjan $[C_L]$.

It will be more profitable to slaughter in the north and ship the meat to Abidjan than to ship live animals to Abidjan when $M_M - M_L > 0$. Combining equations 7.1 and 7.2 it can be shown that:

$$M_M - M_L = DW_{LN} P_{MA} (L_L - L_M) - F_N [P_{FA} (1 - L_L) - P_{FN}] - (C_M - C_L) \quad (7.3)$$

$$\begin{bmatrix} \text{Gain from} \\ \text{slaughter} \\ \text{in north} \end{bmatrix} = \begin{bmatrix} \text{Gain in meat value} \\ \text{from reduced} \\ \text{shrinkage} \end{bmatrix} - \begin{bmatrix} \text{Loss in receipts from} \\ \text{fifth quarter} \end{bmatrix} - \begin{bmatrix} \text{Increase in} \\ \text{slaughter and} \\ \text{transport costs} \end{bmatrix}$$

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[1] In practice, the seller receives a single amount for the live animal that includes both the value of the carcass and the value of the fifth quarter.

Equation 7.3 states that the difference between the margins earned shipping meat and shipping live animals depends on three elements. The first, represented by the term $DW_{LN} P_{MA} (L_L - L_M)$, is the value gained due to the reduced amount of carcass shrinkage in meat shipments as compared to live animal shipments. The second element, represented by the term $F_N [P_{FA} (1-L_L) - P_{FN}]$, is the value lost by selling the fifth quarter in the north rather than in Abidjan, where its price is higher. The final element, $C_M - C_L$, is the difference between the per animal transfer costs of chilled carcasses and live animals.

If one assumes that the weight of the fifth quarter is some constant percentage, y, of liveweight (i.e., $F_N = yW_N$), one can state the conditions under which it will be more profitable to ship meat than to ship live animals. Substituting the new assumed value of F_N into equation 7.3 and letting X equal the ratio of the price of the fifth quarter in Abidjan to the price of meat in Abidjan (i.e., $X = \dfrac{P_{FA}}{P_{MA}}$), equation 7.3 can be expressed in slightly different terms:

$$M_M - M_L = W_{LN} P_{MA} [D(L_L - L_M) - yX(1 - L_L)] + yW_{LN} P_{FN} + C_L - C_M \qquad (7.3a)$$

Equation 7.3a will be greater than zero (i.e., it will be more profitable to ship meat than live animals) when:

$$W_{LN} P_{MA} (L_L - L_M) \quad > \quad yW_{LN}[X P_{MA}(1 - L_L) - P_{FN}] \quad + \quad C_M - C_L \qquad (7.4)$$

$$\begin{bmatrix} \text{Value of meat "saved"} \\ \text{due to reduced} \\ \text{shrinkage} \end{bmatrix} > \begin{bmatrix} \text{Receipts foregone by} \\ \text{selling fifth quarter in} \\ \text{north where its price is} \\ \text{lower} \end{bmatrix} + \begin{bmatrix} \text{Increase in} \\ \text{slaughter and} \\ \text{transport costs} \end{bmatrix}$$

Relationship 7.4 states that it will be more profitable to ship meat than live animals whenever the value of the meat "saved" due to the lower carcass shrinkage involved in meat shipments more than offsets the income foregone in selling the fifth quarter in the north rather than in the south,

and the increase in slaughter and transport costs involved in shipping meat as opposed to live animals. Rearranging terms in relationship 7.4 and dividing through by W_{LN}, the liveweight, leads to the statement that it will be more profitable to ship meat than live animals $(M_M - M_L > 0)$ when:

$$P_{FN} > \frac{P_{MA} [yX(1-L_L) - D(L_L - L_M)]}{y} + \frac{\bar{C}_M - \bar{C}_L}{y} \qquad (7.5)$$

where

$$\bar{C}_M = \frac{C_M}{W_{LN}} = \text{slaughter and transfer costs of meat, expressed in terms of cost per kg original liveweight; and}$$

$$\bar{C}_L = \frac{C_L}{W_{LN}} = \text{per kg transfer costs of live animals.}[1]$$

Relationship 7.5 states that the relative profitability of exporting meat as opposed to live animals will increase only if one or a combination of the following things happen:

1) the price of offals in Abidjan falls relative to the price of meat in Abidjan;

2) the average dressing percentage increases;

3) the amount of carcass shrinkage during meat shipments falls relative to the carcass shrinkage experienced in shipping live animals;

4) the price of the fifth quarter in the producing areas increases relative to the price of meat in Abidjan;

5) the costs of slaughtering in the north and transporting carcasses south fall relative to the costs of transporting cattle south.

[1] Since many of the costs of shipping of both cattle and meat (C_L and C_M) are proportional to the animals' weights (e.g., the number of animals or carcasses shipped per train car depends on their weights), $\bar{C}_L$ and $\bar{C}_M$ vary little with respect to the weight of the animal shipped.

From a policy perspective, the following factors in relationship 7.5 are of greatest importance because of their variability and their susceptibility to government policy management:

1) the price of meat in Abidjan, P_{MA};

2) the price of the fifth quarter in the north, P_{FA}; and

3) slaughter and transport costs for cattle and meat, $\overline{C}_L$ and $\overline{C}_M$.

The ratio of the price of offals in Abidjan to the price of meat in Abidjan, X, is also of critical importance, but as explained below, it is likely to remain fairly stable in the next 10 to 15 years, and therefore can be regarded as nearly constant. Similarly, the average dressing percentage, D, is unlikely to change markedly in the coming years.[1] It is also unlikely that L_M, the percentage carcass shrinkage during meat shipments, will fall relative to L_L, the percentage carcass shrinkage during shipments of live animals.[2]

Before considering the four crucial policy variables, P_{MA}, P_{FN}, $\overline{C}_M$, and $\overline{C}_L$, it is first necessary to explain why X, the offal/meat price ratio in Abidjan, is likely to remain fairly stable in the near future. This price ratio is a function of consumer preferences and incomes in Abidjan (i.e., the shape of the demand functions for offals and meat in Abidjan), and might be expected to change as incomes and the absolute price of meat change. Data presented in Chapter 12 indicate a strong consumer preference for meat as opposed to offals; therefore, as real incomes rise, one might expect demand for meat to increase faster than the demand for offals, leading to a decline in X, the offal/meat price ratio. Whether X decreases as incomes rise, however, depends on several

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[1] Furthermore, relationship 7.5 is not very sensitive to changes in D as D takes values from .4 to .6 (the maximum likely range of variation in D.)

[2] There is much more room for reducing carcass shrinkage during cattle shipments than during meat shipments, particularly for cattle shipped by rail. Speeding up transit time (e.g., by reducing the amount of time spent on sidings) could lead to a reduction in weight losses of cattle and would increase the profitability of shipping live animals as opposed to meat. Therefore, in the following analysis, the possibility of lowering shrinkage during meat shipment relative to shrinkage during live animal shipments is ignored.

factors, including whether consumers of protein other than meat and offals (e.g., fish) begin consuming offals as their incomes rise.[1]

How the offal/meat price ratio, X, will behave as the absolute price of meat in Abidjan increases depends on the size of the own-price elasticity of demand for offals and the cross-price elasticity of offals with respect to meat. If the cross-elasticity is equal to the own-price elasticity, then X remains unchanged as the price of meat increases. If the cross-elasticity is greater than the own-price

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[1]It can be shown that X will decline as incomes rise when

$$P_{FA} > \frac{F_{FA}}{F_{MA}} \cdot \frac{n_{YFA}}{n_{YMA}} \cdot P_{MA} \qquad (1)$$

where

P_A = original price of offals in Abidjan;

F_{FA} = price flexibility of demand for offals in Abidjan (approximately equal to the inverse of the price elasticity of demand for offals);

F_{MA} = price flexibility of demand for meat in Abidjan;

n_{YFA} = income elasticity of demand for offals in Abidjan;

n_{YMA} = income elasticity of demand for meat in Abidjan; and

P_{MA} = original price of meat in Abidjan.

If, as seems reasonable, $n_{YM} > n_{YFA}$, and $|F_{FA}| > |F_{MA}|$, then whether inequality (1) holds depends on the absolute magnitude of these parameters and on the size of P_{MA} and P_{FA}. If, however, as incomes rose, there were a large shift in consumption from fish to offals (i.e., if n_{YFA} were greater than n_{YMA}), then inequality (1) would be unlikely to hold. The experience of developed countries, however, suggests that in the long run, as incomes rise, the offal/meat price ratio falls.

elasticity, then X increases as the price of meat increases.[1] It is
likely that in Abidjan the cross-elasticity of offals with respect

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[1]Let P_{MA} = original price of meat in Abidjan;

P_{FA} = original price of offals in Abidjan;

$X = P_{FA}/P_{MA}$

X is unchanged when P_{MA} increases when:

$$\frac{dX}{dP_{MA}} = 0 = \frac{P_{MA}\frac{dP_{FA}}{dP_{MA}} - P_{FA}}{(P_{MA})^2} = \frac{1}{P_{MA}}\left[\frac{dP_{FA}}{dP_{MA}} - \frac{P_{FA}}{P_{MA}}\right] = 0$$

Solving for $\frac{dP_{FA}}{dP_{MA}}$ yields $\quad \frac{dP_{FA}}{dP_{MA}} = \frac{P_{FA}}{P_{MA}}$. Using the chain rule,

$$\frac{dP_{FA}}{dP_{MA}} = \frac{dP_{FA}}{dQ_{FA}}\frac{dQ_{FA}}{dP_{MA}} = \frac{P_{FA}}{P_{MA}} \quad \text{or}$$

$$\frac{dQ_{FA}}{dP_{MA}} \cdot \frac{P_{MA}}{P_{FA}} = \frac{1}{\frac{dP_{FA}}{dQ_{FA}}} \quad \therefore \quad \frac{dQ_{FA}}{dP_{MA}} \cdot \frac{P_{MA}}{P_{FA}} \cdot \frac{P_{FA}}{Q_{FA}} = \frac{1}{\frac{dP_{FA}}{dQ_{FA}}} \cdot \frac{P_{FA}}{Q_{FA}}$$

$$\eta_{FMA} \approx \eta_{PFA}$$

where

Q_{FA} = quantity of offals demanded in Abidjan;

η_{FMA} = cross-elasticity of demand for offals with respect to meat in Abidjan; and

η_{PFA} = price elasticity of demand for offals in Abidjan.

If $\eta_{FMA} > \eta_{PFA}$, then $\frac{dX}{dP_{MA}} > 0$, i.e., the offal/meat price ratio increases
as the price of meat increases.

to meat is fairly high because meat purchases represent an important part of consumers' food budgets and as the price of meat increases, consumers shift from buying more preferred to less preferred types of animal protein. For a large part of the Abidjan population, such a shift corresponds to buying more offals and less skeletal meat. If this shift were large enough (i.e., if the cross-elasticity were high enough) the offal/meat price ratio could even increase as the price of meat increased.

The preceding discussion suggests that in the near future, decreases in the offal/meat price ratio due to income effects may be offset by increases in the ratio due to price effects. In the following analysis, X (the price ratio) is taken as a constant, although later it is allowed to vary.

If shrinkage during transit, dressing percentages, and the offal/ meat price ratio in Abidjan remain unchanged, the future profitability of the meat trade will depend only on changes in the wholesale price of meat in Abidjan (P_{MA}), the wholesale price of the fifth quarter in the producing regions (P_{FN}), and the relative transfer costs ($\bar{C}_M$ and $\bar{C}_L$). Relationship 7.5 states that given transfer costs, if the price of offals in the exporting region exceeds a certain percentage of the price of meat in Abidjan, it becomes profitable to export meat. If the price of the fifth quarter in the north is fairly high relative to the Abidjan price, the merchant loses comparatively little by selling the fifth quarter in the north rather than shipping it on to Abidjan (in the form of a live animal) where its price is higher. He more than makes up this loss by the meat he "saves" due to the lower carcass shrinkage in meat shipments. Relationship 7.5 further states that if meat prices in Abidjan increase relative to fifth quarter prices in the producing areas and the offal/meat price ratio in Abidjan remains unchanged, it becomes less, not more, profitable to ship meat south. As the meat price in Abidjan rises, so does the price of the fifth quarter in Abidjan, and it becomes increasingly profitable to send both the meat and the fifth quarter south in the form of live animals. Relationship 7.5

implies that unless means are found to increase the demand for fifth quarter products in the producing areas (e.g. through processing and export of offals) expansion of meat exports from these areas may be self-braking. Expanding slaughter in order to export meat from the producing zones will lead to increased supplies of offals in these areas. Without an increase in demand for fifth quarter in the producing areas, the price of fifth quarter there will fall relative to Abidjan, and the profitability of live animal shipments relative to meat shipments will increase.[1]

The model can be tested using data from Abidjan and Ouagadougou. Using the values for D, L_L, L_M, and y corresponding to cattle and beef shipped from Ouagadougou to Abidjan by rail in early 1977 (namely D = .49, L_L = .09, L_M = .04, X = .55, and y = $.175^2$) inequality 7.5 becomes:

$$M_M - M_L > 0 \text{ when}$$

$$P_{FN} > \frac{P_{MA} [.55(.175)(1-.09) - .49(.09 - .04)]}{.175} + \frac{\overline{C}_M - \overline{C}_L}{.175}$$

or

$$M_M - M_L > 0 \text{ when } .36 P_{MA} + 5.7 (\overline{C}_M - \overline{C}_L) < P_{FN} \tag{7.6}$$

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[1] Expanded meat shipments to Abidjan would also increase the supply of meat relative to the supply of offals in Abidjan, leading to an increase in the offal/meat price ratio in Abidjan. This would further increase the relative profitability of shipping live animals rather than meat.

[2] The dressing percentage is taken from data collected on 208 animals slaughtered in Bouaké between July, 1976 and July, 1977. L_L and L_M are taken from Table 7.2. The ratio of fifth quarter to carcass weight, y, is calculated assuming edible offals equal to 25 percent of dressed carcass weight and a hide equal to five percent of liveweight. (The latter is calculated from data presented in Herman (28, p. 148). The ratio of the price of the fifth quarter to the price of meat in Abidjan is calculated using y and a value of the fifth quarter in Abidjan equal to 12,100 CFAF (see Chapter 10).

In the simplest case, were $\overline{C}_M = \overline{C}_L$, it would pay to ship meat to Abidjan whenever the price of offals in Ouagadougou exceeded 36 percent of the wholesale price of meat in Abidjan. To the extent that $\overline{C}_M$, the cost per kg of shipping meat exceeds $\overline{C}_L$, the cost per kg of shipping live animals, the price of offals in Ouagadougou would have to be higher to justify meat shipments. Table 7.2 indicates that in 1977 C_L, total transport costs per animal between Ouagadougou and Abidjan,equaled 14,000 CFAF. If one assumes a carcass weight of 160 kg and a dressing percentage of 49 percent, this implies a liveweight (W_{LN}) of 327 kg and a cost per kg ($\overline{C}_L$) of 42.8 CFAF. Table 7.2 also indicates that C_M, the theoretical slaughter and transfer costs for a carcass shipped from Ouagadougou to Abidjan, totaled 13,796 CFAF in 1977. As mentioned earlier, however, this is an unrealistic figure because it includes no allowance for spoilage due to breakdown of the refrigeration equipment. If a risk premium equal to 10 percent of the merchant's investment in the carcass is added, C_M becomes 18,520 CFAF. For an animal with a liveweight in Ouagadougou of 327 kg, $\overline{C}_M$ was therefore 56.6 CFAF. Table 7.2 also indicates that in early 1977, P_{MA}, the wholesale price of meat in Abidjan, was 400 CFAF per kg. Relationship 7.6 thus becomes

$$M_M - M_L > 0 \text{ when } .36(400) + 5.7(56.6 - 42.8) < P_{FN}$$

or

$$M_M - M_L > 0 \text{ when } P_{FN} > 222.7 \text{ CFAF/kg.}$$

From data presented in Herman (28, p. 148), the average price of fifth quarter in Ouagadougou in early 1977 can be calculated as 164 CFAF per kg. Relationship 7.6 therefore did not hold, and it was more profitable to ship live animals from Ouagadougou to Abidjan than to ship meat (i.e., $M_M - M_L < 0$). This explains why little meat was shipped.

The _absolute_ profitability of meat shipments depends on the price
of meat in Abidjan compared to the price of meat in the north. The
relative profitability of meat versus live animal shipments, however,
depends not only on relative prices in the north and the south, but
also on the ratio of the price of offals in Abidjan to the price of
meat in Abidjan. This is shown in Figure 7.1, which shows how the mar-
gins earned shipping meat and live animals to Abidjan, M_M and M_L, vary
as X, the Abidjan offal/meat price ratio varies. Figure 7.1 is drawn
using the parameters just cited for Ouagadougou and Abidjan and assuming
two different meat prices in Abidjan.[1] In both cases, when X (the
Abidjan offal/meat price ratio), exceeds about .4, it becomes more
profitable to ship live cattle than to ship meat. In early 1977, the ratio
was about .55; therefore, little chilled meat was shipped to Abidjan
from the north. Given the prices in early 1977, it was only profitable
to ship high quality meat from the north to Abidjan. High income con-
sumers in Abidjan paid a premium for this meat, therefore the offal/
meat price ratio for this meat was low.[2] For ordinary quality meat no
premium was paid, and the only way in which shipments of ordinary quality
meat could have become more profitable than shipments of live animals
given the prevailing prices would have been for changes to occur in the
relative transfer costs (C_M and C_L) or in the shrinkage rates for meat
and live animals (L_M and L_L).

Three policy implications follow from this discussion. First, given
current prices, exporting meat from the north will remain less profitable
than exporting live animals unless processing and transportation costs for
meat and shrinkage of meat en route (C_M and L_M) fall relative to transport-
ation costs and shrinkage for live animals (C_L and L_L). Second, an

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[1] A constant cattle price of 250 CFAF per kg carcass weight is assumed
for Ouagadougou, so the two different prices shown for Abidjan represent
two different relative north-south prices.

[2] Stated another way, it was profitable to ship high quality meat
because the value of the meat "saved" because of reduced shrinkage in
carcass shipments was very high, and more than offset the loss incurred in
selling the fifth quarter in the north where its price was lower than in
Abidjan.

FIGURE 7.1   Relationship Between the Profitability of Exporting Meat and Animals to Abidjan and the Abidjan Offal/Meat Price Ratio*

* $X = \dfrac{P_{FA}}{P_{MA}}$ where P_{MA} = wholesale price of beef in Abidjan

P_{FA} = wholesale price of the fifth quarter (offals) in Abidjan

M_M = margin earned exporting meat to Abidjan

M_L = margin earned exporting live animals to Abidjan

The figure is drawn using the parameters described in the text and assuming a cattle price in the north of 250 CFA F per kg carcass weight.

increase in the price of meat in Abidjan alone will not make it more profitable to ship meat than to ship live animals. In fact, if the price of meat and fifth quarter in Abidjan rises relative to the price of fifth quarter in the north, the profitability of shipping chilled _ meat will decline relative to that of shipping live animals. •Third, the value of the fifth quarter plays a crucial role in determing whether it is more profitable to ship live animals or meat. For meat exports to become and remain more profitable than shipments of live animals, not only must transpcrtation costs for meat decline relative to those for animals, but means must also be found to increase the demand for the fifth quarter in the north. Processing and export of offals may be one way of doing this.

PART IV

ANALYSIS OF CATTLE PRICES

CHAPTER 8

VILLAGE-LEVEL CATTLE PRICES IN NORTHERN IVORY COAST

This chapter analyzes the behavior of cattle prices in rural areas of northern Ivory Coast, Ivory Coast's main cattle-producing region. The chapter presents the specifics of price behavior in the north (e.g., how prices vary according to the sex and breed of the animal sold), and uses these specifics to ask the more general question of whether the cattle market in the north works in an economically rational and predictable manner. For example, do prices allocate cattle among alternative uses according to the animals' potential productivity? Do seasonal and regional price differentials reflect fluctuations in the supply and demand for cattle? The chapter also compares the prices that the state-run SODEPRA cattle marketing service pays for cattle with the prices paid by traditional cattle merchants. The comparison gives an idea of the potential for improving cattle producers' incomes in the north by replacing traditional merchants with a state marketing agency.

The chapter is divided into five parts. The first part describes the data available on cattle prices in rural northern Ivory Coast and how they were collected. The second section examines the nature of demand for cattle in northern Ivory Coast by describing the most important cattle buyers in the north. The third section examines whether the observed variations in cattle prices by region, by sex and age, and by season reflect supply and demand conditions. The fourth section presents a model of the demand for cattle in rural northern Ivory Coast and estimates the parameters of the model. The model allows one to see how the marketing system in the north takes account of such factors as an animal's sex, age, and breed in determining the animal's selling price. The model thus provides insight into whether the marketing system works rationally, or whether it really is "anarchic" as some critics claim. The final section compares the prices paid for cattle by SODEPRA with those paid by traditional cattle merchants; it then draws inferences about the scope for improving cattle marketing in the north by expanding the activities of that state marketing agency.

The chapter shows that the cattle marketing system in the north works in a rational, predictable manner, with price differences reflecting variations in the demand for and supply of different types of animals. Prices reflect animals' potential productivity, being highest for breeding and work stock and lowest for cattle suitable only for local slaughter. Regional and seasonal price variations correspond to regional and seasonal fluctuations in demand and supply. For example, prices are generally highest in the area around Touba, an area close to the major consumption markets of Liberia and central Ivory Coast, and lowest around Bouna, which lies in the relatively isolated northeast. Prices rise by 10 to 15 percent per animal at the end of the dry season, when supply is reduced. Not only is the marketing system rational, there seems to be only limited scope for improving producers' incomes by replacing traditional merchants with a state marketing agency. The analysis shows that while SODEPRA paid producers significantly more for a female breeding stock than did traditional cattle merchants, there was no significant difference between the prices SODEPRA paid for males and for cull cows and the prices traditional merchants paid for those animals. Since the bulk of sales in the north involved males and cull cows, producers received roughly the same income selling cattle to traditional merchants as they did selling to the state marketing agency.

The Data

Data on village-level cattle prices in northern Ivory Coast are available from SODEPRA, the Ivorian animal production agency.[1] In July, 1976, SODEPRA began recording the prices paid for animals sold from all village herds covered by its extension programs in northern Ivory Coast. These herds all belonged to sedentary agriculturalists; no transhumant Fulani herds were included. When data collection began, SODEPRA programs covered

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approximately 120,700 head of cattle in northern Ivory Coast, out of a total estimated population in sedentary herds of 237,000 (112, p. 2).[1] By March, 1977, the number of cattle covered by SODEPRA programs had risen to 153,400 (112, p. 2), or roughly 65 percent of all cattle in sedentary herds in the north. For administrative purposes, SODEPRA divided northern Ivory Coast into five zones: Odienné, Touba, Boundiali-Ferkéssédougou, Korhogo, and Bouna. These are shown in Figure 8.1

The price data were collected by SODEPRA extension agents (encadreurs), who recorded monthly information on all animals that entered or left herds under their supervision. Entrances were due to births, purchases, gifts, and consignments of animals, while exits resulted from deaths, sales, gifts, consignments to others, and home consumption. For each animal purchased into the herds, the agent was supposed to record the breed, sex, age, and price. For animals sold from the herds he noted the same information, as well as the profession of the buyer. Since no cattle scales were available in the villages, weights were not recorded. In practice, sale and purchase prices were not always recorded, so the data analyzed here do not cover all commercial transactions from these herds. Table 8.1 presents some characteristics of the animals sold from the herds for which price data were available.[2] For most areas, 11 months' data are available; for Boundiali-Ferkéssédougou, 10 months' data are available.

The herds covered by the survey were composed mainly of taurins: 94 percent of the sales were taurins, 5 percent were zebu-taurin crossbreeds, and only 1 percent were zebus. Of the taurins, 74 percent were Baoulés and 26 percent were N'damas. Regional sales patterns corresponded to the distribution of different breeds in Ivory Coast. N'damas predominated around Odienné and Touba, and Baoulés predominated elsewhere. Bulls made up 49 percent of total sales, cows accounted for 48 percent, and steers made up 3 percent. The small number of steers sold reflects the late age at which most males are castrated (3 to 4 years). The average age of

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[1] The figure of 237,000 head is based on a total population of 230,000 in 1975 and a 3 percent annual growth rate. (See Chapter 1 for details.)

[2] Table 8A.1 in Appendix 8A presents more detailed information on these animals. Table 8A.2 presents data similar to that in Table 8A.1 for cattle purchased into the SODEPRA-affiliated herds in northern Ivory Coast.

FIGURE 8.1   SODEPRA Zones in Northern Ivory Coast

MALI

UPPER VOLTA

I
•ODIENNÉ

III
BOUNDIALI   •KORHOGO   •FERKÉSSÉDOUGOU

V
BOUNA
○

GHANA

IV

GUINEA

KOMOÉ
NATIONAL
PARK

MANKONO
•

II
•TOUBA

•SÉGUÉLA

•BOUAKÉ

•MAN

•DANANÉ

•DALOA

LIBERIA

ABIDJAN

SAN
PEDRO
•

GULF OF GUINEA
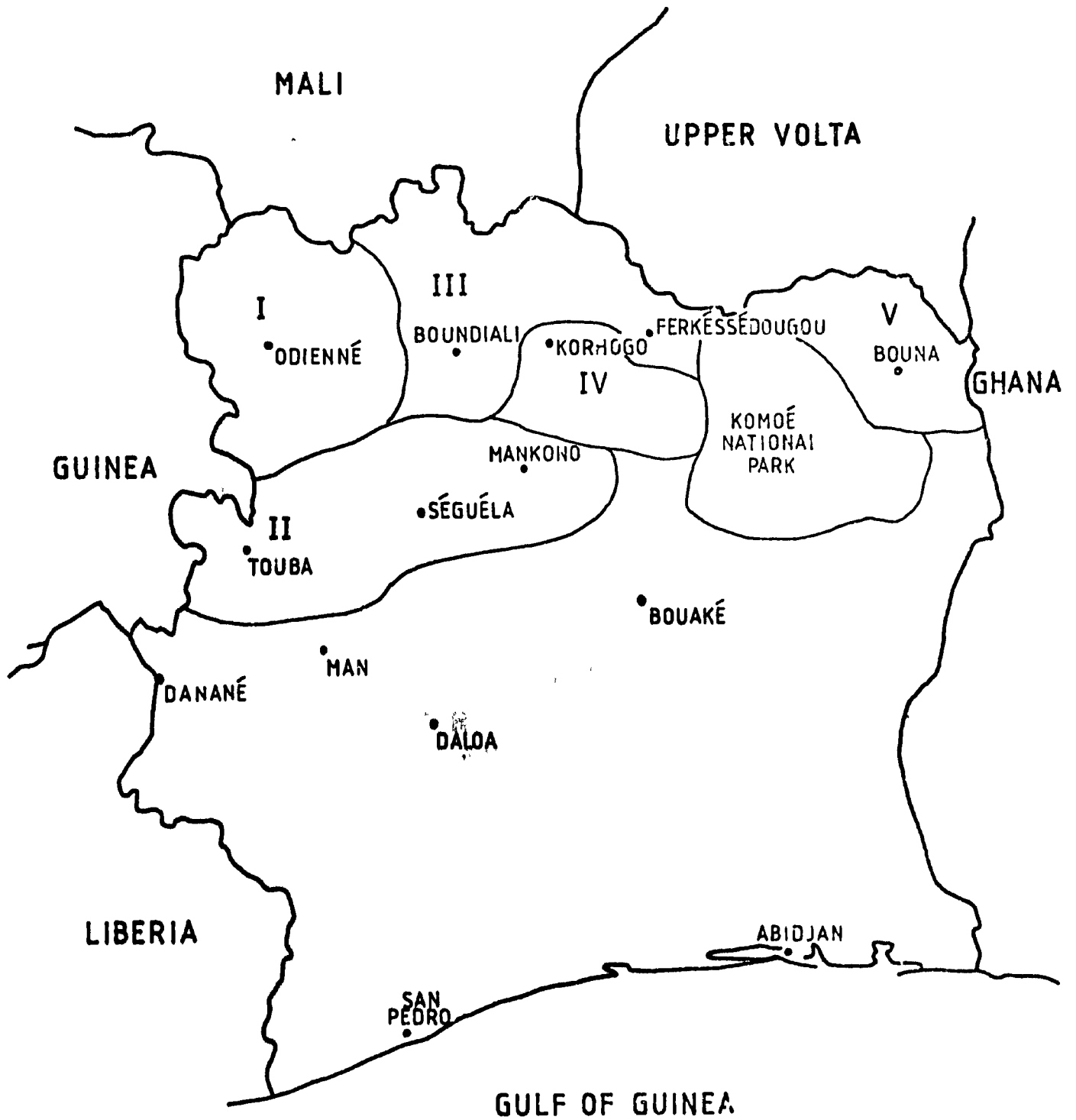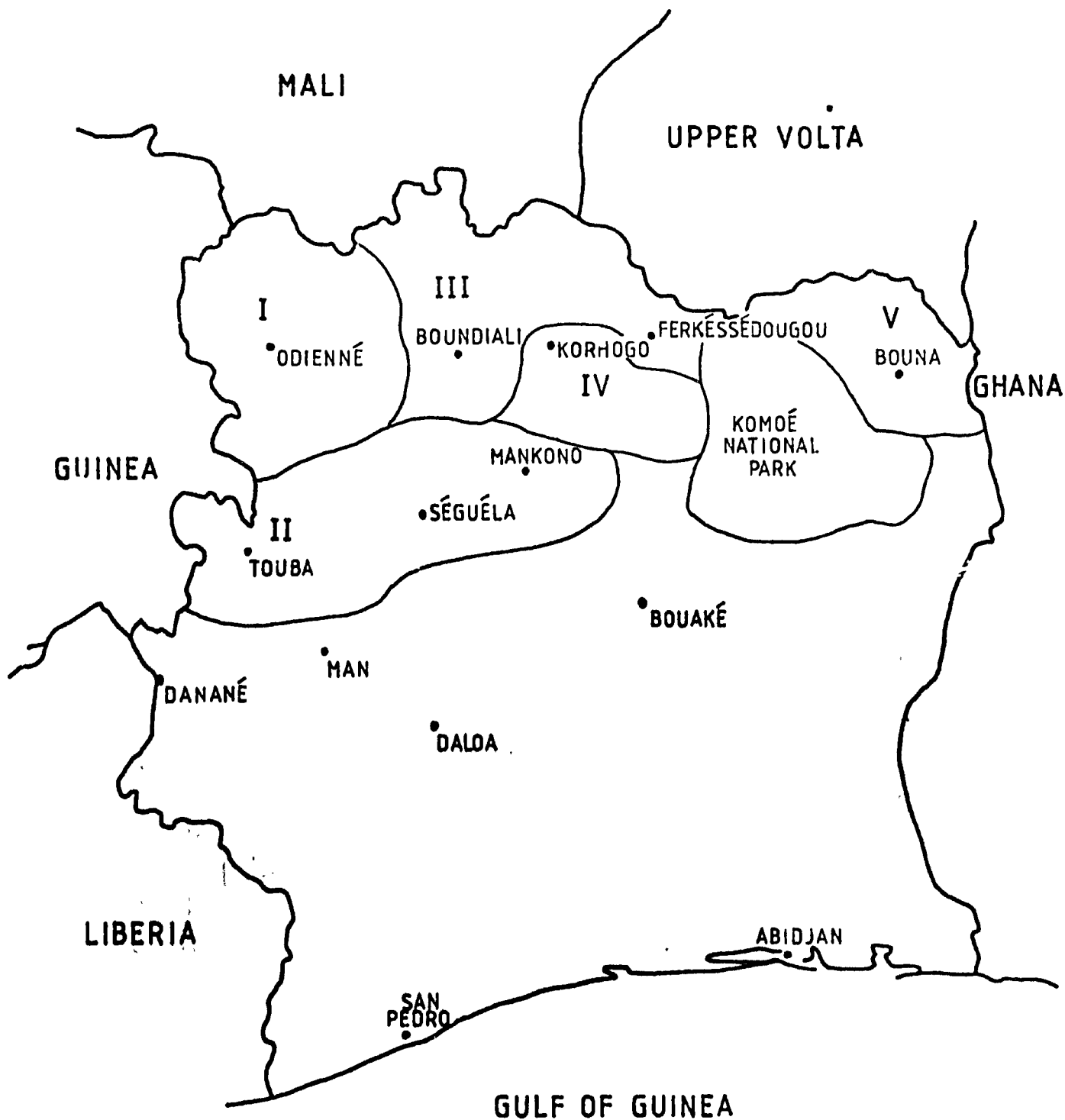
ZONES·

I ODIENNÉ   III BOUNDIALI-FERKÉSSÉDOUGOU
II TOUBA   IV   KORHOGO
                      V   BOUNA

TABLE 8.1

CHARACTERISTICS OF CATTLE SOLD FROM SODEPRA-AFFILIATED HERDS
IN NORTHERN IVORY COAST: JULY, 1976-MAY, 1977

| Characteristic | SODEPRA ZONE | | | | | |
	Odienné	Touba	Boundiali-Ferkéssedougou[b]	Korhogo	Bouna	Total
Sex						
Bull	152	162	344	482	218	1,358
Steer	7	3	45	29	11	95
Female	217	115	445	467	96	1,340
Not recorded	1	0	0	0	0	1
Total	377	280	834	978	325	2,794
Breed						
N'dama	375	201	59	40	0	675
Basulé	1	70	665	873	325	1,934
Zebu	0	0	28	9	0	37
Zebu-Taurin Crossbreed	0	6	70	54	0	130
Not recorded	1	3	12	2	0	18
Total	377	280	834	978	325	2,794

SOURCE: SODEPRA, Opération Nord, unpublished data

[a]SODEPRA's data collection is an ongoing project. Data used in this study were collected from July, 1976 through May, 1977. Figures in this table refer only to animals for which SODEPRA recorded a sale price.

[b]Data for July, 1976 - April, 1977 only.

bulls sold was 3.2 years, while that of steers was 3.6 years, and that of cows was 5.9 years.

Who Buys Cattle in the North?

Before examining the performance of the cattle marketing system in northern Ivory Coast, it is first necessary to look at who the cattle buyers in the north are. The structure of cattle prices depends in part on the types of buyers active in the market. Butchers, for example, are interested almost exclusively in the quantity and quality of meat an animal will yield. Livestock producers, on the other hand, are interested in the animal's breeding potential. Livestock traders who ship cattle south are interested both in the animal's carcass weight and in the animal's ability to withstand the trip south. The degree to which prices are higher for breeding, work, and trade animals than for animals destined for local slaughter thus depends on the number of buyers in the market who are not local butchers.

Table 8.2 shows the distribution of sales from the SODEPRA-affili-ated herds, by type of buyer. Ten types of buyers were recorded:

1. Butchers.-- These were local butchers who bought animals for slaughter.

2. Villagers.-- Local villagers purchased animals for slaughter, either for sacrifice or simply for consumption.

3. Cattle Merchants.-- Cattle merchants purchased animals mainly for shipment to consumption markets farther south. Some merchants, how-ever, may have purchased breeding stock and work animals to resell to , cattle producers and cultivators in the north.

4. SODEPRA.-- In 1975, SODEPRA established a marketing service to purchase animals from herds covered by its extension programs. Animals sold to SODEPRA were used for reproduction and for stocking of other SODEPRA projects, sold to parastatal companies as work animals, or slaugh-tered. In 1975, SODEPRA also created village cooperative feedlots to fatten slaughter animals for sale during the dry season. Some sales to these cooperatives may have been recorded as sales to SODEPRA.

TABLE 8.2

SALES BY TYPE OF BUYER: SODEPRA-AFFILIATED HERDS IN NORTHERN IVORY COAST: JULY, 1976 - May, 1977[a]

| BUYER | ZONE | | | | | | | | | | | |
| | Odienné | | Touba | | Boundiali-Ferkéssédougou[b] | | Korhogo | | Bouna | | Total | |
	Number	Percent[c]	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Butcher	140	44.7	140	57.6	311	42.5	429	49.4	158	53.7	1,178	48.1
Villager	24	7.7	64	26.3	26	3.6	24	2.8	16	5.4	154	6.3
Cattle Merchant	52	16.6	14	5.8	63	8.6	23	2.6	4	1.4	156	6.4
SODEPRA	51	16.3	12	4.9	238	32.6	179	20.6	72	24.5	552	22.5
Other state-owned company	6	1.9	2	0.8	3	0.4	0	-	2	0.7	13	0.5
Fulani[d]	25	8.0	0	-	9	1.2	10	1.2	38	12.9	82	3.3
Peasant Cultivator	4	1.3	5	2.1	51	7.0	187	21.5	1	0.3	248	10.1
Cattle raiser	9	2.9	6	2.5	28	3.8	5	0.6	3	1.0	51	2.1
Village Cooperative Feedlot	2	0.6	0	-	0	-	12	1.4	0	-	14	0.6
Veterinary Service	0	-	0	-	2	0.3	0	-	0	-	2	0.1
Not Recorded	64	-	37	-	103	-	109	-	31	-	344	-
Total	377		280		834		978		325		2,794	-

a. Includes only sales for which a price was recorded
b. Data for July, 1976 - April, 1977
c. Percent of total sales for which a buyer was recorded
d. See text for explanation

5. Other State-Owned Companies.-- Other state-owned companies were recorded as purchasing thirteen head of cattle from the sample herds. Most of these animals were used in animal traction projects.

6. Fulanis.-- Some sales were simply recorded as being made to "Fulanis." Most of these were probably sales to Fulani cattle merchants, although some sales to Fulani cattle raisers may have been included.

7. Peasant Cultivators.-- Most cattle sold to peasants were probably work animals to be used in cotton and rice cultivation. Some sales of breeding stock may have also been included in this category.

8. Cattle Raisers.-- Local cattle raisers purchased mainly breeding stock for inclusion in their herds.

9. Village Cooperative Feedlots.-- There are the cooperative feed-lots discussed above. Some sales to these feedlots may have been recorded as sales to SODEPRA.

10. Veterinary Service.-- The Veterinary Service was recorded as buying two animals in the Boundiali-Ferkéssédougou area.

In all five zones, butchers bought more cattle than did any other type of buyer. Overall, butchers made 48 percent of total recorded purchases from the herds. The bulk of butchers' purchases were young males and cull cows. Since a strong local demand for slaughter animals existed, it is likely that the local slaughter value of animals (a function of their carcass weights) set a floor price for cattle sold in northern Ivory Coast. Livestock raisers and traders had to pay at least the local slaughter value of an animal if they were to obtain the animal.

SODEPRA was the next most important cattle buyer after butchers, accounting for almost 23 percent of recorded purchases. SODEPRA purchased mainly young animals. Sales to SODEPRA were concentrated in the zones of Boundiali-Ferkéssédougou, Korhogo, and Bouna, where the SODEPRA extension program had been active the longest. Sales to peasant cultivators were the third most important category, accounting for 10 percent of total sales. These sales were concentrated in the zones of Boundiali-Ferkéssé-dougou and Korhogo, areas where the use of animal traction for cotton cultivation was increasing rapidly. Next came sales to local villagers and to cattle merchants, each accounting for over 6 percent of total sales.

Sales to other livestock producers accounted for only 2 percent of total sales. The figures in Table 8.2, however, refer only to sales, not total exits, from these herds. SODEPRA data (110, pp. 1-2; 112, p. 2) indicate that non-commercial transactions accounted for roughly 65 percent of the exits of animals from these herds (excluding mortalities). These transactions included home consumption, sacrifices, consignments, loans, and gifts of animals to others.[1] It appears that many of the transactions among livestock owners in northern Ivory Coast do not involve sales.

In summary, the bulk of the cattle sold from SODEPRA-affiliated herds in northern Ivory Coast were destined for use within the north, as either slaughter animals, work animals, or breeding stock. Relatively few were sold to merchants who shipped cattle south. Over half were destined for local slaughter, either by butchers or by villagers. For these animals, carcass weight was probably the most important determinant of price.

Variations in Cattle Prices

This section briefly examines how cattle prices in northern Ivory Coast varied by region, by sex and age of the animal sold, and by season. The analysis indicates that the cattle market in northern Ivory Coast works rationally, with regional and temporal price differences reflecting regional and temporal differences in the supply and demand for cattle. Prices also reflect the alternative uses of animals of different sexes and ages.

The data analyzed in this section are presented in Appendix 8A. Table 8A.3 presents average prices by age class of cattle sold from SODEPRA-affiliated herds in northern Ivory Coast. For each zone, the table presents average prices for the breed most commonly found in that zone. For Odienné and Touba the prices are of N'damas, while for Boundiali-Ferkéssédougou, Korhogo, and Bouna they are of Baoulés. Table 8A.4 presents similar data for animals purchased into the SODEPRA-affiliated herds.

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[1] No breakdown of the relative importance of these noncommercial transactions is available.

implies that unless means are found to increase the demand for fifth
quarter products in the producing areas (e.g. through processing and
export of offals) expansion of meat exports from these areas may be
self-braking. Expanding slaughter in order to export meat from the
producing zones will lead to increased supplies of offals in these
areas. Without an increase in demand for fifth quarter in the pro-
ducing areas, the price of fifth quarter there will fall relative to
Abidjan, and the profitability of live animal shipments relative to
meat shipments will increase.[1]

The model can be tested using data from Abidjan and Ouagadougou.
Using the values for D, L_L, L_M, and y corresponding to cattle and
beef shipped from Ouagadougou to Abidjan by rail in early 1977 (namely
D = .49, L_L = .09, L_M = .04, X = .55, and y = .175[2]) inequality 7.5
becomes:

$$M_M - M_L > 0 \text{ when}$$

$$P_{FN} > \frac{P_{MA} [.55(.175)(1-.09) - .49(.09 - .04)]}{.175} + \frac{\overline{C}_M - \overline{C}_L}{.175}$$

or

$$M_M - M_L > 0 \text{ when } .36 \, P_{MA} + 5.7 \, (\overline{C}_M - \overline{C}_L) < P_{FN} \qquad (7.6)$$

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[1]Expanded meat shipments to Abidjan would also increase the supply
of meat relative to the supply of offals in Abidjan, leading to an in-
crease in the offal/meat price ratio in Abidjan. This would further
increase the relative profitability of shipping live animals rather than
meat.

[2]The dressing percentage is taken from data collected on 208 animals
slaughtered in Bouaké between July, 1976 and July, 1977. L_L and L_M are
taken from Table 7.2. The ratio of fifth quarter to carcass weight, y,
is calculated assuming edible offals equal to 25 percent of dressed
carcass weight and a hide equal to five percent of liveweight. (The
latter is calculated from data presented in Herman (28, p. 148). The
ratio of the price of the fifth quarter to the price of meat in Abidjan
is calculated using y and a value of the fifth quarter in Abidjan equal
to 12,100 CFAF (see Chapter 10).

In the simplest case, were $\overline{C}_M = \overline{C}_L$, it would pay to ship meat to Abidjan whenever the price of offals in Ouagadougou exceeded 36 percent of the wholesale price of meat in Abidjan. To the extent that $\overline{C}_M$, the cost per kg of shipping meat exceeds $\overline{C}_L$, the cost per kg of shipping live animals, the price of offals in Ouagadougou would have to be higher to justify meat shipments. Table 7.2 indicates that in 1977 C_L, total transport costs per animal between Ouagadougou and Abidjan, equaled 14,000 CFAF. If one assumes a carcass weight of 160 kg and a dressing percentage of 49 percent, this implies a liveweight (W_{LN}) of 327 kg and a cost per kg $(\overline{C}_L)$ of 42.8 CFAF. Table 7.2 also indicates that C_M, the theoretical slaughter and transfer costs for a carcass shipped from Ouagadougou to Abidjan, totaled 13,796 CFAF in 1977. As mentioned earlier, however, this is an unrealistic figure because it includes no allowance for spoilage due to breakdown of the refrigeration equipment. If a risk premium equal to 10 percent of the merchant's investment in the carcass is added, C_M becomes 18,520 CFAF. For an animal with a liveweight in Ouagadougou of 327 kg, $\overline{C}_M$ was therefore 56.6 CFAF. Table 7.2 also indicates that in early 1977, P_{MA}, the wholesale price of meat in Abidjan, was 400 CFAF per kg. Relationship 7.6 thus becomes

$$M_M - M_L > 0 \text{ when } .36(400) + 5.7(56.6 - 42.8) < P_{FN}$$

or

$$M_M - M_L > 0 \text{ when } P_{FN} > 222.7 \text{ CFAF/kg.}$$

From data presented in Herman (28, p. 148), the average price of fifth quarter in Ouagadougou in early 1977 can be calculated as 164 CFAF per kg. Relationship 7.6 therefore did not hold, and it was more profitable to ship live animals from Ouagadougou to Abidjan than to ship meat (i.e., $M_M - M_L < 0$). This explains why little meat was shipped.

The **absolute** profitability of meat shipments depends on the price of meat in Abidjan compared to the price of meat in the north. The **relative** profitability of meat versus live animal shipments, however, depends not only on relative prices in the north and the south, but also on the ratio of the price of offals in Abidjan to the price of meat in Abidjan. This is shown in Figure 7.1, which shows how the margins earned shipping meat and live animals to Abidjan, M_M and M_L, vary as X, the Abidjan offal/meat price ratio varies. Figure 7.1 is drawn using the parameters just cited for Ouagadougou and Abidjan and assuming two different meat prices in Abidjan.[1] In both cases, when X (the Abidjan offal/meat price ratio), exceeds about .4, it becomes more profitable to ship live cattle than to ship meat. In early 1977, the ratio was about .55; therefore, little chilled meat was shipped to Abidjan from the north. Given the prices in early 1977, it was only profitable to ship high quality meat from the north to Abidjan. High income consumers in Abidjan paid a premium for this meat, therefore the offal/meat price ratio for this meat was low.[2] For ordinary quality meat no premium was paid, and the only way in which shipments of ordinary quality meat could have become more profitable than shipments of live animals given the prevailing prices would have been for changes to occur in the relative transfer costs (C_M and C_L) or in the shrinkage rates for meat and live animals (L_M and L_L).

Three policy implications follow from this discussion. First, given current prices, exporting meat from the north will remain less profitable than exporting live animals unless processing and transportation costs for meat and shrinkage of meat en route (C_M and L_M) fall relative to transportation costs and shrinkage for live animals (C_L and L_L). Second, an

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[1] A constant cattle price of 250 CFAF per kg carcass weight is assumed for Ouagadougou, so the two different prices shown for Abidjan represent two different relative north-south prices.

[2] Stated another way, it was profitable to ship high quality meat because the value of the meat "saved" because of reduced shrinkage in carcass shipments was very high, and more than offset the loss incurred in selling the fifth quarter in the north where its price was lower than in Abidjan.

FIGURE 7.1 Relationship Between the Profitability of Exporting Meat and Animals to Abidjan and the Abidjan Offal/Meat Price Ratio*

$$* \quad X = \frac{P_{FA}}{P_{MA}} \quad \text{where } P_{MA} = \text{wholesale price of beef in Abidjan}$$

P_{FA} = wholesale price of the fifth quarter (offals) in Abidjan

M_M = margin earned exporting meat to Abidjan

M_L = margin earned exporting live animals to Abidjan

The figure is drawn using the parameters described in the text and assuming a cattle price in the north of 250 CFA F per kg carcass weight.

increase in the price of meat in Abidjan alone will not make it more
profitable to ship meat than to ship live animals. In fact, if the
price of meat and fifth quarter in Abidjan rises relative to the price
of fifth quarter in the north, the profitability of shipping chilled
meat will <u>decline</u> relative to that of shipping live animals. Third,
the value of the fifth quarter plays a crucial role in determing whether
it is more profitable to ship live animals or meat. For meat exports
to become and remain more profitable than shipments of live animals,
not only must transportation costs for meat decline relative to those
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PART IV

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CHAPTER 8

VILLAGE-LEVEL CATTLP PRICES IN NORTHERN IVORY COAST

This chapter analyzes the behavior of cattle prices in rural areas of northern Ivory Coast, Ivory Coast's main cattle-producing region. The chapter presents the specifics of price behavior in the north (e.g., how prices vary according to the sex and breed of the animal sold), and uses these specifics to ask the more general question of whether the cattle market in the north works in an economically rational and predictable manner. For example, do prices allocate cattle among alternative uses according to the animals' potential productivity? Do seasonal and regional price differentials reflect fluctuations in the supply and demand for cattle? The chapter also compares the prices that the state-run SODEPRA cattle marketing service pays for cattle with the prices paid by traditional cattle merchants. The comparison gives an idea of the potential for improving cattle producers' incomes in the north by replacing traditional merchants with a state marketing agency.

The chapter is divided into five parts. The first part describes the data available on cattle prices in rural northern Ivory Coast and how they were collected. The second section examines the nature of demand for cattle in northern Ivory Coast by describing the most important cattle buyers in the north. The third section examines whether the observed variations in cattle prices by region, by sex and age, and by season reflect supply and demand conditions. The fourth section presents a model of the demand for cattle in rural northern Ivory Coast and estimates the parameters of the model. The model allows one to see how the marketing system in the north takes account of such factors as an animal's sex, age, and breed in determining the animal's selling price. The model thus provides insight into whether the marketing system works rationally, or whether it really is "anarchic" as some critics claim. The final section compares the prices paid for cattle by SODEPRA with those paid by traditional cattle merchants; it then draws inferences about the scope for improving cattle marketing in the north by expanding the activities of that state marketing agency.

The chapter shows that the cattle marketing system in the north works in a rational, predictable manner, with price differences reflecting variations in the demand for and supply of different types of animals. Prices reflect animals' potential productivity, being highest for breeding and work stock and lowest for cattle suitable only for local slaughter. Regional and seasonal price variations correspond to regional and seasonal fluctuations in demand and supply. For example, prices are generally highest in the area around Touba, an area close to the major consumption markets of Liberia and central Ivory Coast, and lowest around Bouna, which lies in the relatively isolated northeast. Prices rise by 10 to 15 percent per animal at the end of the dry season, when supply is reduced. Not only is the marketing system rational, there seems to be only limited scope for improving producers' incomes by replacing traditional merchants with a state marketing agency. The analysis shows that while SODEPRA paid producers significantly more for a female breeding stock than did traditional cattle merchants, there was no significant difference between the prices SODEPRA paid for males and for cull cows and the prices traditional merchants paid for those animals. Since the bulk of sales in the north involved males and cull cows, producers received roughly the same income selling cattle to traditional merchants as they did selling to the state marketing agency.

The Data

Data on village-level cattle prices in northern Ivory Coast are available from SODEPRA, the Ivorian animal production agency.[1] In July, 1976, SODEPRA began recording the prices paid for animals sold from all village herds covered by its extension programs in northern Ivory Coast. These herds all belonged to sedentary agriculturalists; no transhumant Fulani herds were included. When data collection began, SODEPRA programs covered

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[1] The investigator is grateful to Pierre de la Gorce, head of SODEPRA's cellule statistique in Korhogo, for permission to use these data.

approximately 120,700 head of cattle in northern Ivory Coast, out of a total estimated population in sedentary herds of 237,000 (112, p. 2).[1] By March, 1977, the number of cattle covered by SODEPRA programs had risen to 153,400 (112, p. 2), or roughly 65 percent of all cattle in sedentary herds in the north. For administrative purposes, SODEPRA divided northern Ivory Coast into five zones: Odienné, Touba, Boundiali-Ferkéssédougou, Korhogo, and Bouna. These are shown in Figure 8.1

The price data were collected by SODEPRA extension agents (encadreurs), who recorded monthly information on all animals that entered or left herds under their supervision. Entrances were due to births, purchases, gifts, and consignments of animals, while exits resulted from deaths, sales, gifts, consignments to others, and home consumption. For each animal purchased into the herds, the agent was supposed to record the breed, sex, age, and price. For animals sold from the herds he noted the same information, as well as the profession of the buyer. Since no cattle scales were available in the villages, weights were not recorded. In practice, sale and purchase prices were not always recorded, so the data analyzed here do not cover all commercial transactions from these herds. Table 8.1 presents some characteristics of the animals sold from the herds for which price data were available.[2] For most areas, 11 months' data are available; for Boundiali-Ferkéssédougou, 10 months' data are available.

The herds covered by the survey were composed mainly of taurins: 94 percent of the sales were taurins, 5 percent were zebu-taurin crossbreeds, and only 1 percent were zebus. Of the taurins, 74 percent were Baoulés and 26 percent were N'damas. Regional sales patterns corresponded to the distribution of different breeds in Ivory Coast. N'damas predominated around Odienné and Touba, and Baoulés predominated elsewhere. Bulls made up 49 percent of total sales, cows accounted for 48 percent, and steers made up 3 percent. The small number of steers sold reflects the late age at which most males are castrated (3 to 4 years). The average age of

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[1] The fugure of 237,000 head is based on a total population of 230,000 in 1975 and a 3 percent annual growth rate. (See Chapter 1 for details.)

[2] Table 8A.1 in Appendix 8A presents more detailed information on these animals. Table 8A.2 presents data similar to that in Table 8A.1 for cattle purchased into the SODEPRA-affiliated herds in northern Ivory Coast.

FIGURE 8.1   SODEPRA Zones in Northern Ivory Coast

ZONES:

I ODIENNÉ
II TOUBA

III BOUNDIALI-FERKÉSSÉDOUGOU
IV KORHOGO
V BOUNA

TABLE 8.1

CHARACTERISTICS OF CATTLE SOLD FROM SODEPRA-AFFILIATED HERDS
IN NORTHERN IVORY COAST: JULY, 1976-MAY, 1977

| Characteristic | SODEPRA ZONE | | | | | |
	Odienné	Touba	Boundiali-Ferkéssedougou[b]	Korhogo	Bouna	Total
Sex						
Bull	152	162	344	482	218	1,358
Steer	7	3	45	29	11	95
Female	217	115	445	467	96	1,340
Not recorded	1	0	0	0	0	1
Total	377	280	834	978	325	2,794
Breed						
N'dama	375	201	59	40	0	675
Basulé	1	70	665	873	325	1,934
Zebu	0	0	28	9	0	37
Zebu-Taurin Crossbreed	0	6	70	54	0	130
Not recorded	1	3	12	2	0	18
Total	377	280	834	978	325	2,794

SOURCE: SODEPRA, Opération Nord, unpublished data

[a]SODEPRA's data collection is an ongoing project. Data used in this study were collected from July, 1976 through May, 1977. Figures in this table refer only to animals for which SODEPRA recorded a sale price.

[b]Data for July, 1976 - April, 1977 only.

bulls sold was 3.2 years, while that of steers was 3.6 years, and that of cows was 5.9 years.

Who Buys Cattle in the North?

Before examining the performance of the cattle marketing system in northern Ivory Coast, it is first necessary to look at who the cattle buyers in the north are. The structure of cattle prices depends in part on the types of buyers active in the market. Butchers, for example, are interested almost exclusively in the quantity and quality of meat an animal will yield. Livestock producers, on the other hand, are interested in the animal's breeding potential. Livestock traders who ship cattle south are interested both in the animal's carcass weight and in the animal's ability to withstand the trip south. The degree to which prices are higher for breeding, work, and trade animals than for animals destined for local slaughter thus depends on the number of buyers in the market who are not local butchers.

Table 8.2 shows the distribution of sales from the SODEPRA-affiliated herds, by type of buyer. Ten types of buyers were recorded:

1. Butchers.-- These were local butchers who bought animals for slaughter.

2. Villagers.-- Local villagers purchased animals for slaughter, either for sacrifice or simply for consumption.

3. Cattle Merchants.-- Cattle merchants purchased animals mainly for shipment to consumption markets farther south. Some merchants, however, may have purchased breeding stock and work animals to resell to cattle producers and cultivators in the north.

4. SODEPRA.-- In 1975, SODEPRA established a marketing service to purchase animals from herds covered by its extension programs. Animals sold to SODEPRA were used for reproduction and for stocking of other SODEPRA projects, sold to parastatal companies as work animals, or slaughtered. In 1975, SODEPRA also created village cooperative feedlots to fatten slaughter animals for sale during the dry season. Some sales to these cooperatives may have been recorded as sales to SODEPRA.

TABLE 8.2

SALES BY TYPE OF BUYER: SODEPRA-AFFILIATED HERDS IN NORTHERN IVORY COAST: JULY, 1976 - May, 1977[a]

BUYER	ZONE										
	Odienné		Touba		Boundiali-Ferkéssédougou[b]		Korhogo		Bouna		Total
	Number	Percent[c]	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Butcher	140	44.7	140	57.6	311	42.5	429	49.4	158	53.7	1,178	48.1
Villager	24	7.7	64	26.3	26	3.6	24	2.8	16	5.4	154	6.3
Cattle Merchant	52	16.6	14	5.8	63	8.6	23	2.6	4	1.4	156	6.4
SODEPRA	51	16.3	12	4.9	238	32.6	179	20.6	72	24.5	552	22.5
Other state-owned company	6	1.9	2	0.8	3	0.4	0	-	2	0.7	13	0.5
Fulani[d]	25	8.0	0	-	9	1.2	10	1.2	38	12.9	82	3.3
Peasant Cultivator	4	1.3	5	2.1	51	7.0	187	21.5	1	0.3	248	10.1
Cattle raiser	9	2.9	6	2.5	28	3.8	5	0.6	3	1.0	51	2.1
Village Cooperative Feedlot	2	0.6	0	-	0	-	12	1.4	0	-	14	0.6
Veterinary Service	0	-	0	-	2	0.3	0	-	0	-	2	0.1
Not Recorded	64	-	37	-	103	-	109	-	31	-	344	-
Total	377		280		834		978		325		2,794	

a. Includes only sales for which a price was recorded
b. Data for July, 1976 - April, 1977
c. Percent of total sales for which a buyer was recorded
d. See text for explanation

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5. Other State-Owned Companies.-- Other state-owned companies were recorded as purchasing thirteen head of cattle from the sample herds. Most of these animals were used in animal traction projects.

6. Fulanis.-- Some sales were simply recorded as being made to "Fulanis." Most of these were probably sales to Fulani cattle merchants, although some sales to Fulani cattle raisers may have been included.

7. Peasant Cultivators.-- Most cattle sold to peasants were probably work animals to be used in cotton and rice cultivation. Some sales of breeding stock may have also been included in this category.

8. Cattle Raisers.-- Local cattle raisers purchased mainly breeding stock for inclusion in their herds.

9. Village Cooperative Feedlots.-- There are the cooperative feedlots discussed above. Some sales to these feedlots may have been recorded as sales to SODEPRA.

10. Veterinary Service.-- The Veterinary Service was recorded as buying two animals in the Boundiali-Ferkéssédougou area.

In all five zones, butchers bought more cattle than did any other type of buyer. Overall, butchers made 48 percent of total recorded purchases from the herds. The bulk of butchers' purchases were young males and cull cows. Since a strong local demand for slaughter animals existed, it is likely that the local slaughter value of animals (a function of their carcass weights) set a floor price for cattle sold in northern Ivory Coast. Livestock raisers and traders had to pay at least the local slaughter value of an animal if they were to obtain the animal.

SODEPRA was the next most important cattle buyer after butchers, accounting for almost 23 percent of recorded purchases. SODEPRA purchased mainly young animals. Sales to SODEPRA were concentrated in the zones of Boundiali-Ferkéssédougou, Korhogo, and Bouna, where the SODEPRA extension program had been active the longest. Sales to peasant cultivators were the third most important category, accounting for 10 percent of total sales. These sales were concentrated in the zones of Boundiali-Ferkéssédougou and Korhogo, areas where the use of animal traction for cotton cultivation was increasing rapidly. Next came sales to local villagers and to cattle merchants, each accounting for over 6 percent of total sales.

Sales to other livestock producers accounted for only 2 percent of total sales. The figures in Table 8.2, however, refer only to sales, not total exits, from these herds. SODEPRA data (110, pp. 1-2; 112, p. 2) indicate that non-commercial transactions accounted for roughly 65 percent of the exits of animals from these herds (excluding rortalities). These transactions included home consumption, sacrifices, consignments, loans, and gifts of animals to others.[1] It appears that many of the transactions among livestock owners in northern Ivory Coast do not involve sales.

In summary, the bulk of the cattle sold from SODEPRA-affiliated herds in northern Ivory Coast were destined for use within the north, as either slaughter animals, work animals, or breeding stock. Relatively few were sold to merchants who shipped cattle south. Over half were destined for local slaughter, either by butchers or by villagers. For these animals, carcass weight was probably the most important determinant of price.

Variations in Cattle Prices

This section briefly examines how cattle prices in northern Ivory Coast varied by region, by sex and age of the animal sold, and by season. The analysis indicates that the cattle market in northern Ivory Coast works rationally, with regional and temporal price differences reflecting regional and temporal differences in the supply and demand for cattle. Prices also reflect the alternative uses of animals of different sexes and ages.

The data analyzed in this section are presented in Appendix 8A. Table 8A.3 presents average prices by age class of cattle sold from SODEPRA-affiliated herds in northern Ivory Coast. For each zone, the table presents average prices for the breed most commonly found in that zone. For Odienné and Touba the prices are of N'damas, while for Boundiali-Ferkéssédougou, Korhogo, and Bouna they are of Baoulés. Table 8A.4 presents similar data for animals purchased into the SODEPRA-affiliated herds.

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[1] No breakdown of the relative importance of these noncommercial transactions is available.

Regional Price Variations.-- Average prices per animal were higher
in the west of northern Ivory Coast (Odienné and Touba) than in other
areas of the north. Prices were higher in the west for three reasons.
First, the animals in the west were N'damas, which are larger than Baoulés.
They therefore had a higher slaughter value per animal because their car-
casses were heavier. Second, there is a strong export demand for cattle
in the west. Traders buy cattle in western Ivory Coast to ship to Liberia,
and as a result, prices are higher. Third, there is a strong demand in
Ivory Coast for N'dama bulls and steers for use as work animals. Farmers
prefer N'damas to Baoulés because N'damas are larger and stronger, and
thus more suited to animal traction. (N'damas are also preferred to
zebus because they are trypano-tolerant and can be used in tsetse-infested
areas.) The demand for work animals is reflected in the much higher
price paid in the west for males three years and older than for females
of the same ages.

The price of Baoulés in the zone of Boundiali-Ferkéssedougou was
about equal to the price in the zone of Korhogo. Prices were lower, how-
ever, in the area around Bouna. Not only were cattle typically smaller
around Bouna than in the other areas; demand for cattle was also lower
around Bouna than in Boundiali-Ferkéssédougou and Korhogo. The zones of
Boundiali-Ferkéssédougou and Korhogo encompass north-central Ivory Coast,
through which pass the two major north-south trade corridors for cattle.
These zones are therefore more influenced by the higher cattle prices in
the consumption centers of the south than is Bouna, which lies in the
more isolated northeast.

Price Variation by Sex and Age of Animal.-- Some animals in the sam-
ple potentially could be used for several purposes (slaughter, breeding,
work, etc.), whereas others were suitable only for slaughter. Prices
served to allocate animals among their alternative uses, with higher
prices being paid for breeding and work stock than for slaughter animals.
For example, the prices of young Baoulé females were higher than those of
young Baoulé males. Young females were sold mainly as breeding stock,

while many of the young males were "surplus" and were sold for slaughter.[1] Since young females had value as breeding stock in addition to their slaughter value, their prices were bid above those of young males. Beginning at about age five, however, higher prices were paid for males than for females. Most of the animals sold over five years of age went for slaughter.[2] For these animals, carc s weight became the main determinant of price. Since bulls were generally heavier than cows, bulls fetched higher prices.

Prices generally increased with age, but only up to about seven years. Undoubtedly, over a certain range age was positively correlated with carcass weight and hence slaughter value. Animals eight years and older, however, probably weighed less than animals between five and eight years old,[3] and therefore their prices were lower than those of younger animals. The prices in Table 8A.3 suggest that even in the range in which age and weight were positively correlated, the relationship may not have been linear.

Seasonal Price Variations.-- Cattle prices in northern Ivory Coast increase both at the end of the rainy season and at the end of the dry season. These seasonal price variations result from climatically-determined production patterns, which influence the supply of animals on the market, and from seasonal variations in the demand for meat. Seasonal variations in demand depend mainly on the timing of major holidays

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[1]Over half the bulls under 5 years old sold from the sample herds went for slaughter (46 percent to butchers and 8 percent to villagers), while only 23 percent of the females sold under 5 years of age went for slaughter (19 percent to butchers and 4 percent to villagers).

[2]About 80 percent of the females sold over 5 years of age went for slaughter, 73 percent to butchers and 7 percent to villagers. Over 70 percent of the bulls sold over 5 years of age went for slaughter, 67 percent to butchers and 5 percent to villagers.

[3]Slaughter data for northern Ivory Coast presented in Appendix 8C confirm this hypothesis.

and on seasonal changes in income, which are a function of crop calendar.

Table 8A.5 in Appendix 8A presents average monthly prices of cattle sold from SODEPRA-affiliated herds in each of the five zones of northern Ivory Coast. The prices are broken down by sex and month, but not by age or breed. In Odienné and Touba, prices refer mainly to N'damas, while in Boundiali-Ferkéssédougou, Korhogo, and Bouna they refer mainly to Baoulés. For simplicity, the following discussion focuses only on the price of males. Figures 8.2 and 8.3 graph the monthly prices of males in the five zones.

Figure 8.2 shows that prices in Boundiali-Ferkéssédougou, Korhogo, and Bouna rose from July to August, reaching a peak either in August or September. They then declined to a low point in November or December, and rose again in December or January. In Boundiali-Ferkéssédougou and Korhogo prices declined in February, then rose in either March or April. In Bouna, however, prices remained steady from December through March, fell in April, then rose in May.

Part of this price variation resulted from seasonal changes in supply. Data on monthly recorded exits of animals from the SODEPRA-affiliated herds are presented in Table 8A.6 in Appendix 8A. Because only monthly supply figures are available, however, correlation of supply and price is sometimes difficult because of the identification problem. Supply by itself did not determine price; price was simultaneously determined by supply and demand.

In Boundiali-Ferkéssédougou, prices seemed inversely related to supply. Supply fell from July through September and prices rose; supply rose in October and prices fell, and so forth. In Boundiali-Ferkéssédougou, Korhogo, and Bouna, supply fell in either August or September, the end of the rainy season. Producers probably held their cattle off the market at this time so the animals could benefit from the good grazing that resulted from the rains. Demand was high for animals in August and September because the animals were in good shape, having had good grazing ever since the rains began in late April; this high demand contributed to the increase in prices. Animals began moving onto the market

FIGURE 8.2   Average Monthly Village-Level Prices
of Males in the Zones of
Boundiali Ferkéssédougou, Korhogo,
and Bouna (in CFA F per animal)
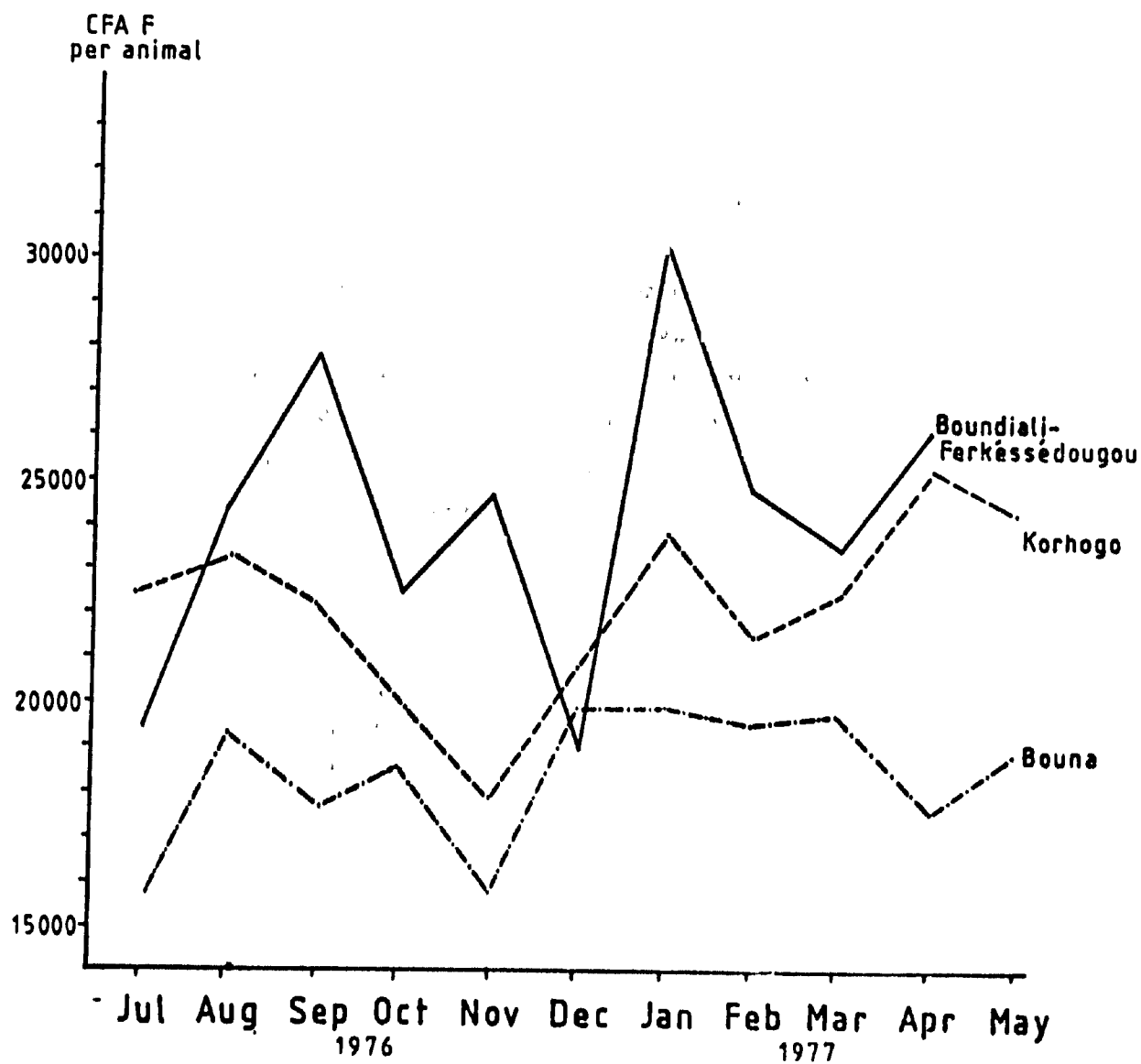
FIGURE 8.3 Average Monthly Village-Level Prices of Males in the Zones of Odienné and Touba (in CFA F per animal)
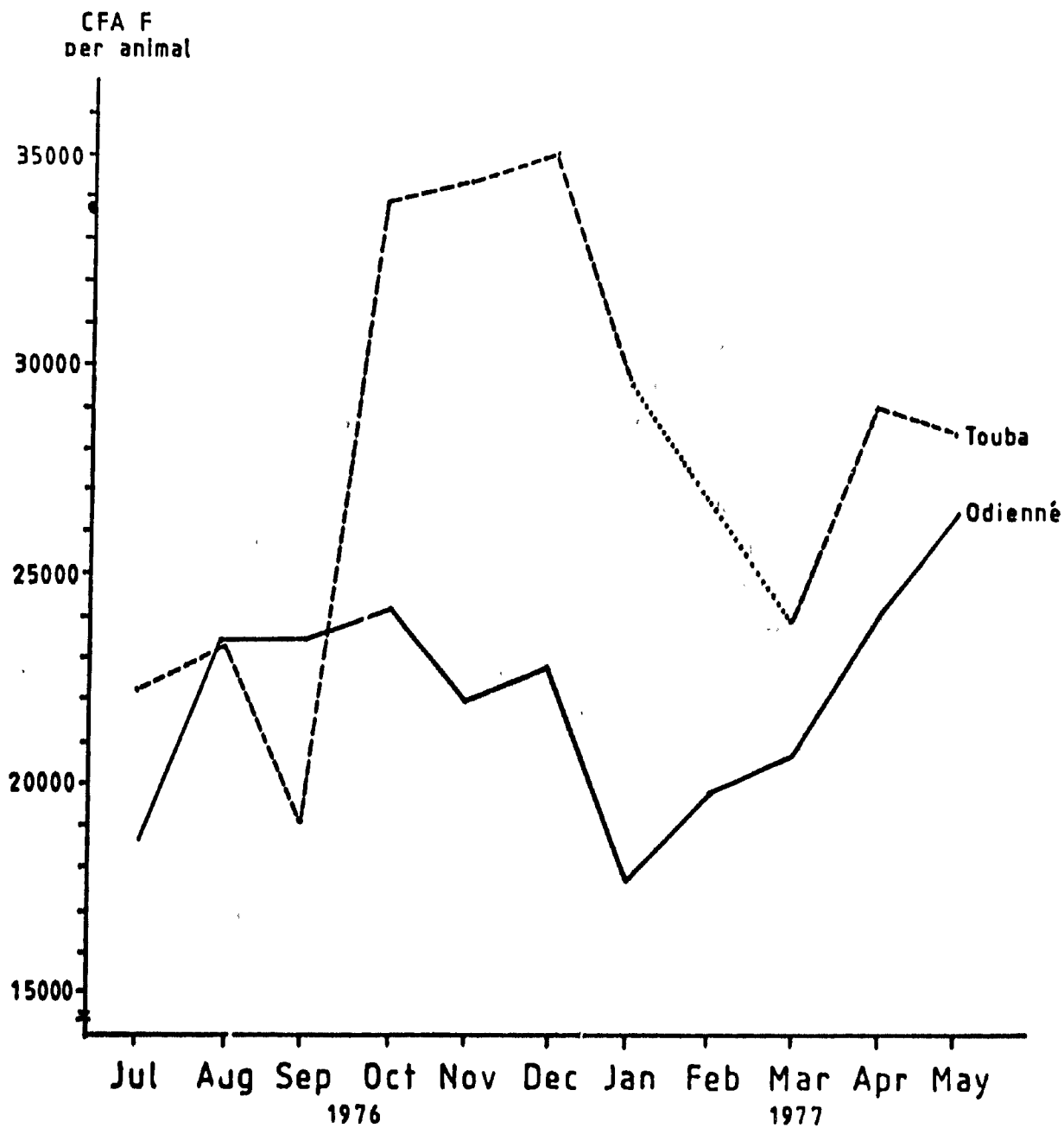
in October or November (depending on the zone), and prices fell.[1] Prices rose in December-January as supply fell again; demand also increased during December-January, as farmers were paid for their cotton crop and celebrated the New Year, and the increased demand bid up prices. In most regions supply increased in February, and prices fell.

Prices rose in March and April, the end of the dry season. Farmers were probably reluctant to sell cattle at the end of the dry season because they wanted the animals to benefit from the grazing that would be available once the rains began. Since animals were losing weight at the end of the dry season, prices per kg probably rose even faster than did prices per animal.

In Odienné and Touba increases in supply tended to be associated with increases in price, suggesting that cattle raisers in these regions responded to higher prices by selling more animals. This was especially true in Touba, where prices rose sharply in October, and where recorded exits reached their highest point in November. Touba is the zone closest to the major consumption markets of Liberia and central Ivory Coast and is probably influenced strongly by seasonal variations in demand in these markets.[2] As explained in Chapter 10, demand increased in both these markets during December and January, and this probably led traders to bid up prices in the Touba area in November and December. As in Boundiali-Ferkéssédougou, Korhogo, and Bouna, cattle prices fell in Odienné and Touba during the early part of the year, then rose at the end of the dry season (February-April).

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[1] The abrupt fall in supply that occurred in Boudiali-Ferkéssédougou during November, 1976 (see Table 8A.6) resulted from an outbreak of contagious bovine pleuro-pneumonia, not normal seasonal factors. The high mortality reduced the number of animals available for sale and caused prices to rise. In Korhogo, Touba, and Odienné, three zones adjacent to Boundiali-Ferkéssédougou, supply increased in November.

[2] Touba was also the zone with the largest apparent offtake rate. This suggests that producers responded to higher prices by increasing the offtake from their herds.

A Model of the Demand for Cattle in Rural Northern Ivory Coast

The role that different factors, such as the sex and age of an animal, play in determining the animal's price in northern Ivory Coast can be seen more clearly with the aid of a multiple regression model. Multiple regression analysis sorts out the effect of each factor and allows the effect to be seen in isolation. This section presents such a model and estimates its parameters using data from the SODEPRA-affiliated herds. The analysis indicates that the main determinant of an animal's price in rural northern Ivory Coast during 1976-77 was the animal's carcass weight or slaughter value. Significant premiums were paid, however, for cattle suitable for breeding or animal traction. Buyers also paid more for Baoulé cattle, which are more disease-resistant than other breeds available in the north, than for equally-sized N'damas and zebu-taurin crossbreeds. The analysis also shows that prices varied seasonally, rising by 10 to 15 percent at the end of the dry season.

The Model.-- In principle, given a certain level of demand for each type of animal (slaughter cattle, work animals, and breeding stock), the price of an individual animal depends on its weight (which in large measure determines its slaughter value and work ability), its potential as a breeding animal, its state of health and disease resistance, and the supply of that type of animal in the area where it is sold. Unfortunately, the data available for rural northern Ivory Coast do not include information on all these variables. Weights were not recorded, and the only supply data available are highly aggregated. (These are the exit figures presented in Appendix 8A.) A significant amount of price variation, however, can be explained by using the information available on the sex, age, and breed of the animals sold, the location and month of sale, and the type of buyer. Several of these variables act as proxies for the missing weight and supply data.

The demand for an animal in northern Ivory Coast varies considerably depending on its sex. Females, especially heifers, are valued mainly as breeding stock, while bulls are sold for slaughter, for use as breeding stock, and for use as draft animals. Steers are sold only as work and slaughter animals. To take account of these differences, the model specified below was estimated separately for each sex.

For each sex, the following model was estimated:

$$P = \alpha_0 + \alpha_1 A + \alpha_2 A^2 + \sum_i \beta_i AB_i + \sum_i \gamma_i BR_i + \sum_i \delta_i L_i + \sum_i \lambda_i PU_i + \sum_i \Pi_i Q_i + e$$

where

P = price of the animal in CFAF;

A = age of the animal in years;

A^2 = age squared;

AB_i = the ith age-breed interaction term;

BR_i = dummy variable equal to one if the animal was of breed i, and zero otherwise;

L_i = dummy variable equal to one if the sale took place in location i, and zero otherwise;

PU_i = dummy variable equal to one if the purchaser had profession i, and zero otherwise;

Q_i = dummy variable equal to 1 if the sale took place in quarter i, and zero otherwise;

α_0, α_1, α_2, β_i, γ_i, δ_i, λ_i, Π_i = the structural parameters of the equation; and

e = randomly distributed error term.

Age was used as a proxy for weight. As explained above, the relationship between age and weight is nonlinear with weight often decreasing with age after about age 7. To take account of this, both age and age squared were included as independent variables. The expected sign of the regression coefficient is positive for age and negative for age squared. The relationship between age and weight also depend on the breed of animal.

For example, zebus are larger than Baoulés; even if zebus have the same percentage weight gain each year as Baoulés, their total weight gain (and hence, the increase in their slaughter value) is greater than that of Baoulés. Therefore, breed-age interaction terms were also included in the model.

Breed should also be an important determinant of price, independent of weight, as it is correlated with resistance to trypanosomiasis and other diseases. One would expect, other things being equal, that prices for non-slaughter animals would be highest for Baoulés, the most disease-resistant breed, followed in order by N'damas, zebu-taurin crossbreeds, and zebus.

The location of sale was used as a proxy for the demand for slaughter animals in different areas. One would expect prices to be lowest in Bouna, which lies in the sparsely populated, relatively isolated northeast, and highest in Touba, which is close to the Liberian and central Ivorian markets for meat. Prices should also be higher if the sale took place near a major town, where the demand for meat would bid up cattle prices.

The type of buyer served as a proxy for the health and conformation of the animal. One would expect prices to be lowest for cattle suitable only for slaughter (purchases by butchers) and highest for cattle that could be used for breeding and animal traction (purchases by livestock raisers, cultivators, and parastatal companies).

Seasonality served as a proxy for the supply of animals on the market. It is hypothesized that prices were higher at the end of the dry season (April-May), when cattle owners were holding their animals off the market, than during the rest of the year.

Estimation.-- The model was estimated for each sex using ordinary least squares. Table 8.3 presents the results. The definition of the independent variables shown in Table 8.3 are the following:

Age Terms

A = age of the animal in years;
A^2 = age squared;

TABLE 8.3

ESTIMATED PARAMETERS OF DEMAND EQUATIONS FOR CATTLE SOLD FROM SODEPRA-
AFFILIATED HERDS IN NORTHERN IVORY COAST: 1976-77

Variable[a]	COEFFICIENTS		
	Bulls	Steers	Females
Constant	4,786[**] (5.3)	13,601[**] (3.8)	15,854[**] (17.2)
Age Terms			
A (Age)	6,427[**] (19.8)	3,020[**] (3.7)	870[**] (4.2)
A^2 (Age squared)	-437[**] (16.0)	--	-58[**] (5.0)
Age-Breed-Interaction Terms			
AN (Age, if N'dama)	1,794[**] (6.4)	-1,897 (1.4)	289[*] (2.4)
AZ (Age, if Zebu)	3,466[**] (4.0)	3,284[*] (2.4)	4,126[**] (3.2)
AC (Age, if crossbreed)	2,139[**] (6.4)	6,084[**] (3.7)	362 (1.2)
Breed			
N (N'dama)	-3,067[*] (2.4)	11,230[##] (2.1)	-1,764[#] (1.7)
Z (Zebu)	-2,115 (0.5)	-1,143 (0.2)	-24,374[**] (2.6)
C (Zebu-Taurin Crossbreed)	-4,398[**] (2.9)	-13,725[##] (2.1)	-2,683 (1.6)
Location of Sale			
O (Odienné)	-3,484[**] (3.3)	-10,392[*] (2.5)	1,823[#] (1.8)
T (Touba)	2,203[*] (2.4)	-12,136[##] (2.3)	7,735[**] (8.1)
BF (Boundiali-Ferkéssédougou)	-729 (1.3)	-3,296 (1.5)	-429 (0.9)
BO (Bouna)	-4,505[**] (6.6)	1,570 (0.3)	-473 (0.6)
SU (Semi-urban area)	3,308[**] (3.9)	--	1,934[**] (2.8)

Table 8.3 continued

Variable[a]	COEFFICIENTS		
	Bulls	Steers	Females
Buyer			
V (Villagers)	975 (1.2)	—	1,207 (1.4)
M (Cattle merchant)	4,401** (5.2)	-6,064## (2.0)	1,445# (1.7)
SA (SODEPRA)	3,228** (5.2)	-2,007 (0.8)	5,163** (7.7)
SE (Other Parastatel companies)	11,423** (5.6)	—	599 (0.1)
F (Fulani)	956 (0.8)	-5,595 (1.2)	-236 (0.2)
P (Peasant Cultivator)	2,070** (3.0)	2,367 (1.1)	3,948** (5.2)
E (Cattle Raiser)	1,652 (1.0)	—	1,106 (1.4)
CO (Village Cooperative)	-1,729 (0.8)	—	—
VS (Veterinary Service)	—	—	1,956 (0.5)
Time of Sale			
Q4 (4th quarter, 1976)	1,023# (1.8)	20,723** (7.2)	95 (0.2)
Q1 (1st quarter, 1977)	1,568** (2.8)	8,701** (2.9)	267 (0.5)
Q2 (2nd quarter, 1977)	3,009** (4.6)	14,385** (5.7)	2,410** (4.1)
Characteristics of Estimated Equations			
N[b]	1,130	85	1,082
D.F.[c]	1,105	67	1,058
R^2	.53	.79	.22
$\bar{R}^2$[d]	.52	.73	.20

[a]See text for description of variables. The figures in parentheses are t-ratios.

Table 8.3 continued

^{b}Number of observations

^{c}Degrees of freedom

^{d}R^2 adjusted for differing degrees of freedom in order to allow comparison of the R^2's of the three different equations.

$$\bar{R}^2 = \frac{1 - k}{n - k} + \frac{n - 1}{n - k} R^2$$

where k = number of independent variables, and
n = number of observations (35, pp. 129-30)

$^\#$Coefficient significantly different from zero at the .10 level.

$^{\#\#}$Coefficient significantly different from zero at the .05 level.

*Coefficient significantly different from zero at the .02 level.

**Coefficient significantly different from zero at the .01 level.

--Variable not included in estimated equation.

Age-Breed Interaction Terms

AN = age-breed interaction variable equal to the age of the
animal if the animal is N'dama, zero otherwise;

AZ = age-breed interaction variable equal to the age of
the animal if the animal is zebu, zero otherwise;

AC = age-breed interaction variable equal to age of the animal
if the animal is a zebu-taurin crossbreed, zero otherwise;

Breed Dummy Variables

N = dummy variable equal to one if the animal is N'dama,
zero otherwise;

Z = dummy variable equal to one if the animal is zebu,
zero otherwise;

C = dummy variable equal to one if the animal is a zebu-
taurin crossbreed, zero otherwise;

Location of Sale Dummy Variables

O = dummy variable equal to one if the sale took place in
Odienné, zero otherwise;

T = dummy variable equal to one if the sale took place in
Touba, zero otherwise;

BF = dummy variable equal to one if the sale took place in
Boundiali- Ferkéssédougou, zero otherwise;

BO = dummy variable equal to one if the sale took place in
Bouna, zero otherwise;

SU = dummy variable equal to one if the seller lived near a
major town, zero otherwise;

Buyer Dummy Variables

V = dummy variable equal to one if the animal was sold to
villagers, zero otherwise;

M = dummy variable equal to one if the animal was sold to a
cattle merchant, zero otherwise;

SA = dummy variable equal to one if the animal was sold to
SODEPRA, zero otherwise;

SE = dummy variable equal to one if the animal was sold to a
state-owned company other than SODEPRA, zero otherwise;

F = dummy variable equal to one if the animal was sold to a
Fulani, zero otherwise;

P = dummy variable equal to one if the animal was sold to a
peasant cultivator, zero otherwise;

E = dummy variable equal to one if the animal was sold to a livestock raiser, zero otherwise;

CO = dummy variable equal to one if the animal was sold to a village co-operative feedlot, zero otherwise;

VS = dummy variable equal to one if the animal was sold to the Veterinary Service, zero otherwise;

Time of Sale Dummy Variables

Q4, Q1, and Q2 = dummy variables indicating, respectively, the last quarter of 1976, the first quarter of 1977, and the second quarter of 1977.

In estimating the model, certain dummy variables had to be excluded in order to avoid getting a singular variance-covariance matrix.[1] The excluded variables correspond to the following:

1) Breed.-- Baoulé;

2) Location of Sale (zone).-- Korhogo;

3) Location of Sale (semi-urban/rural).-- Rural;

4) Buyer.-- Butcher;

5) Time of Sale.-- Third quarter of 1976.

The coefficient of a dummy variable included in the estimated equations measures how much the price of an animal having the characteristic corresponding to that dummy variable differed from the price of an animal having the characteristic corresponding to the excluded dummy variable. For example, the coefficients of the dummy variables for zone measure how much prices in each zone differed from prices in the zone of Korhogo (once the other variables are taken into account). Similarly, the coefficients of the dummy variables for breed measure how much average prices for each breed differed from the average prices of Baoulés (holding other variables constant).

Results.-- The results presented in Table 8.3 indicate that the cattle market in northern Ivory Coast worked in a rational, predictable

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[1]Other dummy variables were excluded from individual equations when there were no sales corresponding to those variables. For example, no steers were sold to villagers; therefore, V, the dummy variable indicating that the buyer was a villager, was excluded from the estimated equation for steers.

manner, with regional differences in cattle prices reflecting regional differences in the demand for meat, and with prices allocating different types of animals among alternative uses. The rationality of the marketing system is illustrated by looking at how prices varied in response to different factors.

a. Price variation by sex and age.-- The constant terms in Table 8.3 indicate that females had a much higher value at birth than did males. Baoulé heifers at birth were worth an average of almost 16,000 CFAF per head in the Korhogo area, compared to about 4,800 CFAF for new-born Baoulé males. Heifers were worth more because of their potential as female breeding stock, whereas most young males were sold for slaughter or as work animals. Since females were valued primarily as breeding stock, their price was not closely tied to increases in their liveweights; therefore, as females grew older, their prices increased only slowly. For example, between ages 0 and 1, the average price of Baoulé heifers increased by only 812 CFAF per head (870 CFAF - 58 CFAF). The value of males, however, both as slaughter animals and as work animals, was closely tied to their liveweights. Males were worth less than females initially, but they increased in value with age much more quickly than did females. Between ages 0 and 1, Baoulé bulls increased in price an average of 5,990 CFAF (6,427 CFAF - 427 CFAF). The regression results indicate that for both bulls and females, the relationship between age and price was non-linear, with average prices falling after about seven years of age. This reflected the low liveweights (and hence low slaughter value) of old animals.[1] Figure 8.4 illustrates the relationship between age and price of Baoulés sold in rural areas around Korhogo.

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[1]Since most steers were sold at an early age, the price equation for steers was estimated as a linear rather than as a quadratic function of age. There were too few old animals in the sample to observe the strongly non-linear relationship between age and weight at higher ages. Only two of the eighty-five steers in the sample were over six years old when sold; seventy-three (81 percent) were four years or younger.

FIGURE 8.4   The Relationship Between Age
and Price of Baoulé Cattle Sold from
SODEPRA—Affiliated Herds in Rural
Areas Around Korhogo, 1976-77
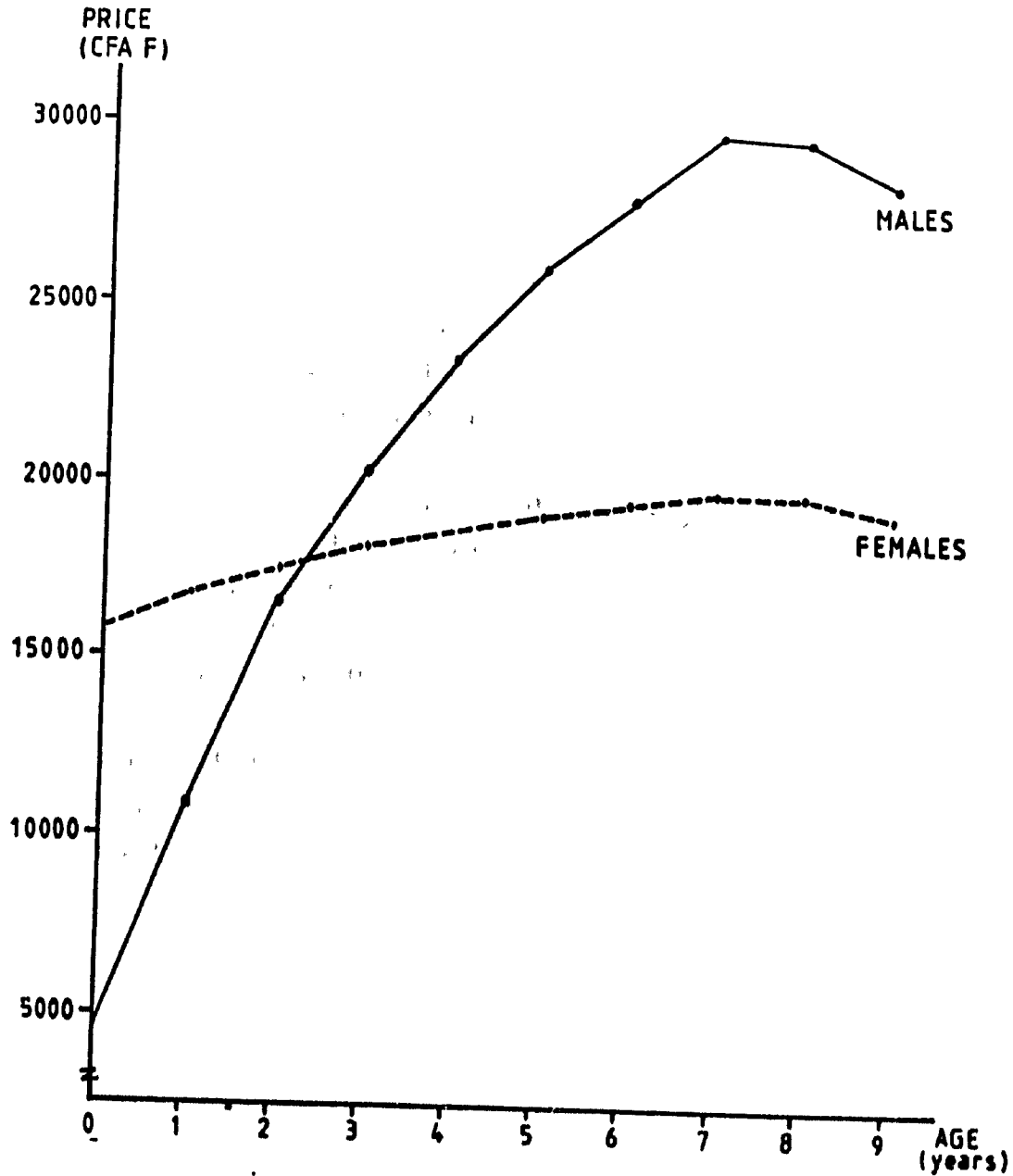
For bulls, the age variables, which are proxies for weight, had the highest explanatory power of any variables in the equation.[1] This suggests that slaughter value was the most important single determinant of the price of bulls, setting a floor price for each animal.

The coefficients of the age-breed interaction variables indicate that, as expected, N'dama, zebu, and zebu-taurin crossbreed bulls and females increased faster in value as they grew older than did Baoulés. This was due to their faster absolute rate of weight gain, and hence faster increase in slaughter value. Zebus, the largest breed, increased in value the fastest, followed in order by zebu-taurin crossbreeds and N'damas.

In summary, the pattern of price variation by age and sex was entirely logical. Prices varied by sex and age in a manner that reflected the animals' value as slaughter cattle, breeding stock, and work stock.

b. Price variation by breed.-- The coefficient of a dummy variable for breed indicates the difference between the average price of animals of that breed and the average price of Baoulés, for which no dummy variable was included. The coefficients of the breed variables in Table 8.3 are almost all negative, indicating that once weight was implicitly taken into account (by the age and age-breed interaction variables) prices were usually lower for N'damas, zebus, and zebu-taurin crossbreeds than for Baoulés. Buyers probably preferred Baoulés (and therefore bid up their prices) because Baoulés are more resistant to trypanosomiasis and other diseases prevalent in northern Ivory Coast than are the other breeds. In a few cases, however, prices for other breeds were as high or higher than the price of Baoulés. For example, buyers paid significantly more (over 11,000 CFAF more) for N'dama steers than for Baoulé steers. N'dama steers are the preferred work animal in northern Ivory Coast; they are larger and stronger than Baoulés, yet possess enough trypano-tolerance to permit them to work in tsetse-infested

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[1]The partial regression coefficients were .51 for A and -.43 for A[2]. The next highest absolute value of any partial was .19.

areas. As a result, the price of N'dama steers was bid up.[1] Also there was no significant difference between the prices of Baoulé males and those of zebu males, even though zebus are highly susceptible to trypanosomiasis. There are two possible reasons for this. First, sales of zebus may have taken place mainly in the northernmost parts of Ivory Coast, where trypanosomiasis is less of a problem. Second, butchers accounted for about half the recorded purchases of zebu males, and data from Bouaké suggest that butchers prefer zebus to taurins. Meat from zebus often contains more fat than does that of taurins, and if consumers in northern Ivory Coast preferred fattier meat, butchers may have bid up the price of zebu males.

c. Regional price variation.-- Regional price differences reflected regional differences in the demand for meat and for draft animals. Prices for both bulls and females were significantly higher in the zone of Touba, the area nearest the large Liberian and central Ivorian markets for meat, than in Korhogo. Prices of steers, however, were significantly lower in the west (Odienné and Touba) than in Korhogo and Boundiali-Ferkéssédougou. This probably reflected a lower level of demand for draft animals in the west than in north-central Ivory Coast.[2] Prices for bulls were lowest around Bouna, an area relatively isolated from the large markets for meat in central Ivory Coast. There were no significant differences between cattle prices in Korhogo and cattle prices in the adjacent zone of Boundiali-Ferkéssédougou.

The regression results indicate that, as hypothesized, the price of cattle was significantly higher near major towns, where the demand

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[1] In contrast, the price of zebu-taurin crossbreed steers averaged 11,725 CFAF less per head than that of Baoulé steers. The larger size of the crossbreeds was more than offset by their increased susceptability to disease, which precluded their use as work animals in much of northern Ivory Coast.

[2] CIDT data (14) indicate that in 1977 there were only 3,070 work cattle in use in the zones of Odienné and Bouna, compared to 8,252 in the zones of Korhogo and Boundiali-Ferkéssédougou. Over 65 percent of the farmland around Korhogo and Ferkéssédougou was cultivated using animal traction, compared to only 44 percent around Odienné.

for meat was high, than in more isolated rural areas. Prices of bulls were higher by about 3,300 CFAF per head, or roughly 15 percent, in semi-urban areas than in rural areas.[1] Prices of females in semi-urban areas were higher by about 1,960 CFAF per head, or 9 percent.[2] Cattle prices thus reflected differences in the demand for beef within regions as well as between regions.

d. Price variation by type of buyer.-- In Table 8.3 the coefficients of the dummy variables denoting the type of buyer measure the difference between the average price paid by each type of buyer and the average price paid by butchers, for whom no dummy variable was included. The regression results for bulls and females confirm that the local slaughter value of these animals (the price a local butcher would pay for them) established their floor price. No class of buyer paid significantly less for bulls and females than did local butchers.[3] Five classes of buyers, however, did not pay significantly more for cattle than did butchers. These buyers included villagers, Fulanis, other cattle raisers, village cooperatives, and the Veterinary Service. Villagers purchased cattle mainly for slaughter, so it is not surprising that they paid no more than did butchers. It is surprising, however, that Fulanis and other cattle raisers, many of whom probably bought cattle for breeding stock, did not pay significantly more than did local butchers.[4]

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[1] The average price of bulls in the sample was 22,706 CFAF.

[2] The average price of females in the sample was 20,962 CFAF.

[3] Cattle merchants, however, apparently paid about 6,000 CFAF less per head for steers than did local butchers. It is not clear why this occurred. The coefficient of the dummy variable indicating the buyer was a cattle merchant was the only coefficient of the buyer variables that was statistically significant in the estimated demand equation for steers.

[4] In the estimated equations for both bulls and cows, the coefficient of E, the dummy variable indicating the buyer was a cattle raiser, was positive, as expected (indicating that cattle raisers did pay more than local butchers), but it was not statistically significant at customary levels.

Four types of buyers did pay significantly more for bulls and females than did local butchers. These buyers included cattle merchants, SODEPRA, other parastatal companies, and peasant cultivators. All bought cattle for uses other than local slaughter. Most cattle merchants bought animals to ship south for slaughter, although some may have also dealt in breeding stock and work animals. Since there was a higher demand for well-fed animals in the south than in the north, and since trade animals had to be strong enough to withstand shipment south, cattle merchants tended to buy larger, stronger animals than did local butchers. SODEPRA bought cattle for use as breeding stock in other areas, for use as work animals, and for slaughter in the south. These cattle also tended to be larger than locally-slaughtered animals. State-owned companies other than SODEPRA bought bulls for animal traction projects, as did peasant cultivators.

Table 8.4 presents the average premiums paid by traders, by SODEPRA, by other parastatal companies, and by peasant cultivators over the price paid by local butchers. The table shows that for bulls, the highest premium was paid by parastatal companies other than SODEPRA. These companies, buying bulls for animal traction projects, paid 50 percent more per head than did local butchers.[1] Undoubtedly the animals they bought were larger and stronger than bulls of the same age and breed that were slaughtered locally. Cattle merchants paid the next highest premium of bulls, 19 percent more than local butchers. SODEPRA paid 14 percent more than did local butchers for bulls, and peasant cultivators paid 9 percent more.

SODEPRA paid more for females than did any other class of buyer. It paid 25 percent more per head for females of a given age and breed than did local butchers. Most of these animals were breeding stock to be used in other SODEPRA projects. Peasant cultivators also paid premiums for female breeding stock (19 percent more than local butchers), and livestock merchants paid a premium of about 7 percent for the females they purchased.

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[1]These companies, however, accounted for only thirteen of the 2,794 animals purchased in the sample.

TABLE 8.4

AVERAGE PREMIUMS PAID FOR CATTLE BY SELECTED BUYERS IN RURAL NORTHERN IVORY
COAST, 1976-77

Type of Buyer	Average Premium Above Price Paid By Local Butchers			
	Bulls		Females	
	CFAF	Percent	CFAF	Percent
Cattle Merchant	4,401	19	1,445	7
SODEPRA	3,228	14	5,163	25
Other Parastatal Companies	11,423	50	---	---
Peasant Cultivators	2,070	9	3,948	19

SOURCE: Table 8.3

Prices thus allocated cattle among different uses in northern
Ivory Coast. Breeding stock and work animals fetched the highest prices,
while animals suitable only for local slaughter fetched the lowest. The
market thus assured that most cattle suitable for use as draft animals and
breeding stock were not slaughtered for local consumption.

e. Seasonal price variation.-- The coefficients of Q4, Q1, and
Q2 in Table 8.3 measure the amount by which prices during the last quarter
of 1976, the first quarter of 1977, and the second quarter of 1977 differed
from prices during the third quarter of 1976 (the end of the rainy season).
The last quarter of 1976 and the first quarter of 1977 represent the early
and mid dry season, and the second quarter of 1977 (which for these data
included only the months of April and May) represents the end of the dry
season. The coefficients in Table 8.3 show that prices of bulls and
females were highest at the end of the dry season. The average price of
bulls at the end of the dry season was about 3,000 CFAF per head higher,
or 14 percent more than the price at the end of the rainy season. The
average price of females at the end of the dry season was roughly 2,400
CFAF per head higher, or 11 percent more than the rainy season price.
Weights were probably falling at the end of the dry season because grazing
was scarce; therefore, prices per kilogram probably rose faster than did
prices per animal. The price rise resulted from cattle owners holding
animals off the market at the end of the dry season, preferring to sell the
animals after they had regained some of the weight lost during the dry
season.

The data also indicate that steer prices were higher at the
end of the dry season than at the end of the rainy season. Steer prices
were highest, however, during the final quarter of 1976, the beginning of
the dry season. CIDT began its annual program of buying draft animals in
December, and this may have bid up steer prices during the final quarter
of 1976.   .

f. Summary of results.-- Almost all the coefficients in Table
8.3 have the signs and the relative magnitudes expected. This suggests
that the cattle market in northern Ivory Coast does indeed work rationally,

with prices reflecting the alternative uses of different animals, their state of health and disease resistance, and seasonal variations in supply. The R^2's of the equations indicate that variations in the independent variables accounted for 53 percent of the variation in the price of bulls, 79 percent of the variation in the price of steers, but only 22 percent of the variation in the price of females. Undoubtedly, the lack of precise information on weights and on the supply of animals resulted in lower R^2's than would otherwise obtain. The R^2 of the equation for females was also low because there were no data on the conformation of the animals and on other characteristics that could serve for proxies for the potential of the animal as breeding stock. The pooling of observations on cull cows and on younger breeding stock also increased total price variability for females. When separate regressions were run for young and old females, the R^2's improved.[1]

SODEPRA's Prices Versus Cattle Merchants' Prices

In 1975 SODEPRA established a marketing service to buy cattle from herds covered by its extension programs. It did so because it felt that traditional cattle merchants offered producers "ridiculously low prices" (prix derisoires) that discouraged cattle production in the north. By 1976 SODEPRA had become an important buyer of cattle, accounting for about 23 percent of recorded purchases from SODEPRA-affiliated herds in the north. (See Table 8.2.) Looking at how SODEPRA's prices compared with those offered by traditional merchants gives an idea of how much scope exists for improving cattle marketing by replacing traditional merchants with a state marketing agency.

The regression equations just presented on cattle sales can be used to test whether SODEPRA paid producers significantly more for their animals than did traditional cattle merchants. The equations presented in Table 8.3 were re-estimated excluding the dummy variable that indicated whether the buyer was a cattle merchant and including a dummy variable

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[1] See Appendix 8.B.

that indicated whether the buyer was a butcher. In the new equations, the coefficient of SA, the dummy variable for SODEPRA, measures the difference between the average price paid by SODEPRA for a given type of animal and the average price paid by traditional cattle merchants. If this coefficient is positive and statistically significant, it indicates that SODEPRA paid significantly more than did traditional cattle merchants. If it is negative and statistically significant, it indicates that SODEPRA paid significantly less than did traditional merchants.

When the equations in Table 8.3 were re-estimated, the coefficient of SA was not statistically different from zero in the equations for bulls and steers, indicating no support for the hypothesis that SODEPRA paid more for males than did traditional cattle merchants.[1] Before re-estimating the equation for females, the sample was divided into two age groups: females less than five years old (essentially breeding stock) and females five years and over (some breeding stock, but mainly cull animals). The equation was then re-estimated for each group. The results indicated that while SODEPRA did not pay significantly more than traditional merchants for old females, it did pay significantly more for young females. The coefficient of SA showed that SODEPRA paid an average of almost 4,900 CFAF per animal for young females than did traditional merchants.[2] Since most cattle merchants in Ivory Coast are engaged in the meat trade, one would not expect them to pay much of a premium for breeding stock.

The results, then, indicate that SODEPRA did pay more for a female breeding stock than did traditional cattle merchants, but that it did not pay significantly more for males or for cull cows than did the traditional merchants. If indeed cattle merchants offered "riduculously low prices" to producers, SODEPRA offered prices that were no higher. This suggests that the scope for improving cattle marketing by replacing the traditional marketing system with a state marketing agency may be quite limited.

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[1] The sign of the coefficient was negative for bulls and positive for steers. Preliminary analysis of price data for 1978 indicates that prices paid by most buyers for bulls and steers in northern Ivory Coast increased by about 20 percent between 1977 and 1978, but that the prices paid by SODEPRA remained unchanged. This suggests that by 1978 SODEPRA may have been paying significantly less for bulls than were traditional merchants.

[2] This coefficient was significant at the .01 level.

CHAPTER 9

PRICES OF SLAUGHTER CATTLE IN NORTHERN IVORY COAST

This chapter examines the prices of slaughter cattle in three cities in northern Ivory Coast -- Odienné, Boundiali, and Bouna. The previous chapter demonstrated that an animal's local slaughter value determines the minimum price a producer will receive for the animal. This chapter examines the determinants of an animal's slaughter value, and addresses three policy issues. First, do butchers in the north pay premiums for fattened cattle? If they do, there may be scope for fattening cull animals in the north before they are slaughtered locally. Second, what is the relationship between price and age of slaughter cattle in the north? Is the price per kilogram of young slaughter cattle higher than that of older animals, encouraging producers to sell young animals from their herds for slaughter? Third, how do prices per kg vary seasonally in the north? Wide seasonal price fluctuations, if they exist, could be reduced by holding animals in dry-season feedlots and selling them as prices rise.

The chapter is divided into three parts. The first part presents price data for Odienne, Boundiali, and Bouna, and discusses how they were collected. The second part compares average cattle prices in these cities with the prices recorded in the surrounding countryside, and looks at seasonal price variation. The third section presents a model of the demand for slaughter cattle in the north and estimates the model's parameters.

The chapter shows that by far the most important determinant of an animal's slaughter value is its carcass weight. Butchers in Odienné, Boundiali, and Bouna pay premiums for cattle with higher quality (fattier) meat, but these premiums are small; only about 3 percent of the price of lean animals. The small premiums for higher quality meat reflect low levels of consumer income in the north. Prices per kilogram of slaughter cattle in northern Ivory Coast also increase slightly as cattle grow older. This is because butchers sometimes have to bid older animals away from alternative uses (breeding, work, and shipment to other markets). The data also show that seasonal variations in the price per kilogram of

slaughter cattle in northern Ivory Coast were fairly small during 1976-77; the maximum price variation between any two months was only about 15 percent. Prices per kilogram were highest in September (at the end of the rainy season) and around the New Year (December and January).

The Data

In July, 1976, SODEPRA and the Veterinary Service began recording the prices and carcass weights of cattle slaughtered in the abattoirs of Odienné, Boundiali, and Bouna. At the time of slaughter, a veterinary agent would ask each butcher how much he had paid for his animal, and they would weigh the animal's carcass and estimate its age according to dentition. Since the butchers knew the study was government-run, they may have sometimes reported inflated cattle prices in hopes of encouraging local authorities to raise the official price of meat.

Table 9A.1 in Appendix 9A shows the characteristics of the cattle for which price and weight data are available.[1] It appears that most of the cattle slaughtered in Odienné, Boundiali, and Bouna were locally produced, rather than imported. Typically these were cull animals; the choicest slaughter animals produced in northern Ivory Coast are sent to the higher-priced markets farther south. Females, most of them cull cows, made up a large part of total slaughter: 54 percent in Odienne, 56 percent in Boundiali, and 38 percent in Bouna. The average age of cattle slaughtered was about 6 years for females, 5 years for bulls, and 6 years for steers (Table 9.1).

The breeds slaughtered in each city reflect local patterns of production and trade. N'damas are produced mainly in the northwest, around Odienné, and they accounted for 94 percent of the cattle slaughtered in Odienné. Boundiali lies in an area in which many Fulanis have settled with their zebu herds. It also lies along one of the major trade routes between Mali and Ivory Coast, along which pass thousands of zebus every

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[1] Price collection is an on-going project in Odienné, Boundiali, and Bouna. The figures in Table 9A.1 refer only to the data analyzed in this study.

TABLE 9.1

AVERAGE AGE OF CATTLE SLAUGHTERED IN ODIENNE, BOUNDIALI, AND BOUNA
JULY, 1976 - MAY, 1977   (IN YEARS)

City	Bulls	Steers	Females
Odienné	5.4	6.2	6.1
Boundiali	3.0	4.7	5.6
Bouna	4.7	5.1	5.8

SOURCE: SODEPRA, Opération Nord, Cellule Statistiqre, unpublished data.

year. Zebus are thus available to butchers in Boundiali, and accounted for
81 percent of recorded slaughters in that city during the study period.
Bouna, in the northeast, lies in an area of Baoulé production, and Baoulé
made up 85 percent of Bouna's recorded cattle slaughters.

Butchers in all three towns reported purchasing their slaughter
animals from producers in the surrounding countryside and from trade herds
passing through their areas. Typically, owners of trade herds sold only
injured or ill animals to these butchers, as prices for healthy cattle
were higher farther south.

Urban-Rural and Seasonal Price Variations

This section compares cattle prices in Odienné, Boundiali, and Bouna
with prices recorded in rural areas around these cities, and examines
seasonal variations in the price of slaughter cattle in northern Ivory
Coast. Prices are shown to increase relative to the rainy season during
three periods: at the end of the rainy season (around September), near
the New Year (December - January), and at the end of the dry season
(March - April).

Urban-Rural Price Differences.-- Table 9.2 compares average recorded prices of cattle slaughtered in Odienné, Boundiali, and Bouna during 1976-77 with the recorded prices of cattle sold from SODEPRA-affiliated herds in the countryside surrounding these cities. On the average, recorded prices of bulls were 14 to 15 percent higher in the cities than in the countryside, while recorded prices of females ranged from 12 to 30 percent higher in the cities than in the countryside, depending on the region.[1]

Recorded prices were higher in the cities than in the countryside even though many butchers bought cattle directly from producers. The higher prices recorded in the cities may be attributable to butchers reporting exaggerated prices to the government agents conducting the price survey or to cattle producers in the rural areas reporting sale prices lower than those they actually received. Although inaccurate reporting of prices by buyers and sellers may account for some of the urban-rural price difference, it is also likely that prices actually were slightly higher in the cities than in the countryside because demand for meat in the cities bid up the price of slaughter cattle in semi-urban areas. Chapter 8 showed that cattle prices in semi-urban areas of northern Ivory Coast averaged 15 percent higher for males and 9 percent higher for females than prices in rural areas. Prices in the city of Boundiali may have also been higher than prices in the surrounding countryside because the prices reported for the countryside around Boundiali refer mainly to taurins, while those reported for the city of Boundiali refer mainly to zebus,which are generally larger than taurins.

Seasonal Price Variation.-- Table 9A.2 in Appendix 9A compares the average monthly prices of cattle slaughtered in Odienné, Boundiali, and Bouna with those of cattle sold from herds in the surrounding countryside. Table 9A.3 presents the monthly variations in the ages, carcass weights, and prices per kilogram of the cattle slaughtered in these three cities. The monthly variations in prices, in both rural and urban areas, are graphed in Figures 9.1 - 9.3.

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[1]These average price differences are calculated by weighting the price differential for each age class shown in Table 9.2 by the proportion of tota slaughter made up by that age class.

TABLE 9.2

AVERAGE CATTLE PRICES BY AGE GROUP IN THE CITIES OF ODIENNE, BOUNDIALI, AND BOUNA AND IN THE SURROUNDING RURAL AREAS: JULY, 1976 - MAY, 1977 (IN CFAF PER HEAD)

Sex / Age Group	Odienné			Boundiali			Bouna		
	City	Zone[a]	Ratio[b]	City	Zone	Ratio	City	Zone	Ratio
Bulls									
1 - 2 (years)	20,453	17,108	1.20	19,728	17,250	1.14	19,205	16,969	1.13
N	38	60		109	142		39	73	
3 - 4	30,464	24,485	1.24	30,109	25,205	1.19	22,478	18,642	1.21
N	91	30		46	145		93	95	
5 - 6	33,365	27,000	1.24	39,593	30,958	1.28	24,448	21,887	1.12
N	156	13		27	38		86	27	
7 - 8	31,928	34,500	0.93	38,250	42,500	0.90	26,205	25,167	1.04
N	109	8		8	9		56	6	
9 +	33,167	34,167	0.97	25,167	32,557	0.77	-	-	-
N	12	3		6	7		-	-	
Females									
1 - 2	21,183	21,143	1.03	19,491	22,532	0.86	20,750	14,444	1.43
N	12	35		55	161		2	9	
3 - 4	29,316	22,170	1.32	25,255	22,028	1.15	22,275	19,694	1.13
N	98	52		74	79		40	18	
5 - 6	29,661	23,776	1.25	29,843	22,209	1.34	25,218	21,750	1.16
N	264	42		112	43		87	14	*
7 - 8	30,403	22,783	1.33	28,881	19,465	1.48	22,246	20,958	1.07
N	234	47		53	55		80	18	
9 +	27,533	19,005	1.45	25,471	17,429	1.46	21,250	16,880	1.26
N	30	39		76	85		4	25	

SOURCE: Calculated from unpublished data of SODEPRA, Opération Nord, Cellule Statistique.
a. Zone refers to the SODEPRA administrative zones shown in Figure 8.1.
b. Price in the city divided by price in the zone.

FIGURE 9.1: Prices of Bulls and Steers in Odienné and in the Surrounding Countryside
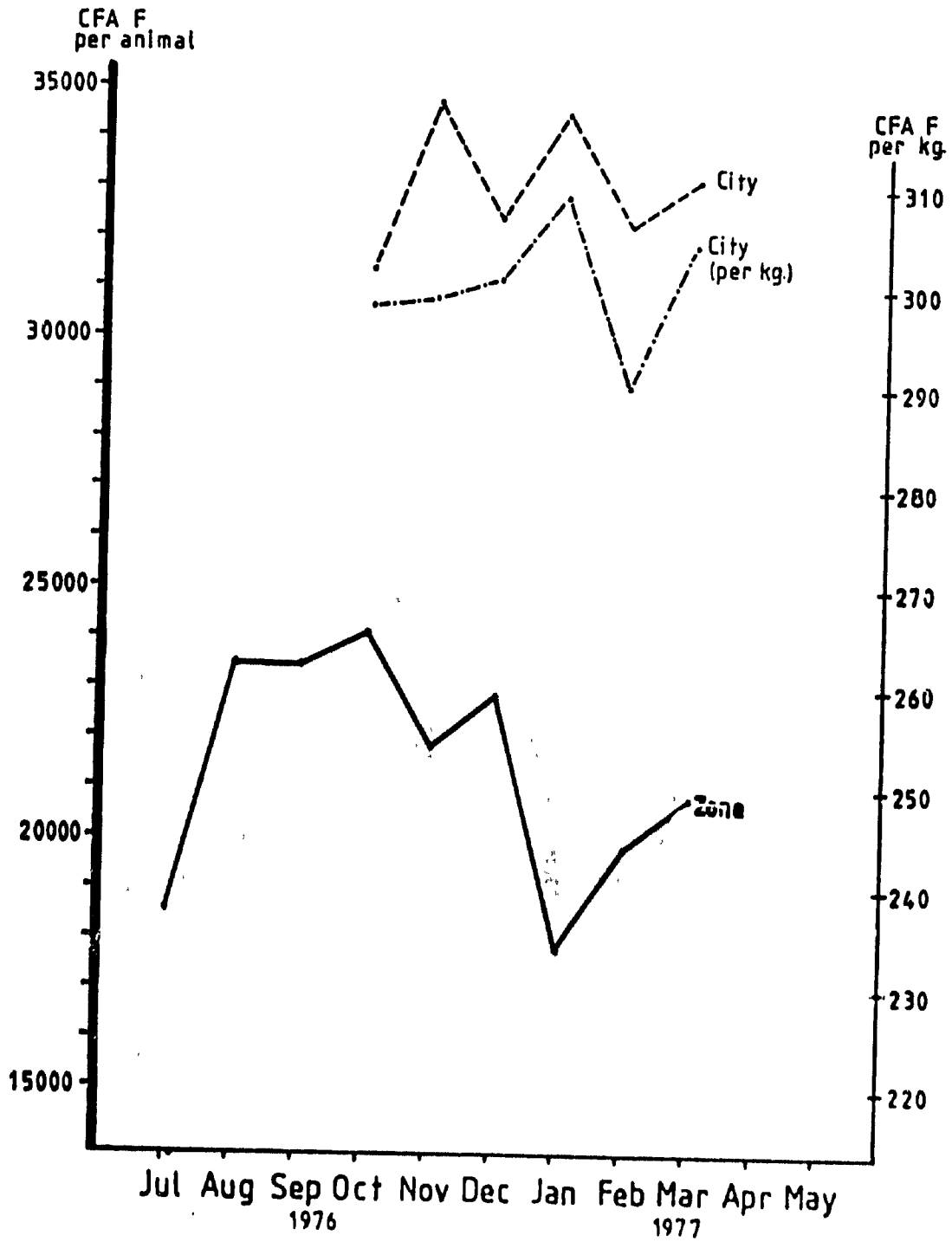
FIGURE 9.2: Prices of Bulls and Steers in Boundiali and in the Surrounding Countryside
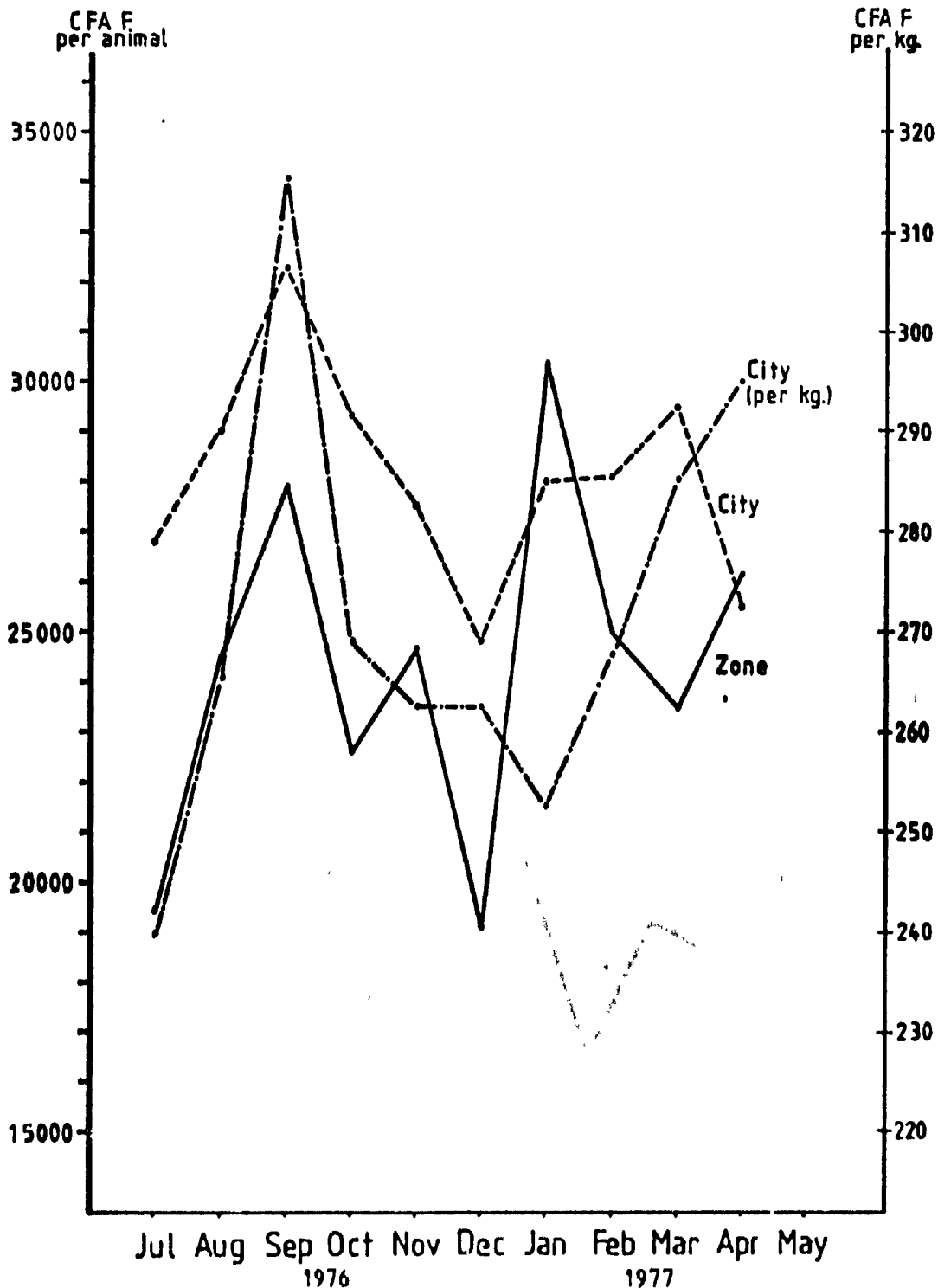
FIGURE 9.3: Prices of Bulls and Steers in Bouna and in the Surrounding Countryside
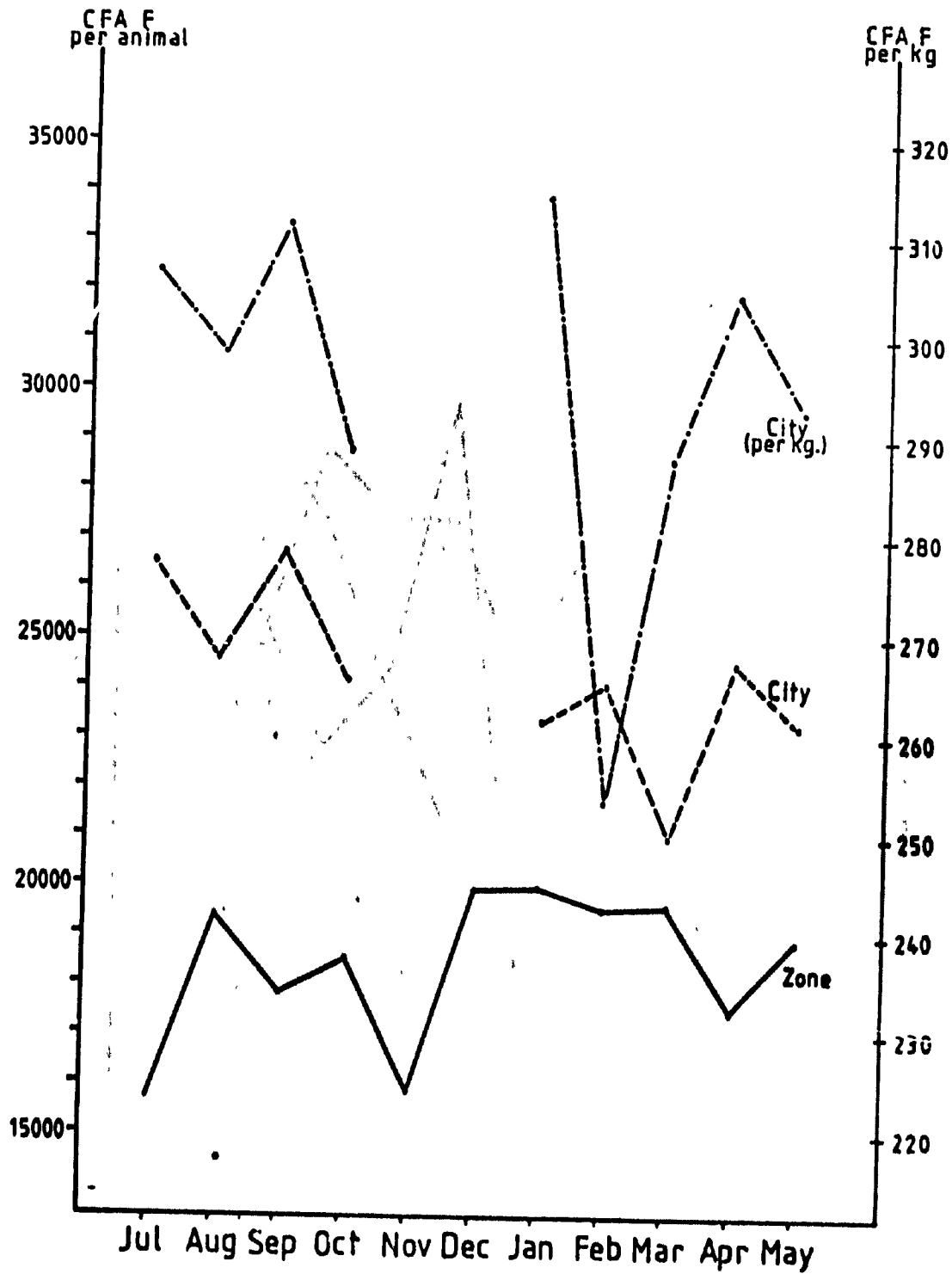
Figure 9.2 shows that monthly price fluctuations in the city of
Boundiali followed price fluctuations in the surrounding countryside
fairly closely. Prices in Odienné and Bouna, however, did not always
follow prices in the rural areas around these two cities. Nonetheless, a
few generalizations can be made about seasonal price variations. In all
three cities, prices increased, either per animal or per kilogram,
beginning in about March. This corresponds to the end of the dry season,
when producers usually hold animals off the market anticipating that once
the rains begin, the animals will re-gain weight lost during the dry season.
Not only were sales probably reduced during the dry season, but so were
average carcass weights (see Table 9A.3). The meat supply was thus reduced,
causing prices to rise. Prices were also high in August and September, the
end of the rainy season. Here, again, producers may have been holding
animals off the market to let them benefit fully from the improved grazing
resulting from the rains.[1] Prices rose in September not only because of
reduced supply, but also because of increased demand. September, 1976
corresponded to the Moslem month of Ramadan, during which beef consumption
normally increases. The early yam harvest also began in September,
giving farmers their first crop receipts of the new planting year, and
this may have also boosted demand for meat.

Prices per kilogram also apparently increased in Odienné and Bouna
around January (although the absence of data for Bouna for November and
December makes it impossible to say exactly when prices peaked in that
city). The price increase in January corresponded to a period of increased
demand for meat. At this time farmers both in the north and in the south
were paid for their crops; therefore, their buying power increased. Many
harvest and religious festivals also occurred in December and January, and
these also boosted the demand for meat.

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[1]The data presented in Table 8A.6 in Appendix 8A on recorded exits
from SODEPRA-affiliated herds in northern Ivory Coast show that recorded
exits were lower in September, 1976 than in any other month from July, 1976
through February, 1977.

Although the price per animal increased slightly in the city of
Boundiali during January, the price per kilogram actually fell. Boundiali,
even more than Odienné and Bouna, relies mainly on young and cull animals
for its meat supply.[1] Perhaps prices in Boundiali were less affected by
changes in the demand for meat farther south (where most of the harvest
festivals took place) because the cattle slaughtered in Boundiali were too
weak to be shipped south. The data indicate that the price of cattle in
the countryside around Boundiali rose sharply in January; only the price of
cattle slaughtered in Boundiali, presumably cull animals, did not.

Model of the Demand for Slaughter Cattle in Northern Ivory Coast

This section presents a model of the demand for slaughter cattle in
Odienné, Boundiali, and Bouna, and uses multiple regression to estimate the
parameters of the model. Multiple regression analysis provides a clearer
view of the factors influencing the demand for slaughter cattle by sorting
out the effect of each factor and allowing it to be seen in isolation.

The Model.-- In theory, the demand for a slaughter animal is a function
of the animal's carcass weight, the quality of the meat it yields, the
supply of meat available when the animal is sold, and the anticipated
demand for meat when the animal is slaughtered. Information is available
on the prices and carcass weights of cattle slaughtered in Odienné,
Boundiali, and Bouna, and three proxies are available for the quality of
the meat yielded by these animals. These proxies are the sex, breed, and
age of the animals. The sex of the animal is generally correlated with
the fat content of the meat. Butchers interviewed in Bouaké (see Chapter 10)
reported that the meat of steers contained more fat than that of bulls.
The meat of cows, especially the very old, thin cows slaughtered in the
north, contains little fat. Assuming consumers want some fat in their

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[1]The average carcass weights of the cattle slaughtered in Boundiali
were very low, 104 kg for males and 100 kg for females, even though 81 per-
cent of the slaughter was made up of zebus. In contrast, the average
carcass weights recorded in Bouaké (see Chapter 10) were 168 kg for males
and 135 kg for females.

meat,[1] one would expect the price of steers to be higher than that of bulls or cows. Breed is also correlated with the fat content of the meat. Butchers report that the meat of zebus is usually fattier than that of taurins. One would therefore expect, other things being equal, that butchers would pay a premium for zebus. Finally, age is inversely correlated with the tenderness of the meat. Given the small number of high-income consumers who prefer tender meat in Odienné, Boundiali, and Bouna, however, one would not expect butchers in these cities to pay a high premium for young animals.

The only proxy available for the volume of supply and the strength of demand for cattle around these three cities is the month in which the animal was slaughtered. Other things being equal, one would expect prices to be higher (relative to the rainy season [July - August]) in September, when producers hold animals off the market to allow them to fatten up; in December and January, when the demand for meat increases; and at the end of the dry season (March - May), when producers hold animals off the market in anticipation of the rains.

In contrast to the model of the demand for cattle at the village level presented in Chapter 8, the parameters of the model specified below were not estimated separately for each sex. All animals in the sample were bought for slaughter; therefore, the main determinant of the demand for them, regardless of sex, was the retail price of beef.[2] The parameters were estimated separately for each city, however, to allow for regional differences in the demand for slaughter cattle. For each city, the following model was estimated:

$$P = \alpha_0 + \alpha_1 W + \alpha_2 A + \sum_i \beta_i SX_i + \sum_i \gamma_i BR_i + \sum_i \delta_i M_i + e$$

where

P = price of the animal in CFAF;

W = carcass weight of the animal in kg;

---

[1]This assumption is based on interviews with butchers in Bouaké and on an analysis of retail meat prices (see Chapters 10 and 12).

[2]In contrast, animals purchased from village herds were bought for several purposes (breeding, work, etc.), and the demand for each sex was different.

A = age of the animal in years;

SX_i = dummy variable equal to one if the animal was of sex i and zero otherwise;

BR_i = dummy variable equal to one if the animal was of breed i and zero otherwise;

M_i = dummy variable equal to one if the sale took place in month i and zero otherwise;

α_0, α_1, α_2, β_i, γ_i, δ_i = the structural parameters of the equation; and

e = randomly distributed error term.

Estimation.-- The model was estimated for each city using ordinary least squares. Table 9.3 presents the results. The definition of the independent variables in Table 9.3 are the following:

Weight

W = carcass weight of the animal in kg;

Age

A = age of the animal in years;

Sex Dummy Variables

S = dummy variable equal to one if the animal was a steer, zero otherwise;

F = dummy variable equal to one if the animal was female, zero otherwise;

Breed Dummy Variables

N = dummy variable equal to one if the animal was N'dama, zero otherwise;

Z = dummy variable equal to one if the animal was zebu, zero otherwise;

B = dummy variable equal to one if the animal was Baoulé zero otherwise;

C = dummy variable equal to one if the animal was a zebu-taurin crossbreed, zero otherwise;

TABLE 9.3

ESTIMATED PARAMETERS OF DEMAND EQUATIONS FOR CATTLE SLAUGHTERED IN
ODIENNE, BOUNDIALI, AND BOUNA FROM JULY, 1976 TO MAY, 1977

Variable[a]	City		
	Odienné	Boundiali	Bouna
Constant	2,263[**] (3.5)	822 (1.1)	2,019[*] (2.8)
Weight			
W (Carcass weight)	259[**] (52.0)	252[**] (39.4)	262[**] (31.0)
Age			
A (Age)	273[**] (4.2)	13 (0.2)	181[##] (2.2)
Sex Dummy Variables			
S (Steer)	343 (0.8)	240 (0.4)	589 (1.4)
F (Female)	-439 (1.6)	-679 (1.5)	-253 (0.8)
Breed Dummy Variables			
Z (Zebu)	780 (1.4)	--	8,128[**] (7.7)
N (N'dama)	--	687 (1.2)	-553 (0.9)
B (Baoulé)	--	694 (0.5)	--
C (Zebu-Taurin Crossbreed)	--	839 (0.9)	8,717[**] (7.4)
Month of Slaughter Dummy Variables			
SE (September, 1976)	-1,257[##] (2.2)	4,173[**] (5.1)	589 (1.4)
OC (October, 1976)	356 (0.9)	411 (0.6)	912[#] (1.8)
NO (November, 1976)	485 (1.1)	9 (0.0)	--
DE (December, 1976)	547 (1.3)	962 (1.5)	--

Table 9.3 continued

Variable[a]	Odienné	Boundiali	Bouna
Month of Slaughter (cont'd)			
JA (January, 1977)	1,093* (2.5)	-103 (0.2)	269 (0.5)
FE (February, 1977)	-753 (1.6)	458 (0.7)	-4,716** (7.7)
MA (March, 1977)	312 (0.7)	1,644* (2.4)	-1,889** (3.3)
AP (April, 1977)	--	--	566 (0.9)
MY (May, 1977)	--	--	-627 (1.2)
Characteristics of Estimated Equations			
N[b]	1,188	655	566
D,F.[c]	1,175	640	551
R^2	.74	.77	.77
$\bar{R}^2$[d]	.74	.77	.77

[a]See text for description of variables. The figures in parentheses are t-ratios.

[b]Number of observations.

[c]Degrees of freedom.

[d]R^2 adjusted for differing degrees of freedom in order to allow comparision of the R^2's of the three different equations.

$$\bar{R}^2 = \frac{1 - k}{n - k} + \frac{n - 1}{n - k} R^2$$

where k = number of independent variables, and
n = number of observations (35, pp. 129-30).

*Coefficient significantly different from zero at the .10 level.

**Coefficient significantly different from zero at the .05 level.

*Coefficient significantly different from zero at the .02 level.

**Coefficient significantly different from zero at the .01 level.

--Variable not included in estimated equation.

Month of Slaughter Dummy Variables

SE = dummy variable equal to one if the animal was slaughtered in September, zero otherwise;

OC = dummy variable equal to one if the animal was slaughtered in October, zero otherwise;

NO = dummy variable equal to one if the animal was slaughtered in November, zero otherwise;

DE = dummy variable equal to one if the animal was slaughtered in December, zero otherwise;

JA = dummy variable equal to one if the animal was slaughtered in January, zero otherwise;

FE = dummy variable equal to one if the animal was slaughtered in February, zero otherwise;

MA = dummy variable equal to one if the animal was slaughtered in March, zero otherwise;

AP = dummy variable equal to one if the animal was slaughtered in April, zero otherwise;

MY = dummy variable equal to one if the animal was slaughtered in May, zero otherwise;

In estimating the model, certain dummy variables were excluded in order to avoid getting a singular variance-covariance matrix. These excluded variables correspond to the following:

Sex.--Bull;

Months of Slaughter.--July and August (rainy season).

For each city, the dummy variable corresponding to the breed most commonly slaughtered in that city was excluded. These breeds were:

Odienné.--N'dama;

Boundiali.--Zebu;

Bouna.--Baoulé.

For each equation, the coefficient of an included dummy variable measures how much the price of an animal having the characteristic corresponding to that dummy variable differed from the price of an animal having the characteristic corresponding to the excluded dummy variable. For example, the coefficient of S, the dummy variable indicating the animal was a steer, measures the difference between the average price per head of steers and the average price of bulls, for which no dummy variable was included.

Results.-- The regression results shown in Table 9.3 indicate that carcass weight, as expected, was the major determinant of the price of slaughter cattle in the north. Prices increased slightly for older slaughter animals, independently of weight, and small premiums seemed to be paid for cattle yielding fattier than average meat. Although some seasonal price variation occurred, it appeared smaller than hypothesized, ranging from 6 to 15 percent of the mean price.

a. Price-weight relationship.-- For all three cities, W, the carcass weight of the animal, was the independent variable with the highest explanatory power.[1] The coefficient of W represents the average price, per kg carcass weight, of bulls belonging to the breed most commonly slaughtered in each city during July and August, 1976. Table 9.3 indicates that once sex, age, and season are taken into account, prices per kg carcass weight in the three cities were similar: 259 CFAF in Odienné, 252 CFAF in Boundiali, and 262 CFAF in Bouna.

b. Price-age relationship.-- The estimated equations show that in Odienné and Bouna prices per kg increased slightly with the age of the animal, growing at about one percent per year, other things being equal.[2] In Boundiali, however, there was no significant relationship between age and price. The positive correlation of price with age (independent of weight) is the opposite of what would obtain were a premium paid for tender (i.e., young) meat. It is also the opposite of the price-age relationship found in developed countries, where the price per kg of young feeder

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[1] The partial regression coefficient of W was .83 for Odienné, .84 for Boundiali, and .80 for Bouna. The next largest partial in any equation was .31.

[2] The coefficient of A in Table 9.3 measures the increase in the price per animal per year attributable to factors other than weight increases. Dividing this coefficient by the average price per animal gives the yearly percentage increase in price that occurs independently of weight, i.e., the yearly percentage increase in price per kg.

cattle is bid above the price per kg of older slaughter cattle because of
the young animals' potential for weight gains. There are three reasons,
however, why prices of slaughter cattle in Odienné and Bouna were
positively correlated with age. First, young animals that were slaughtered
in the north, especially females, were cull animals for which there was
little demand other than for slaughter. The animals with the best
potential as breeding or work stock were retained in the herd or were sold
to traders, SODEPRA, or peasant cultivators, all of whom paid significantly
more for animals than did local butchers.[1] Only 8 percent of the females
under three years old sold from SODEPRA-affiliated herds in northern
Ivory Coast during the study period went for slaughter (6.8 percent to
butchers and 1.2 percent to villagers). The rest were sold as breeding
stock. Less than half the males under three years old sold from these
herds went for slaughter (39 percent to butchers and 10 percent to
villagers).[2] These were animals unsuited for breeding or animal traction.
Since there was little demand for these animals other than for slaughter,
producers had only the alternatives of selling them immediately for
slaughter or holding them to sell for slaughter at a later age. Although
the growth of these animals through about age five would have increased
their value as slaughter animals, producers faced important costs,
especially the risk of mortality and the opportunity cost of their
capital, in holding young animals. Mortality losses are higher for
young animals than for old animals;[3] it is likely that the weight gain
of cull animals are lower than those of other cattle, and their mortality
rate is probably higher. Therefore, the potential profits in holding

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[1] See Chapter 8.

[2] The percentage of young animals culled from the herds was probably
even less than the percentage sold for slaughter because many breeding
animals were transferred to other herds in non-commercial transactions.
(See Chapter 8, p. 280.)

[3] For example, animals under 3 years old make up about 46 percent of
the cattle in herds around Odienné, but they account for 60 percent of
recorded mortalities (105, p. 79; 112, pp. 15-16).

cull animals to a later age are reduced. Having few alternative markets for these animals and receiving limited benefits from holding them for slaughter at a later age, many producers sold them for reduced prices. In contrast, most of the older animals sold to butchers had originally been kept in the herds as breeding or work animals. At the time they were sold to butchers, these animals, especially those under eight years old, may still have had some potential as breeding or work animals. Unlike very young animals, they were also strong enough to withstand the trek south to higher-priced markets. As a result, butchers may have had to pay higher prices to bid the older animals away from their alternative uses. One would not expect prices to be higher for animals older than about eight years, however, because these animals had few alternative uses.[1]

A second reason why the price per kg carcass weight of young animals was lower than that of old animals is that the ratio of bone to meat in carcasses of young animals is generally higher than in those of mature animals. A growing animal first develops its skeleton, then fleshes it out. Therefore, butchers get more meat per kg carcass weight from mature animals than from young animals. It is likely that butchers bid up the price of older animals in recognition of this fact.

The third reason why prices per kg carcass weight were higher for older animals is that the meat of animals between five and eight years old probably contained more fat, and hence was preferred by consumers, than did that of young animals. Range-fed cattle add significant amounts of fat to their carcasses only after they have finished growing. (West African breeds continue to grow until about 4 or 5.) Butchers may have therefore bid the prices of the mature, fattier animals above those of the younger, leaner animals.

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[1] The equations in Table 9.3 were re-estimated with both age and age squared as independent variables in order to test whether prices per kg declined at higher ages. If prices per kg did decline at higher ages, the coefficient of age would be positive and that of age squared would be negative. In all three re-estimations, the coefficients had the expected signs (positive for age and negative for age-squared), but they were not statistically significant at customary levels. This insignificance probably resulted from the high intercorrelation of A and A^2.

In Boundiali, where price was not significantly correlated with age, two of the three preceding arguments did not hold. Most of the cattle slaughtered in Boundiali were zebus. Since zebus are susceptible to trypanosomiasis, they are not suitable as breeding or work stock in much of northern Ivory Coast. Older zebus sold to butchers probably had few alternative uses, so their prices relative to young stock were not bid up. Some of these older cattle may have been injured or sick animals from trade herds, sold at a discount because traders were eager to continue on to markets farther south. The low slaughter weights in Boundiali also suggest that these animals were very thin; therefore, they probably did not yield higher quality (fattier) meat than did young stock.

c. Price variation by sex and breed.-- The sex and breed of an animal are proxies for the quality of meat it yields. Steers generally have fattier meat than do bulls, which in turn usually have fattier meat than do cull cows. Since meat becomes more tender as the amount of interstitial fat increases, the fat content of meat is one indicator of meat quality. Breed is also correlated with the fat content of meat, with butchers reporting that zebus usually yield fattier meat than do taurins.

The coefficients of S and F in Table 9.3, the dummy variables indicating whether an animal was a steer or a female, measure the average difference between the price of steers (or females) and the price of bulls, for which no dummy variable was included. For Odienné and Bouna, the coefficients of S and F have the expected signs (positive for S and negative for F), although they are not significant at customary levels. They suggest, however, that butchers paid slightly more for the fattier meat of steers and slightly less for the leaner meat of cows than for the meat of bulls. The size of these quality premiums, however, appears small. The average difference between the price of a steer and the price of a cow (other things being equal) was about 800 CFAF, or roughly 3 percent of the average price of an animal slaughtered in these cities. The low premiums paid for higher quality meat reflect low levels of consumer income in these cities.

The coefficients of the dummy variables for breed in Table 9.3 indi-
cate that in Bouna, as hypothesized, a premium was paid for zebus and for zebu-
taurin crossbreeds as compared to Baoulés. This again reflected a preference
for fattier meat, as zebus generally yield fattier meat than do taurins. For
Odienné, the coefficient of Z, the dummy variable indicating the animal was a
zebu, was positive, as expected, indicating a premium for zebus as compared
to N'damas, but the coefficient is not significant at the .10 level. Similarly,
the coefficients of the breed variables for the Boundiali suggest that premiums
were paid for Baoulés, N'damas, and crossbreeds as compared to zebus, but none
of these coefficients is statistically significant at the .10 level.

In summary, the data suggest that butchers in northern Ivory
Coast paid only slight premiums for cattle yielding higher quality (fattier)
meat. Consumers' incomes in the north are low, and people who buy beef
probably have little additional income, after meeting their basic needs,
to buy higher quality meat. Since the effective demand for high quality
beef was low, few premiums were paid for fatter animals.

d. Seasonal price variation.-- The coefficients of the dummy
variables for month indicate seasonal variation in prices relative to July
and August (the height of the rainy season). The coefficients indicate
some seasonal variation in prices occurred, but less than hypothesized.
In Boundiali and Bouna it appears that, as hypothesized, prices rose in
September, the end of the rainy season (although the coefficient of the
dummy variable for September is statistically significant only for Boundiali).
In Boundiali, this price increase averaged 4,173 CFAF per head, or
15 percent, compared to prices in July and August. In Odienné, prices
appear to have fallen significantly in September, but this is probably an
aberration resulting from the data for Odienné being incomplete for
September.[1]

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[1] In the original data for Odienné, prices for the first twenty days of
September were included in the data for July and August. Prices labeled
"September prices" referred to only the last ten days of the month.

Prices in all three cities appear to have risen in December or January, as expected, although the rise was statistically significant only in Odienné. The hypothesized price increase at the end of the dry season (March-April) appears to have occurred only in Boundiali, where prices. rose 1,644 CFAF per head (6 percent) relative to rainy season prices. Prices in Bouna during March were significantly lower than those during the rainy season, and in Odienné they were not significantly different from rainy season prices.

One reason why prices may not have shown as much seasonal variation as expected (and, particularly, why prices did not rise sharply at the end of the dry season) is that many of the cattle slaughtered in the north are cull animals. Some of these animals may have been sick, particularly at the end of the dry season when grazing was scarce, and producers therefore may have had little choice about when to sell the animals. It is thus possible that even though total sales of cattle and average carcass weights declined during the dry season, the supply of cull animals, the animals that made up the bulk of slaughter in the north, increased.

Conclusions

The analysis just presented demonstrates that by far the most important determinant of a slaughter animal's value in northern Ivory Coast is its carcass weight. Although butchers in Odienné, Boundiali, and Bouna pay slightly more for animals with higher quality (fattier) meat, the price differential between these animals and low quality (lean) animals is small, only about three percent. The price differential probably is too small to justify fattening schemes aimed at producing higher-quality animals to be consumed in the north.[1] The small premiums

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[1] See Chapter 10 for discussion of whether price differentials for high-quality meat in the south justify programs aimed at producing fatter animals to sell in the south.

paid for high-quality meat in the north reflect traditional eating habits and the low level of consumer income in this area.[1]

The data also indicate that the price per kg of slaughter cattle in the north increases slightly as the animals grow older. This reflects the fact that butchers must sometimes bid older animals away from other uses (breeding, work, sale in the south), while young animals sold for slaughter usually have few alternative uses. The price differential probably also reflects the higher fat content and lower bone content of carcasses of older animals. The lower price per kg of young slaugher animals probably encourages producers to hold males in their herds for several years before selling them for slaughter. For example, more than half the males slaughtered in Odienné, Boundiali, and Bouna were five years of age or older.

Finally, the data indicate some seasonal variation in the price per kg of slaughter animals in northern Ivory Coast, but the variation did not exceed 15 percent. The largest price increases in 1976-77 occurred in September (at the end of the rainy season) and around January. Prices also rose in north-central Ivory Coast at the end of the dry season, but only by about 6 percent.

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[1] In West Africa, meat is traditionally prepared in a sauce, which is boiled for several hours. Since the meat cooks for several hours there is little reason to pay a premium for especially tender meat. As incomes rise, however, so does the opportunity cost of the time spent preparing food. Consumers therefore shift to quicker ways of preparing meat, such as grilling, for which the tenderness of the meat is more important.

CHAPTER 10

CATTLE PRICES IN THE MAJOR CONSUMPTION CENTERS

This chapter examines cattle prices in the major consumption centers of Ivory Coast. Most of the analysis focuses on Abidjan and Bouaké, cities for which several months' data are available. Some authors (e.g., 39) have suggested that cattle marketing in Ivory Coast is "chaotic" or "anarchic," with wide price fluctuations resulting from disorganization of the market. This chapter examines those charges, testing, for example, whether changes in cattle prices over time are really random or whether prices vary in a manner consistent with seasonal changes in the supply of cattle and the demand for meat. Other questions addressed include whether prices for different types of cattle reflect consumers' preferences for different grades of meat, and whether the regional distribution of prices reflects regional differences in production and transportation costs and in the demand for cattle.

This chapter consists of five sections. The first section describes the price data available for Bouaké and Abidjan and how they were collected. The second section analyses data on cattle prices in Bouaké during 1976 and 1977 looking at variations in prices by season and by type of animal. The third section presents a model of the demand for slaughter cattle in Bouaké and estimates the parameters of the model. The fourth section looks at cattle prices in Abidjan, and compares price behavior in Abidjan and Bouaké. The final section compares prices in Bouaké and Abidjan with those in Ferkéssédougou, Daloa and Man, and discusses reasons for the geographical distribution of cattle prices in Ivory Coast.

The data indicate that cattle markets in Ivory Coast work in an economically rational and predictable manner. Prices for cattle are lowest soon after the rainy season, when the supply of cattle is highest. Prices rise as the dry season progresses and animals begin to lose weight. The price rise reflects the important storage costs (including animals' weight losses) borne by cattle owners who hold animals during the dry season. Prices also rise in periods of peak demand, such as the end of the year

holidays. Prices are higher (up to seven percent more per kg) for animals yielding fattier, more tender meat; this reflects consumers' preferences for higher quality meat. Cattle prices tend to fluctuate more in Abidjan than in Bouaké, due to inadequate transportation and holding facilities for cattle in Abidjan. The greater volatility of prices in Abidjan does not indicate that the Abidjan market is less rational than the Bouaké market. Rather, it reflects the inability of merchants and butchers to hold cattle in Abidjan in order to cushion the effect of the fluctuations in supply that result from irregular arrivals of cattle by train. Finally, the regional distribution of prices in Ivory Coast is consistent with transportation costs and local patterns of demand. Prices generally increase from north to south, and prices are higher in the west than in the central region, reflecting the influence of the high prices paid for cattle in Liberia.

The Data

Prior to 1978, no agency in Ivory Coast regularly recorded cattle prices in the country's major consumption markets. In order to get information on cattle prices in the two largest consumption markets, Abidjan and Bouaké, the ELP Ivory Coast studv monitored prices and carcass weights of cattle slaughtered in these cities during 1976 and 1977 Data were collected in Bouaké from July 1976 through July 1977, and in Abidjan from November 1976 through June 1977. Most of the price data presented in this chapter come from these surveys.

It is often difficult to collect accurate data on cattle prices in West Africa for two reasons. First, cattle are seldom sold by weight, and cattle scales are often unavailable. An investigator must therefore record the price of an animal and either estimate its liveweight or weigh its carcass. Second, the traditional cattle marketing system is a "closed" system; merchants and butchers are suspicious of outsiders. They are

particularly wary of government inquiries, fearing such studies will lead to increased taxation. In order to reduce the suspicion of the market participants towards the study, the ELP field study employed enumerators of the same ethnic and geographical background as the market participants and stressed to the butchers and traders that the study was non-governmental. Although there was initial suspicion of the study in both Abidjan and Bouaké, it subsided and most market participants eventually cooperated.

Prices were collected in Abidjan and Bouaké in the following manner. Enumerators attended the cattle markets in the evenings and asked several butchers the prices of animals they had purchased for slaughter the following day. At the same time, the enumerators noted the sex, breed, and point of origin of each animal purchased. The next morning, when the animals were slaughtered, the enumerators estimated the sample animals' ages (according to their dentition and horns) and weighed their carcasses.[1] Normally, the enumerators gathered price and weight data on between four and ten animals per day, five days per week.

Despite the cooperation of most butchers, it was not possible to select and work continuously with a fixed, random sample of butchers for three reasons. First, some butchers were suspicious of the study and would not cooperate particularly during the first month of the study. Second, weighing carcasses at the abattoir was inconvenient for butchers, especially for those in Bouaké, because it slowed down their apprentices and sometimes resulted in their meat getting to market later than that of their competitors. It also meant extra work for the apprentices, as the apprentices had to carry the carcasses to and from the scales.

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[1] Carcass weights were used rather than liveweights because no cattle scales were available in Bouaké when the study began. Scales were installed in Bouaké in November, 1976, and some liveweights were recorded, permitting estimation of dressing percentages. The investigator continued to measure prices in terms CFAF per kg carcass weight because it was much easier to weigh carcasses than to weigh live animals. Using prices per unit carcass weight also avoided variability in weights due to differences in gut fill.

It was not reasonable to expect a small sample of butchers and their apprentices to tolerate these inconveniences for an entire year. A third reasons for using a non-random sample was the desire to have price observations on a wide variety of animals in order to see what price differentials existed for animals of different breeds, sexes, and ages. This meant over-representing certain types of animals in the sample. To overcome these problems, the enumerators were instructed to use a "rotating sample," involving as many butchers as possible, but not using the same butcher two days in a row. In both Bouaké and Abidjan there was broad participation in the study by butchers, with virtually all butchers participating at least once. In Bouaké, forty-nine butchers participated, with no single butcher accounting for more than 7 percent of the animals in the sample. In Abidjan there were fifty-one participants. One, by far the largest butcher in Abidjan, accounted for 47 percent of the animals in the sample. The second most important participant accounted for 6 percent. Table 10.1 shows the number and types of animals for which weights and prices were recorded.

TABLE 10.1

CHARACTERISTICS OF CATTLE INCLUDED IN THE
ABIDJAN AND BOUAKE PRICE SURVEYS, 1976-77

City/Breed	Bulls	Steers	Females	Sex Not Recorded	Total
Abidjan					
Zebus	180	724	8	9	947
Zebu-Taurin					
Crossbreeds	1	-	-	-	1
Total Abidjan	181	724	8	9	948
Bouaké					
Zebus	375	1,077	268	2	1,722
Taurins	20	69	20	-	109
Zebu-Taurin					
Crossbreeds	36	165	57		258
Total Bouaké	431	1,311	345	2	2,089

The sample in Bouaké was more than twice as large as that in Abidjan because prices were collected over a longer period in Bouaké than in Abidjan. The Abidjan sample was almost exclusively zebu and male, reflecting the high percentage of zebu steers and bulls slaughtered in Abidjan. The Bouaké sample was more diverse, including 109 taurins and 258 zebu-taurin crossbreeds. It also included 345 females. The high proportion of steers and bulls in both samples reflects the status of Abidjan and Bouaké as important consumption markets that attract the choicest slaughter animals, typically bulls and steers between five and eight years old. The average age of animals in the Abidjan sample was 6.4 years, and 7.4 years for those in the Bouaké sample.

Since most butchers in Bouaké bought and slaughtered only one or two animals at a time, it was much easier to determine the price differentials between different types of animals in Bouaké than in Abidjan, where animals were often sold in large lots. When a butcher buys several animals in a lot he pays a uniform price per head. The weight of the animals in the lot may vary considerably, and the butcher takes this into account when deciding what price to offer for the lot. The problem a researcher faces in trying to determine the price of cattle in Abidjan is that unless he has the weight of every animal in the lot, he is likely to get a biased view of prices. The smaller animals in the lot appear to have a very high price per kilogram, while the heavy animals appear to have a low price per kilogram. In reality, there exist prices for each type of animal sold in Abidjan, but these prices are only reflected in the average price paid for the lot, not the apparent price for each individual animal. For this reason, most of the data presented in this chapter on price differentials among different types of animals come from the Bouaké study.

Cattle Price in Bouaké

This section examines cattle prices in Bouaké during 1976 and 1977.
In so doing it addresses the question of whether market behavior was
really "anarchic," as some authors claim, or whether the observed
price behavior suggests that the market was working in a rational,
predictable manner. For example, were price differentials between dif-
ferent types of cattle entirely random, or did they appear to reflect
consumer preferences for different grades of meat?

The section is divided into two parts. The first part presents
data on cattle prices in Bouaké and examines the price differentials
between different types of cattle. The second part looks at seasonal
price variation.

Prices for Different Types of Cattle in Bouaké. -- Table 10.2 pre-
sents average monthly prices of cattle slaughtered in Bouaké from July
1976 through July 1977. The table includes the prices of zebu females,
zebu-taurin crossbreeds, taurins, and five different weight classes of
zebu males: 1) animals with carcass weights up to 100 kg (these are
typically young animals, but they also include some old, thin animals);
2) animals of carcass weights of 101-129 kg; 3) animals with carcass
weights of 130-159 kg (these are the typical Sahelian animals sold in
Ivory Coast); and 4) two groups of large, well-fleshed animals, those
with carcasses between 160 and 189 kg and those with carcasses over 190
kg. The data in Table 10.2 refer only to animals sold by traditional
cattle merchants in Bouaké; data on sales by government agencies are ex-
cluded.

Figures 10.1 and 10.2 present some of the data from Table 10.2
graphically. From Figure 10.1 it is clear that cattle prices in Bouaké
were rising throughout much of the study period. Two distinct periods

TABLE 10.2

AVERAGE MONTHLY CATTLE PRICES IN BOUAKÉ FROM JULY 1976 THROUGH JULY 1977
(in CFAF per kg carcass weight)

Type of Animal	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July[a]
Zebu													
Steers and Bulls													
Carcass weights of 0-100 kg	—	—	—	325	—	346	372	376	351	388	343	336	344
s.d.[b]	—	—	—	52	—	57	—	2	—	—	—	—	—
N	0	0	0	2	0	4	1	2	1	1	1	1	1
Carcass weights of 101-129 kg	328	352	353	324	366	399	377	387	390	385	364	393	352
s.d.	12	48	13	25	60	47	39	37	51	27	33	39	53
N	6	7	4	13	16	6	14	12	11	14	23	20	4
Carcass weights of 130-159 kg	344	359	344	343	340	395	366	382	377	382	381	406	376
s.d.	28	34	37	28	31	45	29	27	28	33	25	35	25
N	23	17	25	32	45	46	42	58	34	41	34	21	8
Carcass weights of 160-189 kg	355	359	365	346	346	394	368	370	376	387	392	390	—
s.d.	35	32	37	40	33	31	34	21	25	30	14	24	—
N	17	21	27	44	42	53	42	37	58	36	16	17	0
Carcass weights of 190 kg and more	334	347	362	347	342	375	364	368	375	381	382	395	391
s.d.	25	22	30	27	25	32	31	22	25	30	28	15	—
N	28	33	72	48	57	33	41	28	35	24	17	8	1
Cows													
Average Price	346	346	342	355	345	379	370	379	396	394	376	392	396
s.d.	26	31	38	39	40	39	31	19	32	31	28	20	26
Average Weight	147	144	147	143	145	138	144	141	137	143	127	132	123
s.d.	20	28	23	23	18	24	23	20	15	22	22	21	5
N	7	13	17	16	27	31	22	21	20	19	31	36	5
Zebu-Taurin Crossbreeds													
Average Price	360	330	321	356	336	383	364	370	381	389	376	382	371
s.d.	28	27	22	58	28	29	37	32	30	34	30	31	33
Average Weight	151	134	175	147	156	152	139	138	145	150	141	132	125
s.d.	38	8	10	21	24	31	31	26	21	25	28	24	32
N	5	6	2	15	20	33	40	29	22	32	28	18	5
Taurins													
Average Price	302	335	342	334	329	360	326	382	324	391	392	372	382
s.d.	—	27	21	30	34	40	—	39	23	44	21	36	27
Average Weight	124	122	130	135	141	124	139	124	127	133	117	115	111
s.d.	—	21	31	42	17	34	—	31	13	16	11	24	15
N	1	6	10	10	4	4	1	10	2	11	2	16	4

[a] Price is only for the first week of July, 1977.

[b] Standard deviation.

FIGURE 10.1   Cattle Prices in Bouaké: 1976-77
             Zebus

P= 338 + 4.3 t

STEERS & BULLS
130-159 KG CARCASSES

STEERS & BULLS
190 KG + CARCASSES

ZEBU COWS
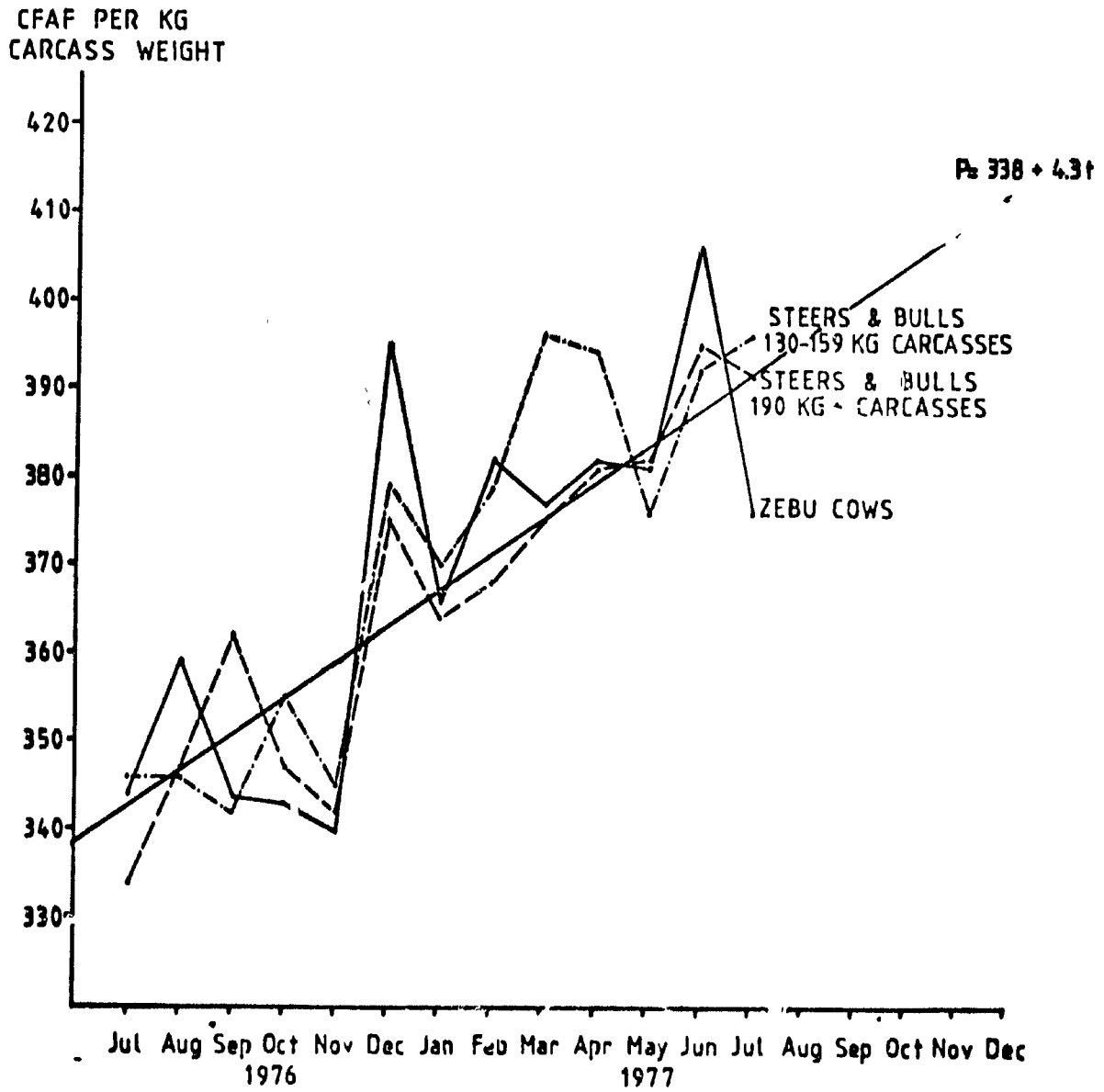
FIGURE 10.2   Cattle Prices in Bouaké:
1976-77 Taurins

CFAF PER KG
CARCASS WEIGHT
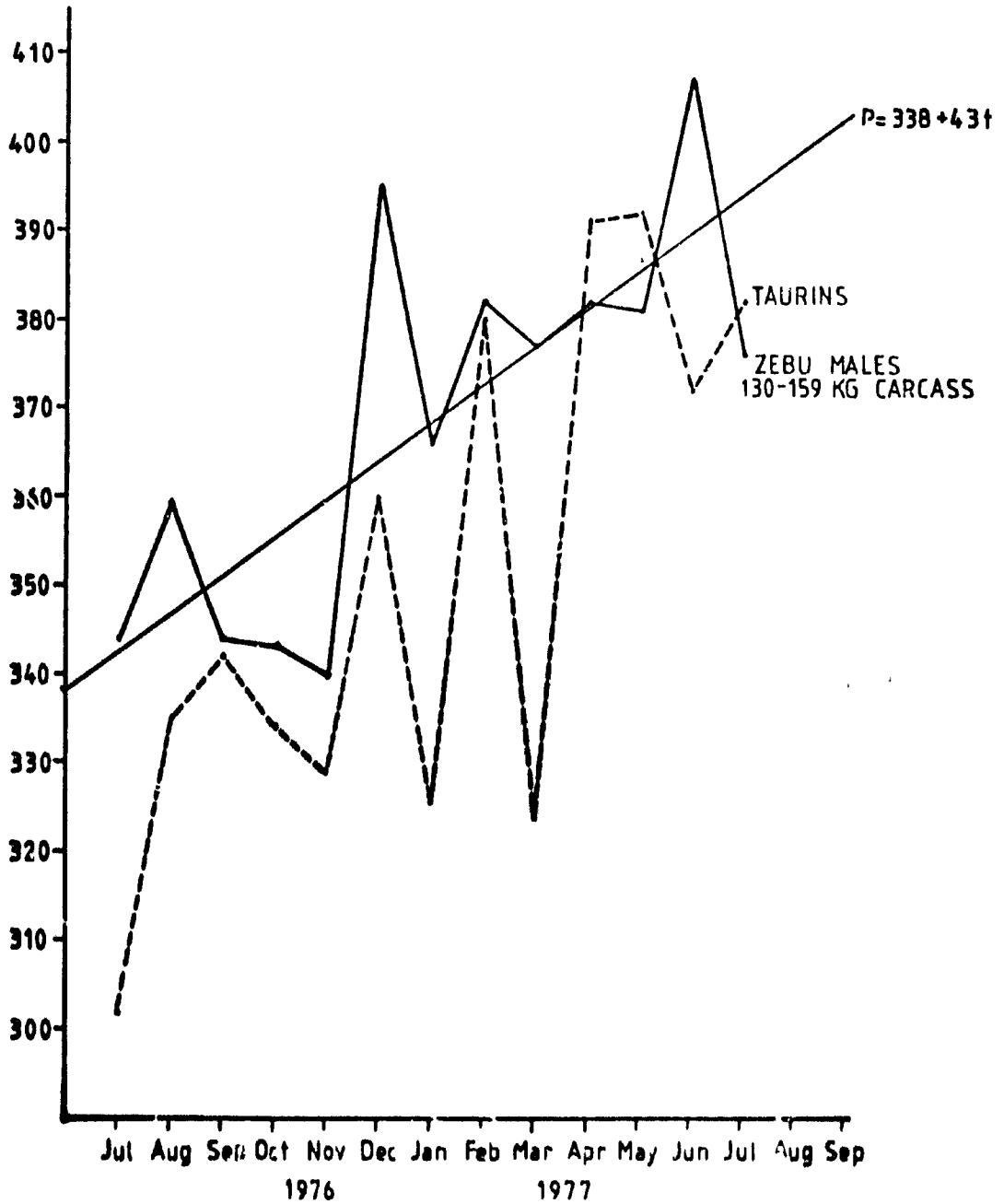
can be distinguished: a period of relatively stable prices from July 1976 through November 1976, and a period of increasing prices from November 1976 through July 1977. When price per kg carcass weight was regressed against month for the study period as a whole, the resulting trend line was P = 338 + 4.3t (R^2 = .14), indicating that on the average, prices rose by 4.3 CFAF per kg carcass weight per month from July 1976 through July 1977.

Table 10.2 and Figure 10.1 indicate that when prices are expressed in CFAF per kg carcass weight, no premium was paid for heavy zebus as opposed to average weight ones. In fact, prices per kg carcass weight of zebus were negatively correlated with carcass weights (r = -.11).[1] The price per kg carcass weight of zebu males having carcasses between 130 and 159 kg averaged 368 CFAF over the period July 1976 - June 1977, compared with 364 CFAF for zebu males with carcasses over 190 kg. The lower price per kg carcass weight for large animals probably resulted from the way in which wholesale butchers in Bouaké sold the fifth quarter.[2] As explained in Chapter 4, most of the fifth quarter of cattle slaughtered in Bouaké was sold to apprentice butchers for a fixed price per animal. Since the price a butcher received for the fifth quarter did not vary with the size of the animal, a butcher's gross revenue did not increase in direct proportion to the weight of the animal. This probably led butchers to offer less per kg carcass weight for large zebus than for small ones.[3] One can calculate the price per kg that butchers paid for the carcass by itself, without offals, by subtracting the wholesale value of the fifth quarter from the price of the animal and then dividing the remainder by the carcass weight. The calculations indicate that butchers paid slightly more per kg for the carcasses of heavy zebu males than for those of

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[1] This correlation was significant at the .01 level.

[2] The term "fifth quart refers to all salable offals, including the hide, head, tail, hooves,   ernal organs.

[3] Since dressing percer   increased with liveweight, there was no significant correlation between liveweight and the price per kg carcass weight. See Appendix 10A for average dressing percentages by type of animal.

average-weight ones. The average price per kg of meat was 339 CFAF for zebu males with carcasses over 190 kg, compared with 335 CFAF for those with carcasses between 130 and 159 kg. Butchers in Bouaké thus paid a slight premium for the meat from large, well-fed animals. _

Table 10.2 also slows that butchers in Bouaké did not pay much of a premium for zebu males as opposed to females. Unlike the very thin cows slaughtered in the north, the zebu females slaughtered in Bouaké were fairly large (the average carcass weight was 134 kg), and it is likely there was little difference between the quality of the meat from females and that from most males. The price differentials between males and females are discussed in more detail below in the section that presents the model of demand for slaughter cattle in Bouaké.

The figures in Table 10.2 suggest, however, that butchers did pay a lower price per kg carcass weight for taurins than for zebus. The average price of all zebu males in the sample having carcass weights between 130 and 159 kg (N = 426) was 370 CFAF per kg carcass weight. The average price for all taurins sold by the traditional marketing system (N = 81) was 360 CFAF per kg carcass weight.[1] The price margin between zebus and taurins reflected the butchers' preference for meat from zebus. Of the twenty-seven wholesale-retail butchers interviewed in Bouaké (see Chapter 4, pps. 149 ff.), fourteen (52%) said they preferred to slaughter zebus, two (7%) said they preferred steers of any breed and the remaining eleven (41 %) said that they had no preference. No butcher expressed a preference for taurins. The butchers who preferred zebus (these included all butchers selling meat to class 1 retailers) said their customers preferred meat from zebus because it was fattier than that from taurins. Butchers also stated that it was harder to store unsold meat from taurins (in order to sell it the following day) because the lack of fat led to excessive dehydration of the meat. The price margin between zebus and taurins

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[1] The regression analysis presented later in this chapter establishes that this price difference was statistically significant.

was most marked during the first nine months of the study. When prices of zebus began to approach 400 CFAF per kg carcass weight in April-July 1977, the margin disappeared. Apparently during this period, when butchers' margins were being squeezed, some butchers switched to buying taurins in spite of their preference for zebus, and as a result, the price differential disappeared.

Although the price differentials between different types of animals seemed to reflect consumer preferences for different grades of meat, the differentials per kg carcass weight appear small. This seems to imply that the effective demand for high quality meat was low, as one would expect in a low-income country. The magnitude of the price differentials and quality premiums are discussed in detail below in the section that presents the model of demand for slaughter cattle in Bouaké.

Seasonal Price Variation in Bouaké. -- Figure 10.1 shows there existed two distinct periods with respect to price behavior in Bouaké. From July 1976 through November 1976, prices showed no consistent upward trend, although most were higher in September. This period of price stability ran from the middle of the rainy season through the beginning of the dry season. Adequate grazing was available in the cattle-producing areas, and as a result, ample supplies of well-fed animals were offered for sale. The effects of the dry season began to be felt in November and continued to be felt through June 1977. Pastures dried up and cattle lost weight; as a result, prices rose. The price rise reflected the costs (including weight losses) of storing meat in the form of live animals during the dry season.

Figures 10.1 and 10.2 show that in addition to these two seasonal trends, cattle prices in Bouaké during the study period displayed distinct month-to-month variations. Not only did absolute prices vary; so did the relative prices of different types of animals. For example, in July and August 1976, the price per kg carcass weight of heavy males was below that of average-weight males. During July and August many heavy animals were entering the market from northern Ivory Coast and southern Mali. These

animals had had good grazing ever since the rains had started in those areas in April, and began to enter the Bouaké market in late May. The demand by class 1 retailers for heavy, well-fed animals started to fall off in June, however, because many of the clients of the class 1 establishments began leaving Bouaké in June for vacation.

In September prices generally rose, and butchers began paying a premium for heavier animals. They did so for two reasons. Europeans and high-income Africans returned to Bouaké at the end of their vacations, and this boosted demand for high-quality meat for the class 1 retailers. Demand for beef also rose because the last week of September was the end of Ramadan. During the month of Ramadan Moslems fast between sunrise and sunset. The end of this month is celebrated with feasting, and beef consumption is high. Butchers tried to slaughter larger animals at this time in order to match the increased demand for meat.

In October the demand for large animals fell off, as did their prices. Prices of all types of cattle were below the trend line in October. Butchers reported that consumer demand for meat was low at this time and supplies of cattle were adequate. Butchers said that many of their customers were short of cash due to the heavy expenses they had had to pay in September for sending their children back to school and for celebrating the end of Ramadan, and that most of the Moslems were saving to buy a sheep for Tabaski.[1]

Prices remained around 345 CFAF per kg carcass weight through November, then shot up dramatically in December. Prices rose in December for two reasons. First, demand for cattle increased throughout central and southern Ivory Coast at this time because many religious and harvest festivals were occurring. It rose most sharply in the forest zone, where farmers were beginning to be paid for their cash crops, particularly coffee and cocoa. As rural incomes rose, so did the effective demand for meat in

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[1] In 1976 Tabaski was on December 4.

rural areas. The increased demand had two effects in Bouaké. First, many outside cattle buyers came to Bouaké looking for animals to purchase and resell to villagers. These additional buyers bid up prices in Bouaké. Second, the increased demand for meat in the countryside led many rural residents living near the major trade routes for cattle to offer traders attractive prices for their cattle. As a result, many cattle from herds being trekked to Bouaké were sold en route, leading to a decline in the arrivals of slaughter cattle in Bouaké. Arrivals also fell in December because most trucks and rail equipment were in use hauling the cocoa and coffee harvests, and were therefore unavailable to transport cattle to market. This reduced supply; the average number of cattle offered for sale per day in Bouaké fell from 129 in the September-November period to 101 in December.

Because fewer animals than normal arrived in the market and more buyers than normal were bidding for the available supply, prices rose. Demand was strongest for medium-sized animals, and their prices rose fastest. These were animals destined for slaughter in the villages. Most of the villages were not large enough to warrant slaughtering a heavy animal, so demand (and prices) increased more slowly for large animals. Another reason why demand for small cattle was high was that during December many butchers in Bouaké were losing money. In December, the price of cattle per kg carcass weight exceeded both the wholesale and the retail prices of meat, which at that time were 350 CFAF per kg and 375 CFAF per kg, respectively. Many butchers felt they had to keep slaughtering during this period in order to keep their regular customers and (they hoped) pay their variable costs and some of their fixed costs. Since they were losing money anyway, they preferred to buy small cattle. Their loss per kg was greater than with large animals, but their total loss was less.

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[1] The average number of cattle offered for sale per day in Bouaké rose from 116 head in the November-January period to 137 head in the February-June period.

Cattle prices in Boauké fell in January, then rose again in February. Prices for average-weight zebu males were stable from February through May, then rose sharply in June. Prices for large zebus, however, rose steadily from February through June. The supply of slaughter cattle in Bouaké was higher from February through June than in the November-January period,[1] yet prices rose for three reasons. First, average carcass weights declined from February to June as a result of the dry season, so the supply of beef did not increase as much as did the supply of animals. The average carcass weight of animals slaughtered by sample butchers in Bouaké fell from 164 kg in the November-January period to 153 kg in the February-June period, a decline of 7 percent. As average weights fell, so did the supply of heavy animals. Fewer cattle with carcass weights of over 190 kg arrived on the market; therefore, their price rose relative to that of average-weight animals. Second, the wholesale price of frozen beef increased rapidly during early 1977, from 235 CFAF per kg in January to 325 CFAF in May. Authorized retail prices for frozen beef rose much more slowly, however, from 300 CFAF in January to 350 CFAF in May. The gross margins of butchers selling frozen beef in Bouaké therefore fell by more that half, from 65 CFAF per kg to 25 CFAF per kg. This led several butchers to quit selling frozen meat and begin slaughtering cattle. AGRIPAC's average daily sales of frozen meat in Bouaké fell from 2.4 tons in the November-January period to 1.4 tons in the February-May period (1). Over the same period, average daily cattle slaughter in Bouaké[2] increased from thirty-nine head to forty-five head. This increase in the demand for slaughter cattle bid up prices. The third reason why prices rose was that beginning in late April, cattle merchants in Bouaké began buying animals to ship to Abidjan. Prices were high in Abidjan because the supply of cattle was reduced due to the normal seasonal decline in arrivals of slaughter animals from Upper Volta. (See Chapter 2, pp. 84-86). The strong "export demand" for cattle in Bouaké bid up prices.

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[1] The average number of cattle offered for sale per day in Bouaké rose from 116 head in the November-January preiod to 137 head in the February-June period.

[2] As recorded by the study's enumerators.

Prices fell in early July, reflecting increased arrivals of cattle in both Abidjan and Bouaké. Prices also fell because of the seasonal decline in the demand for meat due to the summer exodus of expatriates, teachers, and students from Bouaké.

In summary, during three periods of the year cattle prices per kg appear to have risen significantly in Bouaké. The first occurred in August-September, at the end of the rainy season. As mentioned in Chapter 8, producers may hold animals off the market at this time to allow them to benefit fully from the good grazing resulting from the rains. In Bouaké, demand increases in September as expatriates, high income Africans, and students return to the city after their vacations. In 1976, prices were also high in September because Ramadan occurred in September.[1] The second period of high prices occurred in December, and corresponded to a period of high demand for meat, because of increases in rural income and the occurrence of many holidays and reduced arrivals of cattle, due to a transport bottleneck. The third period of high prices occurred at the end of the dry season, when average weights were falling and when there was a seasonal shortage of slaughter cattle in Abidjan. In 1977 the increase in prices during the dry season was accentuated by an increase in the price of frozen meat, which led to higher demand for slaughter animals. The three periods of high prices, September, December, and the end of the dry season, corresponded to periods when cattle prices were also highest in the cattle-producing areas of northern Ivory Coast. (See Chapters 8 and 9.) It appears, then, that seasonal fluctuations in cattle prices in Bouaké were not random, but occurred as a result of changes in supply conditions and consumer demand. The following section of the chapter measures the magnitudes of the price changes that occurred in response to these changes in demand and supply.

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[1] Ramadan falls at a different time every year because it is scheduled according to an uncorrected lunar calendar.

A Model of the Demand for Slaughter Cattle in Bouaké

This section presents a model of the demand for slaughter cattle in Bouaké similar to the models of demand for cattle in northern Ivory Coast that were presented in Chapters 8 and 9. As in Chapters 8 and 9, multiple regression is used to estimate the parameters of the model. Multiple regression is helpful in that ideally it sorts out the effect of each factor influencing cattle prices and allows it to be seen in isolation. By doing this, it allows one to see more clearly how an animal's breed, its sex, and various seasonal factors influence the price a trader receives for the animal.

The Model. -- The demand for slaughter cattle is a derived demand, depending on the retail demand for beef. The demand for a particular animal therefore is primarily a function of the quantity and quality of meat that animal yields. Demand, however, depends not only on slaughter demand in the local market, but also on the demand for meat in other markets to which the animal or its carcass could be shipped. Demand also varies seasonally because of holidays and seasonal changes in consumer income.

Prices are influenced by both demand and supply conditions. Supply fluctuations are of two types: day-to-day fluctuations in the number of cattle offered for sale, and seasonal trends in both the number of cattle offered for sale and average carcass weights. The model presented below takes account only of the effect of seasonal changes in supply, not daily fluctuations.

The following linear model of demand was specified for cattle sold for slaughter in Bouaké:

$$P = \alpha_0 + \alpha_1 W + \alpha_2 A + \alpha_3 QE + \sum_i \beta_i SX_i + \sum_i \gamma_i BR_i + \sum_i \delta_i SL_i + e$$

where

P   =   price of the animal in CFAF;

W   =   carcass weight of the animal in kg;

A   =   age of the animal in years;

QE   =   number of cattle purchased in Bouaké for shipment to other markets;

SX_i =   dummy variable equal to one if the animal is of sex i, and zero otherwise;

BR_i =   dummy variable equal to one if the animal is of breed i, and zero otherwise;

SL_i =   ith seasonality variable;

α_i, β_i, γ_i, and δ_i =   the structural parameters of the equation; and

e   =   randomly distributed error term.

Carcass weight was expected to be the most important explanatory variable because the quantity of meat a butcher gets from an animal in large part determines the butcher's gross revenue. The quality of meat, however, also affects the butcher's earnings, and hence the price he will pay for an animal. Three proxies were available for the quality of the meat yielded by each animal: the animal's breed, its sex, and its age. As discussed in Chapter 9, breed is correlated with the fat content of the meat. Zebus generally yield fattier, more tender meat than do taurins, and butchers reported that their customers preferred this meat. It was therefore hypothesized that, other things being equal, butchers would pay higher prices per kg for zebus than for taurins. Sex is also correlated with the fat content of the meat, with steers yielding fattier meat than either cows or bulls. Therefore, other things being equal, prices of steers were expected to be higher than those of bulls or cows. The age of an animal is inversely correlated with the tenderness of its meat, and therefore it was expected that prices per kg would decline as animals grow older. The premiums paid for animals

yielding high-quality meat were expected to be higher in Bouaké than
in northern Ivory Coast (see Chapter 9) because of the larger number
of high-income consumers in Bouaké.

The month in which the animal was sold for slaughter served as
a proxy for seasonal changes in demand. Two seasonal peaks in demand
were hypothesized: one in September, corresponding to Ramadan; and
one in December, corresponding to Christmas, New Year's, and the harvest
festivals. The number of cattle shipped from Bouaké to other markets
on the day following the sale was taken as a proxy for the number of
buyers from other areas active in the market. It was hypothesized that
the higher this "external demand" was, the higher cattle prices in Bouaké
would be.

Two trend variables were included as proxies for seasonal changes
in supply and storage costs. From Figure 10.2 two distinct periods can
be distinguished. From July 1976 through November 1976, prices were
steady to slightly declining. This period corresponded to the end of
the rainy season and the beginning of the dry season. At this time, many
well-fed animals were moving off the ranges and onto the markets, and as
a result, prices were steady to slightly falling. From November 1976
through June 1977, prices rose fairly steadily. Most of this period
corresponded to the dry season, when grazing was sparse.[1] Animals were
losing weight during this time, and the price rise from November through
June can be interpreted as the cost (including weight losses) of storing
meat on the hoof during the dry season. The two trend variables included
in the model corresponded to the periods June 1976 - November 1976 and
November 1976 - June 1977.[2] The coefficient of the first trend variable
was expected to be near zero, while that of the second trend variable
was expected to be strongly positive.

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[1]Throughout most of central and northern Ivory Coast, the rainy sea-
son started much later than usual in 1977, beginning in mid-June.

[2]The first trend variable had the value of 1 for July 1976, 2 for
August 1976, etc. November 1976 had a value of 5, as did all subsequent
months. The second trend variable had the value of 0 for June 1976 - Sep-
tember 1976. It took on the value of 1 for November 1976, 2 for December
1976, etc. through 8 for June 1977.

Estimation. -- The model was estimated using ordinary least squares. Separate equations were not estimated for each sex because all the animals sold in Bouaké were destined for slaughter. The demand for slaughter cattle, no matter what their sex, is a derived demand that depends primarily on the retail demand for beef. Since the main determinant of the demand for slaughter animals was the same for all sexes, so, by definition, were the basic parameters of the demand functions. It was felt that any differences that existed in the demand for different sexes could be adequately captured by using dummy variables.

When demand equations were estimated using combinations of the above variables, the coefficients of two of the variables, age and the number of cattle shipped from Bouaké to other markets (the proxy for the "external demand" for cattle sold in Bouaké), were consistently insignificant. Although the coefficient of the "external demand" variable had the expected sign, it was not statistically significant. The inclusion of these two variables added little to the explanatory power of the equation, so they were dropped from subsequent estimations.

A word should be said about excluding the age variable. Apparently age, by itself, had little influence on the price of cattle sold in Bouaké. Butchers paid little premium for young animals that yielded tender meat. Either no premium was offered for this meat, or the premium was offset by the higher price butchers may have had to pay for older animals for other reasons. Prices were higher, perhaps, for older animals, in recognition of the higher fat and lower bone content of their carcasses (as compared to young stock), and in order to bid them away from alternative uses in the north.[1]

The results of the final estimation of the model's parameters are shown in Table 10.3. The dependent variable was the price of the animal (in CFAF), and the independent variables were the following:

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[1]See Chapter 9, pp. 320-23.

TABLE 10.3

ESTIMATED PARAMETERS OF DEMAND EQUATION FOR SLAUGHTER CATTLE SOLD IN
BOUAKÉ IN 1976 AND 1977

Variable[a]	Coefficient	Variable[a]	Coefficient
Constant	$-1,420$[#] (1.7)	**Trend and Seasonality Terms** T1 (July – November, 1976)	-58 (0.4)
Weight		T2 (November, 1976– June, 1977)	917** (15.5)
W (Carcass Weight)	360** (103.2)		
		SE (September)	$1,986$** (4.2)
Sex Dummy Variables			
BU (Bull)	$-2,015$** (6.8)	DE (December)	$4,700$** (11.5)
F (Female)	-699* (2.1)		
Breed Dummy Variables		N[b] =	2,026
N (N'dama)	$-2,623$** (2.8)	D.F.[c] =	2,015
B (Bouake)	$-1,100$ (1.4)	R^2 =	.87
C (Zebu-Taurin Crossbreed)	-624[#] (1.7)		

[a]See text for description of variables. The figures in parentheses
are t-ratios.

[b]Number of observations.

[c]Degrees of freedom.

[#]Coefficient significantly different from zero at the .10 level.

[##]Coefficient significantly different from zero at the .05 level.

[*]Coefficient significantly different from zero at the .02 level.

[**]Coefficient significantly different from zero at the .01 level.

Weight

W = carcass weight of the animal in kg.

Sex Dummy Variables

BU = dummy variable equal to one if the animal was a bull, and zero otherwise;

F = dummy variable equal to one if the animal was female, and zero otherwise;

Breed Dummy Variables

N = dummy variable equal to one if the animal was N'dama, and zero otherwise;

B = dummy variable equal to one if the animal was Baoulé or Baoulé-N'dama crossbreed, and zero otherwise;

C = dummy variable equal to one if the animal was a zebu-taurin crossbreed, and zero otherwise;

Trend and Seasonality Terms

T1 = trend variable for the period, June 1976-November 1976[1];

T2 = trend variable for the period, November 1976-June 1977[1];

SE = dummy variable equal to one if the sale occurred in September 1976, and zero otherwise; and

DE = dummy variable equal to one if the sale occurred in December 1976, and zero otherwise.

Certain dummy variables had to be excluded in order to avoid getting a singular variance-covariance matrix. These excluded dummy variables corresponded to:

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[1] See footnote 2, p. 345.

1) Sex. — Steer

2) Breed. -- Zebu

The coefficients of the included dummy variables for sex and breed measure the difference between the average price of animals of these sexes and breeds and the average price of animals of the sex or breed for which dummy variables were excluded. For example, the coefficient of BU, the dummy variable indicating the animal was a bull, indicates that other things (e.g., weight and breed) being equal, butcher in Bouaké paid an average of 2,015 CFAF per head _less_ for bulls than for steers, the sex for which the dummy variable was excluded. The coefficients of the dummy variables for September (SE) and December (DE) measure how much prices in those two months differed from their respective trend lines, T1 and T2.

Results. -- Almost all the coefficients in Table 10.3 are statistically significant (at least at the .10 level), all have the expected signs, and the relative magnitudes appear reasonable. The high R^2 of the estimated equation (.87) indicates that nearly seven-eighths of the total variation in cattle prices were explained by variations in the explanatory variables. The model thus seems to have captured the main elements important in determining the prices of slaughter cattle in Bouaké. The following subsections discuss what the model indicates about how prices varied with the weight of the animal, with its sex and breed, and seasonally.

a. Price-weight relationship. -- As expected, the carcass weight of the animal was the most important determinant of price. The coefficient of W, the carcass weight variable, was very highly significant (t = 103.2), and the partial correlation coefficient of W (.92) was by far the highest of any variable in the equation. The coefficient of W indicates that throughout the study period the average price per kg carcass weight of zebu

steers (the type of animal for which breed and sex dummy variables were excluded from the equation) was 360 CFAF.

b. Price-sex relationship. -- As expected, prices were significantly lower for bulls and cows than for steers, independent of weight. This reflected the preference of consumers, and hence butchers, for the fattier meat of steers. Butchers paid an average of about 700 CFAF per head less for cows and about 2,000 CFAF per head less for bulls than for steers of equal weight. The price differential between steers and cows was relatively small because the cows sold in Bouaké were fairly well fleshed; they were not like the very old, thin cows slaughtered in the north.[1] Most butchers, however, reported that the meat of bulls was much leaner than that of steers; therefore, the difference between the price per kg of steers and that of bulls was substantial.

c. Price-breed relationship. -- The coefficients of the three dummy variables for breed (N, B, and C) indicate that prices were lower for taurins and zebu-taurin crossbreeds than for zebus, independent of weight. Prices averaged about 2,600 CFAF less per head for N'damas, 1,100 CFAF less per head for Baoulés, and 625 CFAF less per head for cross-breeds than for zebus of equal weight.[2] Again, the price differentials were related to the quality (fat content) of the meat. Butchers reported that taurins yielded meat with a lower fat content than that of zebus. Since their customers preferred fattier meat, butchers bid the price of zebus higher than that of taurins. As would be expected, the price per kg of zebu-taurin crossbreeds was intermediate between that of zebus (for which the breed dummy variable was excluded) and that of the two taurin breeds, N'damas and Baoulés.

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[1] Most of the females slaughtered in Bouaké were animals culled from herds because of mastitis or poor temperament.

[2] The coefficient of B, the dummy variable indicating the animal was Baoulé, however, was not significant at customary levels, and that of C, the dummy variable indicating the animal was a zebu-taurin crossbreed, was significant only at the .10 level.

d. Seasonal price variation. -- The two trend variables, Tl
and T2, behaved as expected. The coefficient of Tl was not statisti-
cally different from zero, indicating that nominal prices did not
increase from June 1976 through November 1976. Since inflation was
running at 1.1 percent per month during 1976-77, however, the real price
of cattle actually fell from June to November.[1] The coefficient of T2
indicates that from November 1976, through June 1977, prices rose by
an average of 917 CFAF per head per month, independently of weight.
Since the average price of animals sold during this period was 59,228
CFAF, the coefficient of T2 indicates prices per kg rose by 1.5 percent
per month in monetary terms and 0.4 percent per month in real terms from
November through June. The increase represents the cost (including
weight losses) of storing meat in the form of animals during the dry
season.

The coefficients of SE and DE, the dummy variables for September
and December, 1976, show that significant price increases occurred in
both months. In September, prices rose by an average of 1,986 CFAF per
head, or 3.3 percent relative to average prices in the June-November
period. This price increase reflected the increased demand for beef asso-
ciated with Ramadan and with the return of expatriates, students, and
teachers to Bouaké following the summer vacation. It may have also re-
flected decreased sales by producers at the end of the rainy season.[2]
The price rise in December was even more sharp than the September increase
Prices in December rose an average of 4,700 CFAF per head, or 7.9 percent
over the November-June average. The December price increase resulted
from increased demand for beef, both in Bouaké and in the rural areas,
due to the end-of-the-year holidays and farmers being paid for their crops.

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[1]The rate of inflation cited is the average monthly rate of increase
in the African general cost of living index for Abidjan between April
1976 and March 1977 (58).

[2]See Chapter 8, p. 283.

e. **Relative prices of different types of cattle.** -- The variable W in Table 10.3 takes account of the effect of carcass weights on prices. The coefficients of the other variables in Table 10.3 can therefore be viewed as reflecting differences in the price per kg of animals having the characteristics represented by those variables. The differences in prices per kg can be stated explicitly by dividing each coefficient by the average weight of animals having the characteristic represented by that variable. For example, the coefficient of F in Table 10.3 indicates that butchers paid 699 CFAF per head less for females than for steers of equal weight. Dividing 699 CFAF by the average carcass weight of females in the sample (134 kg) indicates that the average price per kg carcass weight of females was 5 CFAF lower than that of steers. Alternatively, by dividing each coefficient by the average price (per animal) of zebu steers (the type of animal for which the breed and sex dummy variables were excluded) the price of each type of animal can be expressed as a percentage of the price per kg of zebu steers. For example, the coefficient of BU, the dummy variable for bulls, indicates that on the average, bulls sold for 2,015 CFAF less than steers of equal weight. Given that the average price of zebu steers in the sample was 63,732 CFAF, this implies that the average price per kg of zebu bulls was 3.2 percent lower than that of zebu steers [(2,015 ÷ 63,672) x 100]. The discount per kg for N'dama bulls can be calculated by adding the coefficient of BU to that of N (the dummy variable for N'dama) and then dividing the total by the average price of zebu steers. In this way the average price per kg of each type of animal can be expressed as a percentage of the price of zebu steers. Table 10.4 presents the results of such calculations.

Table 10.4 shows that during the study period, prices per kg in Bouaké were highest for zebu steers, followed by zebu-taurin crossbreed steers, and zebu cows. Prices per kg were lowest for N'dama bulls, averaging 7 percent less than for zebu steers. The relatively low price of N'damas deserves special emphasis, since most Ivorian govenrment cattle development programs are based on the N'dama breed. Table 10.4 shows that for each sex

TABLE 10.4

RELATIVE PRICES PER KG. OF DIFFERENT TYPES OF CATTLE
SOLD IN BOUAKÉ, 1976-77
(percent of price per kg of zebu steers)[a]

Breed	Steers	Bulls	Females
Zebus	100.0	96.8	98.9
N'damas	95.9	92.7	94.8
Baoulés	98.3	95.1	97.2
Zebu-Taurin Crossbreeds	99.0	95.8	97.9

[a]Calculated by dividing coefficients of the breed and sex dummy
variables in Table 10.3 by the average price of zebu steers throughout
the period, subtracting the quotient from 1, and expressing the result
as a percentage.

the price per kg of N'damas was only about 96 percent that of zebus.
In contrast, the price of Baoulés averaged about 98 percent of the price
of zebus. This suggests that even if it is cheaper per kg to produce
beef by raising N'damas rather than Baoulés, the higher price per kg
offered for Baoulés may make it more profitable to raise the latter.

The price differentials for different sexes and breeds belie the
commonly-held belief that African consumers make no quality distinctions
when purchasing meat. The higher prices per kg offered for steers and
for zebus clearly reflect a preference for fattier, more tender meat.
Moreover, the price differentials are higher in Bouaké (up to 7 percent)
than in northern Ivory Coast (about 3 percent)[1], where incomes are lower.
Higher incomes are associated with a shift in demand towards fattier, more
tender meat.

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[1]See Chapter 9, p. 323.

Cattle Prices in Abidjan

This section examines prices of slaughter cattle in Abidjan from November 1976 through June 1977. Again, the main question asked is whether the market was working rationally, i.e., whether price fluctuations reflected shifts in supply and demand that were largely outside the control of market participants. The information and analysis presented are less detailed than those just presented for Bouaké, but they support just as strongly the view that the market did behave rationally, given the constraints imposed by the physical infrastructure under which it operated.

The Data. -- Cattle prices were collected in Abidjan from November 1976 through June 1977. As mentioned above, 47 percent of the price observations in Abidjan were of animals purchased by one butcher, the largest wholesale butcher in Abidjan. This butcher held contracts to supply many of the institutions (hospitals, schools, army, etc.) in Abidjan with meat and slaughtered roughly 15 percent of the cattle passing through the Abidjan abattoir. Inspection of the data revealed that this butcher reported paying consistently higher prices per kg for his animals than did other butchers in the sample, in spite of his often buying animals in large lots. Over the entire survey period, he reported paying an average of 453 CFAF per kg carcass weight for his cattle, compared to 423 CFAF per kg carcass weight paid by the other butchers in the sample.[1] There are three reasons why the prices reported by this butcher may have been higher than those reported by other butchers:

1) This butcher may have lied to the study's enumerators.

2) He may have bought higher quality animals than most other butchers and paid a premium for these animals.

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[1] These average prices were calculated by summing the prices paid for all animals in the sample and dividing by the sum of their carcass weights. Thus, the averages correspond to the prices paid by the butchers for their meat.

3) He may have had contractual obligations that forced him
to buy and slaughter animals even when prices were very
high and most other butchers had switched to selling
frozen meat. Alternatively, he may have had contracts to
sell meat at prices higher than those most other butchers
received. These high selling prices may have led him to
not bargain as hard for his animals as did other butchers.

Since this butcher reported paying significantly higher prices for
his animals, the cattle prices reported for Abidjan in this section are
presented in two different ways. The prices paid by all butchers except
the large butcher are used in most of the calculations, and a weighted
average of prices, including those reported by the large butcher, are noted
in parentheses.[1]

Table 10.5 presents average monthly prices for zebu males with carcass
weights between 130 and 159 kg , sold in Abidjan between November 1976 and
June 1977, and compares these prices with those of similar animals sold in
Bouaké. As explained earlier, animals are often sold in large lots for
uniform prices per head in Abidjan, and this makes it difficult to distin-
guish price differentials paid for different grades of animals. Therefore,
the analysis in this section concentrates on average-sized zebu males,
having carcass weights of 130-159 kg.

Price Behavior in Abidjan. -- Prices were much more variable in Abidjan
than in Bouaké, both on a daily and on a month-to-month basis. In Abidjan,
the standard deviation of prices per kg of zebu males equaled about 15
percent of their mean price per kg, while in Bouaké it amounted to approx-
imately 10 percent. Thus, the standard deviation of price per kg was 50
percent higher (relative to the mean) in Abidjan than in Bouaké. This

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[1]The prices paid by the large butcher are weighted by .15, his esti-
mated share of total slaughters in Abidjan, and the prices paid by other
butchers are weighted by .85.

TABLE 10.5

AVERAGE MONTHLY PRICES OF ZEBU MALES HAVING
CARCASS WEIGHTS OF 130-159 KG   SOLD IN ABIDJAN AND BOUAKÉ, NOVEMBER, 1976-JUNE, 1977
(in CFAF per kg   carcass weight)

City	Nov.[a]	Dec.	Jan.	Feb.	March	April	May	June
Abidjan[b]	436 (433)[c]	430 (433)	393 (408)	405 (416)	436 (442)	452 (459)	472 (471)	472 (473)
N	12	28	87	76	62	36	42	25
Bouaké	340	395	366	382	377	382	381	406
N	31	45	29	27	33	25	35	25
Difference[d]	96 (93)[e]	35 (38)	27 (42)	23 (34)	59 (65)	70 (77)	91 (90)	66 (67)

SOURCES: Table 10.2 and field data

[a]For Abidjan, prices are for the last two weeks of November only.

[b]Prices for Abidjan are prices paid by butchers other than the largest butcher in Abidjan.
See text for explanation.

[c]Figures in parentheses are weighted averages of prices paid by all butchers. See text for explanation.

[d]Difference using figures cited in note [b] above.

[e]Difference using figures cited in note [c] above.

higher variability in prices was the result of Abidjan's dependence
on the railroad to deliver the city's supply of slaughter animals.
When train cars were not available in the northern areas to ship
cattle to Abidjan, prices rose rapidly, and the inability to hold ani-
mals in Abidjan meant that price fluctuations were not cushioned by a
stock of reserve animals. In contrast, most of Bouaké's supply of
slaughter animals arrived on hoof; therefore, the supply was less sub-
ject to disruptions due to unavailability of rail cars and trucks.
The ability to hold animals on the pastures around Bouaké also pro-
vided butchers and local traders the possibility of protecting them-
selves against price fluctuations by holding buffer stocks of
animals

Figure 10.3 presents graphically the prices shown in Table 10.5.
As one would expect, prices were higher in Abidjan than in Bouaké
throughout the study period. The price margin between the two cities
varied widely by month, however.

Prices were high in Abidjan during November because few cattle
arrived in the market. Almost all available trucks and train cars, as
well as many of the livestock merchants, were involved at this time in ship-
ping sheep south for Tabaski; therefore few means were available to move
cattle into Abidjan.[1] At this time Bouaké was receiving adequate supplies
of slaughter cattle, most of them arriving on hoof. The lack of transport,
however, prevented cattle merchants from sending some of these animals
on to Abidjan, so a large inter-city price differential developed. In
December the transport bottleneck eased somewhat, but demand for beef in
Abidjan increased because of Christmas and New Year's, and prices remained
at their November levels. At the same time, prices in Bouaké rose

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[1]In 1976, Tabaski was on December 2. The November price data pre-
sented here for Abidjan cover only the last two weeks of the month, the
period when shipment of sheep from the north to the south was heaviest.
It is forbidden to trek cattle into Abidjan; therefore, all cattle arrive
by train or by truck.

FIGURE 10.3   Prices in Abidjan and Bouaké:
Zebu Males with Carcass Weights of
130—159 Kg : 1976-77
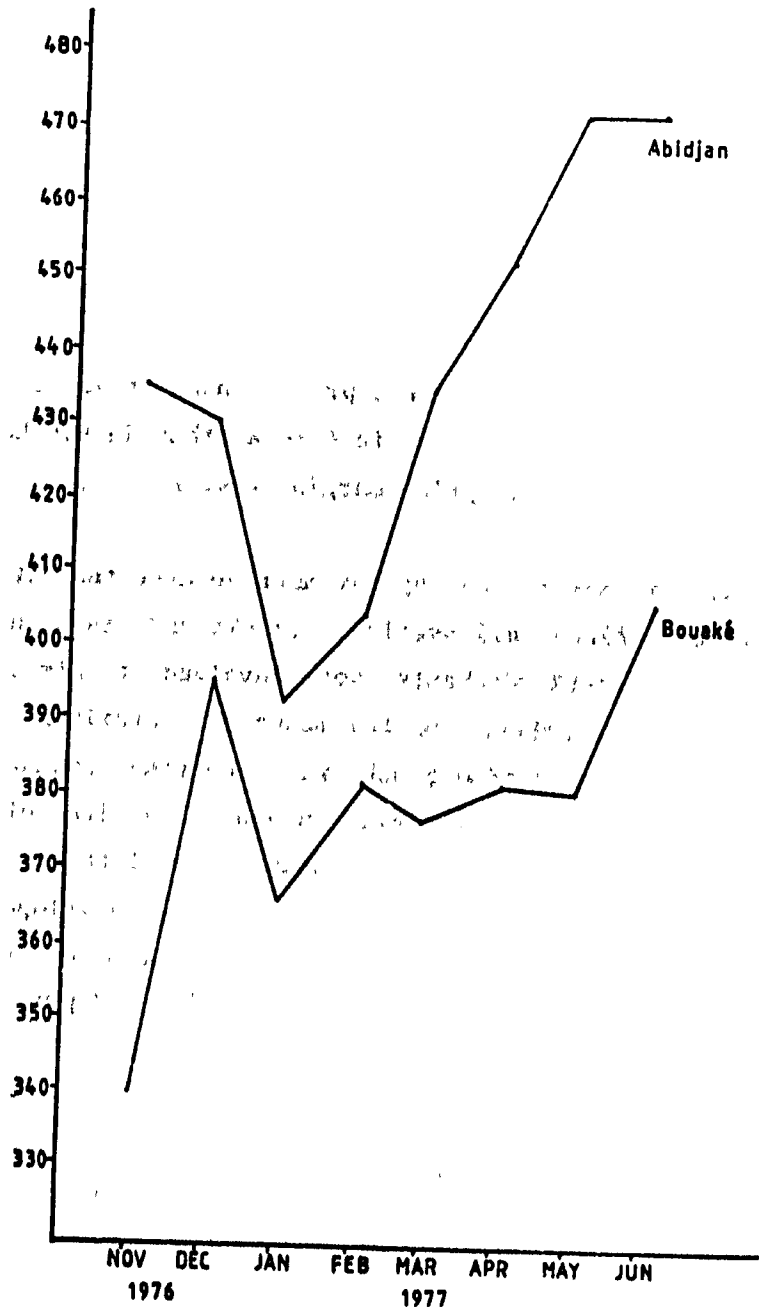
rapidly for the reasons discussed earlier in this chapter. As a result, the price margin between the two cities fell from 96 CFAF per kg carcass weight to 35 CFAF per kg carcass weight. In January, prices fell in both cities as the transport bottleneck eased and demand fell off, and the inter-city price margin fell even further, to 27 CFAF. In February prices climbed and the inter-city price differential shrank slightly, to 23 CFAF per kg. Throughout the December-February period, Abidjan was supplied with slaughter cattle from different sources than was Bouaké. Abidjan received cattle that were shipped by rail from Upper Volta and northern Ivory Coast (many of the latter were Malian), while Bouaké relied on animals arriving from Mali and northern Ivory Coast by hoof and by mixed transport. Few animals were shipped directly from Bouaké to Abidjan because the inter-city price differential was close to the cost of transporting the animals between the two cities, leaving no margin for arbitragers.

In March, prices began to rise sharply in Abidjan, in part because there was a disruption of .rozen beef deliveries to Abidjan. This resulted in AGRIPAC and DISTRIPAC being without frozen meat to sell for about ten days. This led to a large increase in the demand for slaughter cattle. The price rise was accentuated by the normal seasonal decline in arrivals of cattle from Upper Volta, which began to be felt in late March. The shortage of Voltaic cattle in Abidjan became more acute in April and May, and the price margin between Bouaké and Abidjan widened. As a result, artitrage between the two cities became profitable, and cattle merchants began shipping animals from Bouaké to Abidjan. Recorded shipments of cattle from Bouaké to Abidjan increased from none in February to 215 head in March, 867 head in April, 624 head in May, and 1,365 head in June (78). The intercity price margin rose to 91 CFAF per kg carcass weight in May, then fell to 66 CFAF per kg carcass weight in June, partly as a result of this arbitrage.

In sum, prices tended to be higher and fluctuate more in Abidjan than in Bouaké, and at times the price differential between the two cities exceeded the transfer costs of moving cattle from Bouaké to Abidjan. This did not reflect an inefficient market in either city, however; rather, it reflected

the very serious transport constraints that often prevented merchants from shipping cattle to Abidjan when supplies were short there. The inability to hold animals in Abidjan because of inadequate grazing space contributed to the price fluctuations in Abidjan. When transport bottlenecks were removed (e.g., in the December-February period), price differentials between the two cities fell close to transfer costs. The emergence of a large inter-market price differential in April and May (before arbitrage began to close the gap in June), indicates, however, that the market does not react instantaneously to these price differentials. This suggests that market information may not always be diffused as rapidly as possible. On the whole, however, the Abidjan data indicate a rationally operating market, although the market is severely constrained by a lack of adequate facilities for cattle transport and storage.

Prices in Other Markets

In addition to prices in Abidjan and Bouaké, the investigator was able to collect limited information on cattle prices in Ferkéssédougou, Daloa, and Man during May and June 1977. These are presented in Table 10.6, along with comparable data for Bouaké and Abidjan. The prices all refer to the type of cattle slaughtered in the south (males with carcass weights between 120 and 160 kg), and are thus comparable.

The prices follow a north-south gradient, reflecting increased transport costs as cattle are shipped farther south. Prices were lowest in Ferkéssédougou and highest in Abidjan. The one exception to the north-south pattern was Man, which had markedly higher prices than Bouaké, even though Man lies at a latitude only slightly lower than that of Bouaké. (See Figure 10.4.) Prices in Man were even higher than those in Daloa, although Daloa lies about 80 km south of Man. The higher prices in Man reflect the strong export demand in western Ivory Coast for cattle to ship to Liberia. SEDES (102, 103), in studies conducted in 1966 and 1972, also found that cattle prices were higher in the west than in other areas

TABLE 10.6

PRICES OF SLAUGHTER CATTLE IN IVORIAN CITIES
MAY-JUNE, 1977

City	Type of Animal	Mean Carcass Weight (kg)	Mean Price per kg Carcass Weight (CFAF)
Ferkéssédougou	Zebu Males[a]	125	346
Daloa	Zebu and N'dama Males[b]	143	425
Man	N'dama Males[c]	121	453
Bouaké	Zebu Males (130-159 kg carcass)	145	394
Abidjan	Zebu Males (130-159 kg carcass)	144	472

SOURCES: Prices in Ferkéssédougou from SODEPRA, Project d'Embouche Bovine unpublished data. Prices in Daloa and Man from the investigatio's observations. Prices in Abidjan and Bouaké are averages of prices in May and June, 1977 taken from Tables 10.2 and 10.5.

[a]Prices refer to 301 head purchased by SODEPRA's feedlot in Ferkéssédougou during May and June, 1977. Liveweights are converted to carcass weight equivalents assuming a 49 percent dressing percentage.

[b]Prices as of May 24, 1977 (N = 4)

[c]Prices as of June 18, 1977 (N = 9)

FIGURE 10.4

CATTLE PRICES IN IVORY COAST: MAY-JUNE, 1977
(CFAF per kg carcass weight)
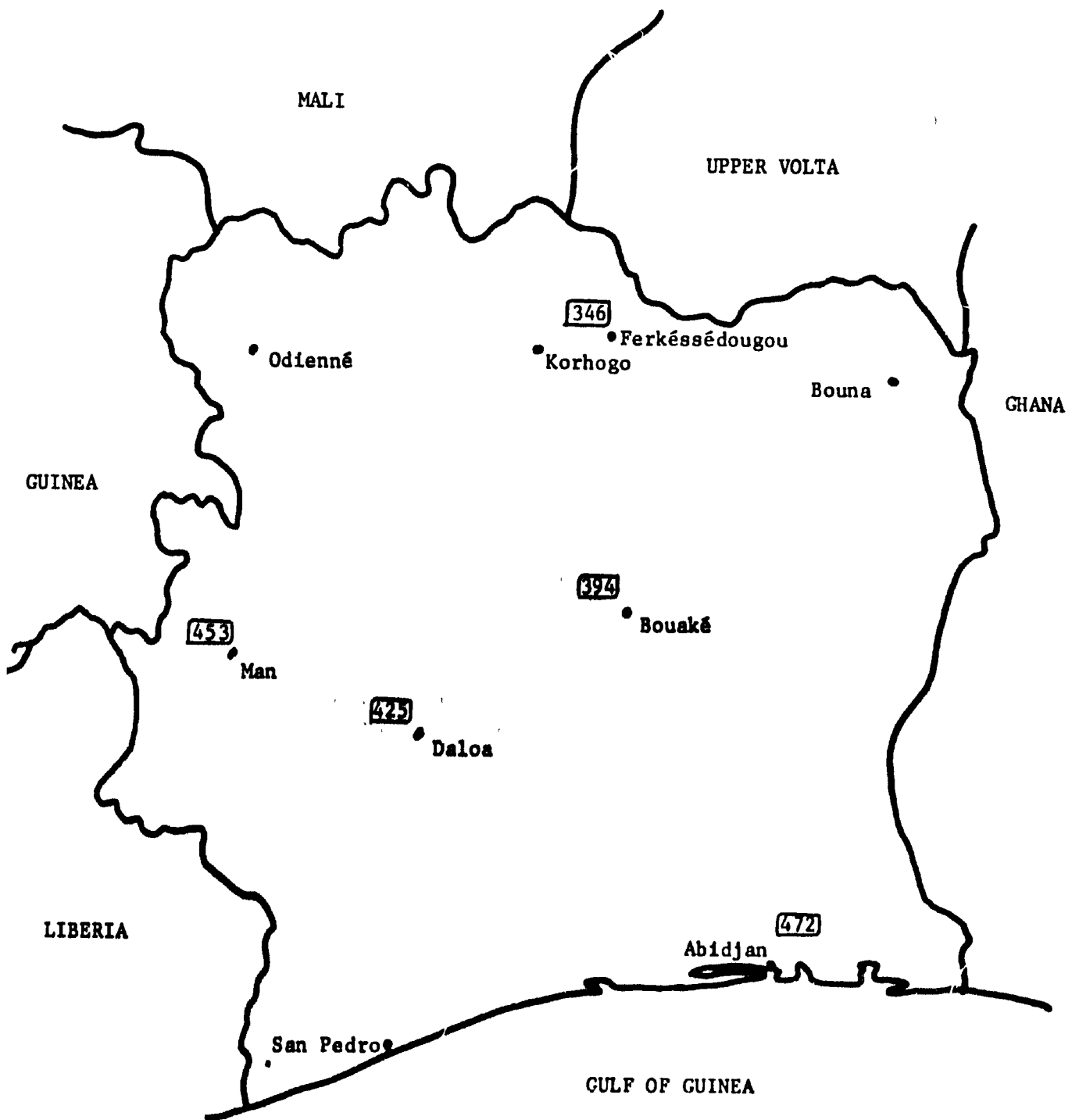
of similar latitude in Ivory Coast. Since most of the roads in Ivory Coast run from north to south, it is costly to transport cattle, especially by truck, from east to west (e.g., from Bouaké to Man). Trucks have to travel part of the way on unpaved roads, and there is often little chance of finding backhaul cargoes in Man. Trekking cattle from east to west is hindered by the thick forest around Daloa and Man, and heavy tsetse infestation. For these reasons, the east-west price differential is maintained. Merchants occasionally ship cattle from Bouaié and Daloa to Man when the price differential becomes large, but the number of animals involved usually is small (77, 79).

The geographical distribution of prices shown in Figure 10.4 suggests that prices in 1977 varied regionally in accordance with transport costs and local patterns of demand. This, in turn, suggests that the market was working rationally. The following chapter examines whether the market was working efficiently, i.e., whether interregional price differences approximated transfer costs among the regions.

Conclusions

The preceding analysis has demonstrated that cattle markets in major consumption centers in Ivory Coast work regionally. The data for Bouaké show that cattle prices vary seasonally in a manner consistent with seasonal changes in demand, supply, and storage costs of cattle. Prices vary among different types of animals in a manner that reflects consumer preferences for different grades of meat. The data for Abidjan show that the Abidjan market also works in a rational manner. Prices are much more variable in Abidjan than in Bouaké, however, because of unreliable rail transport of cattle to Abidjan and insufficient grazing around the Abidjan market, which precludes holding a buffer stock of cattle. The data just presented on the regional distribution of cattle prices indicate that price differentials between regions do reflect (but do not necessarily equal) differences in transport costs between the regions. In sum, the data all show that far from being "chaotic" or "anarchic," the market for cattle in Ivory Coast operates in a logical

and predictable manner. The market can therefore be called economically rational. Chapter 11 examines whether it is economically efficient.

PART V

ANALYSIS OF MARKET EFFICIENCY:
THE MARGINS OF BUTCHERS AND TRADERS

CHAPTER 11

THE EFFICIENCY OF THE TRADING SYSTEM: CATTLE TRADERS' MARGINS

The previous three chapters have demonstrated that the traditional
cattle marketing system works rationally, with prices reflecting both
consumer preferences for different grades of meat and allocating cattle
among different uses according to the animals' potential productivity.
This chapter examines how efficiently the marketing system distributes
cattle among markets by examining the net margins of cattle
merchants, looking at the size of the net margin relative to
other costs involved in transporting and marketing cattle, and examining
the rate of return to capital invested in cattle trading. If profit
margins are high relative to the other costs of transporting and marketing
cattle, both consumers and producers would benefit from increased competi-
tion that would drive down these margins. If rates of return to capital
invested in cattle trading are significantly above those to capital
invested in other activities, there are probably barriers to entry into
cattle trading that restrict competition.

The chapter is divided into three parts. The first part examines
the net margins of merchants who ship cattle to Bouaké and Abidjan from
northern Ivory Coast, Mali, and Upper Volta using different types of
transportation. These margins are compared with the other costs of shipping
cattle to market, and are used to calculate the rates of return to
capital invested in cattle trading. The second part of the chapter discusses
economies of scale in cattle trading, and the final section discusses
flows of price information between markets.

The major finding of the chapter is that the traditional marketing
system is fairly efficient, with traders' net margins representing from
4 to 9 percent of the final sale price of cattle in Bouaké and Abidjan.
Rates of return to capital of traders who shipped cattle to Bouaké in
1976-77 varied from 16 to 30 percent per year, within the accepted range
of estimates of the opportunity cost of capital in West Africa. Annual
rates of return to capital of traders who shipped cattle to Abidjan between
November 1976 and February 1977, however, were much higher, ranging

from 25 to 65 percent, depending on the assumptions used. These high rates of return were due to a severe transportation bottleneck that restricted shipments to Abidjan and a high degree of risk in the Abidjan market.

Another major finding of the chapter was that, given the prices prevailing in 1976-77, it was usurlly more profitable to trek cattle to market than to truck them, even when taking account of the faster capital rotation permitted by trucking. The chapter also shows there are significant economies of scale in cattle trading, with rates of return to capital being higher for merchants who ship more than one herd of cattle to market at a time. Finally, the chapter shows that market information travels quickly between most markets, but travels more slowly between markets that trade only occasionally with each other.

Traders' Margins for Different Routes and Means of Transportation

This section presents estimated average profit margins of merchants who shipped cattle to Abidjan and Bouaké in late 1976 and early 1977. e margins represented the net return to traders' capital and labor. The margins are estimated using average cattle prices in Bouaké and Abidjan for the period November 1976 - February 1977 (the early and middle part of the dry season) and average prices in northern Ivory Coast for the period October 1976 - January 1977. (A month's lag is allowed for transport of the animals from northern Ivory Coast to Bouaké and Abidjan.) For Upper Volta, an average price of 250 CFAF per kg carcass weight is used. (This figure is taken from 28, p. 134.) For Koutiala, Mali, a price of 290 CFAF per kg carcass weight is used.[1] Transport costs used in the margin calculations come from Chapter 6, and prices of cattle in Bouaké and Abidjan are as shown in Chapter 10. (For simplicity, margins

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[1]This figure is drawn from OMBEVI documents. In early 1977, the price per kg carcass weight of export-grade cattle in Kati (near Bamako) was 315 CFAF (86, p. 11), while in Doukoloma (north of Ségou) it was roughly 275 CFAF per kg carcass weight (88, p. 6). It is assumed that the price in Koutiala fell between these two prices. Koutialia is nearer to the major trade routes than is Doukoloma, but it lacks Bamako's large consumption demand for meat.

are calculated assuming a 150-kg-carcass male). The reader should
note that the margins presented are averages that are subject to
considerable variation. Furthermore, even though the figures presented
in the following tables are not rounded off, they are nonetheless   -
approximate and should not be intrepreted as being precise to the last
.FAF.

Margins Earned Shipping Cattle to Bouaké--Tables 11.1 - 11.3
present estimates of the profit margins earned by traders who shipped
cattle from northern Ivory Coast and from Mali to Bouaké in late 1976 and
early 1977. Table 11.1 compares the margin earned trekking cattle to
Bouaké from Tingrela (the largest redistribution market in northern
Ivory Coast) with those earned trucking cattle along the same route.
Table 11.2 estimates the margin earned by buying Baoulé cattle directly
from producers in the Boundiali-Ferkéssédougou region of northern Ivory
Coast and trekking them to Bouaké. Table 11.3 compares the profitability
of shipping cattle from Koutiala, Mali to Bouaké by trek and by mixed
trek-rail transport.

Several facts become apparent from Tables 11.1 to 11.3. First,
under normal price conditions it was more profitable to trek cattle to
market than to use modern, rapid means of transport (truck or rail).
Although trekking invloves a slower rotation of capital than do rail
and truck transport, the margins earned in trekking are large enough to
more than compensate for the slower capital rotation. Table 11.1
shows that even assuming no net carcass weight loss in transit, under
normal conditions merchants would have lost money trucking cattle between
Tingrela and Bouaké. Merchants therefore rarely trucked cattle between
these two cities, using trucking only when the inter-city price differen-
tial was unusually high.[1] Similarly, Table 11.3 shows that under normal

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[1]Only 4 percent of the cattle recorded as entering the Bouaké market
between February and July 1977 (the height of the dry season, when
weight losses in trekking were highest) arrived by truck (79).

TABLE 11.1

MARGINS EARNED SHIPPING ZEBU CATTLE BETWEEN TINGRELA AND BOUAKE

(CFAF per animal)[a]

Item	Trek	Truck
Costs per animal		
Purchase of animal with 150 kg. carcass @ 332 CFAF per kg. carcass weight[b]	49,800	49,800
Costs of transport and sale in Bouaké (Table 6.2)	2,225–2,325	5,405–5,505
Commission of landlord-intermediary[c]	200	200
Average margin of go-between[c]	1,000	1,000
Total costs	53,225–53,325	56,405–56,505
Receipts per animal		
Sale @ 371 CFAF per kg. carcass weight,[d] assuming		
No carcass weight loss	55,650	55,650
Margin	2,325 to 2,425 (4.6%)[e]	−855 to −755 (−1.5%)
3% carcass weight loss	53,981	53,981
Margin	656 to 756 (1.4%)	−2,524 to −2,424 (−4.5%)
5% carcass weight loss	52,868	52,868
Margin	−457 to −357 (−0.8%)	−3,637 to −3,535 (−6.5%)
3% carcass weight gain	57,320	---
Margin	4,095 (7.8%)	---
5% carcass weight gain	3,995 to 58,433	---
Margin	5,108 to 5,208 (9.9%)	---

TABLE 11.1 - Continued

Item	Trek	Truck
Time spent		
Purchasing animals and arranging shipment	7 days	7 days
Days in transit	30 days	1 day
Sale in Bouaké and return trip north	10 days	10 days
Total time per rotation of capital	47 days	18 days
Maximum number of rotations per year	7.6	20

[a]Prices in Bouaké as of November, 1976-February 1977, and in Tingrela as of October 1976 - January 1977.

[b]Average price of 272 head of cattle purchased in Tingrela between October 1976 and January 1977 by SODEPRA's Centre d'Embouche Bovine (113). Liveweights converted to carcass weight equivalents by assuming a 49 percent dressing-out rate (see Appendix 10.A).

[c]The landlord's commission and the go-between's margin are included as costs (even though they are not paid directly by the cattle merchant) because these items are included in the sale prices reported for Bouaké and Abidjan. It is assumed that one-half of total sales are handled by go-betweens, who earn an average margin of 2,000 CFAF per animal.

[d]Average price of zebu males with carcass weights of 130-159 kg. sold in Bouaké between November 1976 and February 197 (see Table 10.2).

[e]Figure in parentheses is the margin expressed as a percentage of the merchant's capital investment in the animal (purchase price plus transport and selling costs). This represents the return to the merchant's capital and labor.

TABLE 11.2

MARGIN EARNED SHIPPING BAOULE CATTLE BETWEEN RURAL NORTHERN IVORY COAST AND BOUAKE

(CFAF per animal)[a]

Item	Trek
Costs per animal	
Purchase of animal with 100 kg carcass in the area around Boundiali @ 287 CFAF per kg. carcass weight[b]	28,700
Costs of collection (2 herders for 1 month @ 25,000 CFAF per month, including food): 50,000 CFAF for 50 head	1,000
Costs of transport and sale ir Bouaké (Table 6.2)	2,225-2,325
Commission of landlord-intermediary[c]	200
Average margin of go-between[c]	1,000
Total costs	33,125-33,225
Receipts per animal	
Sale @ 364 CFAF per kg carcass weight, assuming[d]	
No net carcass weight loss	36,400
Margin	3,175 to 3,275 (10.1%)[e]
3% carcass weight loss	35,308
Margin	2,083 to 2,183 (6.7%)
5% carcass weight loss	34,580
Margin	1,355 to 1,455 (4.4%)

TABLE 11.2 - Continued

Item	Trek
Receipts (cont'd)	
3% carcass weight gain	37,492
Margin	4,267 to 4,367 (13.5%)
5% carcass weight gain	38,220
Margin	4,995 to 5,095 (15.8%)
Time Spent	
Buying animals in the countryside and arranging shipment	30 days
Days in transit	30 days
Sale in Bouaké and return trip north	10 days
Total time per rotation of capital	70 days
Maximum number of rotations per year	5.1

[a]Prices in Bouaké as of November, 1976 - February, 1977, ar . in northern Ivory Coast as of October, 1976 - January, 1977.

[b]The average age of Baoulé males slaughtered in Bouaké w : 5.5 years. The SODEPRA data reviewed in Chapter 8 (114) show that the average price of Boualé males between 5 and 6 years old sold from SODEPRA-affiliated herds in the Boundiali-Ferkéssédougou region of northern Ivory Coast between October, 1976 and January, 1977 was 25,814 CFAF. Sixty-two percent of these arimals were slaughtered locally and the average carcass weight of Baoulé males in this age group slaughtered in northern Ivory Coast was 84 kg. Assuming the animals not sold for local slaughter had an average carcass weight of 100 kg this implies an overall mean carcass weight in the region of 90 kg, and an average price per kg carcass weight of 25,814 CFAF ÷ 90 = 287 CFAF.

[c]See note c, Table 11.1.

[d]Table 10.4 showed that the price per kg of Baoulé cattle in Bouaké averaged 98 percent of that of zebu cattle. 371 CFAF x .98 = 364 CFAF.

[e]See note e, Table 11.1

TABLE 11.3

MARGINS EARNED SHIPPING CATTLE BETWEEN KOUTIALA AND BOUAKE

(CFAF per animal)[a]

Item	Trek	Trek to Ferkéssédougou Rail from Ferkéssédougou to Bouaké
Costs per animal		
Purchase of animal with 150 kg carcass @ 290 CFAF per kg	43,500	43,500
Cost of transport and sale in Bouaké (Table 6.3)	6,923-7,023	8,639-8,739
Landlord's commission[b]	200	200
Average margin of go-between[b]	1,000	1,000
Total costs	51,623-51,723	53,339-53,439
Receipts per animal		
Sale @ 371 CFA F per kg carcass weight,[c] assuming		
No carcass weight loss	55,650	55,650
Margin	3,927 to 4,027 (7.9%)	2,211 to 2,311 (4.3%)
3% carcass weight loss	53,981	53,981
Margin	2,258 to 2,358 (4.6%)	542 to 642 (1.1%)
5% carcass weight loss	52,818	52,868
Margin	1,145 to 1,245 (2.4%)	-571 to -471 (-1.0%)

TABLE 11.3 - Continued

Item	Trek	Trek to Ferkéssédougou Rail from Ferkéssédougou to Bouaké
Receipts (cont'd)		
3% carcass weight gain	57,320	57,320
Margin	5,597 to 5.697 (11.2%)	3,881 to 3,981 (7.5%)
5% carcass weight gain	58,433	58,433
Margin	6,710 to 6,810 (13.4%)	4,994 to 5,094 (9.7%)
Time Spent		
Purchase of animals in and around Koutiala and completing formalities for export	30 days	30 days
Time in transit	40 days	30 days
Sale in Bouaké and return trip north	10 days	10 days
Total time per rotation of capital	80 days	70 days
Maximum number of rotations per year	4.5	5.1

[a]Prices in Bouaké as of November 1976-February 1977.

[b]See note c, Table 11.1.

[c]See note d, Table 11.1.

[d]See note e, Table 11.1.

conditions, the net margin earned shipping cattle by mixed transport from Koutiala to Bouaké was low, roughly 2,260 CFAF per head (assuming no net carcass weight loss). Although the capital rotation time was slightly faster for mixed transport than for trek (70 versus 80 days), it was not fast enough to compensate for the lower margin earned. During the study period, merchants used mixed transport mainly during December and January, when cattle prices were unusually high in Bouaké and a shortage of water and grazing between Ferkéssédougou and Bouaké raised the costs of trekking relative to mixed transport.

Tables 11.1 to 11.3 also demonstrate that the size of the net margin is quite sensitive to the weight loss (or gain) that occurs en route. For example, on average a merchant would have lost money if his animals had lost as much as 5 percent of their carcass weight while trekking between Tingrela and Bouaké, but he would have gained over 5,000 CFAF per head if they had gained 5 percent of their original carcass weight. Merchants can influence how much weight animals lose or gain en route by deciding how quickly to trek the animals to market. The data reviewed in Chapter 6 showed that animals trekked quickly to market may lose 3 to 5 percent of their carcass weights, even during the wet season, while those trekked more slowly may actually gain weight. There is a trade-off between the weight lost (and hence, the margin earned per trip) and the number of trips that can be made per year. Merchants therefore try to balance the margin earned per trip with the rate of capital rotation so as to maximize their yearly profits. For animals trekked to Bouaké from northern Ivory Coast, the average weight loss is probably negligible. Animals probably gain weight during and shortly after the rainy season, when grazing en route is good, and lose weight at the end of the dry season (February-May). Since the trek is short, these losses are probably small. Cattle trekked from Mali probably lose about 3 percent of their carcass weights at the end of the dry season and break even during the rest of the year.

Finally, Tables 11.1 to 11.3 show that the absolute size of the traders' margins is small, ranging from about 2,400 CFAF to 4,000 CFAF per head (assuming no weight loss), depending on the trade route.

Average returns to capital and labor per trip ranged from 4.6 percent to 10.1 percent.

Profits as a Percentage of Final Sale Price in Bouaké-- Table 11.4 presents the net margins earned per trip for the different trade routes and compares them with the other costs incurred in shipping cattle to Bouaké. Profit margins represented between 4.0 and 8.8 percent of the final selling price of cattle in Bouaké. Margins were largest relative to other costs for merchants who bought cattle directly from producers in northern Ivory Coast and were lowest for merchants who shipped cattle between Koutiala and Bouaké by mixed transport and for those who trekked cattle between Tingrela and Bouaké.

Table 11.4 shows that between 78 and 89 percent of the final sale price of cattle in Bouaké was accounted for by the original purchase price of the cattle in the north, which was either paid to producers in northern Ivory Coast or to merchants and producers in the redistribution markets of Tingrela and Koutiala. Labor costs (excluding the cost of the merchant's labor) accounted for only between 2 and 3 percent of the final sale price, except for animals bought directly from producers in northern Ivory Coast, where the cost of collecting the animals raised the total labor cost to 6 percent of the final price. Intermediaries' commissions were likewise fairly low, between 2.3 and 3.6 percent of the final sale price. For animals purchased in Ivory Coast, taxes accounted for only about 1 percent of the final sale price, but for animals exported from Mali, taxes represented over 8 percent of the final sale price. By far the largest part of this was the Malian export tax of 4,400 CFAF per head.

As a percentage of the final sale price, merchants' net margins appear fairly small. Even if the largest relative margin, that of merchants who bought cattle directly from producers in northern Ivory Coast, were redistributed entirely to producers and consumers (on a 50-50 basis), producers' gross receipts would increase only by 5.5. percent. Thus, the scope for improving consumers' and producers' welfare by squeezing traders' profit margins is limited.

TABLE 11.4

EVOLUTION OF THE PRICE OF CATTLE SOLD IN BOUAKE[a]

Item	Cattle trekked from Tingrela	Cattle trekked from rural northern Ivory Coast	Cattle trekked from Koutiala	Cattle shipped by trek & rail from Koutiala
1. Purchase in north	89.5	78.8	78.2	78.2
2. Labor costs[b]	2.1	6.0	3.1	2.6
3. Transaction costs[c]	2.3	3.6	2.4	2.4
4. Licenses, vaccination, and taxes				
Ivory Coast	0.9	1.4	0.4	0.4
Mali	-	-	7.9	7.9
Total	0.9	1.4	8.3	8.3
5. Costs of rail shipment	-	-	-	3.0
6. Loss of animals and forced sales	0.9	1.4	0.9	1.6
7. Other charges[d]	-	-	-	-
8. Trader's profit	4.3	8.8	7.1	4.0

SOURCE: Tables 6.2, 6.3, 11.1, 11.2 and 11.3

[a]Assuming no carcass shrinkage en route.

[b]Includes salary, food and transport costs of drovers and transport and food costs (but not labor costs) of merchant.

[c]Intermediaries' commissions and go-betweens' margins.

[d]Includes payments for crop damage and miscellaneous expenses.

Rates of Return to Capital of Merchants Shipping Cattle to Bouaké—

A trader's net margin represents the return both to his capital and his labor. By subtracting an imputed wage from this margin, the return to the trader's capital can be calculated. If the annual return to capital in cattle trading greatly exceeds that in other activities, this suggests there are barriers to entry that allow cattle traders to earn a degree of monopoly profit. Before one can compare the rate of return to capital in cattle trading to that in other activities, however, it is first necessary to specify three things: the imputed wage of the cattle trader, the number of times the trader's capital is rotated per year, and the opportunity cost of the trader's capital.

In this study, an implicit wage for traders of 30,000 CFAF per month is assumed; this is considerably above the minimum wage for laborers in Ivory Coast (20,000 CFAF per month) because the investigator feels that traders have entrepreneurial skills that could earn more than the minimum wage in other sectors of the economy.

It is difficult to specify precisely the number of times a trader rotates his capital per year. Tables 11.1 - 11.3 indicate the maximum number of rotations possible per year for each route, but traders generally report making fewer rotations per year than indicated in these tables. A trader's activities are often interrupted by seasonal unavailability of animals, the trader's desire to cultivate cropr, or his desire for leisure. On the other hand, the trader's capital may not be idle during these interruptions; it may be invested in other profitable ventures (trade in consumer goods, kola, etc.). In this study, the rates of capital rotation shown in Tables 11.1 to 11.3 are used, but with the understanding that they represent the fastest rates possible. The rates of return to capital calculated here should therefore be interpreted as indicating the upper limits on the rates actually earned.

Finally, the opportunity cost of capital is taken to be between 20 and 30 percent per year. SEDES (102, p. 302) cites a figure of 20 percent for the cost of capital invested in the cattle trade in West Africa, while the work of Chuta (11a) indicates that the cost of capital in the informal sector in Sierra Leone varies between 20 to 35 percent per year.

The annual rates of return to capital for the first three trade routes shown in Table 11.4 are calculated in Appendix 11.A. The annual rate of return was 21 percent for traders trekking cattle between Tingrela and Bouaké, 30 percent for traders buying cattle directly from producers in northern Ivory Coast and trekking the animals to Bouaké, and 16 percent for traders trekking cattle between Koutiala and Bouaké. The rate of return to capital of traders buying directly from producers in northern Ivory Coast may be overstated for two reasons: first, the only collection cost noted in Table 11.2 is the wage of two drovers involved in collecting the animals. There are probably other costs (transport, intermediaries' commissions, and the risk of losing animals) that reduce the average margin earned per trip. Second, trade in rural areas of the north may be disrupted during the rainy season when travel on feeder roads is difficult. (In contrast, Tingrela and Koutiala are linked to Bouaké by all-weather roads.) The rate of return to capital of merchants trekking cattle between Koutiala and Bouaké, however, may be understated. To the extent that traders succeed in avoiding the Malian export tax by smuggling their animals across the border, they earn a larger margin than that indicated in Table 11.3. Even the rate of return to capital of merchants who pay the tax may be higher than 16 percent. Under Malian foreign trade regulations, traders who export legally gain the right to import goods into Mali. Their capital is thus invested both on the trip south (in cattle) and on the return trip north (in consumer goods), and the rate of return per rotation is increased.[1]

In sum, the average return to capital invested in shipping cattle to Bouaké is not very different from the generally cited opportunity cost of capital in the informal sector. While trading cattle between northern Ivory Coast, Mali and Bouaké is profitable, it is not markedly more profitable than other activities. There is thus little evidence of monopoly profit in this part of the cattle trade.

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[1] The average time per rotation would probably be longer than indicated in Table 11.3, however, because time would be needed to sell the consumer goods in the north.

Margins Earned Shipping Cattle to Abidjan.-- Tables 11.5 to 11.7 pre-
sent estimated average profit margins earned shipping cattle to Abidjan
from Tingrela, Koutiala, and Ouagadougou. The margins for Abidjan are
estimated using a sale price of cattle in Abidjan of 416 CFAF per kg
carcass weight, the average price received by most butchers in the Abidjan
sample between November 1976 and February 1977. In Chapter 10 (pp. 354-55),
it was noted that one butcher (the largest butcher in Abidjan) reported
paying significantly higher prices for his cattle than did other Abidjan
butchers. Including his prices in the sample raised the average price
for the period to 423 CFAF per kg. Margins calculated using the 423 CFAF-
per-kg carcass weight price are included in Tables 11.5 to 11.7 for com-
parison, but the investigator believes the price of 416 CFAF is more
accurate.

Like the tables presented earlier for Bouaké, Tables 11.5 to 11.7
demonstrate that the margins earned shipping cattle to Abidjan are modest
in absolute terms and are quite sensitive to the amount of weight lost en
route. Based on the data presented in Chapter 6, carcass weight loss is
estimated at between 1 and 3 percent for cattle shipped by mixed transport
from Tingrela to Abidjan, at 2 to 3 percent for cattle trucked from
Tingrela to Abidjan, at 5 percent for cattle shipped between Koutiala and
Abidjan by mixed transport, at 7 percent for cattle trucked from Koutiala
to Abidjan, and at 9 percent for cattle shipped by rail from Ouagadougou
to Abidjan. Given these weight losses, average margins per trip ranged
from 4,000 to 6,000 CFAF per head.

Like Table 11.1, Tables 11.5 and 11.6 show that it is more profitable
to trek cattle at least part way to market than to truck them the entire
distance. Trucking cattle from Koutiala to Abidjan would result in losses
under normal price conditions, while trucking from Tingrela would yield
a smaller return than could be earned with mixed trek-rail transport, even
when the more rapid capital rotation permitted by trucking is taken into
account. The low profitability of trucking cattle all the way to market
explains why so few cattle are shipped long distances by truck.[1] Trucking
is used mainly for shorter distances, e.g. between Bouaké and Abidjan.

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[1] In 1976, only 1.7 percent of all cattle recorded as entering the
Abidjan cattle market arrived by truck; the rest arrived by rail (10).

TABLE 11.5

MARGINS EARNED SHIPPING ZEBU CATTLE BETWEEN TINGRELA AND ABIDJAN

(CFAF per kg)[a]

Item	Truck	Trek to Bouaké Truck from Bouaké to Abidjan
Costs per animal		
Purchase of animal with 150 kg. carcass @ 332 CFAF per kg carcass weight[b]	49,800	49,800
Costs of transport and sale in Abidjan (Table 6.8)	9,040–9,140	5,600–5,700
Commission of landlord-intermediary[c]	200	200
Average margin of go-between[c]	1,000	1,000
Total Costs	60,040–60,140	56,600–56,700
Receipts per animal		
Sale @ 416 [423] CFAF per kg carcass weight,[d] assuming:		
No carcass weight loss	-	62,400 [63,450][d]
Margin	-	5,700 to 5,800 [6,750 to 6,850]
Percent return to capital & labor	-	10.4% [12.3%]
1% carcass weight loss	-	61,776 [62,816]
Margin	-	5,076 to 5,176 [6,116 to 6,216]
Percent return to capital & labor	-	9.2% [11.1%]

TABLE 11.5 - Continued

| Item | Truck | Trek to Bouaké |
		Truck from Bouaké to Abidjan
Receipts (cont'd)		
3% carcass weight loss	60,528 [61,547]	60,528 [61,547]
Margin	388 to 488 [1,407 to 1,507]	3,828 to 3,928 [4,757 to 4,857]
Percent return to capital & labor	0.7% [2.5%]	7.0% [8.7%]
5% carcass weight loss	59,280 [60,278]	59,280 [60,278]
Margin	-860 to -760 [138 to 238]	2,580 to 2,680 [3,578 to 3,678]
Percent return to capital & labor	-1.4% [0.3%]	4.7% [6.5%]
Time Spent		
Purchase & arranging shipment	7 days	7 days
Time in transit	2 days	32 days
Sale in Abidjan & return trip north	<u>10 days</u>	<u>10 days</u>
Total time per rotation of capital	19 days	49 days
Maximum number of rotations per year	18.9	7.3

[a] Pric. ir Abidjan as of November, 1976-February, 1977 and in Tingrela as of October; 1976-Jaunary, 1977.

[b] See note b, Table 11 1.

[c] See note c, Table 11.1.

[d] Figures in brackets are receipts and margins earned. assuming a sale price in Abidjan of 423 CFAF per kg. carcass weight. See text for explanation.

TABLE 11.6

MARGINS EARNED SHIPPING CATTLE BETWEEN KOUTIALA, MALI AND ABIDJAN

(CFAF per animal)[a]

Item	Truck	Trek to Ferkéssédougou Rail from Ferkéssédougou to Abidjan
Costs		
Purchase of animal with 150 kg carcass @ 290 CFAF per kg carcass weight	43,500	43,500
Costs of transport & sale in Abidjan (Table 6.9)	22,998-23,098	10,345-10,445
Commission of landlord-intermediary[b]	200	200
Average margin of go-between[b]	1,000	1,000
Total Costs	67,698-67,798	55,045-55,145
Receipts		
Sale @ 416 [423] CFAF per kg carcass weight,[c] assuming:		
No carcass weight loss	–	62,400 [63,450]
Margin	–	7,255 to 7,355 [8,305 to 8,405]
Percent return to capital & labor	–	13.6% [15.5%]
3% carcass weight loss	60,528 [61,457]	60,528 [61,457]
Margin	-7,270 to -7,170 [-6,341 to -6,241]	5,383 to 5,483 [6,312 to 6,412]
Percent return to capital & labor	-10.8% [-9.5%]	10.1% [11.8%]

TABLE 11.6 - Continued

Item	Truck	Trek to Ferkéssédougou Rail from Ferkéssédougou to Abidjan
Receipts (cont'd)		
5% carcass weight loss	59,280 [60,278]	59,280 [60,278]
Margin	-8,518 to -8,418 [-7,520 to -7,420]	4,135 to 4,235 [5,133 to 5,233]
Percen: return to capital & labor	-12.7% [-11.2%]	7.8% [9.6%]
.9% carcass weight loss	56,784 [57,740]	56,784 [57,740]
Margin	-11,014 to -10,914 [-10,058 to -9,958]	1,629 to 1,739 [2,595 to 2,695]
Percent return to capital & labor	-16.5% [-15.0%]	3.1% [4.9%]
Time Spent:		
Purchase of animals in and around Koutiala and completing formalities for export	30 days	30 days
Time in transit	3 days	31 days
Sale in Abidjan and return trip north	11 days	11 days
Total time per rotation of capital	44 days	72 days
Maximum number of rotations per year	5.0	8.2

[a] Prices in Abidjan as of November 1976-February 1977.

[b] See note c, Table 11.1.

[c] See note d, Table 11.4.

TABLE 11.7

PROFITS EARNED SHIPPING CATTLE BETWEEN OUAGADOUGOU AND ABIDJAN BY RAIL

(CFAF per animal)[a]

Item	Rail	
Costs		
Purchase of animal with 150 kg carcass @ 250 CFA F per kg carcass weight	37,500	
Costs of transport and sale in Abidjan (Table 6.10)	13,533-14,433	
Commission of landlord-intermediary[b]	200	
Average margin of go-between[b]	1,000	
Total Costs	52,233-53,133	
Receipts		
Sale @ 416 [423] CFAF per kg carcass weight,[c] assuming:		
9% loss of carcass weight	56,784	[57,740]
Margin	3,651 to 4,551	[4,607 to 5,507]
Return to capital and labor	8.0%	[9.8%]
Time Spent		
Purchase in Ouagadougou & arranging export	16 days	
Time en route	4 days	
Sale in Abidjan & return trip north	10 days	
Total time per rotation of capital	30 days	
Number of rotations per year	6-12[d]	

[a] See note a, Table 11.5.

[b] See note c, Table 11.1.

[c] See note d, Table 11.4.

[d] See text for explanation.

Profits as a Percentage of Final Sale Price in Abidjan.-- Table 11.8
presents the profit margins earned in shipping cattle to Abidjan as a
percentage of the animal's final sale price in Abidjan. The relative
magnitude of the margins is about the same as in Bouake, ranging from -
6.4 percent of the final sale price of animals shipped from Ouagadougou
to 8.2 percent of the sale price of animals shipped from Tingrela. Because
Abidjan is roughly 400 km farther south than Bouaké and because it is impos-
sible to trek cattle to Abidjan, transport costs (including shrinkage)
account for a much higher percentage of the final sale price in Abidjan
than in Bouaké. In Bouaké, these costs were 1 to 2 percent of the final
sale price, while in Abidjan they accounted for between 6 and 19 percent
Taxes, especially export taxes, are important costs for cattle shipped
from Mali and Upper Volta, accounting for 8.0 of the final sale price of
Malian cattle, and 11.6 percent of the final sale price of Voltaic cattle.

The data in Table 11.8 for cattle shipped from Ouagadougou are par-
ticularly instructive from a policy viewpoint. Ouagadougou is the single
largest source of cattle sold in Abidjan, accounting for roughly 42 per-
cent of the total.[1] Table 11.8 indicates that the initial purchase price
of the animal in Ouagadougou represents 60 percent of the final sale
price in Abidjan. Of the remaining 40 percent of the final sale price,
the largest costs are taxes (especially the Voltaic export tax of 6,519
CFAF per head) and costs related to rail transport (especially shrinkage
and rail fees). Together, taxes and transport costs account for over
30 percent of the final sale price of the animal, or 76 percent of total
costs excluding the purchase price in Ouagadougou. Presumably taxation
and transport costs (particularly shrinkage resulting from delays during
rail shipment) could be reduced through government actions. To date,
however, most government policies in Ivory Coast and Upper Volta (includ-
ing CEBV policies) have not focused on reducing these costs, but on reducing
transactions costs (i.e., eliminating intermediaries from the trade) and
reducing traders' margins. Table 11.8 indicates, however, that transac-
tions costs and traders' profit margins account for only about 9 percent

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[1]See Chapter 5, p. 191.

TABLE 11.8

EVOLUTION OF THE PRICE OF CATTLE SOLD IN ABIDJAN[a]

Item	Percent of Final Sale Price in Abidjan		
	Cattle from Tingrela (Trek & Truck)	Cattle from Koutiala (Trek & Rail)	Cattle from Ouagadougou (Rail)
1. Purchase in north	79.8	69.7	60.1
2. Labor costs[b]	2.4	2.9	0.7
3. Transactions costs[c]	2.1	2.1	2.5
4. Licenses, vaccinations, and taxes			
Ivory Coast	1.2	0.9	0.8
Mali/Upper Volta	-	7.1	10.8
Total	1.2	8.0	11.6
5. Cost of Truck/Rail shipment	3.6	4.2	7.8
6. Shrinkage[d]	1.0	5.0	9.0
7. Loss of animals and forced sales	1.4	1.6	1.9
8. Other charges[e]	0.2	-	-
TOTAL TRANSPORT COSTS (5 + 6 + 7 + 8)	6.2	10.8	18.7
9. Trader's profit	8.2	6.7	6.4

SOURCES: Tables 6.8, 6.9, 6.10, 11.5, 11.6, and 11.7.

[a] Assuming a sale price in Abidjan of 416 CFAF per kg carcass weight

[b] Includes salary, food and transport costs of drovers and transport and food costs (but not labor cost) of merchant.

[c] Intermediaries' commissions and go-betweens' margins.

[d] Author's estimates.

[e] Includes payment for crop damage, salt for animals, and miscellaneous expenses.

of the total sale price of the animal in Abidjan, or 22 percent of total costs excluding purchase price. This suggests that perhaps government policies should be refocused on improving livestock transport and reducing taxation.

Rates of Return to Capital of Merchants Shipping Cattle to Abidjan.-- Annual rates of return to capital invested in shipping cattle to Abidjan are calculated in Appendix 11.A. As with the data for Bouaké, a shadow wage for the trader of 30,000 CFAF per month and an annual opportunity cost of capital of between 20 and 30 percent are assumed. Rotation times as shown in Tables 11.5-11.7 are used, with the understanding that these represent the minimum possible rotation times. For cattle shipped from Ouagadougou, annual rates of return are calculated using two different assumptions: 1) that capital is invested in the cattle trade for six months per year and is idle for the remaining 6 months; and 2) that capital is invested in the trade for the entire 12 months of the year. Herman (30) reports that most traders in Ouagadougou ship cattle to Abidjan only during 6 months of the year (from September through February), when cattle are plentiful in the Voltaic markets and demand for meat in Abidjan is high. A few traders, however, continue trading to Abidjan during the entire year. Annual returns to capital calculated using the two different assumptions thus should give a range within which the actual rates of return lies.

The annual rates of return to capital calculated for traders shipping cattle to Abidjan are higher than those of traders who ship cattle to Bouaké. For traders shipping cattle from Tingrela to Abidjan, the estimated annual rate of return is 55 percent; for traders shipping cattle from Mali it is 25 percent, and for traders shipping cattle from Ouagadougou it ranges between 32 and 65 percent, depending on the assumption used. While the rate of return for traders shipping cattle between Mali and Abidjan is within the range of the assumed opportunity cost of capital the rates of return for merchants who ship cattle from Tingrela and Ouagadougou to Abidjan are significantly above it.[1] This suggests there are

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[1] It is also possible that the rate of return to capital of Malian traders is underestimated. See p. 378.

barriers to entry that prevent more merchants from shipping cattle to Abidjan or that merchants demand high risk premiums to ship cattle to Abidjan.

Barriers to Entry to the Abidjan Market.-- In the absence of barriers to entry or high risk premiums one would expect the rate of return to capital of traders who ship cattle to Abidjan to approximate that of capital invested in other activities. In particular, it should approximate the return to capital invested in shipping cattle along other trade routes, e.g., between Mali and Bouaké. If the return to capital invested in the Abidjan trade were higher than that earned trading cattle elsewhere, merchants would begin shipping more animals to Abidjan. This would increase the supply of cattle in Abidjan and decrease the supply elsewhere, leading to lower cattle prices in Abidjan and higher cattle prices in other markets. Merchants would continue to ship more animals to Abidjan until the rate of return to capital invested in the Abidjan trade approximated that of capital invested in the cattle trade in other areas. That the rate of return to capital invested in the Abidjan trade was higher than that invested in the Bouaké trade strongly suggests either barriers to entry or high risk premiums.

Barriers to entry could be of three types: 1) collusion among merchants and intermediaries in Abidjan to restrict entry into the Abidjan market; 2) high capital requirements to enter the Abidjan trade; and 3) transportation bottlenecks that prevent merchants from shipping more cattle to Abidjan. Each of these possibilities is examined below.

a. Collusion. -- There is no evidence that merchants and intermediaries in Abidjan collude to restrict entry into the Abidjan cattle market. The concentration ratios for intermediaries in Abidjan presented in Chapter 3 show a very low degree of concentration, with the top 4 intermediaries controlling only 36 percent of total sales during the month of highest concentration. This suggests very limited scope for collusion among intermediaries. In addition, the largest single source of an intermediary's income is the 200-CFAF commission he receives for each animal he

sells; it is therefore in his interest to maximize the number of animals entering the market. Herman's data (30a) show a low degree of concentration among merchants who export cattle from Ouagadougou to Ivory Coast, with the four largest merchants accounting for only 36 percent of total exports and the eight largest accounting for about 55 percent. This further suggests little scope for collusion to bar entry to the Abidjan market.

b. High capital requirements. -- Because of higher transport costs, the average capital investment per animal is slightly higher for cattle shipped to Abidjan than for cattle shipped to Bouaké. Abidjan is farther south than Bouaké, and merchants must ship their cattle through the forest zone either by truck or by rail, as trekking in the forest zone is both illegal and difficult. The average capital investment required to export a herd of fifty head of cattle by mixed transportation from Koutiala, Mali to Abidjan is roughly 2.7 million CFAF, compared with 2.5 million CFAF for exporting the same herd on hoof to Bouaké. The capital investment needed to enter the Abidjan trade is thus about 8 percent higher than that needed to enter the Bouaké trade. Although the higher capital requirement may exclude some small-scale traders from the Abidjan market, it probably is not high enough to exclude most cattle merchants from shifting their operations to Abidjan if they choose to do so.

c. Transportation bottlenecks. -- The major barrier to entry to the Abidjan market, especially during the period under consideration (November 1976 to February 1977), was a lack of transportation to move cattle into the Abidjan market. The traders' margins calculated in Tables 11.5 - 11.7 represent the margins of traders who managed to get trucks or rail cars to ship their cattle to Abidjan. During the November - February period there was a severe transport bottleneck, however, because many of the trucks and rail cars were in use hauling sheep south for Tabaski and hauling the coffee and cocoa harvests to port. This prevented many merchants who wanted to ship cattle south from doing so. Normally one would expect transport costs to rise in such a situation, leaving the rate of return to capital at the same level as would be obtained in the absence of transporta-

tion bottlenecks. Trucking rates did indeed rise at this time, but rail rates did not, as they were set at a constant level by the government-owned railroad. The railroad is the most important means of transporting cattle to Abidjan, and since its rates did not rise during the transportation bottleneck, the nominal cost of shipping cattle to Abidjan was below the shadow cost. This allowed merchants who managed to get transportation for their livestock to earn a high rate of return on their capital, but not everyone who wanted to ship cattle to Abidjan could do so.[1] In contrast, merchants shipping cattle to Bouaké were not faced with a transport constraint because they could trek their animals all the way to market, an option not open to merchants exporting to Abidjan. Because transportation did not pose a constraint to entering the Bouaké market, competition among merchants drove the return to capital down to that which could be earned in other activities. This implies that easing the seasonal transportation constraint to Abidjan could significantly reduce cattle prices in the Ivorian capital.

Risk in the Abidjan Market.-- If traders have only a limited amount of capital, they may be reluctant to invest it in an undertaking with a high expected rate of return if there is a substantial risk of losing some of their capital. Although the investment may pay a high return on average, merchants may prefer to invest in a lower-yielding enterprise that entails less chance of losing part of their principal. Merchants may be willing to undertake the risky investment only if they are paid a substantial premium to do so.

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[1]Another way of stating the same thing is to say that the average time spent in the north purchasing the animals and arranging their shipment south is underestimated in Tables 11.5 - 11.7. Many merchants may have had to wait for a long time to get trucks or rail cars, and some may not have even tried because they knew the wait would be long. Drovers from Ouagadougou interviewed in Abidjan said that it was not uncommon to wait three weeks for a car during this period , even after having paid a bribe to get one. If the period necessary to purchase animals in Ouagadougou and arrange their export is taken as thrity days (as opposed to 16 days as shown on Table 11.7) the rate of return to capital falls from 32-65 percent to 18-36 percent.

The main risks in cattle trading are the risk of the buyer defaulting on a credit sale, the risk of delayed repayment of credit (which lowers the rate of capital rotation), the risk of selling the animals at a loss because of depressed prices in the final market, and the risk of losing money because of excessive transport costs, especially high mortality and shrinkage losses.

a. Risk of default. -- The risk and cost of default may account for a small part of the apparent high rate of return to capital invested in the Abidjan cattle trade. In Chapter 3 it was noted that the average annual loss in unpaid debts per cattle merchant based in Abidjan was 576,000 CFAF. Assuming a monthly volume of 200 head for these merchants, this implies an average cost[1] of 240 CFAF per head. Including this cost in the margin calculations reduces the annual rate of return to capital by 2 to 3 percent for the different routes.[2] The cost of default thus accounts for only a small part of the high return to capital invested in the Abidjan trade.

It does not appear that the risk of default accounts for much of the risk premium demanded by merchants who ship cattle to Abidjan. Given an average price per head of cattle sold in Abidjan of 67,000 CFAF, the annual loss per merchant cited above represented only about 8.5 animals out of a total of 2,400 handled per year. The risk of default is therefore less than 0.4 percent per animal. This risk probably does not bar many merchants from entering the Abidjan market.[3]

b. Risk of delayed repayment. -- The risk of delayed repayment of debts

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[1]Or expected loss, in the framework of risk analysis.

[2]For merchants not based in Abidjan, the expected loss would be less than 240 CFAF per head because in most cases the intermediary would absorb at least some of the loss.

[3]It appears that the incidence of default and delayed repayment of debts in the Abidjan cattle market has fallen in recent years as the amount of credit extended has been reduced. (See Chapter 3, pp. 113-21.)

does not appear to be a major problem in Abidjan. Most credit is extended for only twenty-four to forty-eight hours in Abidjan. Although there are often delays in repayment, the interviews with drovers arriving in Abidjan indicate these delays seldom exceed 10 days.[1] This is in contrast to an average selling time of fifteen to thirty days reported by SEDES in 1972 (103, pp. 131-132).

c. Risks of losses due to fluctuating prices and high mortality and shrinkage. -- There is, however, very substantial risk of loss due to fluctuating prices in Abidjan and varying mortality and shrinkage losses, particularly of cattle shipped by rail from Ouagagoudou. Day-to-day price fluctuations in Abidjan result mainly from fluctuations in the number of rail arrivals, and are thus a function of the availability of cattle cars in the north. Mortalities and shrinkage are mainly a function of the length of time spent in the cattle cars, as was shown in Chapter 6.

As estimate of the variability of profits of merchants who ship cattle to Abidjan by rail from Ouagadougou can be made if one assumes that profits fluctuate only because of daily price changes in Abidjan and fluctuations in the shrinkage and mortality losses.

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[1]Of nine drovers from Ouagadougou interviewed during the study in Abidjan, none reported having waited over ten days to sell his animals and collect the credit due him. The average time spent selling the animals and waiting for repayment of credit was 5.4 days.

The calculations yield an estimated standard deviation of profit per animal of 6,400 CFAF, compared to a mean profit of abour 4,000 CFAF.[1] This high degree of variability indicates that while the average rate of return to capital is high in shipping cattle between Ouagadougou and Abidjan, it is not rare for merchants to lose money on any given trip.[2]

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[1]Variability in daily prices was measured by the variance of prices per kg within a given month. Data on mortality losses in rail transit come from the survey on rail arrivals in Abidjan discussed in Chapter 5. Shrinkage was estimated using these same survey data by assuming a 2.5 percent carcass weight shrinkage per day in transit.

The average profit (Π) earned in shipping an animal having a carcass weight in the north of 150 kg to Abidjan can be defined as follows:

$$\Pi = \left[(P_A) \cdot (150) \cdot (1 - S)\right] \cdot \left[1 - M\right] \qquad - \qquad C$$

$$\begin{bmatrix} \text{Average} \\ \text{Profit} \\ \text{per} \\ \text{animal} \end{bmatrix} = \begin{bmatrix} \text{Value per live animal} \\ \text{safely arrived in} \\ \text{Abidjan, taking account} \\ \text{of weight loss en route} \end{bmatrix} \cdot \begin{bmatrix} \text{Average proportion} \\ \text{of herd that} \\ \text{arrives alive in} \\ \text{Abidjan} \end{bmatrix} - \begin{bmatrix} \text{Cost per animal} \\ \text{of purchase and} \\ \text{shipment, excluding} \\ \text{mortality and} \\ \text{shrinkage costs} \end{bmatrix}$$

where P_A = the price per kg carcass weight in Abidjan

S = the carcass shrinkage en route as a proportion of original carcass weight
M = the mortality rate en route
and C = other costs (assumed constant)

A variable $Q = (150) \cdot (1 - S) \cdot (1 - M)$ was generated directly from the survey data. Since Q and P_A are independent random variables and C is a constant, the variance of profits, σ_Π^2 can be shown to equal

$$\sigma_\Pi^2 = E(P_A^2) \cdot E(Q^2) - \left[E(P_A)\right]^2 \cdot \left[E(Q)\right]^2$$

where E ( ) represents the expected value of the variable in parentheses.

Since $\sigma_{P_A}^2$, the variance of prices, and σ_Q^2, the variance of Q, are known,

E (P_A) and E (Q) can be estimated directly as the means of P_A and Q.

σ_Π the square root of the variance, is the standard deviation of profits.

See Appendix 10.B for the calculations.

[2]If profits were normally distributed, a standard deviation of 6,400 CFAF and a mean of 4,000 CFAF would imply that merchants lost money 27 percent of the time they shipped cattle from Ouagadougou to Abidjan. The distribution of profits, however, appears to be skewed slightly to the left (since mortalities are skewed to the right). Merchants shipping cattle between Ouagadougou and Abidjan therefore lose money less frequently than would be indicated by the normal distribution, probably losing money on between 15 and 20 percent of their trips.

The variation in cattle prices relative to the mean is larger in Abidjan than in Bouaké (see Chapter 10, p. 355), and mortality and shrinkage losses probably vary more, as well. Abidjan is thus a riskier market in which to sell, and this higher risk probably accounts for some the higher return to capital of Abidjan cattle traders.

Economies of Scale

The rates of return to capital calculated above are based on the assumption that a merchant has enough capital (roughly 2.5 million CFAF) to purchase and ship one herd of cattle at a time. If a merchant has enough capital to finance the shipment of more than one herd, however, the rate of return to his capital is higher than indicated above. The merchant's labor input increases less than proportionately to the number of animals shipped because many of his tasks (arranging shipment, paying export taxes, making contacts with intermediaries in the south, etc.) take about the same amount of time whether he ships a large or small number of animals. If the merchant has several "sets" of capital invested in the cattle trade at one time, he may need to hire agents to help handle his sales in the southern markets; even so, it is unlikely that his labor costs would increase as quickly as his gross margins. Assuming that it requires 50 percent more labor input on the part of a trader who ships cattle between Tingrela and Bouaké to rotate two "sets" of capital at a time rather than one,[1] the annual return to his capital rises from 21 percent to 36 percent by operating on this larger scale. There are thus significant economies of scale in cattle trading, and merchants who are able to finance several shipments of cattle at a time earn rates of return to their capital above those available elsewhere. Most merchants do not have enough capital to ship more than one herd at a time, however, and the large amount of capital needed to do so serves as a barrier to entry that protects the high return of those few merchants who do.

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[1] I.e., assuming that the return to the trader's labor increased by 50 percent.

Flows of Market Information

As indicated in Chapters 3 and 4, cattle prices ere openly discussed in the Abidjan and Bouaké markets and information on prices is generally available to all participants within a given market. Information on prices flows <u>between</u> markets mainly by word of mouth, with traders and drovers who travel between different markets sharing market information with their colleagues. In Chapter 3 (p. 136), it was noted that intermediaries in Abidjan and Bouaké often discuss prices and supply conditions in the exporting regions with the northern merchants who sell through the intermediaries, and that the intermediaries sometimes send money north to buy animals if prices appear favorable.

The time it takes for price information to travel from one market to another depends on how tightly linked commercially the markets are to one another and on the means of transport used to ship cattle between the two markets. Flows of information are rapid between markets that normally trade with each other and that are linked to one another by rail. Herman (30a, p. 8) reports that price information is transmitted between Abidjan and Ouagadougou within forty-eight hours by drovers who return from Abidjan by train and report to their employers the prices of cattle in Abidjan on the day they left.

Information appears to flow more slowly between markets that rely on trekking. Traders based in Bouaké, for example, get information on prices in northern producing areas from drovers arriving in Bouaké. This information may be up to a month old, however, if the animals were trekked to market. Traders supplement this information with that gleaned from friends who have recently returned from the north.

Merchants who have their cattle trekked south usually arrive at the sales market a few days before the scheduled arrival of their herd. Depending on market prices, they send word back to their drovers either to speed up or slow down the progress of the herd so that the herd arrives when market conditions are favorable. This flexibility in the timing of arrivals makes the slower diffusion of market information less critical than it otherwise would be for markets that rely on trekking.

The diffusion of market information seems slowest between markets that trade with each other only during certain times of the year (e.g., Bouaké and Abidjan). The investigator often noted that it would take up to two weeks between the time prices rose sharply in Abidjan and the time shipments of cattle began to arrive in Abidjan from Bouaké. The price data presented in Chapter 10 showed that a large inter-market price differential developed between Bouaké and Abidjan in April 1977, and it was not until June that arbitrage between the two cities managed to close the gap. This delay may have been partly due to difficulties in arranging shipment between Bouaké and Abidjan, but it was also due in part to a lack of knowledge among some traders in Bouaké of how high prices in Abidjan were.

Conclusions

This chapter has shown that the traditional cattle marketing system in Ivory Coast is fairly efficient. Although traders' gross margins are large for certain trade routes (e.g., 40 percent of the final sale price of cattle shipped between Ouagadougou and Abidjan), net margins are modest. During the study period, net margins generally ranged between 2,000 and 5,500 CFAF per head, or 4 to 9 percent of the final sale price of the animal. Traders' net margins generally accounted for less of the final sale price of cattle than did export taxes from Mali and Upper Volta, and were also smaller than transport costs (especially shrinkage losses) for cattle shipped from Ouagadougou to Abidjan.

The chapter has also shown that cattle merchants' heavy reliance on trekking is economically sound. Under normal price conditions trucking cattle is much less profitable than trekking them to market, even taking into account the faster capital rotation permitted by truck transport. The high rental cost of trucks and the poor roads in the north are major constraints to the expansion of trucking. Rail transport is more profitable than trucking, but generally less profitable than trekking, under most conditions.

Rates of return to capital of traders who shipped cattle to Bouaké

during the study period ranged from 16 to 30 percent per year, within the 20-to 30-percent range of the opportunity cost capital in the informal sector in West Africa. This suggests that merchants are not earning monopoly profits in the cattle trade. Annual rates of return calculated for Abidjan were higher, however, ranging from 25 to 65 percent (depending on the routes and the assumptions made about the rate of capital rotation), indicating serious barriers to entry to the Abidjan market and high risk premiums demanded by traders who ship cattle to Abidjan. The major barrier to entry was a seasonal shortage of trucks and cattle cars, which prevented many merchants from shipping cattle to Abidjan. The major risk involved was that of losing money because of fluctuating cattle prices in Abidjan (resulting from irregular rail arrivals of cattle) and excessive shrinkage and mortality losses (because of delays in rail transport). There is no evidence that the high rates of return to capital observed in Abidjan resulted from collusive behavior on the part of cattle merchants.

The data indicate that there exist significant economies of scale in cattle trading. Merchants who can afford to ship more than one herd of cattle south at a time appear to earn rates of return to capital in excess of 30 percent per year. The high capital investment needed to finance such multiple purchases acts as a barrier to entry that protects these high rates of return. It appears, however, that few merchants carry out such multiple operations.

Finally, the chapter has shown that market information is diffused rapidly between markets that trade regularly with one another. It is transmitted more slowly, however, between markets such as Bouaké and Abidjan that trade only occasionally with each other.

A major policy implication of these findings is that government actions such as the CEBV accords (16b) that aim at regulating and "reforming" the cattle trade through licensing arrangements, etc., are unwarranted from an efficiency standpoint. The traditional marketing system is working efficiently, given the constraints under which it operates. Government action is needed, however, to relax these constraints on the trade. Particular attention should be given to relieving the seasonal shortage of trucks and

and rail cars that prevents many merchants from shipping to Abidjan during the November to February period. More reliable rail service between Ouagadougou and Abidjan would also encourage increased competition among merchants by reducing the risk of loss due to highly fluctuating prices in Abidjan and excessive shrinkage and mortality losses en route. Officials might also consider measures such as a daily radio broadcast of market conditions in Abidjan to facilitate the flow of market information between Abidjan and Bouaké.

A second major policy implication is that under current price conditions, requiring mandatory trucking of cattle in Ivory Coast would be economically unsound. Not only would such a move result in higher cattle and meat prices in the south, but it would also create enforcement problems as merchants would seek to earn higher margins by clandestinely trekking their cattle to market. The experience of Abidjan also suggests that mandatory trucking would result in seasonal shortages of cattle during the November - February period, when the demand for trucks is high, to haul other cargoes, expecially coffee and cocoa.

CHAPTER 12

THE RETAIL BEEF TRADE AND CONSUMER PREFERENCES FOR MEAT

This chapter examines the final stage of cattle and beef marketing, the retail meat trade. The chapter examines the questions of whether the retail market works rationally and predictably (e.g., whether fluctuations in the retail price of beef follow fluctuations in cattle prices), whether the retail market works efficiently, and what types of meat Ivorian consumers prefer. The chapter is divided into six parts. The first part discusses how data on retail meat prices were collected and explains the selling strategy of most class 2 butchers. The second and third parts analyze data on retail beef prices in Bouaké and Abidjan, and the fourth part uses these data to calculate net margins of class 2 butchers in the two cities. The fifth section discusses the prices charged for beef by class 1 establishments (supermarkets and European-style butchers shops) and examines the net margins earned by those establishments. The final section discusses consumer preferences for beef as opposed to other types of animal protein, and consumer preferences for different grades of beef.

The chapter demonstrates that the retail market works rationally, with fluctuations in retail prices corresponding to fluctuations in cattle prices. Retail prices also reflect the range in the quality of meats available on the class 2 market. The chapter shows that the retail beef trade is fairly efficient, with the net margins of class 2 butchers representing between 8 and 12 percent of the retail price of beef. This compares with a net margin of about 30 percent earned by class 1 butchers in Ivory Coast. Margins are quite variable, due to fluctuations in cattle prices; the data indicate that in 1976-77 class 2 butchers in Bouaké lost money on about 8 percent of the animals they slaughtered. In Abidjan, where cattle prices were much more volatile because of poor transport and the inability of butchers to hold a buffer stock of animals (because of a lack of grazing near the abattoir), butchers lost money on roughly 19 percent of the animals they slaughtered. The chapter shows that the official pricing system in use in 1977 encouraged class 1 butchers to

sell imported meat rather than locally slaughtered beef, and this dampened the demand for choice animals in Abidjan.

The section on consumer preferences demonstrates that fish is the cheapest source of animal protein in Ivory Coast, while beef is the cheapest red meat. Beef is generally preferred to fish (and to all other protein sources except mutton), but the lower price of fish results in its being consumed much more widely than beef. Consumers generally prefer fresh beef to frozen beef, and there is strong evidence of a preference for some fat in the meat. Consumers object, however, to highly finished beef. This pattern of consumer preferences suggests that as incomes grow in Ivory Coast, demand will increase for well-fleshed animals. There may therefore be some scope for expanding short-term (two to three-month) cattle fattening projects. There is little evidence, however, that incomes will rise fast enough to generate enough effective demand to absorb greatly expanded production of highly finished beef.

Data on Retail Meat Prices

Retail prices for beef, mutton, and goat meat are officially fixed in Ivory Coast. Since prices are officially fixed, officially recorded prices of meat are often unreliable, reflecting official rather than actual prices. In order to overcome the problems inherent in working with price data collected by government agencies, data on retail meat prices were collected for this study by actually purchasing and weighing meat and by observing purchases made by others.

Types of Beef Sold.-- Fresh beef is sold in Abidjan and Bouaké both by kilogram and in small unweighed piles called tas. Beef is normally sold by kilogram as viande avec os, a mixture of skeletal meat, fat, bones, and stomach. Beef sold in tas typically contains meat, fat, bones, and offals. In Bouaké and Abidjan several different sizes of tas are available, ranging in price from 25 CFAF to 200 CFAF. The larger, more expensive tas are usually similar in composition to viande avec os, while the smaller tas usually contain a higher proportion of offals.

Official meat prices for all class 1 retailers in Ivory Coast and all class 2 retailers in Abidjan and Bouaké are set by the Ministry of Economic Affairs and Finance. Prices for class 2 retailers in areas outside Abidjan and Bouaké are set by the prefects of each département. In 1977 the official prices for Abidjan and Bouaké were completely outdated, not having been revised since 1974 and 1975, respectively. In both cities butchers sold meat at prices above official levels. Price control authorities generally turned a blind eye to the situation, realizing that given prevailing prices of cattle, butchers were obligated to sell above the official prices.[1] Nonetheless, the official prices tended to brake retail price increases because butchers knew they were selling above the officially-sanctioned levels and that if they raised their prices too rapidly the price control authorities might react by imposing fines. As a result, the price of beef sold by kilogram fluctuated very little from day to day, especially in Bouaké. In contrast, the price of beef sold by tas fluctuated considerably. Although the price per tas did not change, the size and composition of the tas did, thus the price per unit weight of the tas varied.[2]

Sales Strategy of Butchers.-- Sale of meat by tas serves two functions. First, it represents an adaptation to a market in which many consumers have very limited budgets and can only afford a small amount of meat. Second, the variability of the price per unit weight of the tas provides a mechanism by which supply is equated with demand and the

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[1] In 1977 the official prices in Abidjan were 300 CFAF per kg for beef with bones and 350 CFAF per kg for boneless beef. In Bouaké, the prices were 250 CFAF per kg for beef with bones and 300 CFAF for boneless beef (53; 54). It is shown later in this chapter that these prices were from 150 to 200 CFAF per kg lower than the prices actually charged in early 1977.

It appears that in some areas outside of Abidjan and Bouaké, especially in northern Ivory Coast, price control authorities try to enforce the official prices. This results in only lower-quality animals being slaughtered in these areas, with the better-quality animals moving toward Abidjan and Bouaké, where meat prices are freer and cattle prices are therefore more attractive.

[2] In theory, the weight and composition of the tas are fixed by law, but these regulations are not enforced.

market clears. Typically, a wholesale-retail butcher in Bouaké sells
the bulk of his meat at the prevailing, rather stable price per kg. If,
by the end of the morning, he has not sold all his meat, he makes it up
into _tas_, which he often consigns to an agent to sell in the market or
in the neighborhoods.

It is a reasonable hypothesis that the demand for meat in _tas_ is
more price-elastic than the demand for meat sold by weight. Meat in
tas is probably sold mainly to low-income consumers who can only afford
to buy a little meat and for whom beef is more of a luxury than for
higher-income consumers. If the demand for beef in _tas_ is more price-
elastic than that for beef sold by weight, then butchers are practicing
a form of price discrimination that maximizes their total revenue. They
sell as much beef as they can on a per-kg basis at the relatively stable
price per kg, then sell the remainder on the more elastic market at a
lower price. This market strategy is shown schematically in Figure 12.1.

In Figure 12.1 the demand function for beef sold by weight is repre-
sented by the line D_W. The corresponding marginal revenue function is
MR_W. The more elastic demand for beef sold in _tas_ is represented by the
line D_T, and its marginal revenue function is MR_T. In an idealized situ-
ation, butchers who had the quantity Q_{TOT} to sell would sell Q_W by weight
at the stable (and in part institutionally set) price for meat sold by
kilogram, P_W. They would then sell the remainder, Q_T, by _tas_ on the
more elastic market. They would set the price of this meat sold by _tas_,
P_T, so that the marginal revenue earned selling Q_T by _tas_ would equal
the marginal revenue earned selling Q_W by weight. This would then maxi-
mize total revenue. The total revenue earned selling Q_W by weight would
equal to the area $P_W A Q_W O$, and that earned selling Q_T by _tas_ would be equal
to the area $P_T B Q_T O$. It is clear that the sum of these two areas is
greater than the area $P_{TOT} C Q_{TOT} O$, which represents how much butchers would
earn were they to lower the price of beef sold by kilogram enough so that
they could sell the entire quantity Q_{TOT} by weight. Butchers thus appear
to discriminate between two different types of demand for beef in a way
that maximizes their revenues.

FIGURE 12.1 Price Discrimination in Retail Beef Sales
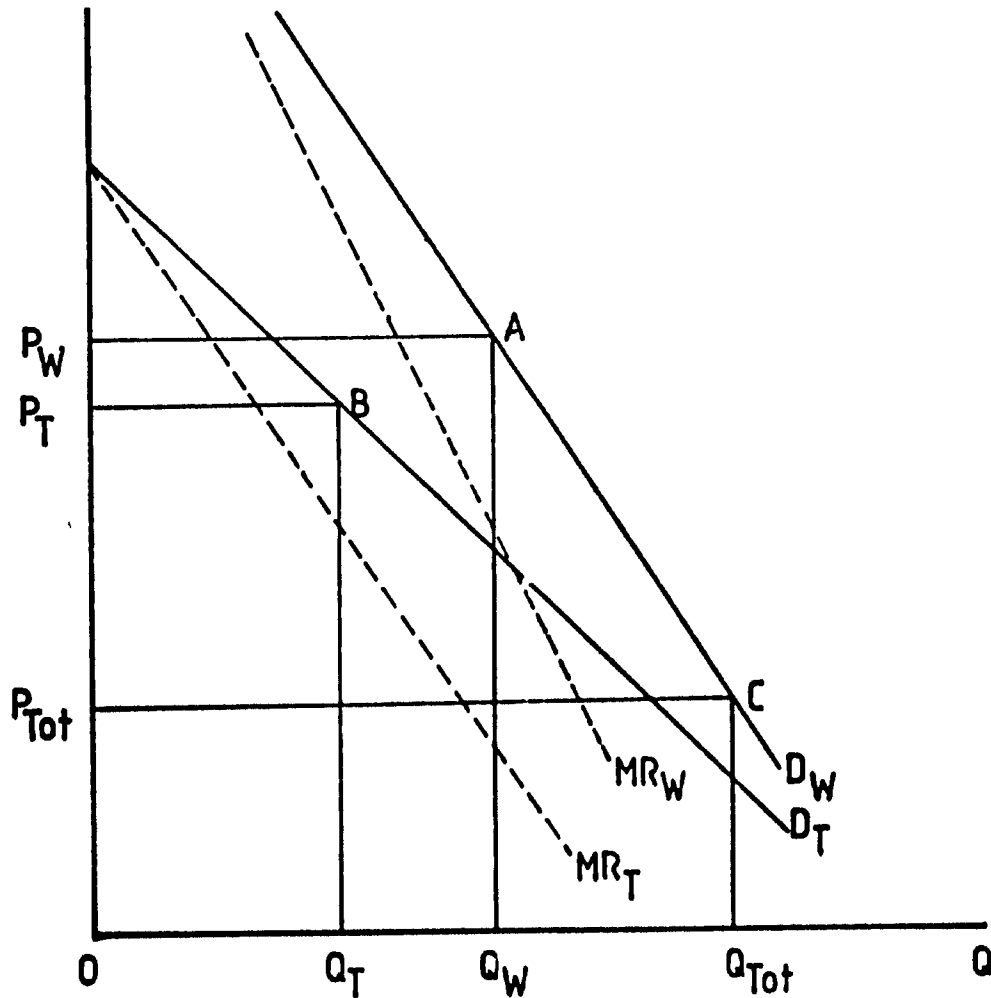
Data Collection.-- Data on retail meat prices were collected in the following manner. Several tas of different sizes were purchased weekly in Bouaké and Abidjan.[1] In Bouaké most purchases occurred at the central market, although meat was also purchased in small neighborhood markets in order to test whether prices varied between markets in the city. In Abidjan, beef was purchased in the markets of Treichville, Adjamé, and Koumsssi. (Many fewer purchases were made in Abidjan, however, than in Bouaké, where the investigator was based.) In each city, the person buying the tas also noted the price at which butchers sold beef and other meat by weight. Beef was occasionally purchased by weight to verify the weight sold and determine its content of bone, fat, meat, and offals.

Once purchased, the meat was taken from the market and weighed. For each tas, the total weight was recorded, as well as the weight of skeletal meat, fat, bones, and offals.[2] Tables 12A.1 and 12A.2 in Appendix 12A present information on the number of types of tas of beef purchased and weighed during the study.

Retail Beef Prices on the Class 2 Market in Bouaké

Although the price of beef sold by weight in the class 2 market was fairly stable, it did vary occasionally, depending on supply and demand. The price of beef sold by tas did not vary at all per tas, but the weight and composition of the tas[3] varied from day to day, so the price per kg of meat sold by tas varied daily. Table 12.1 presents data on how beef prices varied in Bouaké during the study period.

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[1]Purchases were made by an African unknown to the butchers.

[2]When heart was present in a tas, it was weighed as skeletal meat. The fat weighed was only that which could be separated easily from the meat. Interstitial fat (marbling) could not be weighed.

[3]The relative amounts of meat, offals, fat, and bone.

TABLE 12.1

ACTUAL RETAIL PRICES OF BEEF SOLD IN CLASS 2 MARKET IN BOUAKE, JULY, 1976 - JULY, 1977[a]

(IN CFAF PER KG)

Type of Beef	1976						1977	
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
Beef Sold By Weight								
Fresh Beef With Bones								
Range	350	350	350-375	375	375	375-400	375-400	375-400
Most Common Price[c]	350	350	375	375	375	400	375	400
Fresh Boneless Beef								
Range	400	400	400-425	425	425	425-450	425-450	450
Most Common Price	400	400	425	425	425	450	425	450
Frozen Beef With Bones								
Range	300	300	280-300	280	280-300	300	300	300-350
Most Common Price	300	300	280	280	300	300	300	300
Frozen Boneless Beef								
Range	350	350	330-350	330	330-350	350	350	350-400
Most Common Price	350	350	330	330	350	350	350	400
Beef Sold By Tas								
200 CFAF Tas								
Ave. Weight (gm)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	511
(s.d.)[d]								(40)
Price per kg [e]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	394
(s.d.)								(3.2)
n[f]								9
100 CFAF Tas								
Ave. Weight (gm.)	273	273	258	252	246	237	221	256
(s.d.)	(38)	(45)	(44)	(25)	(38)	(42)	(21)	(32)
Price per kg.	367	376	397	401	415	436	458	397
(s.d.)	(42)	(62)	(63)	(39)	(60)	(88)	(44)	(55)
n	12	15	9	15	12	15	9	12
50 CFAF Tas								
Ave. Weight (gm)	239	251	255	229	235	211	212	179
(s d)	(26)	(27)	(30)	(31)	(22)	(36)	(29)	(28)
Price per kg	211	202	198	221	215	242	241	285
(s d)	(24)	(11)	(23)	(28)	(21)	(39)	(44)	(43)
n	11	15	9	15	11	12	9	12
25 CFAF Tas								
Ave. Weight (gm)	114	119	100	114	118	106	92	90
(s.d.)	(16)	(18)	(13)	(19)	(18)	(28)	(16)	(15)
Price per kg	223	214	252	225	217	251	276	285
(s.d.)	(31)	(33)	(33)	(36)	(37)	(64)	(40)	(41)
n	11	15	8	15	12	15	9	12

TABLE 12.1 - Continued

Type of Beef		1977			
	March	April	May	June	July
Beef Sold By Weight					
Fresh Beef With Bones					
Range	375-400	400	375-400	400	400
Most Common Price	400	400	400	400	400
Fresh Boneless Beef					
Range	450	450	450	450	450
Most Common Price	450	450	450	450	450
Frozen Beef With Bones					
Range	300-350	350	350	350	350
Most Common Price	325	350	350	350	350
Frozen Boneless Beef					
Range	400	400	400	400	400
Most Common Price	400	400	400	400	400
Beef Sold By Tas					
200 CFAF Tas					
Ave. Weight (gm)	523	485	512	512	519
(s.d.)	(51)	(38)	(15)	(17)	(14)
Price per kg	386	415	391	391	385
(s.d.)	(35)	(35)	(11)	(13)	(10)
n	9	12	12	12	6
100 CFAF Tas					
Ave. Weight (gm)	262	215	216	256	263
(s.d.)	(33)	(31)	(36)	(54)	(14)
Price per kg	395	476	476	403	381
(s.d.)	(72)	(76)	(82)	(71)	(19)
n	10	12	12	12	6
50 CFAF Tas					
Ave. Weight (gm)	206	198	206	216	221
(s.d.)	(32)	(15)	(22)	(29)	(32)
Price per kg	248	253	245	236	230
(s.d.)	(38)	(19)	(29)	(33)	(38)
n	8	12	12	12	6
25 CFAF Tas					
Ave. Weight (gm)	93	96	96	98	96
(s.d.)	(20)	(20)	(17)	(14)	(17)
Price per kg	274	275	274	259	268
(s.d.)	(46)	(51)	(43)	(36)	(43)
n	6	12	12	12	6

TABLE 12.1 - Continued

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[a]Prices in the central market.

[b]Range of observed selling prices during the month.

[c]The price most commonly charged during the month.

[d]Standard deviation.

[e]Based on actual purchase and weighting of the tas.

[f]Number of observations.

Price of Beef Sold by Weight.-- Between July 1976, and July 1977, retail prices in Bouaké of fresh beef sold by weight rose from 350 CFAF per kg to 400 CFAF per kg. Prices first rose to 375 CFAF per kg in mid-September, when prices for cattle, especially heavy cattle, rose. Retail beef prices were stable from mid-September to near the end of December, when butchers again raised their prices (to 400 CFAF per kg) in response to rising cattle prices. As cattle prices fell in January the retail price fell back to 375 CFAF per kg, but it quickly returned to 400 CFAF per kg in February as cattle prices started to rise at the end of the dry season. From February through July 1977, the price remained stable at 400 CFAF per kg. Throughout the entire period, boneless fresh beef cost 50 CFAF more per kg than did fresh beef with bones.

Frozen beef, mainly South American beef imported by AGRIPAC, sold for between 50 and 100 CFAF less per kg than fresh beef. From July through September 1976, frozen beef sold retail for 300 CFAF per kg. with bones, and 350 CFAF per kg boneless. AGRIPAC reduced authorized retail prices by 20 CFAF per kg for both boneless beef and beef with bones during September and October, then raised prices back to 300 CFAF per kg for meat with bones and 350 CFAF for boneless meat in November. The price of frozen beef with bones remained at 300 CFAF until March, when it rose to 325 CFAF per kg. In April it rose again to 350 CFAF per kg thus re-establishing a 50-CFAF-per-kg difference between it and the price of fresh beef. It is shown later in this chapter that a strong consumer preference for fresh beef allowed this price differential to be maintained.

Price and Composition of Beef Sold by Tas.-- Variations in the weight of the tas allowed the price per kg of beef sold by tas to vary from month to month. For example, the price of beef sold in 100-CFAF tas ranged from 367 CFAF per kg in July 1976 to 476 CFAF per kg in April and May 1977; and price of beef sold in 50-CFAF tas varied from 198 CFAF per kg in September 1976, to 285 CFAF per kg in February 1977.

It is clear from Table 12.1 that the price per kg of beef sold in 100 and 200-CFAF tas was much higher than that sold in 25 and 50-CFAF tas.

The price per kg of the 25 and 50-CFAF _tas_ averaged only about 60 percent of the price per kg of the 100-CFAF _tas_, while the 200-CFAF _tas_ cost 95 percent as much per kg as the 100-CFAF _tas_. The differences in the price per kg reflected quality differences among the _tas_. The smaller _tas_ contained a larger proportion of offals and fat and a smaller proportion of skeletal meat than did the larger _tas_. Moreover, the meat and offals in the more expensive _tas_ were of higher quality than those in the small _tas_.[1] The average compositions of the different-priced _tas_ are shown in Table 12.2, and are compared with that of beef sold by weight.

Table 12.2 shows that over 60 percent of the weight of the large _tas_ was accounted for by skeletal meat, while between 7 and 11 percent was made up of offals. In contrast, only about 40 percent of the weight of the small _tas_ was accounted for by skeletal meat, and offals made up around 30 percent. The large _tas_ contained relatively more bone than the small _tas_ because the large _tas_ were made up of meat from those parts of the carcass that had heavy bones (ribs, hind quarters, and shanks). All of the _tas_, however, contained a smaller proportion of skeletal meat than did beef sold by weight. Beef sold by weight also contained more bone, fewer offals, and less separable meat than did the _tas_.[2] Frozen beef was sold with no offals, while fresh beef sold by weight usually contained a small amount of stomach.

As demand and supply varied, butchers varied both the size and composition of the _tas_. The effect of these changes is shown in Figure 12.2, which compares the monthly price per kg of the 100-CFAF _tas_ with the price per kg of the different constituents contained in it. From Figure 12.2 it is clear that the price per kg total weight varied the least from month to month while the price per kg of skeletal meat contained in the _tas_ varied the most.[3] A more detailed analysis of how the price

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[1] For example, the offals in the large _tas_ were usually those preferred by consumers (e.g., liver and stomach), as opposed to intestines and lungs, which were often included in the smaller _tas_.

[2] The meat sold by kg may have contained more interstitial fat, however, than the meat by the _tas_.

[3] In Figure 12.2, "boneless" is defined as the combined weight of the meat, offals, and fat contained in the _tas_. "Protein" includes only the weight of the meat and offals. See Appendix 12.A for data on how the composition of the _tas_ sold in Bouaké varied by month.

TABLE 12.2

AVERAGE COMPOSITION OF BEEF SOLD IN BOUAKE, JULY 1976 - JULY 1977[a]

	Average Price per Kg	Skeletal Meat (percent)	Offals (percent)	Fat (percent)	Bones (percent)
Tas					
200 CFAF[b]	395	67.4	6.9	7.0	18.7
(s.d.)[c]	(26)	(7.8)	(6.1)	(5.8)	(6.7)
N[d]	60	60	60	60	60
100 CFAF	414	60.3	11.0	12.6	16.0
(s.d.)	(7)	(12.9)	(11.9)	(10.3)	(6.8)
N	151	151	151	151	151
50 CFAF	233	37.3	33.5	18.9	10.4
(s.d.)	(38)	(12.2)	(15.2)	(11.2)	(7.4)
N	144	144	144	144	144
25 CFAF	250	40.2	31.2	20.9	7.7
(s.d.)	(48)	(15.7)	(18.4)	(15.0)	(8.7)
N	145	145	145	145	145
Beef Sold By Weight					
Fresh Beef with Bones	350-400	70.3	3.1	5.5	21.1
(s.d.)		(4.0)	(6.1)	(4.9)	(3.5)
N		5	5	5	5
Frozen Beef with Bones	300-350	72.6	0	5.8	21.6
N		1	1	1	1

[a]Tas sold in central market. N.B. totals may not equal sum of subtotals due to rounding.

[b]Data for 200-CFAF tas refer to the period February - July, 1977.

[c]Standard deviation.

[d]Number of observations

FIGURE 12.2   Price per Kg of Different Constituents of 100-CFAF tas of Beef Sold in Bouake, July, 1976—July, 1977
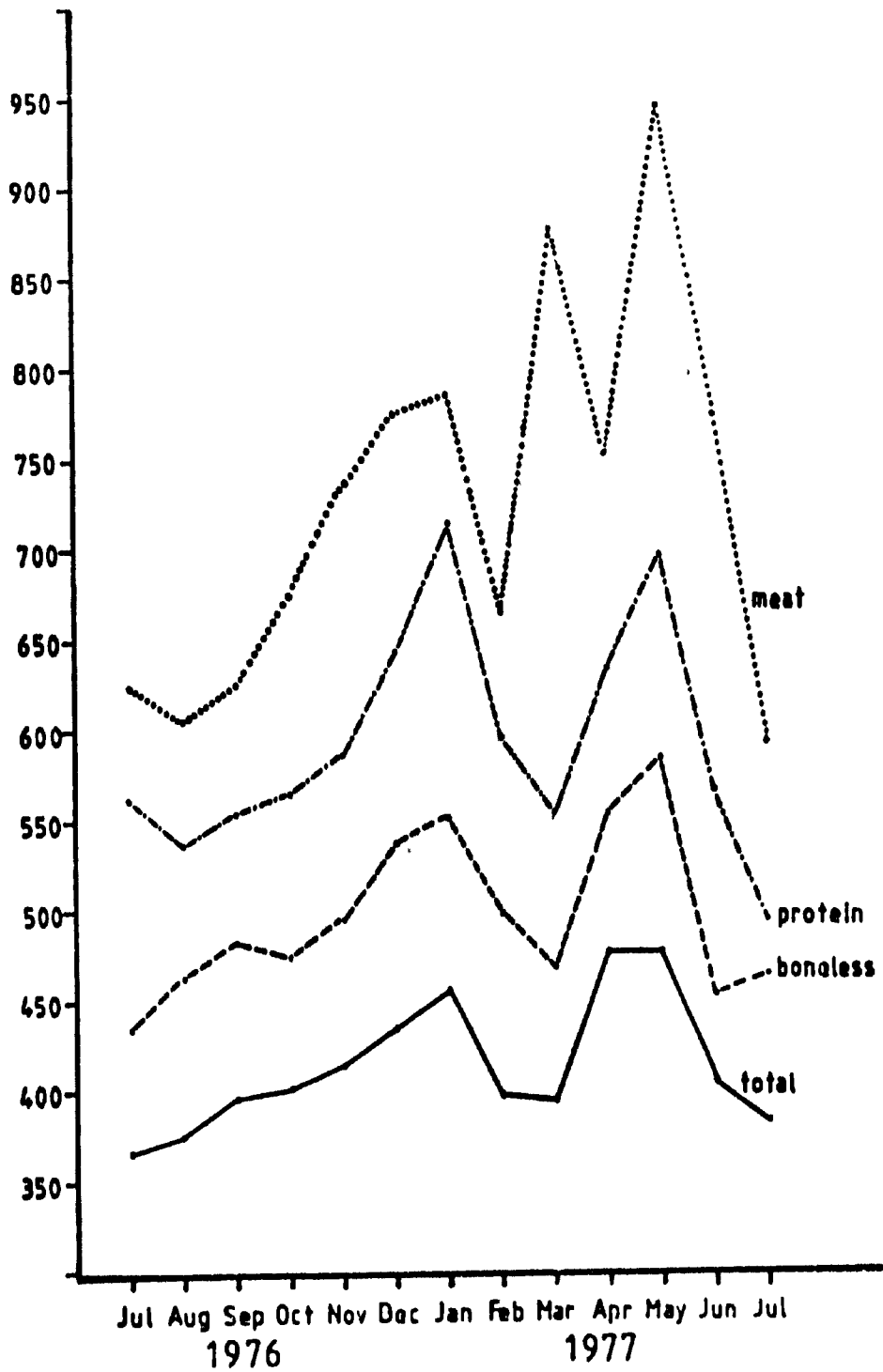
of the _tas_ varied as their composition changed is presented below in the section on consumer preferences for meat.

Relationship Between the Retail Price of Beef and the Price of Cattle.-- The retail demand for beef is the major determinant of the demand for cattle in Bouaké. The retail demand for beef is a combination of the demand for beef sold by kg and the demand for beef sold by _tas_. Interviews with wholesale-retail butchers in Bouaké (see Chapter 4, p. 149ff.)indicated that class 2 butchers in Bouaké sold roughly 17 percent of their beef by _tas_ and 83 percent by weight. Using these percentages, a composite average price of beef was constructed, weighting the "most common price" of fresh beef with bones shown in Table 12.1 by 0.83 and a straight average of the price per kg of the 25, 50, and 100-CFAF _tas_ by 0.17. This monthly composite price is shown in Appendix 12B. Figure 12.3 compares this monthly composite price with the average monthly price of zebu males (with carcass weights of 130-159 kg) sold in Bouaké during the study period. Throughout most of the period fluctuations in retail meat prices were reflected in similar fluctuations in cattle prices. Fluctuations in retail beef prices tended to be smaller than the corresponding fluctuations in cattle prices; this is the usual relationship between a primary and a derived demand. In general, Figure 12.3 indicates that cattle prices in Bouaké closely reflected the retail demand for beef.[1]

Price Differences Between Markets.-- Between February and July 1977, 100-CFAF _tas_ were purchased weekly in one of Bouaké's small neighborhood markets[2] in order to test whether prices varied between the central market and peripheral markets. If prices were highly divergent between markets it would indicate poor spatial arbitrage within the city. If the

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[1] N.B. butchers may make a profit slaughtering an animal even if the price they pay for it, expressed in CFAF per kg carcass weight, exceeds the retail price of beef. This is because the butchers earn additional income by selling the fifth quarter. Therefore, the average price per kg carcass weight of cattle need not be lower than the retail price of beef.

[2] The market of Ahougnanssou.

FIGURE 12.3 Comparison Cattle Prices and Retail Beef Prices, Bouake, July, 1976 - July, 1977.
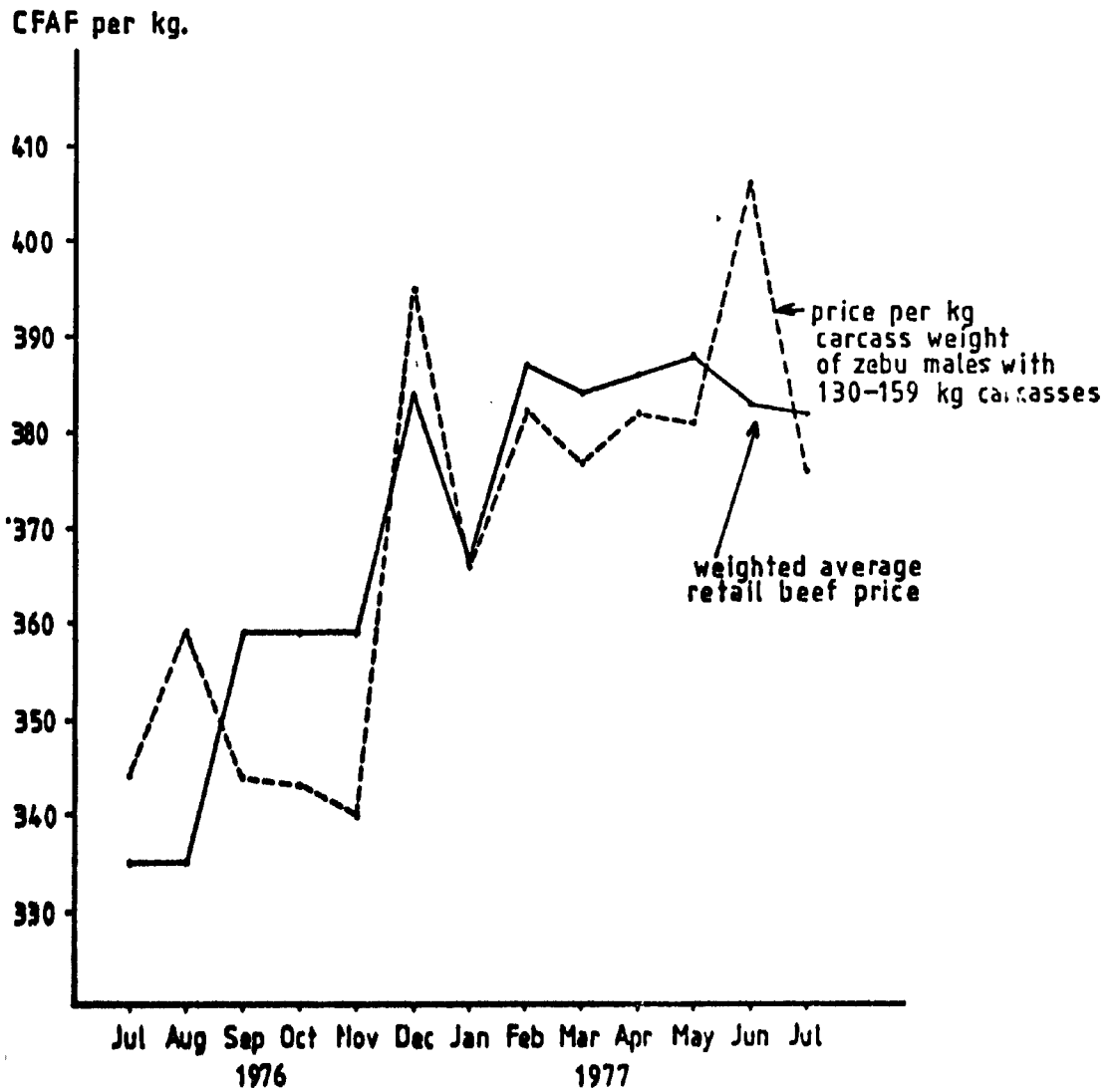
neighborhood price were much higher than the central market price, it would also suggest that sellers in the local market exercised a degree of local monopoly power.

The data shown in Appendix 12A indicate that during three of the six months of observation the price per kg of the 100-CFAF tas in the neighborhood market exceeded the price in the central market, while during the other three months it was below the central market price. The average per kg over the period was 421 CFAF in the central market and 414 CFAF in the neighborhood market. The slightly lower price in the neighborhood market reflected a lower percentage of skeletal meat in the tas sold in the neighborhood market (53 percent versus 59 percent for the central market tas) and a slightly higher proportion of offals and fat than in the central market tas. Overall, however, the close correspondence between the price in the central market and the price in the neighborhood market indicated that efficient spatial arbitrage of meat existed within Bouaké.

Retail Meat Prices on the Class 2 Market in Abidjan

Unlike Bouaké, in Abidjan the price of beef sold by weight fluctuated considerably during the study period. It also appeared that a smaller proportion of total sales in Abidjan were composed of meat sold by tas. During the first six months of 1977, the study's enumerators conducted an informal survey of retail meat prices in three markets in Abidjan (Adjamé, Treichville, and Koumassi), noting prices at which butchers sold beef by weight. Since prices varied among butchers and from day to day, and because in some months only a few observations were made in each market, only the most commonly observed prices are presented in Table 12.3, not mean prices.[1] Table 12.4 presents the average monthly price of beef purchased by tas in the Abidjan markets during the period December 1976 - May 1977.

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[1] The range of prices observed are shown in Appendix 12C.

TABLE 12.3

MOST COMMONLY OBSERVED PRICES OF BEEF SOLD BY WEIGHT IN CLASS 2 MARKET ABIDJAN, 1977[a] (CFAF per kg)

Market/Type of Beef	January	February	March	April	May	June
Treichville						
Fresh Beef						
With Bones	450	450	500	500	500	450
Boneless	500	500	600	600	600	500
Frozen Beef						
With Bones	400-450	350-400	400	350	400	375-400
Boneless	450	400-450	450	400-450	450	425-450
Adjamé						
Fresh Beef						
With Bones	400	450	450	450-500	450	450-500
Boneless	450	500	600	550	500	500-600
Frozen Beef						
With Bones	300	400	400	350	400	400
Boneless	350	450	450	400	450	450
Koumassi						
Fresh Beef						
With Bones	450	450	450	500	450	n.a.
Boneless	500	500	550	600	500	n.a.
Frozen Beef						
With Bones	350	300-400	400	450	400	n.a.
Boneless	400	350-450	450	550	450	n.a.

[a] Prices most commonly recorded by study's enumerators. See Appendix 12C for information on the range of prices observed.
n.a. = not available

Table 12.3 indicates that prices for fresh beef with bones in Abidjan varied between 400 and 500 CFAF per kg during the study period, depending on the market and the month. Frozen beef generally sold for between 50 and 100 CFAF less per kg than did fresh beef. Prices were usually highest in Treichville and lowest in Adjamé. This was probably due to Treichville being a higher-income neighborhood than either Adjamé or Koumassi.

TABLE 12.4

AVERAGE PRICE PER KG OF BEEF SOLD BY 100-CFAF TAS
IN ABIDJAN, DECEMBER, 1976 - MAY, 1977 (IN CFAF)

	1976	1977				
	Dec.	Jan.	Feb.	Mar.	Apr.	May
Average weight (gm)	367	365	268	311	463	277
(s.d.)[a]	(153)	(104)	(9)	(167)	(184)	(30)
Price per kg	306	292	374	376	248	365
(s.d.)	(97)	(83)	(12)	(138)	(111)	(37)
N[b]	7	4	4	4	5	4

Average composition of 100-CFAF tas sold in Abidjan:

50.3 percent skeletal meat

12.3 percent fat

14.1 percent offals

23.3 percent bone

[a]Standard deviation.

[b]Number of observations.

Table 12.4 shows that the average price of beef sold by tas was considerably below that of beef sold by weight. Compared to the 100-CFAF tas sold in Bouaké, the Abidjan tas contained a higher percentage of offals and a lower percentage of meat. Fluctuation in the composition of the tas accounted for much of the month-to-month price variation shown in Table 12.4. (See Appendix 12A for details.)

Profit Margins of Class 2 Butchers

The large number of butchers active in both Abidjan and Bouaké (see Chapter 4, p. 146), suggests that the class 2 market for meat is competitive. Examining the net margins of butchers can shed further light on the degree of competition in the trade. High net margins would probably reflect barriers to entry into the butchers' trade and would suggest scope for improving the welfare of producers and consumers by encouraging increased competition among butchers.

Net margins for wholesale and wholesale-retail butchers in Abidjan and Bouaké are calculated below using the data just presented on retail meat prices and the information presented in Chapter 10 on cattle prices. The data on butchers' costs come from the interviews with butchers discussed in Chapter 4 and from discussions with Veterinary Service officials in Abidjan and Bouaké.

Profit Margins of Class 2 Butchers in Bouaké.-- Table 12.5 presents estimates of the net margins earned by class 2 wholesale-retail butchers in Bouaké during the period April-June 1977 (the end of the dry season). Most of the cost and receipt items in Table 12.5 are self-explanatory, but four points need clarification:

1) In Bouaké butchers usually mix the stomach with meat, bones, and fat, and sell the combination as "meat with bones."

2) Butchers in the class 2 market sell little boneless beef. Boneless beef is sold primarily to European and Lebanese customers, and the amount sold probably does not exceed 10 kg per carcass, excluding the filet.

3) Waste in cutting up the carcass is low. The only losses are the scapula, which is not sold, and bone splinters. These together are estimated at two kg per carcass.

4) In Bouaké, apprentice butchers are obligated to buy the fifth quarter of each animal for a fixed price (except for the hide and stomach, which are sold by the butcher). The apprentices must pay this fixed amount to the butcher even if some of the

TABLE 12.5

ESTIMATED NET MARGIN OF A BUTCHER SLAUGHTERING
A 150 KG CARCASS WEIGHT ZEBU MALE IN BOUAKE (IN CFAF)
(Prices and Costs as of April - June, 1977)

Expenses

Purchase of Animal: 150 kg @ 390 CFAF[a] per kg carcass weight	58,500
Slaughter Tax	750
Veterinary Inspection Tax	450
Transport of Meat from Abattoir to Market	200
Rental fee for market stall: 3,700 CFAF[b] per month	123
Butchers' Union Fees	
5,000 CFAF annual dues	14
100 CFAF per day contribution collected at market	100
Amortization of butcher's license (average cost per year = 136,800 CFAF[c])	302
Risk of seizure of carcass: 0.3%[d] of amount invested in the animal	180
Paper to wrap meat, sharpening of tools, etc.	200
Butcher's transport to and from cattle market and abattoir	240
Average payment to sales assistant	500
Average cash payment to apprentices: 5,000 CFAF per month	167
Payment to store unsold meat in cold rooms[e]	100
Average daily loss through defaults on credit sales of meat: 18,800 CFAF per year[f]	54
TOTAL COSTS	**61,880**

Receipts I — Typical Situation — 65 percent of meat sold retail, 35 percent wholesale[g].

Fillet 4 kg @ 700 CFAF/kg	2,800
166 kg of remaining carcass + 8.5 kg of stomach,[h] of which:	
54 kg (35%) sold wholesale @ 375 CFAF/kg	20,250
108.5 kg sold retail, of which 83.5 kg sold by kg and 17 kg sold by tas	
10 kg sold boneless @ 450 CFAF/kg	4,500
66 kg sold with bones @ 400 CFAF/kg [j]	27,800
3.5 kg sold next day @ 350 CFAF/kg	1,225
17 kg sold by tas	
10 kg sold in 100 CFA F tas @ 434 CFAF / kg [k]	4,340
7 kg sold in 50 CFA F tas [l] @ 244 CFAF/kg	1,687
2 kg wastage[m]	0
Hide	350
Fifth quarter: Sold to apprentices @	8,000
TOTAL RECEIPTS	**68,352**
Net Margin =	6,472 CFAF =

10.5 percent of butcher's costs

9.1 percent of final sale price of meat and offals.

TABLE 12.5 - Continued

Receipts II -- 100 percent sold wholesale

Filet: 4 kg @ 700 CFAF/kg	2,800
146 kg of carcass + 8.5 kg stomach sold wholesale @ 375 CFAF	57,938
Hide	350
Fifth quarter: Sold to apprentices @	6,000
TOTAL RECEIPTS	67,088

Total Costs = 61,880 CFAF - 500 CFAF payment to retail sales assistant 61,380 CFAF

Net Margin =   5,708 CFAF =

      9.3 percent of butcher's costs

      8.5 percent of final sale price of meat and offals

Receipts III -- 100 percent retail sales

Filet: 4 kg @ 700 CFAF/kg	2,800
146 kg of carcass + 8.5 kg of stomach, of which:	
26 kg sold by tas	
16 kg sold in 100 CFA F tas @ 434 CFAF/kg =	6,944
10 kg sold in 50 CFA F tas @ 241 CFAF/kg	2,410
128.5 kg sold by weight, of which:	
10 kg sold boneless @ 450 CFAF/kg	4,500
116.5 kg sold with bones @ 400 'CFAF/kg	46,600
2 kg wastage	0
Fifth quarter: Sold to apprentices @	6,000
Hide	350
TOTAL RECEIPTS	69,604
TOTAL COSTS	61,880

Net Margin =   7,724 CFAF =

      12.5 percent of butchers' costs

      11.1 percent of sale price of meat and offals.

See following page for notes for Table 12.5.

Table 12.5 - Continued

[a]Average price of zebu males with carcass weights of 130-159 kg sold in Bouaké between April and June 1977 (Table 10.2.)

[b]Average rental fee for market stalls of 27 wholesale-retail butchers interviewed in Bouaké (see Chapter 4).

[c]The cost of a butcher's license varies according to the number of cattle slaughtered per year and the rental fee of the butcher's market stall. The figure of 108,800 CFAF is an average drawn from the interviews mentioned in note b.

[d]The 0.3% rate is based on data on condemnations of carcass by the Veterinary Service in Bouaké during 1976. Since the apprentices in Bouaké are obligated to pay the butcher 6,000 CFAF for the fifth quarter even if some of the internal organs are seized, the only risk the butcher bears is that of seizure of the entire carcass.

[e]Payment for storage in AGRIPAC cold room or for buying ice to store meat overnight.

[f]Figure drawn from interviews with wholsale-retail butchers in Bouaké (see Chapter 4, p. 149 ff.). Daily figure assumes an annual volume of 350 animals.

[g]The interviews with wholesale-retail butchers in Bouaké indicated that on the average they sold 65 percent of their beef retail and 35 percent wholesale (see Chapter 4, pp. 158-59).

[h]Butchers combine the stomach with skeletal meat, bones, and fat and sell the mixture as "beef with bones." The figure of 8.5 kg is a mean drawn from weighing the stomachs of 50 cattle slaughtered in Bouaké having carcass weights between 140 and 159 kg.

[i]The interviews with wholesale-retail butchers in Bouaké described in note b indicated that approximately 83 percent of their retail sales of meat were made by weight and 17 percent were made by tas.

[j]The interviews with butchers showed that on the average they had 3.5 kg of meat left over per day, which they sold at a discount of 50 CFAF per kg

[k]Average price per kg of 100-CFAF tas sold between April and June 1977 (see Table 12.1).

[l]Average price per kg of 50-CFAF tas sold between April and June 1977 (See Table 12.1).

[m]Bone chips and scapula.

internal organs are seized by the Veterinary Service
because of disease. The apprentices therefore bear the
entire risk of loss due to condemnation of the internal
organs.

Table 12.5 shows the net margins earned in three different situations.
The first, which is the most typical, involves the butcher selling 35
percent of his meat wholesale and 65 percent retail. Of the retail sales,
83 percent are by weight and 17 percent are by tas.[1] In this situation,
the butcher earned an average net margin of about 6,500 CFAF per head.
This margin was equal to 10.5 percent of his total costs and 9.5 percent
of his total receipts. The second ituation involves the butcher selling
all his meat wholesale. In this situation the net margin equaled about
5,700 CFAF per animal, equivalent to 9.3 percent of the butcher's costs
or 8.5 percent of his total receipts. The third situation is that of a
butcher selling all his meat retail. This resulted in an average net
margin of about 7,700 CFAF per animal, equivalent to 12.5 percent of the
butcher's costs and 11.1 percent of his total receipts. Obviously, the
more time a butcher spent cutting up and selling meat retail, the larger
was his net margin. The proportion of meat a butcher sold retail there-
fore probably depended in part on the value he placed on his time.

It should be noted that butchers in Bouaké sold their meat at prices
considerably above the officially controlled price of beef. Given cattle
prices during the study period, if butchers had sold all their meat retail
at the officially controlled price, they would have lost over 14,000 CFAF
per head.

Two caveats should be made about the margins noted in Table 12.5.
First, the margins were calculated assuming butchers were normally licensed.
As discussed in Chapter 4, however, many young butchers were unable to
get licenses through official channels in 1976-77 and had to rent the
licenses of other butchers at prices that were over five times higher
than the official price of licenses. This reduced their average net mar-
gin by about 1,200 CFAF per animal. Second, the cattle prices used in

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[1]These percentages are averages drawn from the interviews with
wholesale-retail butchers in Bouaké described in Chapter 4.

calculating the net margins in Table 12.5 were based on carcass weights at the time of slaughter, when the carcasses were still warm. There may have been some moisture lost through evaporation from the carcasses between the time of slaughter and the time the meat was sold. A 2 percent evaporation loss would reduce net margins by about 1,200 CFAF per animal. Thus, the average net margin in the "typical" situation probably ran from about 4,100 CFAF to 6,500 CFAF per head, depending on whether the butcher was officially licensed or not, and how large the evaporation losses were.

Table 12.5 shows the importance to the butcher of selling the fifth quarter. In the "typical" situation, the sale of meat covers the butcher's costs, and the sale of the fifth quarter provides the margin of profit.

The net margins presented in Table 12.5 are modest. The return to the butcher's capital and labor represented about 11 percent of the final sale price of beef, compared to a profit margin of about 33 percent for butchers in France (67).[1] The gross margin was about 19 percent for wholesale-retail butchers who sold all their meat retail, but this figure understates the true mark-up because it is based on the wholesale, not the retail, value of the fifth quarter. Valuing the fifth quarter at its retail value of roughly 13,300 CFAF (see Appendix 12D) raises the total gross margin to 30 percent.

Variations in Net Margins in Bouaké.-- The average net margins cal- culated in Table 12.5 were subject to considerable variation, both daily and seasonally. Daily fluctuations in the margin resulted from fluctuat- ing cattle prices (due to changes in supply and demand), from butchers under-or over-estimating the weights of the animals they purchased, and from fluctuating costs (e.g., losses of meat through condemnations).

If one assumes that daily fluctuations in the net margin were due only to daily fluctuations in cattle prices, the standard deviation of

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[1] Obviously, the total return to capital would be higher for French butchers because they operate in a much more capital-intensive fashion than do African butchers.

the net margin can be calculated as 4,650 CFAF.[1] Since the "typical" net margin shown in Table 12.5 was 6,472 CFAF and since cattle prices in Bouaké are normally distributed, this implies that butchers in Bouaké lost money on about 8 percent of the cattle they slaughtered.•

Margins also varied seasonally. The net margins calculated for the period September – November 1976 (soon after the rainy season) are higher than those for the April – June period (the end of the dry season). The "typical" net margin per animal for the September – November period was 8,328 CFAF, compared to 6,472 CFAF for April – June. (See Appendix 12E.) Butchers' average net margins shrank to near zero in December 1976, when cattle prices rose quickly. (See Appendix 12E.) As a result, butchers raised the price of fresh beef (with bones) from 375 to 400 CFAF per kg

Evolution of the Price of Beef Sold in Bouaké.-- Combining the data on butchers' margins with those presented in Table 11.5 on cattle traders' margins, one can calculate how much of the retail price of beef and offals is attributable to different costs. Table 12.6 does this, assuming the average retail value of all meat and offals from a 150-kg carcass weight animal was 76,573 CFAF.[2]

Table 12.6 shows that in 1977 approximately 60 percent of the retail price of beef and offals in Bouaké was attributable to the purchase price of the animal in the north. The next most important costs were the total

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[1]If costs are assumed constant, the variance of the net margin equals the variance of cattle prices within a given period multiplied by the square of the weight of the animal. During the April – June 1977 period the standard deviation of cattle prices of 130-160-kg zebu males within each month averaged 31 CFAF per kg carcass weight; therefore, the variance was 961. If the average carcass weight was 150 kg , then the variance of the net margin was 21,622,500 and the standard deviation was 4,650 CFAF.

[2]This figure equals the total receipts of 69,604 CFAF shown in Table 12.5 for a butcher selling all his beef retail plus an additional 6,969 CFAF earned by the slaughterer and the apprentices who sold the fifth quarter retail. (See Appendix 12D.)

TABLE 12.6

EVOLUTION OF THE PRICE OF BEEF SOLD RETAIL IN BOUAKE[a]

Item	Percent of Final Sale Price
1. Purchase of 150 kg carcass - zebu in Koutiala, Mali	59.7
2. Labor Costs	
Trekking	2.4
Slaughter and Sale	9.7
Total Labor	12.1
3. Intermediaries' Commissions and Profits	1.8
4. Licenses and Taxes	
Ivory Coast	2.7
Mali	6.1
Total Taxes	8.8
5. Risk of Loss	
Cattle	0.9
Meat	0.8
6. Wastage of bone in sale	1.1
7. Other Costs	0.9
8. Profits	
Cattle Merchant	5.4
Butcher	8.5
Total Profits	13.9
TOTAL	100.0

SOURCES: Tables 11.4, 12.5, ind text.

[a]Assuming a 150-kg carcass weight zebu male purchased in Koutiala, Mali and trekked to Bouaké.

profits of traders and butchers (13.9 percent of the final sale price), labor costs (12.1 percent), and tax and license fees (8.8 percent). Intermediaries' commissions, which government officials often decry as inflationary, accounted for only 1.8 percent.

The gross margin involved in transporting cattle from Mali to Bouaké and transforming them into beef was large, accounting for 40 percent of the final sale price for beef. Net margins of all agents in the trade, however, accounted for only about 14 percent of the final sale price. Considering the risks and the large investment of traders' and butchers' capital involved, the total net margin does not seem excessive.

Profit Margins of Class 2 Butchers in Abidjan.-- Table 12.7 presents estimated net margins of class 2 wholesale-retail butchers in Abidjan. Most items in Table 12.7 are self-explanatory, but a few need clarification:

1) Cattle are slaughtered in Abidjan during the day and most carcasses are held in the abattoir cold room for sale the next day. When refrigerated, the carcasses lose weight because of dehydration. The weight loss is estimated at 3 percent.

2) Due to the large number of class 1 retailers in Abidjan, wholesale butchers can usually sell the rear quarters at a higher price per kg than the front quarters.

3) In Abidjan, in contrast to Bouaké, butchers sell the fifth quarter directly to retailers, not apprentices, and bear the risk of the offals being seized because of disease. The apprentices receive a cash payment for each animal slaughtered.[1]

Table 12.7 shows that net margins in Abidjan were of the same magnitude as those earned in Bouaké. Because of higher costs in Abidjan, however, the margin represented a smaller return to capital and labor than

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[1]The apprentices in Abidjan perform fewer services for the butchers than do apprentices in Bouaké. This accounts in part for their lower wage.

TABLE 12.7

ESTIMATED NET MARGIN FOR A BUTCHER SLAUGHTERING A
ZEBU MALE IN ABIDJAN (IN CFAF)

(Prices and Costs as of November, 1976 - February, 1977)

Expenses:

Purchase of animal with 150 kg carcass @ 416 CFAF per kg carcass weight	62,400
Slaughter tax, veterinary inspection, cold room charges	2,500
Transport of meat from abattoir to market	300
Rental of market stall: 500 CFAF per day	500
Butchers' union fees	
5,000 CFAF annual dues	14
100 CFAF per day contribution collected at market	100
Amortization of butcher's license (120,000 CFAF per year)	333
Payment of apprentices for slaughtering animal	500
Butcher's transport to & from market	240
Losses through seizures:	
Carcass: 0.3% of amount invested in animal	200
Internal organs: 7.6% of the value of the abats rouges (4,800 CFAF)	365
Average loss through defaulted credit sales of meat 13,000 CFAF per year	36
TOTAL EXPENSES	**67,488**

Receipts 1 — Entire Carcass Sold Wholesale

150 kg total carcass
3% (4.5 kg) loss through refrigeration   0
145.5 kg remaining, of which:

64 kg of front quarters sold @ 375 CFAF per kg.	24,000
71.5 kg of rear quarters sold @ 435 CFAF per kg	30,368
4.0 kg of filet sold @ 800 CFAF per kg	3,200
6 kg of front quarter sold next day @ 335 CFAF per kg	1,930

Sale of fifth quarter:

Tail		600
Tongue		300
Kidneys 150 CFAF each	Sold Retail	300
Hooves: 400 CFAF each	at abattoir	1,600
Liver: 400 CFAF/kg x 5 kg		2,000
Head		
Heart		
Stomach		
Intestines	Sold Wholesale	6,000
Lungs		
Spleen and pancreas		
Hide		1,100

Subtotal: fifth quarter	12,100
TOTAL RECEIPTS	**71,630**

Net Margin per Animal =	4,150
6.2 percent of butcher's costs	
5.8 percent of sale price of meat and offals	

Table 12.7 - Continued

Receipts II -- Front quarter sold retail

         Rear quarters sold wholesale

    150 kg total carcass

        3% loss through refrigeration   0

    145.5 kg remaining, of which:

      71.5 kg of rear quarters sold wholesale @
        425 CFAF per kg   30,388

      62 kg of front quarters sold retail @
        425 CFAF per kg   26,350

      6 kg of front quarter sold retail next
        day @ 375 CFAF per kg   2,250

      4 kg of filet sold @ 800 CFAF per kg   3,200

      2 kg wastage[h]   0

    Sale fifth quarter   12,100

                TOTAL RECEIPTS   74,288

                TOTAL COSTS   67,488

          + payment to sales assistant   750

                       TOTAL   68,238

    Net Margin per Animal   6,050

      = 8.9 percent of butcher's costs

      = 8.1 percent of butcher's sales

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[a]Average price of zebu males having carcass weights of 130-159 kg sold in Abidjan between November, 1976 and February, 1977 (see Table 10.5).

[b]The average cost of a butcher's license is higher in Abidjan than in Bouaké.

[c]Based on Bouaké data. See note d, Table 12.5

[d]Based on data on condemnations of internal organs in Bouaké in 1976. Abats rouges include the heart, lungs, kidneys, liver, spleen, and pancreas.

[e]Based on interviews with wholesale-retail butchers in Abidjan. (See Chapter 4, p. 149 ff) Assumes an annual volume of 300 head.

[f]Author's estimate.

[g]The interviews with butchers in Abidjan indicated that they had an average of 20 kg of unsold meat at the end of the day. The butchers interviewed slaughtered an average of 3.3 head per day; therefore the average per animal 6 kg. This meat sold the next day at an average discount of 50 CFAF per kg

[h]Bone chips + scapula

in Bouaké. The net margin of an Abidjan butcher selling half his meat retail and half wholesale equaled 8.9 percent of his costs or 8.1 percent of his total receipts.

Variations in Net Margins in Abidjan.-- Net margins were more variable in Abidjan than in Bouaké because cattle prices varied more in Abidjan than in Bouaké (see Chapter 10 pp. 355-57). Assuming that net margins varied only because of variations in cattle prices, the standard deviation of the net margin of an Abidjan butcher slaughtering a 150-kg animal can be calculated as 6,795 CFAF.[1] Since cattle prices (and hence margins) were normally distributed, this implies that butchers in Abidjan lost money on 19 percent of the animals they slaughtered. Thus, highly fluctuating cattle prices in Abidjan (the result of unreliable rail arrivals and the inability to hold animals because of a lack of grazing) made Abidjan a much riskier market in which to sell, not only for cattle merchants, but for butchers as well. It was this riskiness that was behind the higher rate of default on debts by butchers in Abidjan.

Evolution of the Price of Beef Sold in Abidjan.-- The data in Table 12.7 can be combined with those in Table 11.8 to show the relative amounts of the retail price of beef in Abidjan attributable to different costs.[2] Table 12.8 presents the results of such a calculation, based on a 150-kg carcass weight animal purchased in Ouagadougou and shipped by rail to Abidjan.

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[1]During the period November 1976 - February 1977, the standard deviation of the price of 130-150 kg carcass weight zebu males within each month in Abidjan averaged 45.3 CFAF per kg carcass weight. Using the methodology described in footnote 1, p.423, this figure can be used to calculate the standard deviation of the butcher's net margin.

[2]When doing this, the fifth quarter should be valued at its retail of 17,960 CFAF (see Appendix 12D) rather than at its wholesale value of 12,100 CFAF shown in Table 12.7.

TABLE 12.8

EVOLUTION OF THE COST OF BEEF AND OFFALS SOLD RETAIL IN ABIDJAN

Item	Percent of Final Sale Price
1. Purchase of animal in Ouagadougou	46.8
2. Labor	
Shipping cattle	0.5
Slaugh er	0.6
Total Labor	1.1
3. Intermediaries' commissions & margins	1.9
4. Taxes and licenses	
Ivory Coast	4.3
Upper Volta	8.4
Total Taxes	12.7
5. Transport of cattle	
Transport fees	6.1
Shrinkage	7.0
Losses and forced sales	1.5
Total Transport	14.6
6. Selling costs of meat	
Transport, stall rental, & labor[a]	4.4
Wastage (bone)	1.0
Losses due to condemnations & default on credit sales	0.8
Total Selling Costs	6.2
7. Profits	
Cattle trader	5.0
Wholesale-retail butcher	7.5
Vender of fifth quarter	4.1
Total Profits	16.6

SOURCES: Calculated from data in Tables 11.8, 12.7, and Appendix 12E.

[a]Includes an estimated total cost of selling offals (stall rental, labor, transport, and wastage) of 2,500 CFAF per animal.

Table 12.8 indicates there was a large gross margin involved in shipping cattle from Ouagadougou to Abidjan, slaughtering them, and selling the meat retail. Only about 47 percent of the final retail cost of the meat and offals was attributable to the purchase price of the animal in Ouagadougou. Of the remaining 53 percent, however, total profits of all agents in the marketing system accounted for only 16.6 percent. The profits of butchers, the largest profits of any one group, accounted for 7.5 percent of the final sale price. Among the most important other costs were rail transport, totaling 14.6 percent of the final sale price (this included the high implicit cost of shrinkage en route), and taxes, which accounted for 12.7 percent of the final sale price of beef. Chief among the taxes was the Voltaic export tax of 6,519 CFAF per animal. In contrast, total commissions and margins of intermediaries accounted for less than 2 percent of the final sale price of beef and offals in Abidjan.

Table 12.8 shows that while the total gross margin in the cattle and meat marketing system is large, only about 30 percent of the gross margin is attributable to traders' and butchers' profits. The other 70 percent represents costs incurred in transporting and slaughtering cattle. Considering the high capital investment and risks involved in the cattle and meat trade, the profit margins do not seem excessive.

Prices and Margins of Class 1 Retailers

The Ivorian government sets official retail prices for class 1 retailers of beef (supermarkets and European-style butcher shops). The official prices were established in 1974; between late 1975 and 1978 there also existed a set of "tolerated" prices for locally-slaughtered beef that were higher than the official prices. Most class 1 butchers sold locally-slaughtered beef at the "tolerated" prices during 1976 and 1977. In addition, under an agreement between the Ministry of Commerce, the Ministry of Animal Production, and the class 1 butchers' union, the retail price of imported chilled beef was indexed to the wholesale price

paid by the butcher. For example, if a class 1 retailer purchased a rear quarter of Argentine chilled beef for 700 CFAF per kg , he was permitted to sell the filet at 3.6 x 700 = 2,520 CFAF per kg ; steaks could be sold at 3.2 x 700 = 2,240 CFAF per kg ; and so forth. The coefficients were calculated so as to allow a 33 percent net margin for the butchers, which is approximately the margin earned by butchers in France (67). The official prices, the "tolerated" prices, and the indices for imported meat are shown in Table 12.9.

Table 12.9 indicates that the "tolerated" prices for locally-slaughtered beef (i.e., the prices charged by most class 1 retailers during 1976-77) were between 27 and 37 percent above the official prices. They were not floating prices, as were the indexed prices for imported chilled meats; therefore, as the wholesale price of locally-slaughtered beef increased, the retailer's margin fell. Given the wholesale price of beef in Abidjan in early 1977, the "tolerated" prices permitted a net margin of about 26 percent. As cattle and wholesale meat prices increased in mid-1977 this net margin was reduced. The fact that the price of locally-slaughtered beef was fixed while that of imported chilled beef was indexed to its wholesale price gave retailers an incentive to sell imported beef. This had the effect of reducing the demand for choice animals in Abidjan and boosting the demand for imported, largely non-West African, chilled beef.

Consumer Preferences

In order to accurately project demand for beef in Ivory Coast, it is necessary to have an idea of consumer preferences in the country, both between beef and other meats and among different grades of beef. This section examines consumer preferences and compares the relative prices of various sources of animal protein in the Ivorian diet. Specifically, the section looks at: 1) consumer preferences for beef as compared with other animal protein sources; 2) consumer preferences for fresh versus frozen beef; and 3) consumer preferences for different grades of fresh beef.

TABLE 12.9

OFFICIAL PRICES, "TOLERATED" PRICES, AND INDICES FOR IMPORTED BEEF

ALLOWED CLASS 1 RETAILERS IN IVORY COAST, 1977

(in CFAF per kg)

Cut of Beef	Locally Slaughtered Beef				Index for Imported Beef
	Official Price		"Tolerated" Price		
	First Choice Quality	"Extra" Quality	First Choice Quality	"Extra" Quality	
Filet	950	1,100	1,250	1,405	3.6 x wholesale price
Me ts for grilling (steaks, etc.)	800	950	1,100	1,240	3.2 x wholesale price
Roasts	650	800	910	1,020	2.6 x wholesale price
Meats for Braising	340	360	440	440	1.6 x wholesale price
Stew Meat	300	300	370	370	1.2 x wholesale price

SOURCE: République de Côte d'Ivoire, Ministère de la Production Animale, unpublished data.

Consumer Preferences for Different Sources of Animal Protein. --
Chapter 1 showed that beef is the most widely consumed red meat in Ivory
Coast and the second most widely consumed source of animal protein (after
fish). The relatively heavy consumption of fish and beef results from
their being the cheapest major sources of animal protein available. This
can be seen in Table 12.10, which compares retail prices in June 1977
of different sources of animal protein sold in Bouaké and Abidjan. In
both cities frozen fish was the cheapest source of animal protein avail-
able; in Bouaké it cost roughly half as much per kg as fresh beef with
bones. In Abidjan the relative price of frozen fish was even lower, 36
percent of the price of fresh beef with bones.[1] The cheapest red meat
in both cities, and the second cheapest source of animal protein, was
a mixture of fresh beef and offals sold in small tas. As mentioned above,
fresh beef was sold both by weight and in smalled unweighed piles (tas)
of mixed meat and offals. Several sizes of tas were available, and in
general, the smaller the tas, the larger the proportion of offals and
the lower the quality of the meat included in the tas. The smaller tas
had a lower cost per kg than the larger tas, and represented a relatively
cheap source of animal protein. They cost 59 percent of the price of
fresh beef with bones in Bouaké and 51 percent of that price in Abidjan.
Smoked fish was the third cheapest source of animal protein in both
cities, costing 60 percent of the price of fresh beef with bones in Abidjan
and 70 percent of the fresh beef price in Bouaké.

Imported frozen beef was the next cheapest source of animal protein,
costing between 80 and 87 percent the price of fresh beef. The retail
price of frozen beef was determined by the supply of and the demand for
both fresh and frozen beef in each city, not just the wholesale price
of frozen beef and the costs of transporting and storing it. In Bouaké,
where fresh beef sold at 400 CFAF per kg with bones, sellers of frozen beef

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[1] Due to   ,ort and storage costs, the price of frozen fish (most of
which is impo. _ , is higher the farther north one goes in Ivory Coast. Just
the opposite pattern prevails for fresh beef prices, which increase the
farther south one goes (again because of transport costs). Therefore, the
relative price of frozen fish compared to fresh beef rises rapidly as one goes
north from Abidjan.

TABLE 12.10

RETAIL PRICES OF MAJOR SOURCES OF ANIMAL PROTEIN
IN ABIDJAN AND BOUAKE, JUNE, 1977

Type of Meat	BOUAKE		ABIDJAN	
	Price per kg (CFAF)	Price as a % of price of fresh beef w/bones	Price per kg (CFAF)	Price as a % of price of fresh beef w/bones
Meat Sold by Weight				
Fresh beef w/bones	400	100.0	500	100.0
Fresh beef, boneless	450	112.5	600	120.0
Frozen beef w/bones	350	87.5	400	80.0
Frozen beef, boneless	400	100.0	400	100.0
Mutton/goat meat w/bones	600	150.0	750	150.0
Pork w/bones	450	112.5	n.a.	-
Fresh beef & offals sold by the pile[a]	236	59.0	257	51.4
Frozen fish[b]	210	52.5	182	36.4
Smoked fish[c]	281	70.3	300	60.0
Chicken[d]	714	178.5	n.a.	-

NOTE: Prices for meats sold by weight were established by observing actual purchases. Prices of fresh beef and offals sold by the pile (tas), fish, and chicken were established by actual purchases and weighings.

[a]50 - CFAF tas of meat and offals
N = 6 for Bouaké, N = 3 for Abidjan.

[b]Frozen chinchard, the cheapest fish on the market. N = 6 for Bouaké, N = 3 for Abidjan.

[c]Smoked chinchard . N = 9 for Bouaké, N = 3 for Abidjan.

[d]Price of live chicken expressed in CFAF per kg. dressed weight (N = 2)

sold their product at 350 CFAF per kg. In Abidjan, where the price of fresh beef was higher, so was the price of frozen beef, in spite of lower transport and storage costs for frozen beef in Abidjan. Most consumers strongly preferred fresh beef; therefore, sellers of frozen beef had to maintain its price below that of fresh beef in order to sell their product.

Other meats were more expensive than beef. The ratio of the price of pork to the price of fresh beef was 1.1; for mutton and goat meat the ratio was 1.5, and for chicken it was almost 1.3.[1] As was shown in Chapter 1, poultry, pork, and mutton consumption in Ivory Coast are much lower than beef consumption, and relative prices undoubtedly play a large role in determining the pattern of consumption.[2]

In 1974-75 Bollinger conducted a study on the preferences of Ivorian consumers for different types of animal protein (7). Bollinger's study involved a random sample of 893 respondents throughout the country, stratified by region and urban-rural residence. Respondents were shown pictures of different sources of animal protein and were asked to rank their preferences. Bollinger found that while fish and beef were the most widely consumed forms of animal protein, they were not the most preferred sources.[3] The ranking of consumer preferences found in Bollinger's study is shown in Table 12.11.

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[1] Most of the mouton sold on the class 2 market in Abidjan and Bouaké was in reality goat meat.

[2] Pork consumption is also limited because about a third of the Ivorian population is Moslem.

[3] Approximately 46 percent of the sample reported they "regularly" consumed beef, compared to 11 percent for goat meat and mutton, 11 percent for chicken, and 3 percent for pork; 35 percent of the sample reported consuming fresh or frozen fish regularly, and 64 percent said they regularly ate smoked fish (7, Vol. I, p. 37).

TABLE 12.11

RANKING OF CONSUMER PREFERENCES FOR DIFFERENT
SOURCES OF ANIMAL PROTEIN IN IVORY COAST

1.	Mutton	8.	Goat
2.	Beef	9.	Rabbit
3.	Chicken	10.	Pigeon
4.	Guinea fowl	11.	Duck
5.	Agouti	12.	Snails
6.	Turkey	13.	Pork
7.	Fish		

SOURCE: D. Bollinger, Le marché Ivoirien des volailles, des oeufs, des porcs et de la charcuterie, Vol. I, p. 42.

Mutton was the most preferred source of animal protein, followed by beef, poultry, agouti, fish, goat meat, and lastly, pork. The fact that beef was preferred to most other sources of animal protein suggests that the income elasticity of demand for beef may be higher than that of most other meats. That is, if there were no changes in relative prices, as incomes rose, consumption of beef would probably increase more rapidly than consumption of other protein sources except mutton. This suggests that if the Ivorian government is to achieve its goal of shifting consumption towards the meat of animals with short reproductive cycles (poultry, fish, swine, and small ruminants) in order to reduce the country's dependence on imports (see Chapter 1, p. 63), it will have to do so by changing the relative prices of different meats. It cannot rely on income growth alone to increase the relative importance of other meats in the diet. The one exception is mutton, the most preferred meat of Ivorian consumers. As incomes rise, consumption of mutton will probably increase markedly.

Preferences for Fresh Versus Frozen Beef.-- Bollinger's study was
conducted before large imports of frozen beef began in late 1975, so it
provides no information on consumer preferences between fresh and frozen
beef. In order to gather information on these preferences, enumerators
of the ELP study conducted interviews with purchasers of beef in class
2 retail markets in Bouaké from May through July, 1977. Because the
interviews took place in markets where buyers were constantly entering
and leaving and because only one enumerator was available to conduct most
of the interviews, it was not possible to design the survey in a way that
would guarantee a random sample. Nonetheless, a review of the survey
results yields some insight into consumer preferences.

Some characteristics of the sample interviewed are presented in
Table 12.12. A total of 153 people took part in the survey. The sample
was more heavily Moslem than the Ivorian population as a whole (the
Ivorian population is roughly one-third Moslem); this reflects the heavy
Islamic influence in Bouaké. Over a third of the sample identified them-
selves as Dioula, a broad appelation covering most non-Voltaic northerners
in Bouaké.[1] Almost another third of the sample was Baoulé, the major
ethnic group in central Ivory Coast, and the rest of the sample was made
up of members of other ethnic groups.

In most respects purchasers of frozen beef were similar to purchasers
of fresh beef. A higher percentage of the sample members who bought fro-
zen meat were Dioula than were those who bought fresh meat, but since the
term "Dioula" covers in reality many different ethnic groups, not too
much significance should be attached to this difference. There were no
striking differences in the religious composition of the two groups, nor
were there marked differences in the profession of the heads of households
of each group.

The main distinguishing characteristics between the two groups were
family size and weekly expenditure per person for meat and fish. Pur-
chasers of frozen meat had larger families (6.3 on the average compared
with 5.2 for purchasers of fresh meat) and spent only about 90 percent

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[1]See footnote b, Table 12.12.

TABLE 12.12

CHARACTERISTICS OF SAMPLE INTERVIEWED IN SURVEY ON CONSUMER MEAT PREFERENCES
Bouaké, May-July, 1977

Characteristic	Purchasers of Fresh Beef		Purchasers of Frozen Beef		Total Sample	
	Number	Percent	Number	Percent	Number	Percent
Ethnic Group						
Baoulé	27	28.4	16	27.6	43	28.1
Dioula	29	30.5	24	41.4	53	34.6
Other	38	40.0	17	29.3	55	35.9
No Response	1	1.1	1	1.7	2	1.3
Total	95	100.0	58	100.0	153	100.0
Religion						
Christian	24	25.3	14	24.1	38	24.8
Moslem	41	43.1	25	43.1	66	43.1
Animist	26	27.4	18	31.0	44	28.8
No Response	4	4.2	1	1.7	5	3.3
TOTAL	95	100.0	58	100.0	153	100.0
Occupation of Head of Household						
Farmer	1	1.1	1	1.7	2	1.3
Skilled Worker	20	21.1	12	20.7	32	20.9
Laborer	16	16.8	5	8.6	21	13.7
Office Worker or Civil Servant	17	17.9	11	19.0	28	18.3
Merchant	19	20.0	14	24.1	33	21.6
Transporter	2	2.1	2	3.4	4	2.6
Self Employed (Tailor, etc.)	13	13.7	6	10.3	19	12.4
Others	6	6.3	3	5.2	9	5.9
No Response	1	1.1	4	6.9	5	3.3
TOTAL	95	100.0	58	100.0	153	100.0

TABLE 12.12 - continued.

Characteristic	Purchasers of Fresh Beef	Purchasers of Frozen Beef	Total Sample
Average Weekly Expenditure per Family for Fish and Meat	2,279 CFAF	2,466 CFAF	2,350 CFAF
Average Family Size			
Adults	3.0	3.4	3.2
Children	2.2	2.9	2.5
Total	5.2	6.3	5.7
Average Weekly Expenditure for Fish and Meat per Person	438 CFAF	391 CFAF	412 CFAF

a. Baoulé are the principal indigenous ethnic group in central Ivory Coast, the region in which Bouaké is located.

b. The term "Dioula," as commonly used in Bouaké, includes all people from northern Ivory Coast, Guinea, and Mali speaking a language of the Mandé group. The term includes most non-Voltaic northerners in Bouaké.

as much per person on purchases of animal protein as did purchasers of fresh meat. This suggests that the lower price of frozen beef attracted clients with large families and limited budgets. The lower price of the frozen beef allowed these clients to provide to each of their family members at a lower cost per person, roughly the same quantity of beef as was consumed by members of families that bought fresh beef.

The interviews confirmed that most purchasers of frozen beef had bought frozen beef because it was cheaper than fresh beef, not because they preferred its taste. Sample members were asked why they had purchased the type of beef they had and which type they would have purchased had the prices been equal. Fifty-six percent of the purchasers of frozen beef said that they had bought frozen beef because of its lower price; they said that they preferred the flavor of fresh beef and would have purchased it had the prices been equal.[1] Of the 44 percent of frozen meat buyers that expressed a preference for frozen meat, most said they preferred it because of its tenderness rather than for its flavor. Two groups were discernable among the sample members who preferred frozen meat: families that included old people or very young children and families in which the wife worked outside the home. Old people and young children often found it easier to chew the more tender frozen meat, and working wives said that the frozen meat could be prepared more quickly than the tougher fresh meat.

When purchasers of fresh beef were asked why they had purchased fresh beef, 55 percent said that the fresh beef was more flavorful than frozen beef, 22 percent said that it "looked better" than frozen beef (e.g., the meat had some blood in it and the carcasses were not covered with a thick layer of fat), and 23 percent mentioned other reasons. Chief among the latter were the belief by many Moslem consumers that the frozen carcasses had come from animals that had not been slaughtered according

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[1]The figure of 56 percent may understate the proportion of buyers who purchased frozen beef because of its low price. When asked these questions, several purchasers of frozen beef responded indignantly, apparently insulted by the implication that they had purchased frozen meat because they had lacked the money to purchase fresh meat.

to Moslem ritual and the view of some consumers that the meat was not beef. (Several respondents stated that they thought it was horse meat).

In total, 83 percent of the total sample (buyers of both fresh and frozen beef) expressed a preference for fresh beef. It was this strong preference for fresh beef that allowed a price differential to be maintained between fresh and frozen beef. The director of meat sales for DISTRIPAC, one of the two agencies that import frozen meat, told the investigator that DISTRIPAC felt it was necessary to maintain the price of frozen beef at least 50 CFAF per kg below that of fresh beef in order to prevent a massive shift in purchases away from frozen beef to fresh beef.

Preferences for Different Grades of Fresh Beef.-- Some authors suggest that African consumers make few quality distinctions when buying meat. While price differentials among different grades of beef are not as marked on the class 2 market as on the class 1 market, it is not true that African consumers are oblivious to quality. Given the traditional method of preparing meat in sauces that are boiled for several hours, however, there is little reason to pay a high premium for tender meat. One might expect that as incomes rise and the opportunity cost of women's time increases, a more marked premium will develop for tender meat suitable for grilling and other rapid means of preparation.

There is evidence that a small premium already exists for tender, more fatty meat. As mentioned in Chapter 10, the price per kg carcass weight of taurin cattle sold in Bouaké in 1976-77 averaged 2 to 4 percent less than the price of equivalent-weight zebus. Butchers attributed this price differential to the preference of their customers to the fattier meat from zebus.[1] Data presented below on the relationship between the price and composition of beef sold by tas also suggest a preference for

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[1] This preference was reflected in the retail market by the ease with which a butcher could sell his meat. Butchers reported that when they sold meat from taurins they sometimes had trouble selling all their meat during the morning. They were thus required to either put in longer hours at the market to sell all their meat or sell the meat the next day (or in the evening) at a discount.

fattier meat. Butchers and consumers both complain, however, if beef is "too fat," i.e., if the carcass is covered by a thick layer of fat. This was one of the main complaints voiced by consumers in Bouaké about the frozen meat from Argentina. What consumers look for, in short, is meat from well-fleshed, but not finished, animals.

In addition to the preference for fattier meat, there is a strong preference among consumers for meat as opposed to offals. This is clearly reflected in the price of different-sized _tas_ of beef sold on the class 2 market. In general, the cheaper _tas_ contain a higher percentage of offals and less meat than do the more expensive _tas_. The smaller _tas_ also generally contain a lower quality meat (e.g., very tough meat from the head) than do the larger _tas_. As a result, the price per kg of smaller _tas_ is much lower than that of the more expensive _tas_.

The relationship between the price of beef sold by _tas_ and the composition of the _tas_ was investigated in order to gain a clearer picture of consumer preferences for different qualities of beef. Using the data collected in Bouaké, the total price of each _tas_ was regressed against the weight of skeletal meat, fat, offals, and bones contained in the _tas_. In the regression equation, the coefficient of each constituent represents the implicit price per kg paid by consumers for that constituent. Comparing these implicit prices allows one to see how consumers ranked the different constituents in order of preference. Two size-weight interaction variables were introduced into the equation in order to test whether significant quality differences existed between the meat and offals contained in different-sized _tas_. The coefficients of these two interaction variables measure how much higher the implicit price per kg of meat and offals were in the large 100 and 200-CFAF _tas_ than in the 25 and 50-CFAF _tas_.[1] The regression analysis yielded the following results:[2]

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[1] Alternate specifications of the model indicated there was no significant difference between the implicit price per kg of meat (or offals) in the 25-CFAF _tas_ and the price in the 50-CFAF _tas_. Similarly, no significant differences existed between the implicit prices per kg in the 100 CFAF _tas_ and those in the 200-CFAF _tas_.

[2] The equation was constrained to pass through the origin, because theoretically if a _tas_ contained none of the constituents it would have zero price.

$$P = 217\ M + 286\ F + 182\ O + 290\ B + 221\ M_L + 189\ O_L$$

(t-ratio)	(12.4)	(16.0)	(11.1)	(11.5)	(13.2)	(6.8)
signifi- cance	.001	.001	.001	.001	.001.	.001

$$N = 449 \qquad D.F. = 493 \qquad R^2 = .96$$

where:

P = price of the tas in CFAF

M = weight of skeletal meat in the tas (in kg)

F = weight of fat in the tas (in kg)

O = weight of offals in the tas (in kg)

B = weight of bones in the tas (in kg)

M_L = a size-weight interaction term equal to the weight of the skeletal meat in the tas (in kg) if the tas cost 100 or 200 CFAF, and zero otherwise; and

O_L = a size-weight interaction term equal to the weight of offals in the tas (in kg) if the tas cost 100 or 200 CFAF, and zero otherwise.

The coefficients of the different variables indicate that in the 25 to 50-CFAF tas, the implicit prices per kg of the constituents were the following: meat--217 CFAF; fat--286 CFAF; offals--182 CFAF; and bone--290 CFAF. It is likely, however, that the regression equation underestimated the implicit price of meat and overestimated the implicit price of bone because of strong intercorrelation (r = .85) between the amount of meat and the amount of bone contained in the tas.[1] The highly significant size-weight interaction variables indicate there were large differences in quality between the meat and offals in the large tas and those in the small tas. The implicit prices per kg of the constituents

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[1] As mentioned above, the large tas contained a higher proportion of bone than the small tas because the large tas were made up of meat from those parts of the carcass that contained heavy bones (ribs, legs, etc.).

in the 100 and 200-CFAF _tas_ were the following: meat--438 CFAF; fat--
286 CFAF; offals--371 CFAF; and bone--290 CFAF. It thus appears that
the small _tas_ are considered "poor man's food" and are purchased by con-
sumers who lack the money to buy higher quality meat. The implicit price
of fat in both types of _tas_ was nearly 300 CFAF per kg ; this clearly
indicates that consumers desire some fat in their diet.

Clearly, then, African consumers do make quality distinctions when
buying beef. One can therefore expect that as incomes rise there will
be a gradual shift in consumption towards higher grades of beef. Although
there will not be a dramatic shift to European-style eating habits and
a high demand for finished beef, the demand for well-fleshed animals will
gradually increase. This implies that while there probably will not be
enough effective demand in Ivory Coast to absorb the projected production
of finished beef from all the long-term fattening projects planned for
Mali, Upper Volta, and northern Ivory Coast (see Chapter 1, pp. 46-7), there
may be scope for increasing sales of well-fleshed animals produced in
shorter (2- to 3-month) feeding programs.

PART VI

CONCLUSIONS AND POLICY RECOMMENDATIONS

CHAPTER 13

CONCLUSIONS AND POLICY RECOMMENDATIONS

This chapter summarizes the major findings of the study and presents a series of policy recommendations aimed at improving cattle marketing in Ivory Coast. The conclusions and policy recommendations fall under seven headings: 1) the potential for growth and change in the Ivorian market for beef; 2) the current organization of cattle marketing in Ivory Coast, and whether it represents an obstacle to expansion of the cattle and meat trades; 3) improvements in market infrastructure that are (and are not) needed to improve cattle and meat marketing in Ivory Coast; 4) the problems and costs of transporting cattle and meat, and the implications of these costs for transportation policy; 5) the optimum location of slaughter and how it is likely to change in the future; 6) the nature of demand for beef in Ivory Coast, and the implications of this demand for northern cattle-fattening projects; and 7) general recommendations for marketing policy in the future.

Growth and Change in the Ivorian Market for Beef

Historically Ivory Coast has imported the bulk of its red meat supply, including over 80 percent of its beef, from Mali, Upper Volta, Mauritania, and Niger. These Sahelian countries, particularly Upper Volta and Mali, have become increasingly dependent on Ivory Coast as an outlet for their cattle exports in recent years. In 1970 Ivory Coast absorbed slightly over 60 percent cattle exports from Mali and Upper Volta; by 1975 it accounted for over 80 percent. Until very recently Ivory Coast and its northern trading partners were highly interdependent. The cattle marketing system in central West Africa was self-contained, with few cattle or mea' imports entering the region and few exports leaving the region.

In 1975, however, the situation changed radically. Cattle exports from the Sahelian countries to Ivory Coast fell dramatically, partly as

a result of the drought and partly in response to the high prices being paid for cattle in Niger and Nigeria. Faced with decreased meat supplies and rising prices, Ivory Coast turned to the world market, which at the time was in a period of surplus. Imports of frozen and chilled beef jumped from about 1,200 tons in 1974 to over 16,600 tons in 1976; in 1974 frozen beef imports accounted for only 3 percent of Ivory Coast's beef supply, but by 1976 they accounted for 38 percent. The imports of frozen meat dampened increases in the price of meat in Ivory Coast and encouraged even more Voltaic and Malian cattle merchants to ship their cattle to markets other than Ivory Coast. In spite of the frozen meat imports, however, beef prices in Ivory Coast rose faster than did fish prices, leading to a shift in consumption from beef into fish. Between 1970 and 1975, per capita beef consumption fell from 8.0 kg to 5.6 kg per year, while per capita fish consumption increased from 18.0 kg to 25.3 kg per year. The Ivorian government, in an attempt to reduce Ivory Coast's dependence on cattle and meat imports, launched a series of programs in the early 1970s aimed at increasing domestic meat production, particularly from animals with short reproductive cycles.

Substantial changes have thus occurred in the Ivorian beef market since 1975. In the near future the number of cattle imported into Ivory Coast from the Sahelian countries will depend on the growth of demand for animal protein in Ivory Coast (a function of changes in per capita income, population growth, and the rate of urbanization) and on the price of the substitutes for imported cattle (domestically produced livestock and fish, and imported frozen meat and fish). The outlook for changes in each of these factors is discussed briefly below.[1]

Income Changes, Population Growth, and Urbanization.-- Real per capita income increased rapidly in Ivory Coast during most of the 1960s, feeding the demand for meat. Since 1970, however, real per capita income has

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[1] The outlook for the Ivorian market for red meat through 1985 is discussed in detail in a forthcoming report by the author. This report, to be published in 1979, is part of a larger study on livestock and meat marketing in the "Central Corridor" of West Africa being conducted by the University of Michigan's Center for Research on Economic Development for the United States Agency for International Development (Contract REDSO/WA 77-105).

stagnated, and it is unlikely that in the next few years it will grow at anywhere near the 5.4 percent annual rate experienced during the 1960s. The 1975-80 National Development Plan (65, Vol. III, Part IV, p. 215) projected per capita income to rise by 3 percent per year between 1975 and 1985, but considering Ivory Coast's recent economic performance, this should be considered an optimistic projection. One to two percent growth may be more realistic. If the income elasticity of demand for beef is close to unity, this would translate into a one to two percent increase in demand due to income growth.

Population has been growing at roughly 4 percent per year recently and is likely to continue to do so for the next 5 to 10 years. Similarly, there is little evidence that Ivory Coast's rapid urbanization will slow in the near future. Therefore, in the absence of price changes, demand for beef would rise at a minimum of about 5 percent per year due to population growth, increased urbanization, and higher per capita incomes.[1]

Prices of Substitutes for Imported Cattle.-- Consumption of imported cattle, however, may not increase at 5 percent annually for two reasons. First, unless the increased demand is met by a sufficient increase in cattle exports from the north, part of the demand will translate into higher prices, which will slow the growth of beef consumption.[2] Second, the relative price of imported cattle compared to the substitutes for imported cattle (domestically produced livestock and imported meat and fish) are likely to change. Changes in relative prices will induce changes in consumers' patterns of buying.

It is beyond the scope of this study to project the likely trend in cattle exports from the Sahelian countries over the next few years.[3] The recent trend in exports from Mali and Upper Volta, however, suggests that cattle exports are not likely to grow as quickly as they did during the

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[1] This increase in demand can be pictured as a shift in the demand curve to the right, not as a movement along the curve.

[2] The effect of higher prices on consumption can be pictured as a movement up the demand curve for beef.

[3] This subject will be dealt within the study mentioned in footnote 1, p. 446.

1960s, and that higher prices for cattle will therefore dampen the increase in consumption that would otherwise result from Ivory Coast's population growth, increased urbanization, and higher income.

Prices of substitutes for imported cattle will depend on: 1) how successful the Ivorian government is in increasing domestic livestock production (and at what cost); 2) how the world beef market changes in the next few years; and 3) how the markets for imported substitutes for beef (particularly fish) change in the near future. During the past few years Ivory Coast's domestic beef production has increased at only about 3 percent per year, but poultry and pork production have increased more rapidly. Poultry and pork, however, continue to be more expensive than beef. Given the low levels of current per capita consumption of poultry and pork and consumers' preference for beef, it would probably take a large shift in relative prices to effect a substantial substitution of poultry and pork for beef in the Ivorian diet. Given the costs of production of poultry and pork, such a shift in relative prices would only occur if the price of beef were to increase markedly.

The outlook, then, is for Ivory Coast to remain largely dependent on imported animal protein for the next five to ten years. The question remains whether this protein will be imported in the form of live animals or as frozen beef and fish. Prices in the world beef market were unusually low in 1975 and 1976, and can be expected to increase through 1980.[1] The world price of beef is also very sensitive to the trade policies of the major meat-importing countries. If, for example, the European Community were to relax restrictions on meat imports, the world price would rise substantially, and this would influence Ivory Coast's import decisions. In spite of the tendency for world prices to rise, however, Ivory Coast is likely to continue to import more frozen and chilled meat than it did prior to 1975. Many of the fixed costs of importing and selling frozen beef already have been met (e.g., Ivory Coast has made the necessary contacts with the exporting countries, a chain of cold storage facilities

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[1] Information from Argentina, Ivory Coast's main supplier of frozen beef (51a, p.1) indicates that in mid-1978 roughly 40 percent of total cattle sales to meat-packing companies in Buenos Aires were made up of females. Such a high rate of slaughter of females strongly suggests that herd sizes will be reduced by 1980, forcing up prices.

has been constructed, and consumers have been introduced to the product). Therefore, it will be relatively easy for Ivory Coast to enter the world market when prices are favorable.

Fish, the major substitute for red meat in the Ivorian diet, is more widely consumed than is red meat, and the bulk of the fish consumed in Ivory Coast is imported. Changes in the world fish market therefore could have a large impact on the demand for beef. Between 1970 and 1975 the relative price of fish compared to beef fell sharply in Ivory Coast, and total fish consumption increased by 74 percent, while total beef consumption remained unchanged. The increase in the demand for beef that normally would have occurred because of population growth and increased urbanization was offset by the increased relative price of beef compared to fish. It is unlikely, however, that fish prices will continue to decline relative to beef prices as fast as they did during the early 1970s. The price of fish imported into Ivory Coast rose by about 10 percent between 1977 and 1978 (1), and importers expect it to continue to rise. Therefore, unlike the situation in the early 1970s, increases in the demand for beef due to population growth and increased urbanization probably will not be entirely offset by a decline in the relative price of fish compared to beef.

Ivory Coast will therefore continue to depend on cattle imports from the Sahelian countries, particularly from Upper Volta and Mali, for a large part of its beef supply. Ivory Coast will continue to be a major outlet for cattle from Mali and Upper Volta, but not on the same terms as before 1975. The central West African market for beef is now integrated with the world beef market, and exporting countries should recognize that Ivory Coast will not hesitate to enter the world market when prices in the world market are lower than West African prices. Nonetheless, given the projected rise in world beef prices through 1980 it is unlikely that Ivory Coast's frozen beef imports will greatly exceed their 1976 levels during the next few years. Nor is it likely that increases in domestic poultry and pork production will induce large changes in Ivorian meat consumption patterns in the near future. Therefore, the demand for imported cattle from the Sahelian countries is likely to grow at somewhere

between 3 to 5 percent per year through 1980 because of increases in Ivory Coast's income, population, and urbanization. While a decline in the price of fish relative to the price of beef may offset some of this increase in demand, it is unlikely to completely cancel it out as it did between 1970 and 1975.

The main policy implication for Ivory Coast of this continued dependence on imported cattle is that it is in Ivory Coast's interest to facilitate the flow of cattle from Mali and Upper Volta to Ivory Coast, e.g. through improvement of transportation routes for cattle. By facilitating the flow of cattle south, Ivory Coast can help shift its supply curve for beef to the right, assuring that at least part of the increase in demand for beef during the next few years translates into an increase in the quantity consumed, not just an increase in prices.

A second implication of this continued dependence on imports is that Ivory Coast will be vulnerable to fluctuations in supply conditions in Mali and Upper Volta. Ivory Coast's ability to enter the world market will reduce its vulnerability to variation in West African supply conditions, and the push to increase domestic livestock production is also aimed at reducing the country's vulnerability to outside conditions. To date, however, it has not been possible to domestically produce large quantities of meat, especially beef, more cheaply than they can be imported.[1] Ivorian policy makers should therefore recognize that increased domestic livestock production can reduce dependence on external markets, but only at the cost (at least in the short run) of higher domestic meat prices. To date the Ivorian government has been unwilling to restrict imports in order to boost the prices domestic producers receive for their cattle and to shift the pattern of consumption away from beef towards the types of meat Ivory Coast can more easily produce.

Market Organization: A Constraint to Development?

Many government officials in West Africa view the traditional

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[1] This point is discussed in more detail in the forthcoming report referred to in footnote 1, p.446.

organization of cattle marketing as a constraint to the expansion of the beef trade. In particular, officials feel that market participants are often uneducated in the basic business skills needed for expansion of the trade, and that many market participants, particularly the large number of intermediaries in trade, are unnecessary "parasites" on the system. This study has examined the efficiency of the traditional marketing system by looking at market structure (e.g., the degree of market concentration), the behavior of market participants (e.g., the economic roles of market participants and the incidence of collusion), and the net margins of cattle traders and butchers. ⁻f there is a high degree of market concentration, if collusion to fix prices is common, or if net margins are high (indicating monopoly profits), there is probably a strong need to reform the traditional marketing system. If, on the other hand, market concentration is low, collusion is rare, and net margins are modest, widespread reorganization of the trade might not be economically justified.

Market Structure.-- The data on market structure indicated that only limited scope existed for collusion by merchants, intermediaries, and butchers in Abidjan and Bouaké. Most criticism of the traditional marketing system has focused on collusion among intermediaries, who allegedly try to raise cattle prices artificially. Concentration ratios, however, indicated only a moderate degree of concentration among intermediaries in Bouaké and a low degree of concentration among intermediaries in Abidjan. In most months, the four largest intermediaries in Bouaké handled between 50 and 60 percent of total sales, while in Abidjan the market share of the largest four intermediaries never exceeded 36 percent. Therefore, even if intermediaries wanted to collude to restrict the number of cattle entering the market in order to raise prices, the large number of inter-mediaries active in the market and their relatively small market shares would make any collusive agreement inherently unstable.[1] The

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[1] As is explained below, most intermediaries wanted to maximize the number of sales they handled, and therefore had no incentive to restrict the number of cattle entering the market.

wholesale and retail butchers' trades in Bouaké and Abidjan were even less concentrated than the intermediaries' trade, indicating little scope for collusive behavior.

Cattle and meat marketing require specialized knowledge, and the traditional marketing system has developed indigenous training programs to impart this knowledge to people entering the trade. Most cattle merchants, large-scale intermediaries, and butchers spent several years as assistants or apprentices before entering the trade themselves. For example, butchers interviewed in Bouaké spent an average of 7.5 years as apprentices before becoming independent butchers. During their apprenticeships, young butchers and cattle merchants learn the fundamentals of cattle and meat marketing and accumulate the capital needed to enter the trade. There is, therefore, little evidence that merchants and butchers need special government training programs to teach them business fundamentals. Most cattle traders and butchers are highly experienced individuals having a detailed knowledge of their profession.

Market Behavior.-- In over a year's observation of the Bouaké and Abidjan cattle markets, the investigator never observed collusion among intermediaries to restrict the number of cattle sold in order to force up prices, nor among butchers to restrict the volume of meat sold. Butchers, in fact, often complained about their inability to form a collusive bloc to deal with the intermediaries. Intermediaries, for their part, usually received the majority of their income from a fixed commission on every animal sold, and therefore had an interest in maximizing, not restricting, the number of animals sold.

Intermediaries would sometimes collude in deciding to whom they would sell, but not on the volume of sales. Intermediaries sometimes refused to sell to buyers who had defaulted on previous purchases on credit, in order to try to force repayment of the debt. Butchers also claimed that large-scale intermediaries would sometimes refuse to deal directly with butchers, preferring to pass through smaller-scale brokers who were often related to the large intermediaries.

The research showed that the term "intermediary" covers a wide variety of market agents, ranging from large-scale cattle brokers to small-scale traders. Far from being "parasites," most intermediaries (particularly large-scale intermediaries) play important roles in facilitating the sale of cattle, transmitting market information, and guaranteeing the credit of buyers. Roughly 25 percent of all cattle sales in Bouaké and 50 percent of all sales in Abidjan are on credit, and the bulk of this credit is guaranteed by intermediaries. If authorities tried to eliminate intermediaries from the marketing system (as is sometimes advocated), a severe credit constraint would arise in the Bouaké and Abidjan cattle markets. A reduction in the availability of credit of this sort would greatly increase the working capital required to buy and slaughter animals, thus reducing competition in the butchers' trade and probably leading to higher meat prices.

Profit Margins of Cattle Merchants and Butchers.

-- The gross margin of merchants who ship cattle to Ivory Coast from Mali and Upper Volta is typically large, but most of the gross margin is attributable to transport costs and export taxes, not the merchants' profits. The merchants' profits typically account for between 4 and 9 percent of the final sale price of cattle in Abidjan and Bouaké. Rates of return to capital of traders who shipped cattle to Bouaké in 1976-77 varied between 16 and 30 percent per year, within the range of the accepted opportunity cost of capital in West Africa. Rates of return to capital of merchants who shipped cattle to Abidjan in 1976-77 were higher, but the high returns were apparently due to a transportation bottleneck that restricted cattle shipments to Abidjan and to the high risk of shipping cattle to Abidjan (due to the volatility of Abidjan cattle prices), not to collusion on the part of cattle merchants.

Similarly, the net margins of class 2 (traditional) butchers in Bouaké and Abidjan were fairly low, accounting for between 8 and 12 percent of the retail price of beef. These margins are considerably below those earned by class 1 (European-style) butchers. In short, the net margins of butchers and cattle merchants who trade in Bouaké and Abidjan are modest, indicating little evidence of monopoly profits.

Policy Implications for Market Organization.-- The data indicate
that cattle and beef marketing in Ivory Coast are fairly competitive in-
dustries that distribute cattle and beef efficiently throughout the coun-
try, given the transportation and infrastructure constraints under which
they operate. Market imperfections exist, but they are the exception,
not the rule.

One reason the market is fairly competitive and net margins are
modest is the relative ease of entry into the cattle and meat trades.
Since it is fairly easy to enter the trade, there are many buyers and
sellers in major markets, and competition among them holds down profit
margins. Most plans put forward by the Ivorian government for reorgani-
zation of the cattle and meat trades involve restricting the number of
people involved in the trade, either through strict licensing or by re-
placing certain market agents by state agencies. While officials may
feel that strict licensing requirements would allow the government a
higher degree of control over cattle and meat marketing, officials should
also realize that by restricting access to the trade, licensing reduces
competition and usually leads to higher meat prices. Indeed, the main
effect of limiting the number of butchers' licenses issued in Bouaké and
Abidjan has been to create a black market in licenses that has made it
difficult and expensive for young butchers to enter the trade.

The traditional marketing system is labor-intensive, using little
capital other than the cattle sold. Most plans for market reorganization and
abattoir improvement involve replacing some of the labor involved in mar-
keting with imported capital equipment. Such plans also would usually
result in disruption of the indigenous training system for butchers and
traders. When planning marketing projects, officials should carefully
consider the employment effects of these projects. They should also
realize that it may not always be appropriate to adopt European or North
American models of slaughter and livestock and meat marketing in Ivory
Coast because the economic parameters upon which these models are based
(e.g., the relative prices of capital and labor) are different in Ivory
Coast than in Europe or North America. For example, it would probably
prove less costly in the long run for Ivory Coast to modify European or

North American plans for abattoirs and livestock and meat markets in order to suit local price conditions than to adopt those plans unmodified and end up substituting expensive capital equipment for cheap labor.

Finally, the study has shown that even though butchers in Abidjan. and Bouaké ignore official price controls, butchers' net margins are quite low. This implies that the butchers' trade is competitive enough to prevent price-gouging by butchers even without price controls. Removing retail price controls on beef in Abidjan and Bouaké therefore would not lead to a rapid increase in prices, but it would free the personnel in charge of trying to enforce these controls for more productive work.

Market Infrastructure Needs[1]

Most cattle marketing projects funded to date by the Ivorian government and by donor agencies have emphasized improving market infrastructure, e.g. by providing cattle scales to markets and by constructing modern abattoirs. Planners seem to hope that by duplicating the structure of cattle markets in developed countries, the efficiency of those markets can be duplicated. Some officials also seem to hope that by moving to the sale of cattle on a per-kg basis, it will be easier for the government to set cattle prices.

In most markets, however, the lack of scales and other infrastructure has not hindered efficient market operation. Cattle and meat prices fluctuate seasonally and from day to day in a manner entirely consistent with fluctuations in demand and supply. Furthermore, the distribution of prices per kg of cattle sold 'on sight" in Abidjan and Bouaké is tightly clustered about the mean, indicating that butchers accurately

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[1]This section deals exclusively with the infrastructure needs of cattle markets and abattoirs in Ivory Coast. Needs for improved transportation infrastructure are discussed in the following section.

estimate carcass weights without using scales.[1] This implies that the scope for improvement in butchers' weight estimates is very limited. In markets in Ivory Coast where single animal cattle scales have been installed, butchers and merchants have not used them. It is difficult to weigh cattle that are not used to being handled, and the risk of injury, either to the animals or to the person trying to weigh them, is significant. Furthermore, the scales are often out of adjustment, and differences in gut fill among animals can lead to fluctuations in liveweights. Most butchers contacted during the study indicated that although they would find it useful to know the liveweight of an animal before bidding on it, they would not like to buy cattle for a fixed price per kg liveweight. They felt that prices should be allowed to vary to take into account differences in dressing percentages and meat quality.

Some improvements in market infrastructure, however, are badly needed, particularly in Abidjan. The Abidjan abattoir is in very bad condition, and hygienic conditions are poor. Few carcass hoists in the abattoir still function, so most animals are gutted on the floor while they lie surrounded by blood, manure, and urine. Extensive refurnishing of the Abidjan abattoir is needed to insure the basic cleanliness of slaughter facilities in the capital.

The Bouaké abattoir, on the other hand, is very simple and much cleaner than the Abidjan abattoir. The Bouaké abattoir, however, was built in 1946 and is now too small to handle the volume of animals passing through it adequately. While the basic design of the Bouaké abattoir is well-suited to local conditions,[2] the structure should be replaced by a newer, larger facility. The new abattoir should include facilities for washing offals (which the current abattoir lacks) and a cold room.

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[1] For zebu males with carcass weights of between 130 and 160 kg sold in Bouaké during the study period, the standard deviation of average monthly prices per kg was only 8.5 percent of the mean. In other words, 68 percent of all prices fell within $\pm$ 8.5 percent of the mean. Furthermore, not all of the variation around the mean was random; some was due to daily fluctuations in supply and demand conditions and to differences in the degree of finish of the animals.

[2] It is a covered structure, open on the sides, with cement floors and hand-operated carcass hoists.

When refurbishing the Abidjan abattoir or building new abattoirs in other cities, officials should keep two principles in mind. First, they should avoid overcapitalizing the slaughterhouses, i.e. replacing inexpensive labor with expensive imported capital equipment. Most modern abattoirs constructed in Africa are designed after abattoirs in developed countries, where capital is relatively cheap and labor is relatively expensive. In developing countries, however, the relative prices of capital and labor are just the reverse. If officials contract for the construction of abattoirs with companies that simply copy the plans of European or North American slaughterhouses rather than try to adapt these plans to African price conditions, the cost of slaughtering will probably be raised substantially above what it otherwise would have been, and many of the laborers currently involved in slaughtering will probably become unemployed.

The second point that officials should keep in mind is that the equipment used in the abattoirs should be simple and easy to repair. Equipment like power hoists and electric scales are likely to break down often when given heavy use by relatively untrained abattoir personnel. Simple manual equipment for which spare parts can be made locally are likely to be both cheaper and more reliable than more complicated power equipment.

The lack of grazing space around the Abidjan cattle market and abattoir represents another serious infrastructure constraint to cattle marketing in Ivory Coast. The inability to hold cattle for more than a few days because of inadequate grazing prevents butchers and merchants from maintaining a buffer stock of animals to smooth out price tions in Abidjan. Rail shipments of cattle to Abidjan are irregular, and as a result, the supply of cattle in Abidjan varies widely from day to day. With no buffer stock to absorb some of this variation, prices in Abidjan are more volatile than in Bouaké, where cattle can be held as a hedge against supply fluctuations. The greater instability of cattle prices in Abidjan leads to a higher rate of default on debts by butchers

in Abidjan than in Bouaké and more fluctuant meat prices, and it makes Abidjan a riskier market than Bouaké for northern cattle merchants.[1]

Another problem at the Abidjan cattle market is that inadequate unloading facilities prevent cattle from being unloaded from rail cars at night. As a result, cattle arriving in Abidjan often must wait ten hours or more before they can be unloaded. This significantly increases mortality and weight losses of cattle shipped by rail to Abidjan.

Given the difficulties of holding cattle in Abidjan and the poor condition of the Abidjan abattoir, officials should seriously consider moving the cattle market-abattoir complex out of the industrial zone of Port Bouët to an area where adequate grazing and water are available. Unless the market is moved or unless means are found to provide forage economically to the cattle at the present location, many of the current problems of cattle marketing in Abidjan (e.g., the high rate of default on debts) are likely to continue.

Problems and Costs of Transporting Cattle

The research showed that trekking is a relatively inexpensive means of moving cattle within the Sudanese and Guinean savanna zones. Long-distance trucking of cattle is very expensive and little used in West Africa, while rail transportation is intermediate in cost between trucking and trekking, and is used mainly to ship cattle to Abidjan.

Trekking.-- Most of the cattle imported into Ivory Coast enter the country on hoof. Most merchants prefer trekking to other means of transport because trekking requires a low cash outlay and allows the merchant more flexibility than trucking or rail transport in timing the arrival of his herd to coincide with favorable market conditions. Some authors suggest that trekking involves heavy mortality and weight losses, but data collected during this study do not support this view. Only about

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[1] Similar problems due to a lack of grazing are developing on a smaller scale at the cattle market in Man.

one percent of cattle from herds trekked to Bouaké are lost en route,
and mortality losses per se among these cattle are much less than one
percent.[1] Forced sales of sick and injured animals account for only
about 0.6 percent of the cattle trekked to Bouaké. Weight losses of
trekked cattle are variable, but do not seem to be as high as is often
asserted. Data collected during the study show that cattle trekked dur-
ing the rainy season sometimes gain weight en route, and data collected
in Upper Volta (84) indicate that even during the dry season trekked
cattle do not always lose weight en route.

Crop damage caused by herds trekking to market is sometimes cited
as a major social cost of trekking. The study showed, however, that the
cost of crop damage per animal trekked to market is very low, only about
10 CFAF. Even if the incidence of crop damage were several times higher
than recorded in this study, the cost per animal would not be high enough,
from an economic standpoint, to justify trucking.[2]

Rail Shipment.-- Almost all cattle sold in Abidjan arrive in Abidjan
by train. Some trek part of the way to Abidjan before boarding the train
(e.g., from Mali to Ferkéssédougou); others, particularly those from
Upper Volta, travel the entire distance by rail. Rail shipment is more
costly per trip than trekking, but allows cattle to be shipped longer
distances during the dry season (e.g., from Ouagadougou to Abidjan) than
trekking would allow. Rail transport also permics traders to rotate
their capital more quickly than with trekking.

There are three major problems, however, with rail shipment of cat-
tle in Ivory Coast and Upper Volta. First, delays in loading, unloading,
and en route result in cattle spending a long time in the poorly venti-
lated rail cars without food or water. For example, the research showed

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[1] Most animals lost during trekking simply become separated from the
herd and are lost in the surrounding countryside. Only mortality losses
represent net losses to society. Animals lost in the bush during trekking
represent losses to the cattle merchants, but not to society as a whole,
because someone presumably finds the lost animals and either raises them or
slaughters them.

[2] An alternative means of dealing with the problem of crop damage is
discussed below in the subsection on policy implications for cattle trans-
portation.

that,on the average, cattle shipped from Ouagadougou to Abidjan spend 3.5 days between the time they are loaded in the cars in Ouagadougou and the time they are unloaded in Abidjan. During this time they receive neither food nor water. The results are heavy shrinkage and mortality losses. The data indicate that cattle shipped from Ouagadougou to Abidjan lose about 9 percent of their original carcass weight en route. Tissue shrinkage is the single largest cost, excluding export taxes, of shipping cattle between Ouagadougou and Abidjan, costing about 5,700 CFAF per head.[1] Mortality losses and forced sales, while significant, are less important than shrinkage losses, costing about 1,200 CFAF per head. Roughly 1.6 percent of all cattle shipped between Ouagadougou and Abidjan die en route. Mortality losses only become important when cattle spend more than two days in the train cars; therefore, very few cattle shipped by rail within Ivory Coast die en route.

The second major problem of rail shipment is that the cars used by the RAN to ship cattle are boxcar-style wagons with very little ventilation. As a result, the cars become very hot inside, and this exacerbates the mortality and weight losses en route.

The third problem of rail transport is a seasonal shortage of rail cars during the peak months of the cattle trade (September to February). The shortage often forces merchants to wait a week or more for cars to ship their cattle south. The transportation bottleneck not only reduces the number of cattle that can be shipped to Abidjan; it significantly raises the price of moving cattle south, as merchants incur additional costs as their herds wait at the railroad loading points for cars to become available. These costs are estimated at roughly 124 CFAF per animal per day, or 6,200 CFAF per day for a herd of fifty head; they are passed on to consumers in the form of higher meat prices. The seasonal shortage of rail cars is due to a slow north-south rotation of cars by the RAN. The rotation is slow because merchants who ship goods north in the cars are reluctant tb unload them once they arrive in Upper Volta due to a lack of warehouse space.

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[1]Viewed another way, the 9-percent carcass weight loss is the equivalent of losing one out of every eleven animals shipped.

Trucking.-- Long-distance trucking is often advocated as a solution to the problems of weight loss and crop damage associated with trekking. Data collected during this study, however, indicate that trucking is a very expensive way of moving cattle in the Sudanese and Guinean savanna zones, and its high cost explains why few merchants currently truck cattle long distances in Ivory Coast. Trucking is competitive within the forest zone, however, where trekking is difficult (and in some areas forbidden), and trucking within the forest zone is common.

Several factors work against long-distance trucking of cattle in Ivory Coast. Truck rental rates are high, and although trucking allows a faster rotation of capital than trekking, the net margin earned by merchants who truck their cattle to market is usually so low that it remains more profitable on an annual basis to trek cattle to market. Furthermore, the incidence of injury and death among trucked cattle appears to be higher than among trekked cattle. Net weight losses during trucking also are considerable, roughly 2.7 percent of carcass weight per day in transit.

Forcing merchants to truck cattle rather than trek them would cause two major problems in the short run. First, a seasonal shortage of trucks already exists in December and January, when most vehicles are being used to haul the cocoa and coffee harvests to market. December and January, however, are the months of highest demand for cattle in the south, so the imposition of mandatory trucking would result in a severe transportation bottleneck. Second, truckers currently consider cattle a backhaul cargo of last resort; they can earn more money hauling cargoes with higher weight-to-volume ratios. Therefore, truckers would probably agree to haul increased numbers of cattle only if the rates they charged for hauling cattle were substantially increased. This would increase transport costs, leading to higher meat prices in the south and lower cattle prices in the north.

Policy Implications for Cattle Transportation.-- The research shows that trekking is usually the least expensive way of moving cattle within the Sudanese and Guinean savanna regions, and that trucking is the most expensive. Trucking is expensive because truck rental rates per animal

are high (due to the low weight-to-volume ratio of cattle as compared with other cargoes) and because truckers and merchants are forced to pay substantial unofficial costs en route (e.g., bribes). Therefore, if Ivorian officials want to hold down meat prices in the cities, it would be inadvisable at this time to force merchants to truck their cattle to market. Merchants, who are quite sensitive to relative transport costs, will shift to long-distance trucking when it becomes profitable for them to do so. The widespread use of trucking within the forest zone indicates that merchants are not opposed to trucking per se; they are only opposed to trucking when more economical means of transport are available. As roads improve and cattle prices rise, the relative profitability of long-distance trucking will increase, leading merchants to ship their cattle by truck.

For the next several years, however, trekking will probably remain the most profitable way of transporting cattle within the savanna zones. Trekking costs could be reduced by the establishment within Ivory Coast of clearly marked cattle trails along which cattle would have right-of-way. Such trails, like those that exist in Upper Volta, would facilitate the flow of cattle southward, reduce the possibility of imported cattle spreading disease to domestic livestock (by restricting imported cattle to specified routes), and lower the incidence of crop damage by trade herds. Trekking losses could be reduced by constructing a few dipping tanks along these trade routes (to reduce weight losses and mortalities resulting from tick-borne diseases) and by providing dry-season watering facilities.

The research showed that the cost of crop damage caused by trade herds is very low when expressed in terms of cost per animal trekked. The problem is that the cost is borne by only a few people, the farmers whose fields are damaged. Although the creation of clearly marked cattle trails in Ivory Coast would reduce the incidence of crop damage, it probably would not eliminate it. One way to handle the problem of compensating farmers for crop damage would be to levy a small tax, e.g., 25 to 30 CFAF per head on all cattle trekked within the country.[1] The pro-

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[1] This tax could be collected by veterinary agents when they issue a health certificate (laissez-passer sanitaire) to the herd.

ceeds of this tax would go into a fund administered by the Ministry of Agriculture to compensate farmers whose crops had been damaged by trade herds. Even if the cost of administering the fund were substantial, this solution would be much cheaper for the country than forcing merchants to truck their cattle, the cost of which would be reflected in higher meat prices and seasonal transportation bottlenecks.

Rail transport will continue to be an important means of moving cattle to market, particularly to Abidjan. The cost of shipping cattle by rail, however, is high, especially in terms of the shrinkage and mortality losses en route and the costs of waiting several days in the north for train cars to become available. The RAN should act to reduce the time cattle spend in transit by assuring that trains carrying livestock are given priority over trains carrying other merchandise. The RAN should also consider creating express trains for livestock, either separately or as part of passenger trains. Typically, when cattle are shipped by rail, during much of the time the animals are in the cattle cars, the train is not moving. Three delays are especially important: after the cattle have been loaded in Upper Volta but before the train leaves the station (this delay averages about 8 hours in Ouagadougou), at the Voltaic-Ivorian border, and in Abidjan at the Treichville train station before the cattle are shipped the 8 kilometers to the cattle market at Port Bouët (this delay often lasts 10 to 12 hours). These delays add significantly to the mortality and weight losses of the cattle during shipment; therefore, the RAN should work with Voltaic and Ivorian customs officials and Abidjan market officials to reduce these delays to a minimum. For example, if the unloading facilities at the Abidjan market were improved and merchants were allowed to pay their RAN bills in advance or as soon as the train arrived in Abidjan, cattle could be unloaded in Abidjan at night, often cutting 10 to 12 hours off the time the animals spend in the cattle cars.

In the long-run, the RAN should consider replacing its poorly-ventilated cars with open-slatted cattle cars, which would further reduce shrinkage and mortalities en route. The RAN should also study the possibility of feeding and watering cattle en route, either in the cars or at rest stops where the cattle would be unloaded.

The seasonal shortage of rail cars that forces merchants to wait a week or more in the north for cars could be lessened by a change in the RAN's rate structure. If the RAN were to sharply increase the daily rental rate charged for unloaded cars sitting on sidings, merchants who ship goods north would be induced to unload the cars quickly, leading to a more rapid rotation of these cars. Data presented in the study indicate that during 1976-77 the rate of rotation of cars used to ship cattle south was very low, and that a faster rotation of these cars could go a long way to reduce the seasonal transportation bottleneck.

Factors Affecting the Location of Slaughter

In recent years, governments of the Sahelian countries and donor agencies have pushed the construction of modern abattoirs in the northern livestock-producing areas, with the goal of shipping refrigerated meat to the coastal areas. The Ivory Coast government has followed a similar policy, contracting for the construction of a refrigerated abattoir in Ferkéssédougou, which will ship meat south to Abidjan. Policy makers see two advantages in slaughtering in the north and shipping the meat south. First, the shrinkage and mortality losses associated with the shipment of live animals would be reduced or eliminated. Second, slaughtering in the north would increase value added in the north.

To date, however, it had remained more profitable to ship live animals south than to ship chilled meat, and as a result, the chilled meat trade has not developed as planners had hoped that it would. The abattoirs of Ouagadougou and Bamako, constructed with the goal of exporting meat to the coastal states, therefore operate far below capacity.

One reason it has remained more profitable to export cattle than meat is the high cost of shipping chilled meat in West Africa. Frequent breakdowns of refrigeration equipment (especially of the poorly maintained refrigerated rail cars used to ship meat between Upper Volta and Abidjan) lead to deterioration of the meat, adding significantly to transport costs.

Transport costs, however, are not the only determinant of the relative profitability of cattle and meat exports. A model presented in Chapter 7 showed that under existing conditions, the factors that determine whether it is more profitable to export live animals or meat from the north are the price of meat in the south, the price of the fifth quarter in the north, and relative transport costs and shrinkage for cattle and meat. Contrary to a popularly held view, with given transport costs, if the price of meat and offals in the south rise relative to prices in the north it becomes relatively <u>less</u>, not more, profitable to ship meat than live animals.[1] By slaughtering in the north a merchant forgoes the income he could have earned selling the fifth quarter in the south, where its price is higher. An increase in meat prices in the south relative to the north will increase the relative profitability of exporting meat as opposed to live animals only if the price of offals in the south falls relative to the price of meat in the south, a situation unlikely to occur in Abidjan in the next five to ten years. Furthermore, expansion of slaughter in the north in order to increase meat exports would increase the supply of offals in the north, and with no increase in the demand for offals in the north, their price would fall. This would increase the relative profitability of sending the offals south (in the form of a live animal) where their price was higher, rather than slaughtering in the north and selling the offals locally.

The model showed that under conditions likely to prevail during the next five to ten years, the only way to which it could become more profitable to export meat as opposed to live animals would be for the costs of slaughtering in the north and transporting carcasses south to fall relative to the cost of transporting live animals south, or for the price of the fifth quarter in the north to increase relative to the price of meat in the south. Furthermore, if only relative transport costs changed, expansion of slaughter in the north would be self-braking because of a fall in the relative price of offals in the north. Therefore, if export-

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[1] The <u>absolute</u> profitability of exporting meat increases as the price of meat and offals in the south increases relative to prices in the north, but the <u>relative</u> profitability of meat as opposed to live animal exports falls.

ing meat from the north is to become and __remain__ more profitable than exporting live animals, not only must slaughter costs in the north and the cost of transporting meat fall relative to the cost of transporting live animals, but the price of the fifth quarter in the north must also rise relative to the price of the fifth quarter in the south. One way to increase the demand for the fifth quarter in the north (hence its price) would be to build processing facilities for offals in the north. Processing would allow northerners to export the fifth quarter to areas where the demand for it is high rather than being forced to sell it in the north, where the demand for it is limited. This would increase the relative profitability of exporting meat as opposed to live animals.

Meat Prices and Consumer Preferences: Their Implications for Northern Fattening Projects

Ivory Coast has two distinct markets for beef: the class 1 market, made up of supermarkets and European-style butcher shops; and the class 2 market, made up of butchers who sell meat in open market stalls. The class 1 market, which caters to the urban elite (expatriates and high-income Africans) handles slightly over 1,800 tons of beef per year, about 4 percent of the total beef consumed in Ivory Coast. The market for high quality beef in Ivory Coast is thus small, both in absolute and relative terms.

Projected production of high-quality beef in central West Africa, however, is high. SODEPRA is currently operating a feedlot at Ferkéssédougou, and the National Plan projected that output from this feedlot would total 16,000 head by 1980, the equivalent of 1,600 tons of fattened rear quarters.[1] Mali plans to export 19,000 head of fattened cattle per year to Ivory Coast by 1980 (95), the equivalent of 1,900 tons of fattened rear quarters. Three feedlots have been constructed near Banfora in Upper Volta, with a total capacity of over 6,000 head per year (600 tons of fat-

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[1] In 1978, however, the feedlot's manager said that production in 1980 would probably total only about 10,000 head (113).

tuned rear quarters) (30). Tl e financial success of almost all these projects depends on the ability of the feedlot operators to se'l the fattened animals (or the meat from these animals) at a premium ov the Ivorian market. The projected production from these feedlots, however, far exceeds the demand for high-quality beef in Ivory Coast. The production of just high quality rear quarters is projected at about. 6,000 tons in 1980, while the to'al de nand for high quality beef in Ivory Coast is unlikely to exceed 2,000 tons.

The question arises as to whether alternative markets can be found for this beef. While some markets may exist in other coastal states (particularly Nigeria), many of these states are setting up their own feedlots. It is therefore likely that the bulk of this high-quality beef, if it is produced, will have to be sold on the class 2 market.

Data on cattle prices and retail meat prices collected during this study and information gathered through interviews with purchasers of beef indicate that there is some preference in the class 2 market for fattier, more tender meat. The degree to which this preference for fattier meat translates into higher prices for well-fed animals, however, is limited by three factors: consumers' dislike of meat that is "too fat," traditional eating habits, and low consumer incomes. Although Ivorian consumers apparently like some interstitial fat in meat, they complain if meat is "too fat," i.e., if there is a large amount of fat on the outside of the carcass. (This was one of the major complaints consumers voiced about the imported frozen meat). Traditional eating habits and low incomes also limit the effective demand for tender meat. Traditionally, meat is consumed in West Africa as part of a sauce that is boiled for several hours. Given this method of preparation, there is little reason to pay a premium for especially tender meat. The effective demand in the class 2 market for tender meat is further limited by the low discretionary income of most consumers. Most consumers who buy meat on the class 2 market have little income left after meeting their basic needs to pay a premium for tender meat. Demand for tender meat can be expected to grow, however, as incomes increase. With higher incomes and greater employment possibilities outside of the home for women, the op-

portunity cost of the long time spent preparing meals by traditional methods will increase. Consumers will therefore shift to more rapid means of preparing meat, such as grilling, for which the tenderness of the meat is an important consideration.

What consumers in the class 2 market currently are looking for, however, is meat from a well-fleshed, but not a finished, animal. Butchers who sell on the class 2 market therefore pay slightly more (up to about 7 percent more per kg carcass weight) for animals yielding fattier meat than for lean animals. Effective demand for well-fleshed animals in the class 2 market is probably not high enough, however, to absorb at a premium price all the fattened cattle scheduled to be produced from northern feedlots in the next few years.

Some fattening projects in the north therefore should be redirected from their current four to six-month fattening period towards shorter fattening periods aimed at producing well-fleshed but not fat animals. There is some room for replacing currently imported high quality beef with locally produced beef, but the market for high quality beef is small. The bulk of the beef sold in Ivory Coast will continue to go to the class 2 market, where the demand for higher quality meat is limited. This market could absorb more well-fed animals from short-term (one to three-month) fattening schemes, but in planning such programs two points should be kept in mind. First, the projects should be based on a low-cost technology because the class 2 market offers only small premiums for fattened animals. Most of the profit in such projects will have to be made on the weight gain of the animal, not on a premium price paid for higher quality meat. Second, the growth of demand for higher quality meat in the class 2 market will be contingent on the growth of per capita incomes in Ivory Coast. Demand for higher quality beef is therefore likely to grow only at a modest pace, and planners should be careful not to expand fattening projects so fast that the market is flooded with more well-fed cattle than it can absorb at prices that make the fattening projects profitable.

General Considerations to Guide Marketing Policy

An efficient cattle and meat marketing system is one that transforms cattle into meat and distributes the cattle and meat over time and among regions while minimizing the gross marketing margin.[1] By minimizing the cost of performing the tasks of distribution, storage, and transformation an efficient marketing system benefits both producers and consumers. Producers receive higher prices for their animals and consumers pay lower prices and receive larger quantities of meat than they would with an inefficient marketing system (118, pp. 120-24). Improving market efficiency therefore contributes directly to the stated goal of development policy in Ivory Coast, the improvement of the welfare of the individual.

The problem facing planners and donor agencies in Ivory Coast (and in all of West Africa) is how to reduce the gross marketing margins for cattle and meat in the least costly manner, given the tasks of distribution, storage, and transformation the marketing system must perform. Two types of solutions have been proposed. The first, typified by the CEBV accords (16a), calls for large-scale restructuring of the traditional marketing system in the hope of assuring more government control over the market. Ghana has gone farther than any other country in restructuring the trade by replacing the traditional marketing system with a state monopoly. The other type of solution involves working to relieve the transportation and infrastructure constraints in the current marketing system, in the hope that once these constraints are lessened, competition within the traditional marketing system will drive down gross margins.

The results of this study strongly suggest that the second approach is much more likely to succeed, and in the long run would be much cheaper, than trying to totally restructure the marketing system. The research shows that while gross margins in the cattle and meat trades are high, net margins are modest. This implies that the marketing system is competitive and efficient given the infrastructure and transportation constraints under which it operates. The main reason why gross margins are high is

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[1]The gross marketing margin is the difference between the producer price and the retail price.

that cattle merchants have high costs (e.g. in terms of mortality and shrinkage losses en route and high export taxes), not that merchants earn monopoly profits.

For the livestock and meat trade to expand in order to meet the needs of Ivory Coast's rapidly growing population, the transportation and infrastructure bottlenecks facing livestock marketing will have to be overcome whether or not the trade is drastically reorganized. The real question facing Ivory Coast, then, is the following. Should Ivory Coast use its valuable resources (including its scarce veterinary and administrative personnel) to try to totally restructure livestock marketing, while at the same time trying to relieve the transportation and infrastructure constraints, or should it concentrate its resources on relieving the transportation and infrastructure constraints, and let the traditional marketing system handle the tasks of distributing cattle and transforming cattle into meat?

Extensive reorganization of the marketing system would involve a very heavy cost in terms of the time of the government personnel (presumably from the Veterinary Service or SODEPRA) who would be called upon to run the new system or enforce the new regulations. It would probably be a more efficient use of government resources for the government to work jointly with traditional cattle traders and merchants, most of whom are highly experienced and have a detailed knowledge of the cattle trade, to develop mutually acceptable improvements in the marketing system rather than working against these marketing agents in an attempt to completely restructure the trade. Ivory Coast's only attempt to date to set up an alternative cattle marketing system, SODEPRA's Service de Commercialisation, has not been encouraging. The research shows that despite the expenses the state incurred in setting up and running the new marketing agency, the agency did not achieve its primary goal of offering northern Ivorian cattle producers prices that were significantly higher than those offered by traditional merchants. Certainly Ghana's recent experience with its state cattle marketing agency, the Ghana Meat Marketing Board, should serve as a warning to planners about the difficulties of trying to replace the traditional marketing system with a state monopoly.

Working with the traditional marketing system does not mean the government will be without a role in cattle and meat marketing. The government has important roles to play in insuring the health of imported and domestically produced animals, safeguarding public health by insuring proper sanitation in the abattoirs, and improving the transportation and market infrastructure for cattle and meat. The government should not use its power, however, to restrict entry into the cattle and meat trades unless there is strong justification in terms of maintaining public health. Restricting entry (e.g., through limiting the number of licenses issued) typically reduces competition, drives up marketing margins, and results in producers receiving lower prices for their animals and consumers paying higher prices for their meat.

A shift in government policy away from trying to totally restructure cattle marketing to an attempt to improve infrastructure and guarantee the competitiveness of the traditional marketing system implies a major change in the way in which livestock marketing projects are designed and implemented. In the past, donor organizations and government planners have typically designed marketing projects without consulting butchers, traders, or intermediaries about these market participants' perceptions of the major problems of cattle and meat marketing. Market participants were usually contacted (if at all) only after the project had been planned, in order to tell them what their new obligations would be as a result of the project. Seldom have planners tried to tap merchants' and butchers' knowledge of the trade when designing projects, nor have they often tried to design projects to respond to what the market participants feel are the major problems of cattle and meat marketing. As a result, many butchers and traders regard the government as an adversary, interested mainly in taxing them to finance projects they feel are unnecessary.

If livestock and meat marketing in Ivory Coast are to be improved efficiently and effectively, there needs to be more contact and two-way communication between market participants and the government officials and donor agencies in charge of planning market improvements. Market participants should be contacted early in the design stage of projects so that the projects can be modified to respond to what these marketing

agents perceive as major problems in the trade. Certainly planners should not be obligated to do everything the butchers and cattle traders suggest, but it would be equally unwise for planners to totally ignore these market participants when designing projects. Not only do butchers and traders have knowledge of the market that can be extremely useful in designing projects, but by involving the market participants in project design, planners can help assure that butchers and traders will cooperate in project implementation. It is also important that before planners advocate widespread changes in the marketing system, they understand why market participants behave as they do; often, behavior that appears irrational at first glance is based on firm economic principles.

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APPENDICES

APPENDIX 1A

OFFICIAL VOLTAIC STATISTICS ON LIVESTOCK
EXPORTS, MEAT EXPORTS, AND TRANSITS OF
FOREIGN LIVESTOCK THROUGH UPPER VOLTA

TABLE 1A.1

RECORDED EXPORTS OF LIVESTOCK FROM UPPER VOLTA 1965-75
(number of animals)

Year	Ivory Coast		Ghana		Togo		Benin		Total	
	Cattle	Small Ruminants	Cattle	Small Ruminants	Cattle	Small Ruminants	Cattle	Small Ruminants	Cattle	Small Ruminants
1965	—	—	—	—	—	—	—	—	135,189	183,479
1966	—	—	—	—	—	—	—	—	96,441	199,209
1967	—	—	—	—	—	—	—	—	89,833	214,038
1968	—	—	—	—	—	—	—	—	98,303	299,602
1969	—	—	—	—	—	—	—	—	82,811	218,423
1970	59,207	191,563	20,865	36,363	2,663	3,218	585	2,101	83,320	233,245
1971	59,589	191,382	18,482	40,755	2,685	4,387	360	1,452	81,116	237,976
1972	58,041	265,798	9,949	8,202	4,726	3,626	189	2,141	72,905	279,767
1973	48,573	276,644	27,497	19,812	4,656	4,001	709	1,353	81,435	301,810
1974	49,490	241,511	23,482	25,296	6,669	6,362	288	430	79,929	273,599
1975	57,91	286,864	3,706	11,437	4,811	3,776	15	478	66,450	302,555
1976	23,219	156,327	3,503	18,287	8,181	2,855	235	262	35,138	177,731

SOURCE: République de Haute Volta, Direction des Services de l'Elevage et des Industries Animales.

TABLE 1A.2

RECORDED TRANSITS OF LIVESTOCK THROUGH UPPER VOLTA: 1970-75
(number of animals)

Year/origin	Destination									
	Ivory Coast		Ghana		Togo		Benin		Total	
	Cattle	Small Ruminar'	Cattle	Small Ruminants	Cattle	Small Ruminants	Cattle	Small Ruminants	Cattle	Small Ruminants
1970										
Mali	13,096	8,583	35,062	2,154	—	—	—	—	48,158	10,737
Niger	—	11,009	8,420	3,800	4,309	6	58	—	12,787	14,815
Total	13,096	19,592	43,482	5,954	4,309	6	58	—	60,945	25,552
1971										
Mali	17,857	18,264	36,219	5,508	—	—	—	—	54,076	23,772
Niger	6,453	7,252	7,946	5,953	2,389	33	—	—	16,788	13,238
Total	24,310	25,516	44,165	11,461	2,389	33	—	—	70,864	37,010
1972										
Mali	16,013	15,904	24,466	2,267	199	—	—	—	40,678	18,171
Niger	—	3,410	3,797	3,119	3,695	284	—	—	7,492	6,813
Total	16,013	19,314	28,263	5,386	3,634	284	—	—	48,170	24,984
1973										
Mali	24,580	36,393	11,450	1,821	—	—	—	—	36,030	38,214
Niger	182	8,700	13,629	9,194	1,821	381	—	—	15,632	18,275
Total	24,762	45,093	25,079	11,015	1,821	381	—	—	51,662	56,489
1974										
Mali	5,690	20,218	10,685	398	—	—	—	—	16,375	20,616
Niger	—	3,582	11,020	7,607	2,980	314	—	—	14,000	11,503
Total	5,690	23,800	21,705	8,005	2,980	314	—	—	30,375	32,119
1975										
Mali	3,702	1,003	—	—	—	—	—	—	3,702	*1,003
Niger	100	5,532	809	91	2,061	—	—	—	2,970	5,623
Total	3,802	6,535	809	91	2,061	—	—	—	6,672	6,626
1976										
Total	—	—	—	—	—	—	—	—	—	—

SOURCE: République de Haute Volta, Direction des Services de l'Elevage et des Industries Animales

RECORDED MEAT EXPORTS FROM UPPER VOLTA: 1967-75 (tons)

Year/Destination	Beef	Mutton	Goat Meat	Pork	Horse	Offals, etc.	Total[a]
1967							
Ivory Coast	942.7	253.0	17.6	96.7	101.6	19.2	1,430.8
1968							
Ivory Coast	1,309.7	201.2	18.5	58.1	90.5	13.4	1,691.4
1969							
Ivory Coast	1,012.8	115.7	4.9	101.9	60.7	31.0	1,327.1
1970							
Ivory Coast	900.2	105.8	12.1	108.0	51.3	11.2	1,188.7
1971							
Ivory Coast	1,075.4	126.0	14.2	55.0	62.3	11.7	1,374.6
1972							
Ivory Coast	751.0	85.3	12.8	54.3	53.5	6.8	963.7
1973							
Ivory Coast	706.6	42.2	8.4	27.7	10.0	9.8	804.8
Ghana	14.8	—	—	—	—	34.8	49.6
Total	721.4	42.2	8.4	27.7	10.0	44.6	854.4
1974							
Ivory Coast	720.6	55.8	3.6	62.8	9.7	13.0	865.6
Togo	3.1	4.8	0.3	0.4	2.2	2.1	12.9
Total	723.7	60.6	3.9	63.2	11.9	15.1	878.5
1975							
Ivory Coast	406.0	22.2	2.8	24.6	12.4	5.3	473.2
1976							
Ivory Coast	174.0	12.4	—	3.8	3.1	0.8	202.7[b]

SOURCE. République de Haute Volta, Direction des Services de l'Elevage et des Industries Animales

[a] Totals may differ slightly from sum of subtotals due to rounding.

[b] Total includes b.: - - - -f "non-specified" meat exported from Ouagadougou in January. Most of this was probably beef.

APPENDIX 1B

OFFICIAL MALIAN STATISTICS ON LIVESTOCK AND MEAT EXPORTS

TABLE 1B.1

RECORDED CATTLE EXPORTS FROM MALI 1960-75
(number of animals)

Destination	Year									
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Ivory Coast	19,596	24,840	21,985	27,671	50,133	29,881	8,063	17,240	17,648	30,787
Ghana	10,801	12,221	14,889	21,731	17,079	26,169	22,365	23,057	18,674	43,853
Upper Volta	1,346	5,549	3,399	3,075	1,575	1,353	466	1,305	6	361
Senegal	243	——	——	124	681	30	193	——	192	629
Niger	3,463	2,041	1,411	2,740	1,199	824	451	683	5	133
Liberia	301	2,517	5,400	4,694	2,813	2,048	866	840	390	690
Others[a]	2,487	755	52	60	108	96	44	——	——	——
Total	38,237	47,923	47,136	60,095	73,588	60,401	32,448	43,125	36,915	76,453

TABLE 1B.1 (cont'd.)

RECORDED CATTLE EXPORTS FROM MALI 1960-75
(number of animals)

Destination	Year					
	1970	1971[b]	1972[b]	1973[b]	1974	1975[c]
Ivory Coast	49,560	44,500	49,500	32,700	26,865	13,011
Ghana	30,023	32,200	16,200	11,300	6,305	—
Upper Volta	37	2,100	2,400	—	70	—
Senegal	444	—	—	—	730	1,324
Niger	378	7,800	4,700	—	127	—
Liberia	1,189	300	5,000	—	2,834	25
Others[a]	78	1,100	21,100	7,800	3,780	274
Total	81,718	88,000	98,900	51,800	40,711	14,634

SOURCES: République du Mali, Ministère du Développement Rural, Office Malien du Bétail et de la Viande (OMBEVI), Statistiques du bétail et de la viande, issues for the years 1960-70, 1974 and 1975; and OMBEVI, unpublished data.

[a]Includes exports to "non-determined" destinations.

[b]Rounded figures

[c]Data for the first four months only. Mali banned livestock exports for six months of 1975; therefore recorded exports for 1975 are abnormally low.

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TABLE 1B.2

RECORDED EXPORTS OF SMALL RUMINANTS FROM MALI 1960-75
(number of animals)

Destination	Year									
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Ivory Coast	39,237	40,965	25,037	31,852	48,722	26,043	3,913	7,650	2,023	42,482
Ghana	4,594	5,622	5,238	5,964	1,242	1,129	152	642	1,665	500
Upper Volta	795	6,110	1,928	3,111	412	2,794	337	134	79	——
Senegal	20,398	——	——	183	415	323	9,556	225	4,695	14
Niger	1,479	2,723	3,569	3,007	2,383	2,028	980	2,055	64	291
Liberia	1,201	1,307	5,527	3,171	1,425	2,162	255	1,322	430	1,957
Others	14,677	22,827	1,321	2,982	12,040	13,146	16,470	21,186	8,059	11,687
Total	82,381	79,554	42,620	50,270	66,549	47,625	31,663	33,214	17,215	56,931

RECORDED EXPORTS OF SMALL RUMINANTS FROM MALI 1960-75
(number of animals)

Destination	Year					
	1970	1971[b]	1972[b]	1973	1974	1975[c]
Ivory Coast	83,861	86,700	81,200	n.a.	70,275	18,185
Ghana	1,360	10,500	400	n.a.	20	
Upper Volta	708	2,100	400	n.a.		——
Senegal	2,009	——	——	n.a.	——	——
Niger	935	2,100	2,000	n.a.	755	990
Liberia	4,968	600	4,100	n.a.	——	——
Others[a]	13,480	24,900	9,000	n.a.	4,590	94
					10,258	3,216
Total	107,321	126,900	97,100	n.a.	85,898	22,395

SOURCES: République du Mali, Ministère du Développement Rural, Office Malian du Bétail et de la Viande (OMBEVI), Statistiques du bétail et de la viande, issues for the years 1960-70, 1974, and 1975; and OMBEVI, unpublished data.

NOTE: n.a. - not available

[a] Includes exports to "non-determined" destinations

[b] Rounded figures

[c] Data for the first four months only. Mali banned livestock exports for six months of 1975; therefore recorded exports for 1975 are abnormally low.

TABLE 1B.3

ESTIMATED TOTAL CATTLE EXPORTS FROM MALI: 1970-76
(number of animals)

Destination	Years						
	1970	1971	1972	1973	1974	1975	1976
Ivory Coast	110,000	130,000	160,000	115,000	110,000	95,000	100,000
Ghana	50,000	40,000	20,000	15,000	10,000	5,000	5,000
Liberia	10,000	10,000	15,000	10,000	5,000	10,000	5,000
Senegal	5,000	—	—	—	1,000	5,000	5,000
Niger	15,000	20,000	25,000	10,000	4,000	5,000	5,000
Total	190,000	200,000	220,000	150,000	130,000	120,000	120,000

SOURCE: République de Mali, Ministère du Développement Rural, Office Malien du Bétail et de la Viande (OMBEVI), projet FAO, unpublished data.

TABLE 1B.4

ESTIMATED TOTAL GROSS EXPORTS OF SMALL RUMINANTS FROM MALI: 1970-76
(number of animals)[a]

Destination	Years						
	1970	1971	1972	1973	1974	1975	1976
Ivory Coast	170,000	200,000	170,000	140,000	110,000	150,000	185,000
Ghana	30,000	40,000	10,000	5,000	—	—	—
Liberia	30,000	40,000	30,000	30,000	20,000	25,000	30,000
Senegal	10,000	10,000	10,000	5,000	5,000	10,000	10,000
Niger	10,000	10,000	5,000	5,000	5,000	5,000	10,000
Algeria	20,000	20,000	15,000	15,000	10,000	10,000	15,000
Total	270,000	320,000	240,000	200,000	150,000	200,000	250,000

SOURCE: Republique du Mali, Ministère du Développement Rural, Office Malien du Bétail et de la Viande (OMBEVI), projet FAO, unpublished data.

[a] Mali imports a large number of small ruminants from Mauritania; therefore net exports are considerably below the totals shown in this table.

TABLE 1B.5

RECORDED RED MEAT EXPORTS FROM MALI: 1960-75
(tons)

Year	Ivory Coast	Ghana	Liberia	Senegal	Libya	Congo-Brazzaville	Other[a]	Total
1960	—	—	—	—	—	—	—	118.4
1961	—	—	—	—	—	—	115.3	115.3
1962								
1963	126.2	—	1.9	6.0	—	—	1.8	135.9
1964	366.9	124.9	—	—	—	—	0.7	492.5
1965	354.5	139.1	13.8	—	—	—	—	507.4
1966	623.6	28.5	3.5	—	—	—	0.3	655.9
1967	—	—	—	—	—	—	—	185.0
1968	—	—	—	—	—	—	—	323.5
1969	—	—	—	—	—	—	—	477.0
1970	261.2	66.6	—	—	—	—	—	327.8
1971	12.0	10.0	—	—	—	—	12.0	34.0
1972	0.5	—	21.0	—	25.2	52.6	—	99.3
1973	—	184.0	37.0	—	100.0	—	—	321.0
1974	—	19.3	18.2	—	—	—	—	37.5
1975	—	—	—	—	—	—	—	—

SOURCES: République du Mali, Ministère du Développement Rural, Office Malien du Bétail et de la Viande (OMBEVI), Statistiques du bétail et de la viande, and OMBEVI, unpublished data.

NOTES: — signifies not available
___signifies none or negligible

[a]Includes exports to "non-determined" destinations.

APPENDIX 1C

ARRIVALS OF IMPORTED LIVESTOCK IN IVORY COAST RECORDED BY THE VETERINARY SERVICE: 1961-71

Year	Mali		Mauritania		Upper Volta		Niger		Total	
	Cattle	Small Ruminants	Cattle	Small Ruminants	Cattle	Small Ruminants	Cattle	Small Ruminants	Cattle	Small Ruminants
1961	—	—	—	—	—	—	—	—	71,921	51,921
1962	—	—	—	—	—	—	—	—	75,858	66,948
1963	—	—	—	—	—	—	—	—	79,817	89,294
1964	—	—	—	—	—	—	—	—	107,474	129,299
1965	36,446	39,902	1,914	4,936	64,828	86,347	10	10,780	103,198	141,965
1966	19,996	18,875	37,234	107,072	44,273	55,311	119	—	101,622	181,258
1967	46,063	13,964	16,739	17,380	56,123	137,169	718	2,004	119,643	170,517
1968	67,836	27,605	16,356	15,568	80,566	182,015	—	—	164,758	225,188
1969	115,773	90,628	44,289	29,988	49,085	148,894	—	—	209,147	269,510
1970	117,624	122,673	62,286	36,135	51,199	128,490	—	—	231,109	287,298
1971	97,574	125,042	22,527	40,502	61,994	148,308	—	—	182,095	313,852

SOURCE: République de Côte-d'Ivoire, Ministère de l'Economie et des Finances, Direction de la Statistique, Situation Économique de la Côte-d'Ivoire, various issues.

APPENDIX 1D

CITIES IN IVORY COAST IN WHICH CATTLE SLAUGHTER
WAS OFFICIALLY RECORDED IN 1976, BY VETERINARY REGION

Region/City	Estimated Population in 1976[a]
North	
Boundiali	10,615
Ferkéssédougou	27,025
Korhogo	47,925
Odienné	14,805
Séguéla	12,912
Tingrela	9,527
Touba	5,490
Bako	
Dianra	
Dickodougou	
Dioulatiédougou	
Gbéléban	
Goulia	
Kong	
Kani	
M'Bengué	
Maninian	
Napiélodougou	30,000[b]
Niellé	
Ouangolodougou	
Samatiguila	
Sanhala	
Séguélon	
Sinématiali	
Tiéningboué	
Tienko	
Worofla	
Subtotal: North	158,299

APPENDIX 1D - Continued

Region/City		Estimated Population in 1976[a]
East	Abengourou	32,238
	Agnibilékrou	13,450
	Bondoukou	20,387
	Bouna	18,331
	Tanda	7,519
	Doropo	
	Tehjni	1,500[b]
	Subtotal: East	93,425
Center		
	Bouaké	185,715
	Béoumi	11,902
	Dabakala	3,470
	Dimbokro	35,706
	Katiola	18,909
	M'Bahiakro	10,575
	Tiébissou	6,136
	Toumodi	14,046
	Yamoussoukro	39,515
	Boniérédougou	
	Niakaramandougou	
	Santana-Sokoura	6,000[b]
	Tafiré	
	Subtotal: Center	328,974
South		
	Abidjan	1,017,705
	Adzopé	22,446
	Agboville	27,256
	Dabou	25,944
	Divo	39,664
	Grand Bassam	27,209

APPENDIX 1D (continued)

Region/City	Estimated Population in 1976[a]
South (cont'd.)	
Lakota	14,170
Tiassalé	8,457
Subtotal: South	1,182,851
Center-West	
Bouaflé	19,652
Daloa	62,743
Gagnoa	45,024
Sassandra	9,218
Subtotal: Center-West	136,637
West	
Danané	19,092
Douékoué	12,864
Man	50,876
Subtotal: West	82,832

SOURCE: List of cities provided by République de Côte d'Ivoire, Ministère de la Production Animale, Direction des Services Vétérinaires.

[a]Populations for major cities estimated using 1975 populations and annual growth rates listed in République de Côte d'Ivoire, Ministère du Plan, La Côte d'Ivoire en chiffres, p. 13.

[b]Author's estimate

APPENDIX 1E

SOURCES OF DATA ON DOMESTIC LIVESTOCK PRODUCTION
AND LIVESTOCK AND MEAT IMPORTS

The Available Data.-- This appendix discusses the reliability and limitations of the data available on domestic livestock production in Ivory Coast and on imports of livestock and meat. These data are used in Chapter 1 to estimate the volume of the Ivorian meat supply.

Almost all the data used in Chapter 1 were provided by the Ivorian Ministry of Animal Production. The Ministry compiles these statistics from the monthly reports of the Veterinary Service and the other government agencies dealing with livestock, such as SODEPRA[1] and CEIB.[2] Many of the data have limitations that must be kept in mind when analyzing these figures.

Figures on domestic livestock and meat production are based on estimates of the number of animals present in the country, the offtake rates practiced by livestock owners, and average carcass weights. Cattle in Ivory Coast are of two major types: zebus, or humped cattle,[3] and taurus, or humpless cattle.[4] The Ministry of Animal Production takes its figures on the number of zebus in the country from a census conducted in 1975 of zebu herds in northern Ivory Coast[5] (8). This census took place in conjunction with a campaign to vaccinate the northern zebu herds. The census provides data on the number of animals and the age-sex structure of the herds. Researchers who conducted the survey used information gathered on a subsample of herds (N = 63) to calculate offtake rates and other herd parameters. All livestock researchers in Ivory Coast contacted by the investigator felt that this census was carefully done and the results were reliable.

Data on the number of taurins in the country are less precise than those available on the zebu population. Four different sources of information are available. These include the National Agricultural Census of 1975 (figures cited in 74), which was based on a sample survey of all

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[1]Societé pour le Développement des Productions Animales, the parastatal company that promotes domestic livestock production.

[2]Centre d'Exploitation Industrielle du Bétail, the agency in charge of the Abidjan markets for cattle and small ruminants.

[3]Varieties of the species Bos indicus.

[4]Varieties of the species Bos taurus. For the sake of brevity, the word "taurin" is used in this study to indicate taurus cattle.

[5]Because of their susceptibility to trypanosomiasis, no zebus are raised in the central and southern regions of Ivory Coast, which are heavily infested with tsetse fly.

farms in the country; a census of taurin herds in northern Ivory Coast
carried out in 1974 by SODEPRA as a prelude to its extension program (74);
a SODEPRA census of taurin herds in the central region of the country
carried out in 1976 (74); and estimates of the taurin population made by
agents of the Veterinary Service. Of these estimates, the investigator
feels that the figures collected by SODEPRA are the most reliable. For
southern and part of central Ivory Coast, SODEPRA has not carried out a
livestock census,[1] and the only data are the estimates of the Veterinary
Service and the National Agricultural Census. A priori, one would expect
the Veterinary Service to have a more complete coverage of herds than the
National Agricultural Census since the Veterinary Service is well-known
to livestock raisers and is associated in their minds with the health
services it provides to their animals.[2] The Veterinary Service did, in
fact, record more taurins in these regions than did the National Agri-
cultural Census. The Veterinary Service reported 44,600 taurins in the
southern and central regions of the country in January, 1977, compared to
the National Agricultural census' estimate of 10,500 in 1975 (74). The
official figures reported by the Ministry of Animal Production on the
number of taurins in the country include the Veterinary Service's
estimate of the cattle population in the south and central regions of the
country and SODEPRA's estimate of the taurin population of the north. The
official estimates of the demographic parameters for taurin herds come
from a study carried out in 1974 of herds in northern Ivory Coast (69).

To convert data on the number of animals slaughtered into terms of
meat and edible offals one needs estimates of carcass weights. The
official Ivorian statistics rely on the carcass weight estimates used in
the 1969 SEDES study of livestock and meat marketing in middle West
Africa (102). These figures have not been updated to reflect any changes
in animal weights that may have occurred as a result of the drought in
the Sahel.

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[1] SODEPRA plans a livestock census of the West Central region of the
country in 1977 and 1978.

[2] Unlike many West African countries, Ivory Coast imposes no head-
tax on livestock, therefore livestock owners have little incentive for
tax reasons to hide their livestock from the Veterinary Service.

Data on the small ruminant population are much less reliable than those for cattle. No census of small ruminants has been taken in Ivory Coast except in the central part of the country.[1] On the basis of its sample survey, the National Agricultural Census estimated the country's sheep and goat population at 1,288,600 (74), somewhat lower than the official figure of 1,600,000 advanced by the Ministry of Animal Production. If livestock owners concealed their small stock from the enumerators of the National Agricultural Census as they apparently did their cattle (see p. 503), the agricultural census's figure is probably an underestimate of the true population. The higher figure of the Ministry of Animal Production, however, is not based on any actual census.

Figures for the demographic parameters of the domestic goat and sheep herds are equally unknown. The Ivorian government used the estimates provided in the 1969 SEDES study (102). The SEDES figures on average carcass weights are also used.

Data on domestic pork production are better than those on small ruminant production, but less accurate than those on beef production. In Ivory Coast, swine are produced both in relatively modern pig farms and in traditional village settings. The Veterinary Service has good estimates of the number of pigs produced in the modern farms. The estimates of village production, however, are just guesses. Demographic parameters and carcass weights used in calculating official figures on pork production differ slightly from the SEDES figures. The investigator was not able to determine how the Ministry of Animal Production established these parameters.

Since domestic livestock production makes up such a small proportion of the country's total red meat supply, even large errors in the estimates of domestic production have relatively small effects on estimates of the total Ivorian red meat supply. Errors in estimated imports of livestock and meat are potentially much more important.

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[1] In the départements of Bouaflé, Bouaké, Dimbokro, Katiola and Dabakala. The census was conducted by SODEPRA in 1976.

<u>Official Statistics on Imports of Livestock and Meat</u>.--These statistics contain several types of errors. Nonetheless, the official Ivorian statistics on livestock imports are usually much more reliable than the corresponding export figures of the major exporting countries-like Mali and Upper Volta. Livestock exported from the Sahelian countries are subject to heavy export taxes; therefore, exporters have a strong incentive to evade official controls by smuggling animals out of these countries. Once the cattle reach Ivory Coast, however, there is more of an incentive to pass through official channels. Imported cattle are not heavily taxed in Ivory Coast, but police and veterinary agents frequently check their health papers, which are issued near the border by the Ivorian Veterinary Service.[1] If the importer has not obtained these papers, he is liable to a heavy fine and his herd can be quarantined. Therefore, most importers obtain the necessary papers from the Veterinary Service. As a result, the entry of their herds into Ivory Coast is reflected in the official statistics.

Nonetheless, certain errors occur in the import statistics, and these usually result in imports being underestimated. The first error arises from a problem common to statistics-gathering in all developing countries: a shortage of qualified manpower. Most of the statistics on livestock and meat imports are collected by the Veterinary Service, which has as its primary objective the prevention and control of contagious animal diseases. The collection of data on livestock imports is a by-product of the Veterinary Service's other activities. For example, much of the data on imports come from figures on the number of health certificates issued to imported herds. Given the urgency of its other tasks, the Veterinary Service may not always give sufficient attention to the gathering and compilation of statistics. Furthermore, because of limited staff, the Veterinary Service cannot accurately monitor all import routes at all times.[2] If an agent in one of the smaller

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[1]Livestock are not subject to an import tax in Ivory Coast. Importers do have to pay a modest fee (generally 2,500 CFAF per herd) for health certificates (<u>laissez-passer sanitaires</u>) for their herds, and the cattle are subject to market taxes in certain cities (e.g. Abidjan and Bouaké).

[2]For example, data on cattle imports into the northwest corner of the country (around Odienné) are incomplete (100).

veterinary stations becomes ill or cannot fulfill his duties for other reasons, collection of data usually stops until he recovers or is replaced. Even when the data are collected conscientiously, they are tabulated manually, and computational errors often occur.

A second problem arises because some of the official statistics on livestock and meat imports are collected at the same time that a tax is levied on the animals or meat. For example, data on livestock imports include figures collected by the Veterinary Service on the number of imported animals that arrive in major cattle markets in Ivory Coast without having been previously counted at the border.[1] The figures on market arrivals are gathered by the same agents who collect the livestock market tax.[2] Similarly, data on the amount of frozen and chilled meat imported are gathered by the same agents who collect the veterinary inspection tax on this meat.[3]

Whenever the collection of data on imports is combined with the payment of a tax on those goods, the statistics are likely to underestimate the true volume of imports, for two reasons. First, the taxes assessed are directly proportional to the volume of animals or meat imported; therefore, the importer has a strong incentive to declare fewer animals or less meat than he is actually importing. This is especially true for livestock merchants arriving in Bouaké and Abidjan, since they know that the authorities in charge of these markets lack the manpower to verify the number of animals that arrive.[4] Under-reporting

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[1] Beginning with the statistics for 1975, the Ministry of Animal Production has added all livestock arrivals in Abidjan to the official import statistics. This is done because few of these animals (especially those entering the country by rail) are counted at the border.

[2] This tax equals 200 CFAF per head of cattle in Bouaké and 500 CFAF per head of cattle in Abidjan.

[3] This tax equals 10 CFAF per kg.

[4] One should not underestimate the difficulty of accurately counting several dozen cattle which arrive at a market all at once. It is especially difficult to do this in Abidjan, since several train cars of cattle may arrive and unload at the same time. Typically, merchants underdeclare the number of animals they have imported when they obtain the herd's health certificate at the border. This poses few problems en route, because few of the police and veterinary agents who check the certificate along the route count the number of animals in the herd. On arriving at the final market, the importer then presents the health certificate as "proof" of the number of animals imported.

may also occur when taxes are in fact collected but records neglect to reflect the corresponding import of cattle or meat. Personal observation by the investigator from October,1976 through June,1977 indicates that merchants who import cattle by rail to Abidjan usually declare 15 to 20 percent fewer animals to the market authorities than they actually import.[1] Since recorded imports to Abidjan account for 24 to 30 percent of total recorded imports, this implies a 4 to 7 percent underestimation of total imports.[2] This underestimation is partly offset because some animals arriving in Abidjan undoubtedly are also counted at the border. Therefore, when total arrivals in Abidjan are added to the other import statistics, some double-counting occurs.

Data on chilled meat exports from Niamey suggest that the official Ivorian statistics may also underestimate the volume of chilled and frozen meat imported into the country.[3] These data are presented in Table 1E.1. The figures show that during the period 1972-75, only 58 percent of the meat recorded as leaving Niamey for Ivory Coast was registered as entering Ivory Coast. Possibly some of this meat went to other destinations or spoiled en route,[4] but part of it probably entered Ivory Coast without

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[1] Typically merchants importing a cattle car of 25 to 27 head declare 20-22 head; those importing a car of 35-38 head declare about 30 head.

[2] Official records show that in 1975, 140,970 cattle entered Ivory Coast; of these, 41,480 head (29%) were recorded as arriving in Abidjan. In 1976, the corresponding figures were 112,314 and 27,911 (25%). If imports to Abidjan are underestimated by some proportion x (e.g. .15) and, assuming that import statistics for other destinations are correct, the underestimation of total imports is given by the formula

$$y = \frac{xA_r}{(1-x) \ R + A_r}$$

where

y is the underestimation of total imports, expressed as a decimal fraction. A_r is recorded arrivals in Abidjan, and I_r is total recorded imports.

[3] All meat imported into Ivory Coast from Niger comes from Niamey.

[4] Most of the shipments came by air, so spoilage en route was probably minimal.

being recorded.[1] SEDES (107, p. 8) suggested that official Ivorian estimates of frozen and chilled meat imports into Ivory Coast during the 1960's were 10 to 20 percent below the actual amount imported.

TABLE 1E.1

COMPARISON OF RECORDED MEAT EXPORTS FROM NIAMEY TO
IVORY COAST WITH RECORDED ARRIVALS OF NIGERIEN MEAT IN IVORY COAST
(in tons)

Year	Recorded Meat Exports from Niamey to Ivory Coast[a] (1)	Recorded Arrivals of Nigerien Meat in Ivory Coast[b] (2)	Difference	
			(1)-(2)	Percent[c]
1972	493	234	259	52
1973	332	194	138	42
1974	245	187	58	24
1975	461	277	184	40

SOURCES: République de Côte d'Ivoire, Ministère de la Production Animale, unpublished data; République du Niger, Ministère du Développement Rurale, Direction du Service de l'Elevage et des Industries Animales, Rapport annuel: année 1975 (Niamey: n.d.).

[a]Figures from official Nigerien statistics.

[b]Figures from official Ivorian statistics.

[c]Difference expressed as a percentage of recorded exports from Niamey.

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[1]In contrast to the Nigerien figures, the official Voltaic statistics (85) indicate that less meat is exported to Ivory Coast from Upper Volta, than the Ivorians record as arriving in Ivory Coast from Upper Volta. According to Herman (30), this occurs because Voltaic meat exporters declare less meat to the Voltaic customs officials than they actually export in order to evade that country's export tax on meat. See Appendix 1A for the official Voltaic statistics on cattle and meat exports to Ivory Coast.

OFFICIALLY RECORDED LIVESTOCK IMPORTS INTO LIBERIA: 1968-76 (HEAD)

Year	Senegal	Mali	Ivory Coast	Guinea	Sierra Leone	Other	Total
1968							
Cattle	350	399	774	271	774	150	2,658
Sheep	-	313	524	95	-	-	932
Goats	10	472	110	30	-	-	662
1969							
Cattle	360	1,088	354	181	538	8	2,529
Sheep	-	480	295	20	54	-	1,049
Goats	-	1,242	502	91	18	-	1,853
1970							
Cattle	198	1,130	3,682	240	1,007	-	6,257
Sheep	-	1,092	1,539	138	121	-	2,882
Goats	-	540	451	106	1	-	1,098
1971							
Cattle	314	1,354	5,624	119	776	-	8,187
Sheep	180	2,753	2,006	14	13	-	4,966
Goats	-	179	142	55	23	-	399
1972							
Cattle	420	281	7,773	582	1,014	-	10,072
Sheep	50	1,079	2,923	40	302	-	4,394
Goats	-	525	544	57	15	-	1,161
1973							
Cattle	1,024	20	10,224	736	669	20	12,693
Sheep	-	-	5,418	111	194	-	5,723
Goats	-	-	1,673	117	-	-	1,790
1974							
Cattle	-	23	9,533	938	1,126	-	11,649
Sheep	-	-	5,741	269	60	-	6,070
Goats	-	-	943	120	4	-	1,067
1975							
Cattle	-	17	4,439	900	3,888	13	9,257
Sheep	-	-	1,288	64	355	50	1,669
Goats	-	-	296	50	52	-	398
1976							
Cattle	-	25	4,494	753	6,069	-	11,341
Sheep	-	-	2,967	86	517	-	3,570
Goats	-	-	474	155	178	-	807

SOURCE: Republic of Liberia, Ministry of Planning and Economic Affairs, External Trade of Liberia: Imports, various issues.

APPENDIX 2B

SHIPMENT OF CATTLE FROM BOUAKE TO OTHER MARKETS
IN IVORY COAST IN 1976 (Head)

Market	Number	Market	Number
Abengourou	299	Jacqueville	35
Abidjan	2,440	Katiola	7
Abougoua	129	Kotobi	31
Adzopé	212	Lakota	14
Agboville	213	M'Bahiakro	361
Akoupé	22	M'Batto	80
Anoumaba	27	Morounou	25
Béomi	14	N'douci	294
Bocanda	103	Ouéllé	101
Boli-Gare	87	Oumé	1,051
Bongouanou	299	Prikro	206
Bouaflé	348	Sakassou	9
Dabakala	73	San Pedro	36
Daloa	598	Sassandra	62
Danané	17	Séguéla	12
Daoukro	815	Sinfra	3?6
Diédivi	287	Tiébissou	431
Dimbokro	828	Toumodi	1,018
Divo	1,298	Toulépleu	15
Gagnoa	73	Yamoussoukro	2,766
Guiglo	17		
		Total	15,149

APPENDIX 3A
CASE STUDIES OF CATTLE MERCHANTS AND INTERMEDIARY-LANDLORDS IN ABIDJAN AND BOUAKÉ

Cattle Merchants

The following case studies describe the activities of two highly successful long-distance cattle merchants, one based in Bouaké and the other based in Abidjan, and one small-scale trader based in Bouaké.

The highly successful Bouaké merchant was approximately 60 years old when interviewed in 1977. He was born in Sikasso, Mali, the son of a tribal warrior.[1] He grew up in Sikasso, attending Koranic school but never receiving any formal Western education. He never learned to speak or read French. In 1932 he left Sikasso for Bamako. Finding no work in Bamako, he continued on to Siguiri, Guinea, where he got a job in the gold mines. He worked for eight years in the mines, during which time he saved a considerable amount of money. Moving back to Bamako, he began selling bicycles, which he imported through Dakar. His business flourished, and in 1951 he returned to his home town of Sikasso to sell bicycles. In 1952 he moved to Bouaké, having heard there was a strong demand for bicycles in Ivory Coast. His business did well in Bouaké, and he began selling motorbikes as well. In 1962 he used his earnings from the cycle business to finance his entry into both the kola and cattle trades.

At the time he was interviewed in 1977, the merchant had a team of 16 cattle-buying agents in Mali, three of whom were his own sons.[2] He would send money north to his agents, who would then buy animals from Malian cattle producers and assemble herds which were trekked south to Bouaké. He said that each agent would send two herds south per year. In addition, the merchant had three agents who sold kola for him: one in Niamey, one in San (Mali), and one in Dakar. His employees would buy kola in the forest zone of southern Ivory Coast and load it on rented 10-ton trucks for shipment north. The agents, after selling the kola, would send the receipts back to Bouaké by bank transfer. The merchant also owned three 35-ton tractor-trailer trucks, which he rented out for general freight transport. He refused to use his trucks to transport either his own or other merchants'

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[1]The French conquest of Mali put an end to his father's professional activities.

[2]He had four wives and twenty-five children.

cattle, claiming that it was cheaper to trek cattle to market and that he could earn more hauling bulkier merchandise in his trucks. The merchant still had his cycle business, and he also owned seven houses in Bouaké which he rented out. He was a devout Moslem who had made the pilgrimage to Mecca.

In addition to the cattle he received from Mali, he also purchased many animals in the Bouaké market. Typically, he would buy an entire herd and then resell the animals individually. He estimated that he handled roughly 400 animals per month, of which 100 to 120 came from his agents in Mali and the rest were purchased in the Bouaké market.[1] At an average price of 59,000 CFAF per head, this represented a monthly turnover of 23,600,000 CFAF.

The merchant sold all his animals in the Bouaké market, often to butchers and cattle traders from other cities who would come to Bouaké looking for animals. He had five regular customers, cattle merchants from other cities in southern Ivory Coast who would buy cattle in lots from him on credit. In spite of his being the largest cattle merchant in Bouaké, he claimed to spend only one fourth of his time on the cattle trade; the rest he devoted to his other businesses. In all his banking and credit transactions he was dependent on others for help, as he could neither read nor write. Judging by his success, his aides served him well.

The merchant in Abidjan was younger, 24. He was born in southern Upper Volta, the son of the <u>chef de canton</u>. He went to school through ninth grade, then in 1969 began working for his brother and uncle, who were cattle merchants in Bobo-Dioulasso. After six months as his brother's apprentice, his brother lent him 750,000 CFAF to begin cattle trading in Abidjan. He, his brother, and his uncle worked as partners, shipping cattle not only from Bobo-Dioulasso to Abidjan, but also from Upper Volta to Ghana and Niger. His uncle, as senior partner, financed most of the operation and received three-fourths of the profits. In addition to the animals sent him by his brother and uncle, the Abidjan merchant also bought animals in the Abidjan market, usually entire carloads, to re-sell to his customers, who were

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[1] If each of the merchant's 16 agents sent two herds south per year, as the merchant claimed, and if each herd averaged 42 head (the average size of trekked herds arriving in Bouaké during the study), then the merchant received 1,344 head per year from his agents, or 112 head per month.

mainly butchers and cattle merchants in Abidjan. His uncle often arranged
for cattle merchants in Upper Volta to act as buying agents for the partner-
ship, buying animals in the villages of Upper Volta. When interviewed in
1977, the young merchant's monthly volume in Abidjan was approximately 400
head of cattle. He was aided in Abidjan by several sales agents. He paid
them between 1,000 and 2,000 CFAF per week for finding buyers for his
cattle. In addition, the agents earned a small commission on each animal
sold, paid by the buyer. The partnership also employed a team of 10 drovers
who accompanied its animals between Upper Volta and the markets where they
were sold.

In addition to his work as a cattle trader, the Abidjan merchant
also worked as a cattle intermediary or broker, arranging the sale of animals
belonging to northern cattle merchants, but not actually purchasing the
animals himself. He earned a commission on each animal sold. He also
supplemented his income by exporting construction materials (wood, cement,
etc.) from Ivory Coast to Upper Volta. Cattle trading was his main activity
however, taking up about three-fourths of his business time.

A smaller-scale trader in Bouaké typified many of the merchants who
specialize in short and medium distance arbitrage of cattle in Ivory Coast.
These merchants are largely responsible for supplying rural areas and small
towns in central and southern Ivory Coast with beef. This merchant was 55
years old when interviewed in 1977. He was born in Bouaké. His father was
a butcher, originally from Mali, who practiced his trade in Bouaké. When
his father died he inherited the business, which he ran for several years.
He used his profits from butchering to finance his entry into cattle
trading, and soon became one of the more important cattle merchants in
Bouaké. A number of customers defaulted on their debts to him, however (he
had sold them animals on credit); he said he lost roughly five million CFAF.
As a result, he was forced to quit cattle trading. He became a butcher in
a small town near Bouaké. Again, he used his earnings from butchering to
re-enter the cattle trade, although on a much smaller scale. When inter-
viewed, his monthly volume was roughly 50 animals. He specialized in
buying animals in the Bouaké market and reselling them a few days later
either in surrounding towns or the Bouaké market itself. He had two regular
buyers (butchers in neighboring towns) to whom he consistently sold on credit.

All his other sales were for cash. He was no longer an active butcher, and was renting out his butcher's license in the small town near Bouaké where he was authorized to slaughter. At the time he was interviewed, he had spent 37 years in the cattle and meat business.

Intermediary-Landlords

The following case studies describe the activities of two landlord-intermediaries, one in Bouaké and the other in Abidjan. The Bouaké landlord was 45 years old when interviewed in 1977. He was born in Mali, near Mopti. His father raised livestock and worked as a cattle merchant in Mali. The Bouaké landlord began his working life at 15 as a drover, accompanying trade herds of cattle between Mali and Ivory Coast. He soon settled in Bouaké, working as a drover and assistant to his uncle, who was a landlord-trader in Bouaké. During this time he learned the skills of the cattle trade from his uncle. After having worked a few years for his uncle, the two had a dispute, and the nephew returned to Mali to work as a drover. The savings he accumulated while working as a drover in Mali permitted him to return to Bouaké and begin trading cattle on his own as a seller-trader. After having acquired sufficient stature in the market, he began lodging northern cattle merchants who arrived in Bouaké.

When interviewed, the Bouaké landlord was working as a landlord-trader, receiving merchants from Mali, Upper Volta, and northern Ivory Coast and buying animals in northern Ivory Coast for resale in Bouaké and in a nearby market. He claimed to have several regular clients who sold cattle through him, mainly cattle merchants, but also a few live-stock raisers from Mali. He said that most of his regular clients were either his relatives or people he had met through his relatives. He claimed to provide his clients a number of incidental services in addition to selling their animals and guaranteeing the buyers's credit, including food, lodging, and washing of laundry. He said he always guaranteed the buyer that the animal purchased was healthy and not stolen. When he had enough capital, he would send an agent to northern Ivory Coast

to purchase animals and arrange to trek them to Bouaké. He preferred buying animals within Ivory Coast in order to avoid paying Malian or Voltaic export taxes.

The landlord said that his regular customers included three butchers in Bouaké and one in M'Bahiakro, a town 89 km southeast of Bouaké. He also sold to other buyers in these markets, but not consistently. Roughly one-quarter of his sales were on credit, and depending on the customer, he would sometimes require a down payment equal to one-half the purchase price of the animal. He claimed that buyers occasionally defaulted on credit and that currently he was owed 426,900 CFAF in unpaid debts by six buyers. These debts were between one and three years old. The largest single debt (240,900 CFAF) was owed him by one of his regular customers in M'Bahiakro, to whom he continued to sell. In order to reduce the risk of contracting bad debts he said he regularly exchanged information with other landlords on the solvency of different buyers in the market.

Being one of the less prosperous landlords in Bouaké, he claimed to sell all his clients' animals himself, not consigning animals to other sellers. His only employee was a drover, employed to transport his animals between northern Ivory Coast and Bouaké and between Bouaké and M'Bahiakro. In return for the services the landlord provided both the buyer and seller of animals he handled, he claimed to receive between 200 and 1,000 CFAF per animal sold, paid by the buyer, and a gift from the seller that varied between 2,000 CFAF and 5,000 CFAF per herd. In addition to being a landlord-trader he was also a cattle raiser. He owned a herd of cattle in Mali and a second herd of 25 head in Lolobo, Ivory Coast.

The Bouaké landlord had two relatives in the cattle trade in Bouaké: his uncle, who had taught him the trade and who was still a landlord in Bouaké (although the nephew was now a more important landlord than the uncle), and his brother-in-law, who was also an intermediary. His children were not yet involved in the trade, but he hoped they would become interested in it and that one of them would take over his business when he retired.

The Abidjan landlord was 58 years old when interviewed in 1977. He was Mossi, born in Kaya, Upper Volta, the son of an agriculturalist and

cattle merchant. He attended Koranic school, but did not receive any formal western education. Until he was 29 he worked as a farmer in Kaya. In 1948, when he was 29, he began working as a local cattle merchant, buying animals from villagers for resale in Kaya. He was encouraged to begin trading by his father, who taught him the basics of cattle trading and financed his entry into the cattle trade. After several years of working as a local merchant, he became a landlord in Kaya, where he remained until 1956. In 1956 he moved to Abidjan and became the first Voltaic landlord to work in the Abidjan market. Up until 1956 all the landlords in Abidjan had been Malians. The completion of the rail line to Ouagadougou in 1954 led to a rapid expansion of the cattle trade between central Upper Volta and Abidjan, and there arose a need in Abidjan for Voltaic landlords with personal ties to Voltaic producers and merchants. The business of the Voltaic landlord grew rapidly, and he was soon encouraging drovers from Upper Volta to also settle in Abidjan and work as landlords.[1]

When interviewed in 1977 the Abidjan landlord was working as a landlord financer, selling his clients' animals and financing the trade of some of his clients in return for a share of their profits. In periods when few Voltaic animals arrived in the market (e.g. from April through July), he would often work as a seller-broker, selling animals consigned him by the Malian intermediaries. He enjoyed a strong reputation as the first and best-established Voltaic landlord in Abidjan, and he counted some of the largest cattle merchants from Kaya and Ouagadougou among his regular clients.

In addition to acting as a cattle broker for his clients, he also fed and lodged his clients while they were in Abidjan. They usually reimbursed him for the cost of the food, paying 200 CFAP per person per day. He sometimes would guarantee buyers' credit, but this depended on his agreement with the seller. When the animal belonged to the landlord (i.e., when he had financed its purchase) or when the owner had authorized him to handle all aspects of the sale, he would guarantee the buyers' credit.

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[1] This was confirmed in interviews with other Voltaic landlords in Abidjan, some of whom said they had started working in Abidjan at the encouragement of the first Voltaic landlord.

If the owner took an active part in selling the animals and decided that he wanted to sell to a certain buyer on credit, the owner bore the risk of default himself. Like all Abidjan landlords, the Voltaic landlord guaranteed neither the health nor the legal ownership of the animal to the buyer. For his services, the landlord received 200 CFA F per animal paid by the buyer and a gift from the seller (once the entire herd was sold) that usually ranged from 4,000 to 5,000 CFAF.

The landlord claimed to have lost roughly 10 million CFAF in unpaid debts during 21 years as a landlord in Abidjan. When asked for a precise list of the amounts and debtors involved, however, he detailed only 4.8 million CFAF in unpaid debts, which occured between 1968 and 1976. In order to reduce the risk of contracting bad debts, he regularly discussed the solvency of different buyers with other intermediaires, as well as possible sanctions to be taken against buyers who refused to pay their debts.

The landlord employed several of his "children" as seller-agents.[1] He would assign them animals to sell, and they would keep the 200 CFAF commission for each animal they sold. He also employed two drovers who accompanied herds whose purchase he had financed south from Upper Volta. When not working for the landlord, these drovers worked for his clients.

The landlord claimed to derive all his income from the cattle trade, having no outside income-earning activities. In addition to his "children" employed as seller agents in Abidjan, the landlord had a "brother"[2] who worked as an intermediary in Abidjan. He hoped that this brother would take over his business when he retired, and he indicated a willingness to finance his brother's operations if he did so. Like many of the successful landlords in West Africa, the Abidjan landlord had made the pilgrimage to Mecca.

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[1] In West Africa the term "my children" is often used to indicate not only one's own children but also those of relatives and close friends. Thus,the children the landlord employed may not have been his own.

[2] In West Africa, the term "brother" often indicates any male relative or close friend.

APPENDIX 4A

CHARACTERISTICS OF WHOLESALE BUTCHERS INTERVIEWED IN ABIDJAN AND BOUAKÉ

TABLE 4A.1

CHARACTERISTICS OF WHOLESALE BUTCHERS INTERVIEWED IN BOUAKÉ IN 1976-77

Characteristic	Butchers						
	1	2	3	4	5	6	7
Nationality	Voltaic	Voltaic	Voltaic	Voltaic	Voltaic	Voltaic	Voltaic
Ethnic group	Fulani	Fulani	Fulani	Fulani	Fulani	Fulani	Fulani
Age	46	39	45	32	32	36	38
Father's profession	Livestock raiser	Livestock raiser, butcher	Agriculturalist, livestock raiser	R.R.	Agriculturalist	Agriculturalist, livestock raiser	Agriculturalist, livestock raiser
Number of years in Bouaké	25	17	24	13	6	12	19
Number of years as a butcher	18	17	17	7	1	10	10
Number of years as a butcher's apprentice	11	10	7	6	5	2	9
Other countries or cities where worked as a butcher or apprentice	Ouagadougou, Belogami (Upper Volta)	Dori (Upper Volta)	None	None	None	None	None
First job	Butcher's apprentice	Butcher's apprentice	Meat vendor	Butcher's apprentice	Agriculturalist	Butcher's apprentice for uncle	Butcher's apprentice
Other income-earning activities	None	Cattle merchant, landlord	None	None	None	None	None
Head of cattle slaughtered per week	7	7	7	7	7	7	7

Characteristic	Butcher						
	8	9	10	11	12	13	14
Nationality	Voltaic	Voltaic	Voltaic	Voltaic	Voltaic	Voltaic	Voltaic
Ethnic group	Hounouma	Hounouma	Hounouma	Hounouma	Hounouma	Hounouma	Mossi
Age	32	48	26	43	34	28	50+
Father's profession	Agriculturalist	Agriculturalist	Agriculturalist	Agriculturalist	Agriculturalist	Agriculturalist; general merchant	Agriculturalist
Number of years in school	19	28	15	22	3	14	41
Number of years as a butcher	15	14	8	10	1	1	40
Number of years as a butcher's apprentice	4	12	5	12	3	13	0
Other countries or cities where worked as a butcher or apprentice	None	None	None	None	None	None	None
First job	Butcher's apprentice	Butcher's apprentice	Butcher's apprentice	N.R.	N.R.	Agriculturalist	Meat vendor
Other income-earning activities	Sells ice cream	None	Owns Taxi	None	Also works as a butcher's apprentice	None	Vegetable farmer
Head of cattle slaughtered per week	7	9 - 15	7	7	7	7	7.

TABLE 4A.1 - CONTINUED

	15	16	17	18	19	20	21
Nationality	Voltaic	Guinean	Guinean	Guinean	Guinean	Guinean	Malian
Ethnic group	Sian	Fulani	Fulani	Fulani	Fulani	Fulani	Bambara
Age	57	52	35	35	52	32	35
Father's profession	Agriculturalist, blacksmith	Agriculturalist	Butcher	Agriculturalist	Livestock raiser	Butcher	Agriculturalist
Number of years in Bouaké	30	25	18	12	20	13	9
Number of years as a butcher	16	25	7	5	27	3	1
Number of years as a butcher's apprentice	14	1	3^a	7^a	4	10	8
Other countries or cities where worked as a butcher or apprentice	Mali	Kankan (Guinea).	Guinea	Fouta-Djalon (Guinea)	Kankan (Guinea)	Guinea	None
First job	Butcher's apprentice	N.R.	Butcher's apprentice	N.R.	Herder for father	Butcher's apprentice	N.R.
Other income-earning activities	None	Cattle merchant, intermediary	None	None	None	Owns taxi	None
Head of cattle slaughtered per week	7	7	7	7	7	7	7

Characteristic	Butcher					
	22	23	24	25	26	27
Nationality	Malian	Malian	Malian	Malian	Joint Malian-Ghanaean	Ivorian
Ethnic group	Fulani	Bambara	Sarahalé	Fulani	Malinké	Malinké
Age	33	52	35	30	43	53
Father's profession	Agriculturalist	Agriculturalist	Cattle merchant	Livestock raiser, butcher	General merchant	Agriculturalist
Number of years in Bouaké	21	38	11	8	43	53
Number of years as a butcher	3	27		8	9	35
Number of years as a butcher's apprentice	14	11	11	1 month	14	6
Other countries or cities where worked as a butcher or apprentice	None	None	None	None	None	Abidjan
First job	Butcher's apprentice	Butcher's apprentice	N.R.	Boatman on Niger River	N.R.	Butcher's apprentice
Other income-earning activities	None	None	None	None	None	None
Head of cattle slaughtered per week	7	7	7	10	7	7

NOTE: N.R. = no response

a. Refers only to time spent as an apprentice in Bouaké. The respondent also spent an undetermined amount of time as an apprentice in Guinea.

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TABLE 4A.2

CHARACTERISTICS OF WHOLESALE BUTCHERS INTERVIEWED IN ABIDJAN IN 1977

Characteristic	Butcher							
	1	2	3	4	5	6	7	8
Nationality	Malian	Malian	Malian	Malian	Malian	Malian	Malian	Senegalese
Ethnic group	Bambara	Bambara	Bambara	Sarakole	Soraka	Soraka	Soraka	Fulani
Age	36	28	33	39	23	26	23	66
Father's profession	Butcher	Agriculturalist	Cloth merchant	Livestock raiser	Livestock raiser, agriculturalist	Butcher	Herder	Kola merchant
Number of years in Abidjan	18	8	12	11	2	5	5	40
Number of years as a butcher	11	4	7	7	1	8	5	40
Number of years as a butcher's apprentice	11	4[a]	3.5	4	1	4	N.R.	4
Other countries or cities where s/he worked as a butcher or apprentice	Bamako	Bamako	None	Bamako	None	Bamako, Monrovia, Man	None	None
First job	Butcher's apprentice	N.R.	Cloth seller for father	N.R.	Cigarette vendor	Butcher's apprentice	N.R.	Kola seller for father
Other income-earning activities	None	None	Cattle merchant	None	None	None	None	Rents houses
Head of cattle slaughtered per week	16	20	40 - 45	28 - 30	5	18 - 20	12	b

Note: N.R. = no response

[a] Refer only to time spent as an apprentice in Abidjan. The respondent also spent an undetermined amount of time as an apprentice in Bamako.

[b] Sells mainly fresh meat.

APPENDIX 4B

CASE STUDIES OF WHOLESALE BUTCHERS IN ABIDJAN AND BOUAKÉ

The following case studies describe the background and activities of three wholesale butchers in Bouaké and two wholesale butchers in Abidjan. The three wholesale butchers described for Bouaké typify three different types of butchers found in Ivory Coast: the northern immigrant who migrated to Ivory Coast several years ago, began butchering, and became highly successful; the butcher who practiced his trade elsewhere before moving to Ivory Coast; and the young apprentice butcher just beginning to slaughter on his own.

The highly successful Bouaké butcher was 48 years old when interviewed in 1977. He was born in Upper Volta, the son of a farmer. At age 20, he immigrated to Bouaké, where he got a job as an apprentice to a butcher who was from his home village in Upper Volta. After three years, he switched employers and began working for two other butchers. After a total of twelve years as an apprentice butcher he resigned and moved to Séguéla in central Ivory Coast, where he worked for two years as a diamond miner. During these two years he saved enough money to allow him to enter butchering, so he returned to Bouaké and began slaughtering on his own, renting the license of a retired butcher for 1,000 CFAF per day plus two kg of meat per day. After six years he was able to get his own license, and at the time he was interviewed, he had slaughtered under his own name for eight years.

The butcher specialized in buying large, well-fed animals and selling the rear quarters to class 1 butcher shops and hotels. He would usually sell one of the two front quarters to class 2 retailers or meat vendors and retail the remaining front quarter himself. He normally slaughtered between 9 and 15 head of cattle per week. He said he did not buy animals on credit from intermediaries, but that the class 1 retailers often extended him credit to buy animals from local cattle merchants or government agencies. He was also observed t· ·tionally loan money to other butchers to finance their purchases. Alt'· ѱ bought animals from almost all selling agents in the market, he reported that he often dealt with one particular intermediary. This man, acting as a go-between, would arrange to buy large, well-fed animals and then resell them to the butcher. In order to guard

against shortages of animals, the butcher usually kept three or four animals in reserve, buying them when many animals were on the market and holding them until the supply of animals diminished and prices were high. He could thus avoid buying animals for a few days if he felt prices were unfavorable.

The butcher dealt exclusively in fresh meat. He had once tried selling frozen meat, but his clients had objected, so he quit. He did not buy meat slaughtered by other butchers to resell himself. His animals were slaughtered and dressed out by a team of three apprentices, one of whom was his younger brother. These apprentices also worked for three other butchers. He did not pay them a cash wage; rather, he paid their house rent and sold them the fifth quarter of his animals (except the hide and stomach), which they in turn resold for a profit.

Most of his wholesale sales were made for cash. Sales to class 2 retailers, however, were on 24-hour credit. He said that in the past few years no retailers had defaulted on their debts to him, but that early in his career he had lost roughly 250,000 CFAF in bad debts. His retail sales were made both on a per-kg basis and in small piles (tas). Normally he would begin selling meat around 7:30 a.m., and sell as much as he could on a per kg basis. If, by about 10:30 some meat remained, he would make it up into tas and consign them to his apprentices to sell. He estimated that on an average day he would sell 30 kg of meat on a per kg basis and 10-15 kg in tas. Rarely did he have meat left over at the end of the day. If he did, he would store it either in the AGRIPAC cold room or in the cold room of one of his class 1 clients. This normally cost about 100 CFAF.

When deciding whether to buy an animal he would normally ask the advice of his nephew, who was also a wholesale butcher, and two other butchers who also specialized in buying large, well-fed animals. Once, when a very large steer was offered for sale, the butcher and a second butcher who was also interested in buying it drew lots to decide who would bid on it. They did this to avoid bidding the price too high and "risking our friendship over an animal." In addition to his nephew and younger brother, the butcher had one other relative in the meat trade, a cousin who was also a wholesale butcher in Bouaké. The highly successful butcher claimed to

derive all his income from the meat trade.

A second butcher was typical of the Guinean butchers who had settled in Bouaké. He was 52 years old when interviewed. His father was a cattle raiser in Fouta-Djalon, and the butcher began his working life as a herder for his father. When he was 17 he moved to Kankan, Guinea, where he worked for several years as an apprentice butcher. He then became an independent wholesale butcher in Kankan. In 1956, after 14 years in Kankan, he moved to Bouaké, where he worked as a meat vendor until he had earned enough money to purchase a butcher's license. He then began buying animals on credit and slaughtering them on his own.

At the time he was interviewed he slaughtered one animal per day. He claimed to buy all his animals for cash now, and dealt with no one fixed intermediary. He said he tried to keep 4 or 5 animals in reserve as a hedge against high prices.

This butcher sold only fresh meat from animals he had purchased himself. He employed one apprentice, who slaughtered his animals for him. This apprentice worked exclusively for him, and was not paid a cash wage. The apprentice's earnings came from purchasing the fifth quarter of the animal on credit and reselling it at a profit. Almost 90 percent of the butcher's sales were retail sales for cash. He would sell 10 to 20 kg of meat whole-sale to a meat vendor; the rest he sold retail on a weight basis. He would occasionally have meat left over at the end of the day (he estimated the quantity at 30 kg per week), which he would store in the AGRIPAC cold room and then sell at a discount the following day.

When buying an animal he would ask the advice of one other butcher, the man just described in the earlier case study. He would ask both his estimate of the carcass weight and his opinion of the proposed price. He said he valued the other man's opinion because he was a highly experienced butcher.

The Guinean butcher had two relatives in the meat trade in Bouaké, cousins who were unlicensed wholesale butchers. He said that when he retired, one of his sons might take over his business. If his son did, the butcher said he would give him his butcher's license but would not finance him in any other way. Like the butcher described above, the Guinean butcher claimed

to derive most of his income from butchering. He said he also occasionally sold some of his "reserve" animals to other butchers for a profit.

The third butcher was younger, 32. He was Voltaic, but grew up in Kumasi, Ghana, where his father was a retail merchant. After working several years for his father in Ghana, he moved to Bouaké in 1974, where he got a job as a butcher's apprentice. At the time he was interviewed in 1977, he was still employed as an apprentice butcher but was also buying and slaughtering seven animals per week on his own. He worked in partnership with his brother, splitting the costs and the profits of the trade equally. Since he was not able to get his own license he rented that of a butcher who had retired, paying him 1,500 CFAF per day. The young butcher said he purchased all of his animals for cash. This may reflect the landlords' reticence to extend credit to a newcomer of unknown creditworthiness. (He had been slaughtering animals on his own for less than a year.) Having little capital, he held no reserve animals.

He took part in the slaughtering of his own animals, but was aided by three other apprentices who also worked for another butcher. Like most apprentice butchers, they received no cash wage, but profited from the sale of the fifth quarter.

The young butcher sold only fresh meat from animals he had slaughtered himself. He sold roughly three-fourths of his meat wholesale to three retailers. Sales were on one-day credit, with the butcher reporting that his buyers had never defaulted on credit he had extended them. The remaining one-fourth of his meat was sold retail by his brother in one of the small neighborhood markets of Bouaké. The young butcher reported that he never had unsold meat left at the end of the day.

When buying animals, the butcher said he discussed the price and estimated weight of the animal only with his brother. He said that his brother was his only relative in the cattle and meat trade.

The butchers in the Abidjan sample were in some ways typified by a 39 year old Malian butcher. The son of a cattle raiser, he had spent much of his life tending the family's animals in Mali. When he was 27 he moved to Bamako, where he got a job as a butcher's apprentice. After a year in Bamako, he moved to Abidjan and worked three years as an apprentice to his uncle, a major wholesale butcher. After three years he had saved 50,000 CFAF.

His uncle loaned him an additional 50,000 CFAF and he began buying and
slaughtering cattle on his own, using his uncle's license. (The uncle
retired.)

When interviewed in 1977, this butcher had been slaughtering indepen-
dently for 7 years. He slaughtered about 30 animals per week, buying them
on credit, often with a down-payment required. Since he had amassed a
considerable debt with some of the Abidjan landlords, he was often forced
to buy animals through other butchers, as landlords sometimes refused to
sell to him. Being unlicensed, he continued to rent the license of his
uncle, paying him 20,000 CFAF per month.

The butcher's animals were dressed by a team of nine apprentices who
received 600 CFAF for each animal they slaughtered. The butcher sold only
fresh meat from animals he had purchased himself, although when he had
first started to slaughter he used to also buy carcasses from other butchers
to resell himself. He sold all his meat wholesale, with sales taking place
at the abattoir. His clients included supermarkets, hotels, restaurants,
and class 2 retailers. He would extend them 48-hour credit for up to half
the value of the meat purchased. He said that he often had trouble finding
clients for all the meat he had to sell, and ended up storing roughly one
60 kg quarter of beef per day in the cold room of the abattoir. He then
sold this meat at a discount the following day.

He said that when buying animals he asked the advice of other butchers,
but that he had no one person to whom he generally turned for advice. Like
most of the butchers interviewed in Abidjan, he claimed to derive all his
income from the meat trade.

The other Abidjan butcher was one of the oldest active butchers in
Abidjan. He was born in 1911 in Thiès, Senegal. His father was a general
merchant who traveled throughout West Africa. Until he was 22 he worked as
an assistant to his father. In 1933 his uncle, a butcher in Abidjan, request-
ed that he come to Abidjan and work for him as an apprentice. He agreed
and spent 4 years as his uncle's apprentice. In 1937 his uncle financed the
purchase of his first animal, and ever since that time he had worked as an
independent butcher.[1] His trade grew, and he reported that in the 1950s

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[1]He said that his first animal weighed roughly 300 kg liveweight and
cost 1,500 CFAF.

and 1960s he slaughtered up to 100 head of cattle per week.

When interviewed in 1977, the butcher sold mainly frozen meat, buying and slaughtering animals only occasionally. He sold a small volume, between 300 and 500 kg of meat per week. He bought most of his frozen meat directly from AGRIPAC, although he occasionally bought from other butchers as well. He sold most of his meat retail. When he did buy cattle to slaughter he usually bought them through an old friend who was the largest wholesale butcher in Abidjan. He thus benefited from the lower price the large butcher sometimes received for buying several animals at a time. The large butcher would then have his apprentices dress out the animals purchased by the old butcher, not charging him for this service.

The old butcher no longer sold his meat himself on the market. That was the task of his son, whom the butcher had designated as his successor in the meat trade. The old man still supervised the purchase of animals and frozen carcasses. He reported that in addition to butchering, he earned money from renting three houses that he owned, two in Abidjan and one in Senegal.

APPENDIX 5.A

AUTHORIZED TREKKING
CORRIDORS IN IVORY COAST

1 - Kimbirila (Bodougou), Odienné, Touba, Man, Danané

2 - Maninian, Odienné

3 - Wahiré, Madinani, Séguéla, Man

4 - Tingrela, Boundiali, Séguéla

5 - Séguéla, Vavoua, Daloa, Gagnoa

6 - Niéllé, Ouangolodougou, Ferkéssédougou, Katiola, Bouaké, Tiébissou

7 - Bouaké, M'Bahiakro

8 - Bouaké, Béoumi, Zuénoula

9 - Kong, Dabakala, Agnibilékrou

10 - Kong, Bondoukou, Agnibilékrou, Abengourou

11 - M'Bengué, Korhogo, Mankono, Séguéla

12 - Mankono, Zuénoula

13 - Doropo, Bouna, Bondoukou

14 - Dimbokro, Bongouanou

15 - Dimbokro, Bocanda

16 - Dimbokro, Toumodi, Oumé

17 - Agboville, Adzopé, Abengourou

18 - Agboville, Taissalé, Divo, Lakota, Gagnoa

19 - Lakota, Sassandra

20 - Divo, Grand-Lahou

21 - Abidjan, Grand-Bassam, Adiaké, Aboisso

22 - Abidjan, Alépé

23 - Abidjan, Bingerville

24 - Abidjan, Dabou, Grand-Lahou

Source: République de Côte-d'Ivoire, Loi No. 63-323 du 25 juillet 1963 relative à la police sanitaire des animaux en République de Côte d'Ivoire, Article 93 (pp.18-19).

APPENDIX 6A

CASE STUDIES OF HERDS SHIPPED TO BOUAKÉ

Four case studies of herds arriving in Bouaké illustrate the variability in costs incurred while transporting cattle to market. The first case study concerns a herd that was trekked from Boundiali to Bouaké during March and April 1977. The herd was cooperatively owned by eight small-scale merchants. When it left Boundiali it was made up of seventy-four head of cattle, mainly zebus, that had been purchased from cattle raisers in the countryside around Boundiali. The herd was trekked south by a team of four hired drovers accompanied by two of the owners. The trip, which took place at the end of the dry season, lasted twenty-four days. During the journey, five animals escaped from the herd and could not be recovered by the drovers.[1] An additional ten animals were sold en route, in a small town north of Bouaké, to butchers who offered attractive prices for them. The herd arrived in Bouaké with fifty-nine of its original seventy-four animals.

The cash costs incurred in trekking the animals to Bouaké are shown in Table 6A.1. Each of the four hired drovers received a wage 10,000 CFAF for the trip plus an allowance of 7,500 CFAF to cover food costs. The drovers themselves paid the cost of their return transport to Boundiali. The return trips of the two owners who had accompanied the herd were paid out of the sales receipts. The owners also paid 2,000 CFAF at Boundiali for a health certificate for the herd, and they paid 500 CFAF at each of two veterinary stations en route to have the certificate stamped and signed. The eight owners were not licensed cattle merchants. They shipped the cattle to Bouaké using the license

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[1] This was the largest loss of animals from any herd covered by the interviews in Bouaké. The loss was borne entirely by the merchants who owned the specific animals lost. It was not shared among all merchants having animals in the herd.

TABLE 6A.1

CASE STUDY:

COSTS OF TREKKING A HERD OF 74 HEAD OF CATTLE FROM BOUNDIALI TO BOUAKÉ, MARCH-APRIL, 1977
(in CFAF)

Number of cattle at point of departure	74
Lost en route	5
Sold en route	10
Number arrived in Bouaké	59

Direct Costs		Amount
1.	Salary for drovers: 4 hired drovers @ 10,000	40,000
2.	Food for drovers: 4 @ 7,500	30,000
3.	Return trip for drovers	0
4.	Return trip for owners: 2 @ 2,500	5,000
5.	Food for owners in Bouaké, 7 days CFAF/day x 2	2,800
6.	Health certificate, 2,000 CFAF plus 2 x 500 CFAF	3,000
7.	Vaccination	0
8.	Rental of trader's license, 100 CFAF x 74 head	7,400
9.	Indemnity for damaged fields	0
10.	Unofficial costs	0
11.	Cattle market tax: Bouaké, 200 CFAF x 59	11,800
12.	Gift to landlord	0
	Total Direct Costs	100,000

Indirect Costs		
13.	Losses of animals, 5 @ 40,000	200,000
14.	Forced sales	0
	Total Indirect Costs	200,000
	Total Costs	300,000
	Cost per animal sold	4,348

of another cattle merchant. They paid this merchant 100 CFAF per animal shipped, or a total of 7,400 CFAF, for the privilege of using his licence.

The renting out of cattle merchants' licenses, although illegal, is fairly common in Ivory Coast. Those who rent licenses from other merchants are usually small-scale traders who ship few animals per year. They find it cheaper to rent a license for the few times they need one than to buy one themselves. For example, the owners of this herd claimed to have sent only one other herd south from Boundiali in the previous twelve months. Table 6.2 shows the "typical" amortization cost of a cattle merchant's license as 242 CFAF per animal shipped. By renting a license, these merchants paid only 100 CFAF per animal.

Once in Bouaké the owners sold all their animals for cash through a number of intermediary-sellers. They did not use the services of a landlord, and gave no gifts to those who sold their animals. They had to arrange for their own food and lodging while in Bouaké.[1] They also paid the Bouaké cattle market tax of 200 CFAF per head for a total of 11,800 CFAF. The total expenses of transporting the animals from Boundiali and selling them in Bouaké (excluding the value of the lost animals) was 100,000 CFAF, or 1,450 CFAF for each of the sixty-nine animals sold either in Bouaké or en route. This is considerably below the "typical" figure 1,847 CFAF indicated by the data in Table 6.2. When the value of the lost animals is included, however, the total cost per animal sold becomes 4,348 CFAF.[2] This total cost per animal was almost double the figure of 2,225 CFAF shown in Table 6.2 for a "typical" trip.

The second case study is of a large herd trekked from Korhogo to Bouaké in May, 1977 (i.e., in the beginning of the rainy season). It

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[1] No information was available on how much the owners spent on food and lodging in Bouaké. In this analysis it is assumed that they lodged for free with friends living in Bouaké and spent an average of 200 CFAF each per day for food.

[2] This assumes the owners' investment in each lost animal averaged 40,000 CFAF.

belonged to one of the largest cattle merchants in the Korhogo area. When the herd left Korhogo it included 110 animals (taurins, zebus, and crossbreeds) which had been purchased in Korhogo and in the surrounding towns and villages. The herd was trekked south by a team of five hired drovers plus a chief drover who was the son the Korhogo merchant. The trip from Korhogo to Bouaké took 15 days. Two animals were sold in Katiola to buyers who offered attractive prices for them. No animals were lost en route and there were no forced sales.

The costs incurred in trekking the animals to Bouaké are shown in Table 6A.2 The five hired drovers who trekked the animals south worked exclusive) or the Korhogo merchant. Each one received a cash wage of 7,000 CAF for the trip. In addition, each herder was given one young animal in the herd, which the merchant had purchased in the north for approximately 15,000 CFAF and which the drover resold in Bouaké for roughly 26,000 CFAF. The chief drover received no cash wage, but his father gave him two animals from the herd, which were purchased in the north for about 25,000 CFAF each and which he sold in Bouaké for 37,000 CFAF each. In addition, he was allowed to keep any of the food and "contingency money" not spent during the journey.[1]

When the animals given the drovers are valued at their purchase price in the north plus the cash costs incurred in shipping them south,[2] one sees that the drovers were well paid. The five drovers each received 23,310 CFAF in benefits for the trip, and the chief drover received 52,600 CFAF in the value of his animals alone. The trip was short (fifteen days in transit and approximately fifteen days in Bouaké), so the daily wage was high as well. Most of the drovers had worked for the Korhogo merchant for several years, and their wages may have reflected his

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[1]The chief drover reported that before leaving Korhogo his father gave him 25,000 CFAF to cover the cost of food for the drovers and 25,000 CFAF to cover other expenses, such as fees paid to veterinary officials and indemnities for crop damage caused by the animals.

[2]This was the cost to the merchant of giving the animals to the drovers.

TABLE 6A.2

CASE STUDY:
COSTS OF TREKKING A HERD OF 110 HEAD OF CATTLE FROM KORHOGO TO BOUAKÉ,
MAY, 1977
(in CFAF)

Number of cattle at point of departure	110
Lost en route	0
Sold en route	2
Number arrived in Bouaké	108

Direct Costs

1. Salary for drovers:
   5 drovers, each paid 7,000 CFAF, plus — 35,000
   1 animal a piece valued @ 16,310 CFAF per head — 81,550
   Chief drover-2 animals valued @ 26,310 per head — 52,620
   plus 23,500 in cash — 23,500

2. Food for drovers — 24,000

3. Return trip for drovers, 6 @ 1,500 — 9,000

4. Round trip for owner — 0

5. Food for chief drover in Bouaké, 15 days @ 200
   CFAF/day — 3,000

6. Health certificate, 1,000 CFAF plus 2 x 500 CFAF — 2,500

7. Vaccination: 110 head x 50 CFAF/head — 5,500

8. Amortization of trader's license, 110 head x 141
   CFAF/head — 15,510

9. Indemnity for damaged fields — 0

10. Unofficial costs — 0

11. Cattle market tax: Bouaké, 200 CFAF x 108 — 21,600

12. Gift to landlord — 4,500

   Total Direct Costs: — 278,280

Indirect Costs

13. Losses of animals — 0

14. Forced sales — 0

   Total Indirect Costs: — 0

   Total Cost: — 278,280

   Cost per animal sold: — 2,530

appreciation of their long service. They apparently ware accomplished drovers; during the journey no animals were lost and there were no forced sales. The high wage paid the chief drover probably reflected a father's indulgence toward the son he had chosen as his successor in. the trade.

In addition to the drovers' wages, a number of other costs were incurred. Food for the drovers cost 24,000 CFAF, and the return trip for the five drovers totaled 7,500 CFAF. The merchant did not come to Bouaké for the sale, entrusting the sale to his son and his landlord in Bouaké. The return fare for his son was 1,500 CFAF. Before leaving Korhogo, all animals in the herd were vaccinated, at a cost of 5,500 CFAF. The merchant also paid 1,500 CFAF for a health certificate for the herd. The chief drover paid a total of 1,000 CFAF at two veterinary stations en route to have the certificate signed and stamped.

The merchant was licensed and traded a large number of animals per year. During the first five months of 1977 he sent five herds of cattle to Bouaké, the main market at which he sold. The herds varied in size from thirty-six to one-hundred-ten animals, averaging 57.8 head. The chief drover said that normally the merchant sent one herd to Bouaké per month. If the herds were the same size as those sent during the first five months of 1977, this implies an annual volume of about 700 animals. The amortization of the trader's license per animal was therefore 98,600 CFAF ÷ 700 = 141 CFAF, or 15,510 CFAF for the herd of 110 animals.

In Bouaké the chief drover stayed with a landlord who helped him sell the animals. The chief drover paid the landlord 200 CFAF per day for food during the 15 days he was in Bouaké and gave him a gift of 4,500 CFAF when he left. In Bouaké the chief drover also paid the market tax of 200 CFAF per head for a total of 21,600 CFAF.

The total cost of transporting the animals to Bouaké and selling them was 278,280 CFAF. Of this, 116,550 CFAF went to the hired drovers in cash and in animals and 76,120 CFAF went to the chief drover in cash and animals. Drovers' wages thus accounted for 69 percent of the total costs, compared with 13 percent of the total costs in the previous case study. The cost per animal was 2,530 CFAF. This is slightly above

the figure of 2,225 CFAF shown in Table 6.2 for animals trekked from Boundiali, even though Boundiali is farther from Bouaké than is Korhogo. If one regards the money earned by the chief drover in excess of that paid the other drovers as a return to management (since he was the son of the owner) the cost per animal was 2,050 CFAF.

The third case study involves a herd of fifty cattle trekked from Sikasso, Mali to Bouaké in June and July, 1977 (i.e., during the rainy season). The herd, composed entirely of zebus, was owned by a cattle merchant from Sikasso. The merchant had purchased half the animals in Koutiala and the other half in villages around Sikasso. The herd was trekked to Bouaké by three drovers, who took thirty-six days to walk the animals south. No animals were lost during the trip south and there were no forced sales.

The costs of trekking the cattle to Bouaké are shown in Table 6A.3. Each of the three drovers received a salary of 15,000 CFAF for the trip. In addition, they received 40,000 CFAF to cover their food costs en route and in Bouaké. The cattle owner paid for their return trip to Sikasso (3,000 CFAF each) plus one round trip for himself from Sikasso to Bouaké (6,000 CFAF). Malian export taxes, licenses, and vaccinations for the animals totaled 230,000 CFAF, or 4,600 CFAF per head.[1] The only other expense en route was the health certificate issued by the Ivorian Veterinary Service. This cost a total of 3,500 CFAF: 1,500 CFAF for the certificate itself and 500 CFAF at each of four veterinary stations en route to have it stamped and signed.

In Bouaké the merchant sold his animals through a landlord who was a friend from his home village in Mali. They had known each other for twenty years. Since the merchant was his "brother", the landlord fed and lodged the merchant for free and did not receive a cash gift from the merchant. The only cost the merchant had to pay in Bouaké was the Bouaké cattle market tax. The total cost (excluding weight losses) of transporting the animals to Bouaké and selling them was 343,500 CFAF or 6,870 CFAF

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[1] This is a slightly more than the 4,400 CFAF per animal that Van de Putte (124) reports is usually charged Malian exporters.

TABLE 6A.3

CASE STUDY:

COSTS OF TREKKING A HERD OF 50 HEAD OF CATTLE FROM SIKASSO, MALI TO BOUAKÉ,
JUNE-JULY, 1977 (in CFAF)

Number of cattle at point of departure	50
Lost en route	0
Sold en route	0
Number arrived in Bouaké	50

Direct Costs	Amount
1. Salary for drovers: 3 @ 15,000	45,000
2. Food for drovers	40,000
3. Return trip for drovers, 3 @ 3,000	9,000
4. Round trip for owner	6,000
5. Malian export taxes, license, and vaccinations 50 x 4,600 CFAF	230,000
6. Health certificate, 1,500 CFAF plus 4 x 500 CFAF	3,500
7. Food for owner in Bouaké	0
8. Indemnity for damaged fields	0
9. Unofficial costs	0
10. Cattle market tax: Bouaké, 50 x 200 CFAF	10,000
11. Gift to landlord	0
Total Direct Costs	343,500
Indirect Costs	
12. Losses of animals	0
13. Forced sales	0
Total Indirect Costs	0
Total Costs	343,500
Cost per animal sold	6,870

per animal. This is slightly below the figure of 6,923 CFAF shown in Table 6.3 for trekking cattle from Koutiata, a city 130 km to the north of Sikasso.

The fourth case study also is of a herd from Sikasso, this one shipped to Bouaké by mixed trek-train transport. The herd was owned by the same merchant who owned the herd in the previous case study. The herd traveled from Sikasso to Bouaké in November and December 1976, which corresponded to the middle of the dry season. Because the merchant had heard there was little grazing or water between Ferkéssédougou and Bouaké, he decided to trek the animals only as far as Ferkéssédougou. They travelled from Ferkéssédougou to Bouaké by train.

When the herd left Sikasso it included sixty-five animals, all zebus, purchased both in the cattle market in Sikasso and in surrounding villages. One large steer became ill en route and had to be sold at a loss of 52,500 CFAF.[1] A second animal, purchased for 55,000 CFAF, died in the train and was thrown out. The herd spent a total of forty-eight days en route: 31 days trekking between Sikasso and Ferkéssédougou, sixteen days waiting in Ferkéssédougou to get a train car, and one day traveling between Ferkéssédougou and Bouaké by train.

The expenses incurred are shown in Table 6A.4. Two drovers who accompanied the animals all the way to Bouaké received 12,500 CFAF each.[2] A third drover who went only as far as Ferkéssédougou received only 10,000 CFAF. In addition, each drover received 200 CFAF per day of the journey to cover his food expenses. The RAN provided free return passage to Ferkéssédougou for the two drovers who accompanied the animals on the train. The owner had only to pay the return passage of his three drovers from Ferkéssédougou to Sikasso.

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[1] The chief drover reported that the steer had been purchased for 65,000 CFAF but was sold for only 12,500 CFAF.

[2] The merchant paid the two drovers less than he paid drovers who trekked his animals all the way to Bouaké during the rainy season. During the interviews in Bouaké, some respondants reported paying higher wages to drovers during the rainy season. They did this because they considered the drovers' work more difficult during the rainy season, when the animals had to be closely watched so they did not damage crops along the route.

TABLE 6A.4

CASE STUDY:
COSTS OF SHIPPING A HERD OF 65 HEAD OF CATTLE FROM SIKASSO, MALI TO BOUAKÉ
BY MIXED TREK-RAIL TRANSPORT, NOVEMBER-DECEMBER, 1976
(in CFAF)

Number of cattle at point of departure	65
Lost en route	1
Sold en route	1
Number arrived in Bouaké	63

Direct Costs		Amount
1.	Salary for drovers, 2 @ 12,500 plus 1 @ 10,000	35,000
2.	Food for drovers	25,400
3.	Return trip for drovers (Ferkéssédougou-Sikasso) 3 @ 1,500 CFAF	4,500
4.	Round trip for owner	6,000
5.	Malian export taxes, licenses and vaccinations 50 x 4,400 CFAF	286,000
6.	Health certificate	2,500
7.	Food for owner in Bouaké	0
8.	Indemnity for damaged fields	11,500
9.	Rental of train cars	99,265
10.	Other costs of rail shipment	3,300
11.	Cattle market tax: Bouaké, 63 x 200 CFAF	12,600
12.	Payment to herders in Bouaké	2,000
13.	Gift to landlord	0
	Total Direct Cost:	488,065

Indirect Costs		
14.	Losses of animals, 1 @ 55,000 CFAF	55,000
15.	Forced sales, at a net loss of 52,500	52,500
	Total Indirect Costs	107,500
	Total Costs	595,565
	Cost per animal sold	9,306

Before the herd left Mali, the owner paid taxes, license, and vaccination fees totaling 4,400 CFAF per animal, or 286,000 CFAF for the herd. Arriving in Ivory Coast he paid 2,500 CFAF for a health certificate for the herd, but did not have to pay to have it signed or stamped en route. Before reaching Ferkéssédougou the herd damaged a cultivated field, and an indemnity of 11,500 CFAF was paid to the farmer.

Once the herd arrived in Ferkéssédougou the chief drover requested two H13 cattle cars from the RAN, but had to wait 16 days before he got them.[1] The fee for the wagons was 99,265 CFAF. Additional costs of shipping animals included 1,000 CFAF for straw to cover the floors of the train cars, an 800 CFAF "tip" paid to RAN employees in Bouaké to unhook the train car, and 1,500 CFAF to herders in Bouaké to help unload the train cars.

Once in Bouaké the herd was watched over by another team of herders who were paid a total of 2,000 CFAF. The 200 CFAF market tax was paid on the 63 animals that arrived, for a total of 12,600 CFAF. As in the previous case study, the merchant sold through his friend, the landlord, so no additional lodging, food, or gift costs were incurred.

The total cost of shipping the animals was 595,565 CFAF. Of this, 107,500 CFAF (18 percent) represented losses due to death and forced sales. An additional 286,000 CFAF (48 percent) was attributable to Malian taxes, license fees, and vaccinations. Costs associated with rail shipment accounted for 102,565 CFAF (17 percent). Other costs made up the remaining 17 percent. The cost per animal sold was high, 9,306 CFAF.

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[1] He did not pay a gratuity to RAN employees in order to reserve a cattle car, as was commonly done.

APPENDIX 6B

ESTIMATED COST OF WAITING FOR CATTLE CARS

This appendix presents the regression equation used to estimate the cost to merchants of waiting at railroad loading points for cattle cars. The data on which the equation is based come from the interviews carried out with cattle merchants and drovers in Bouaké.[1] The estimated equation was the following:

$$C_t = 1,276.0 - 19.4\, N_d + 2.2\, D_t + 1.9\, D_r + 39.7\, K + 114.4\, N_t - 1,467.7\, N_t + 102.0\, W + 240.3\, S$$

(t-ratio)	(0.66)	(1.46)	(1.24)	(0.70)	(1.88)	(0.35)	(2.15)	(3.15)	(0.55)
significance	-	-	-	-	.10	-	.05	.01	-

$N = 32 \qquad D.F. = 23 \qquad R^2 = .71$

where

C_t = total variable cost per animal (in CFAF) of transporting the herd to Bouaké, excluding export taxes (which presumably were not affected by the amount of time a merchant had to wait for a cattle car) and the opportunity cost of the merchant's capital (which is analyzed separately -- see text);

N_d = number of animals in the herd at the point of departure;

D_t = the distance (in km) trekked by the herd;

D_r = the distance (in km) the herd traveled by rail;

K = the number of kilometers trekked by the herd per day;

H_t = the total number of drovers that accompanied the herd;

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[1] Thirty-two of the forty respondents gave complete information on the variable costs they incurred.

H_f = the proportion of total drovers made up of unpaid family members;

W = the number of days the herd had to wait at the railhead for a train car;

S = a dummy variable indicating the wet season.

The coefficient of W, the waiting-time variable, represents the average cost per animal of waiting an additional day for a cattle car. The estimated cost (excluding the opportunity cost of the capital immobilized) was 102 CFAF. This coefficient is significantly different from zero at the .01 level.

The coefficient of N_d, the number of animals in the herd at the point of departure, is negative, suggesting that economies of scale existed in trekking and mixed trek-rail transport. For each traditional animal in the herd, the cost per animal of transport fell by 19 CFAF. The coefficient of N_d, however, is not significant at the .05 level.[1]

The coefficient of K, the speed at which the animals trekked, is positive, suggesting that the faster the animals were trekked, the higher was the cost of transport per animal. Although cash costs per animal fell the faster the animals were trekked,[2] losses and forced sales increased, leading total costs per animal to rise. Again, however, the coefficient is not significant at the .05 level.

The R^2 of the equation indicates that 71 percent of the variation in the total variable cost of transport per animal was accounted for by variations in the independent variables. When the variable cash cost of transport per animal was used as the dependent variable rather than the total variable cost per animal, the R^2 was much higher, .93. This

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[1] When the variable cash cost per animal (i.e., C_t minus the estimated value of lost animals and forced sales) was used as the dependent variable, the coefficient of N_d equaled - 24.2 and was significant at the .001 level.

[2] When the variable cash cost per animal was used as the dependent variable, the coefficient of K equaled - 14.8 and was significant at the .05 level.

suggests that while cash costs are largely a function of traders' decisions regarding the means of transport used, etc., losses due to forced sales and mortalities are much more random.

APPENDIX 6A

DATA ON CATTLE PURCHASED AND SOLD BY VILLAGERS
IN RURAL NORTHERN IVORY COAST

TABLE 8A.1

CHARACTERISTICS OF CATTLE SOLD FROM SODEPRA-AFFILIATED VILLAGE HERDS IN NORTHERN IVORY COAST: JULY, 1976-MAY, 1977[a]

SODEPRA Zone/Breed	Bulls	Steers	Females	Sex Not Recorded	Total
Odienné					
N'dama	152	7	215	1	375
Baoulé	0	0	1	0	1
Zebu	0	0	0	0	0
Zebu-taurin Crossbreed	0	0	0	0	0
Breed Not Recorded	0	0	1	0	1
Total: Odienné	152	7	217	1	377
Touba					
N'dama	116	3	82	0	201
Baoulé	43	0	27	0	70
Zebu	0	0	0	0	0
Zebu-taurin Crossbreed	2	0	4	0	6
Breed Not Recorded	1	0	2	0	3
Total: Touba	162	3	115	0	280
Boundiali-Ferkéssédougou[b]					
N'dama	24	0	35	0	59
Baoulé	253	37	375	0	665
Zebu	16	2	10	0	28
Zebu-taurin Crossbreed	45	6	19	0	70
Breed Not Recorded	6	0	6	0	12
Total: Boundiali-Ferkéssédougou	344	45	445	0	834

SODEPRA Zone/Breed	Bulls	Steers	Females	Sex Not Recorded	Total
Korhogo					
N'dama	24	5	11	0	40
Baoulé	415	20	438	0	873
Zebu	8	1	0	0	9
Zebu-Taurin Crossbreed	33	3	18	0	54
Breed Not Recorded	2	0	0	0	2
Total: Korhogo	482	29	467	0	978
Boundiali					
N'dama	0	0	0	0	0
Baoulé	218	11	96	0	325
Zebu	0	0	0	0	0
Zebu-taurin Crossbreed	0	0	0	0	0
Breed Not Recorded	0	0	0	0	0
Total: Bouna	218	11	96	0	325
All Zones					
N'dama	316	15	343	1	675
Baoulé	929	68	937	0	1,934
Zebu	24	3	10	0	37
Zebu-taurin Crossbreed	80	9	41	0	130
Breed Not Recorded	9	0	9	0	18
Total: All Zones	1,358	95	1,340	1	2,794

SOURCE: SODEPRA, Opération Nord, unpublished data

a. SODEPRA's data collection is an ongoing project. Data used in this study were collected from July, 1976 through May, 1977. Figures in this table refer only to animals for which SODEPRA recorded a sale price.

b. Data for July, 1976 - April, 1977 only.

TABLE 8A.2

CHARACTERISTICS OF CATTLE PURCHASED BY VILLAGERS
IN NORTHERN IVORY COAST: JULY, 1976 - MAY, 1977[a]

SODEPRA Zone/Breed	Bulls	Steers	Females	Total
Odienné				
N'dama	33	7	69	109
Baoulé	2	0	1	3
Zebu	2	0	1	3
Zebu-Taurin Crossbread	2	0	1	3
Breed Not Recorded	0	0	0	0
Total: Odienné	39	7	72	118
Touba				
N'dama	23	0	23	46
Baoulé	2	1	4	7
Zebu	0	0	0	0
Zebu-Taurin Crossbreed	1	0	0	1
Breed Not Recorded	0	0	0	0
Total: Touba	26	1	27	54
Boundiali-Ferkéssédougou				
N'dama	3	0	10	13
Boaulé	5	0	29	34
Zebu	20	0	8	28
Zebu-Taurin Crossbreed	10	0	11	21
Breed Not Recorded	0	0	0	0
Total: Boundiali-Ferkéssédougou	38	0	58	96
Korhogo				
N'dama	12	0	9	21
Baoulé	19	0	109	128
Zebu	9	0	2	11
Zebu-Taurin Crossbreed	5	0	13	18
Breed Not Recorded	1	0	0	1
Total: Korhogo	46	0	133	179
Bouna				
N'dama	14	0	0	14
Baoulé	3	0	12	15
Zebu	1	0	0	1
Zebu-Taurin Crossbreed	0	0	0	0
Breed Not Recorded	1	0	0	1
Total: Bouna	19	0	12	31
All Zones				
N'dama	85	7	111	203
Baoulé	31	1	155	187
Zebu	32	0	11	43
Zebu-Taurin Crossbreed	18	0	25	43
Breed Not Recorded	2	0	0	2
Total: All Zones	168	8	302	478

SOURCE: SODEPRA, Opération Nord, unpublished data.

[a] Data refer to animals purchased for inclusion in SODEPRA-affiliated herds in northern Ivory Coast. Data are only for those animals for which SODEPRA recorded the purchase price.

[b] Data for July, 1976 - April, 1977 only.

TABLE 8A.3

AVERAGE PRICES OF CATTLE SOLD FROM SODEPRA-
AFFILIATED HERDS, NORTHERN IVORY COAST, JULY, 1976 - MAY, 1977
(IN CFAF per animal)

Age (years)	N'damas			Baoulés			
	Odienné	Touba	Average[a]	Boundiali-Ferkéssédougou[b]	Korhogo	Bouna	Average[a]
BULLS							
Less than 1	23,000	---	23,000	---	7,687	---	7,687
(s.d.)[a]	---	---		---	(11,048)	---	
N	1	---		---	4	---	
1 - 2	17,108	18,812	17,960	17,907	17,383	16,969	17,420
(s.d.)	(5,935)	(6,663)		(7,098)	(5,415)	(4,140)	
N	60	25		123	171	73	
3 - 4	24,485	27,064	25,775	23,042	23,723	18,642	21,802
(s.d.)	(7,924)	(9,513)		(7,178)	(7,451)	(3,683)	
N	67	63		100	200	95	
5 - 6	27,000	39,360	33,180	25,814	32,208	21,887	26,636
(s.d.)	(6,367)	(9,715)		(9,869)	(8,123)	(6,116)	
N	13	15		22	24	27	
7 - 8	34,500	47,000	40,750	40,125	29,800	25,167	31,697
(s.d.)	(9,385)	(9,747)		(7,076)	(12,433)	(6,178)	
N	8	5		4	5	6	
9 +	34,167	43,250	38,709	23,950	14,750	18,000	18,900
(s.d.)	(13,769)	(9,605)		(8,556)	(4,574)	---	
N	3	4		2	4	1	
STEERS							
Less than 1	---	---	---	---	---	---	---
(s.d.)	---	---		---	---	---	
N	---	---		---	---	---	
1 - 2	42,000	---	42,000	29,600	18,500	25,000	24,367
(s.d.)	---	---		(4,980)	(707)	---	
N	1	---		5	2	1	
3 - 4	23,333	31,000	27,167	30,610	24,156	19,500	24,755
(s.d.)	(5,508)	(6,557)		(10,916)	(2,998)	(3,674)	
N	3	3		25	16	5	
5 - 6	40,000	---	40,000	29,286	33,000	35,000	32,429
(s.d.)	---	---		(10,404)	(0)	---	
N	1	---		7	2	1	
7 - 8	32,000	---	32,000	---	---	---	---
(s.d.)	---	---		---	---	---	
N	1	---		---	---	---	
9 +	---	---	---	---	---	---	---
(s.d.)	---	---		---	---	---	
N	---	---		---	---	---	

TABLE 8A.3-continued

Age (years)	N'damas			Baoulés			
	Odienné	Touba	Average[a]	Boundiali-Ferkéssédougou[b]	Korhogo	Bouna	Average[a]
FEMALES							
Less than 1	---	---	---	3,333	20,833	---	12,083
(s.d.)	---	---		(1,444)	(1,258)	---	
N	---	---		3	3	---	
1 - 2	21,143	13,406	19,775	22,770	21,218	14,444	19,477
(s.d.)	(4,849)	(4,013)		(3,596)	(3,660)	(3,355)	
N	35	8		136	124	9	
3 - 4	22,037	23,702	22,870	22,315	21,601	19,694	21,205
(s.d.)	(4,028)	(5,445)		(4,893)	(6,205)	(5,791)	
N	50	27		61	57	18	
5 - 6	23,776	28,789	26,283	22,100	20,885	21,750	21,578
(s.d.)	(6,143)	(6,499)		(7,886)	(4,786)	(4,799)	
N	42	23		35	41	14	
7 - 8	22,783	31,615	27,199	19,004	22,109	20,958	20,690
(s.d.)	(6,446)	(9,847)		(6,425)	(4,848)	(4,246)	
N	47	10		56	60	18	
9 +	19,005	32,396	25,701	17,149	18,416	16,880	17,482
(s.d.)	(6,589)	(6,234)		(5,734)	(7,573)	(5,555)	
N	39	13		80	147	25	

SOURCE: Calculated from SODEPRA, Opération Nord, Cellule Statistique, unpublished data.

[a] Unweighted average of prices in the two (three) zones.

[b] Data for July, 1976 - April, 1977 only.

[c] Standard deviation.

TABLE 8A.4

AVERAGE PRICES OF CATTLE PURCHASED FOR SODEPRA
AFFILIATED HERDS, NORTHERN IVORY COAST, JULY, 1976 - MAY, 1977
(in CFAF per animal)

Age (years)	N'damas			Baoulés			
	Odienné	Touba	Average[a]	Boundiali-Ferkéssédougou[b]	Korhogo	Bouna	Average[a]
BULLS							
Less than 1	--	3,000	3,000	--	--	--	--
(s.d.)[c]	--	---		--	--	---	
N	0	1		0	0	0	
1 - 2	18,200	26,053	22,127	18,625	14,413	19,500	17,513
(s.d.)	(6,029)	(4,469)		(3,945)	(7,155)	(2,121)	
N	10	19		4	8	2	
3 - 4	29,854	28,933	29,394	23,500	24,278	--	23,889
(s.d.)	(7,619)	(1,677)		--	(4,718)	--	
N	20	3		1	9	0	
5 - 6	31,708	--	31,708	--	25,000	21,000	23,000
(s.d.)	(10,332)	--		--	--	--	
N	3	0		0	1	1	
7 - 8	--	--	--	--	23,000	--	23,000
(s.d.)	--	--		--	--	--	
N	0	0		0	1	0	
9 +	--	--	--	--	--	--	--
(s.d.)	--	--		--	--	--	
N	0	0		0	0	0	
STEERS							
Less than 1	--	--	--	--	--	--	--
(s.d.)	--	--		--	--	--	
N	0	0		0	0	0	
1 - 2	--	--	--	--	--	--	--
(s.d.)	--	--		--	--	--	
N	0	0		0	0	0	
3 - 4	--	--	--	--	--	--	--
(s.d.)	--	--		--	--	--	
N	0	0		0	0	0	
5 - 6	30,360	--	30,360	--	--	--	--
(s.d.)	(7,813)	--		--	--	--	
N	5	0		0	0	0	

TABLE 8A.4 - continued

Age (years)	N'damas			Baoulés			
	Odienné	Touba	Average[a]	Boundiali-Ferkéssédougou[b]	Korhogo	Bouna	Average[a]
STEERS							
7 - 8	43,500	--	43,500	--	--	--	--
(s.d.)	(2,121)	--		--	--	--	
N	2	0		0	0	0	
9 +	--	--	--	--	--	--	--
(s.d.)	--	--		--	--	--	
N	0	0		0	0	0	
FEMALES							
Less than 1	--	5,750	5,750	--	20,000	--	20,000
(s.d.)	--	--		--	--	--	
N	0	1		0	1	0	
1 - 2	21,880	20,500	21,190	19,147	21,649	13,917	18,238
(s.d.)	(3,368)	(6,964)		(5,676)	(3,824)	(3,412)	
N	15	7		17	45	6	
3 - 4	21,659	26,421	24,040	22,357	24,083	15,000	20,480
(s.d.)	(5,109)	(8,258)		(2,495)	(5,819)	--	
N	22	7		7	39	1	
5 - 6	26,036	27,533	26,785	44,000	25,979	14,167	28,049
(s.d.)	(6,072)	(13,572)		(1,732)	(4,949)	(3,818)	
N	14	6		3	14	3	
7 - 8	28,664	24,000	26,332	20,500	20,750	12,500	17,917
(s.d.)	(4,355)	(8,485)		--	(6,222)	--	
N	11	2		1	8	1	
9 +	29,675	--	29,675	22,500	20,000	15,000	19,167
(s.d.)	(6,063)	--		--	--	--	
N	6	0		1	1	1	

SOURCE: Calculated from SODEPRA, Opération Nord, Cellule Statistique, unpublished data.

[a]Unweighted average of prices in the two (three) zones.

[b]Data for July, 1976 - April, 1977 only.

[c]Standard deviation.

TABLE 8A.5

AVERAGE MONTHLY PRICES AND AGES OF CATTLE SOLD FROM SODEPRA - AFFILIATED HERDS IN NORTHERN IVORY COAST
(in CFAF per animal)

Region	1976						1977				
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May
						MALES					
Odienné											
Price	18,688	23,76	23,478	24,088	21,925	22,967	17,917	19,833	20,727	24,114	26,538
(s.d.)	(4,949)	(7,913)	(11,391)	(11,070)	(5,630)	(11,981)	(9,287)	(2,307)	(5,574)	(7,976)	(9,811)
N	8	21	23	17	20	15	6	3	11	22	13
Age	3.25	2.67	3.39	3.47	3.95	3.40	3.33	2.33	3.09	2.77	3.50
(s.d.)	(1.17)	(1.32)	(1.20)	(2.07)	(2.04)	(2.29)	(1.86)	(.58)	(.83)	(1.27)	(2.75)
N	8	21	23	17	20	15	6	3	11	22	12
Touba											
Price	22,072	23,107	19,232	33,881	34,376	35,077	29,556	—	25,062	29,491	33,037
(s.d.)	(6,509)	(8,486)	(6,754)	(14,629)	(13,651)	(12,992)	(10,249)	---	(7,340)	(10,254)	(9,794)
N	9	21	19	21	21	11	8	0	11	29	15
Age	4.00	3.29	3.11	4.71	4.35	3.91	3.63	—	3.00	3.00	4.33
(s.d.)	(3.39)	(1.06)	1.23	(2.35)	(1.95)	(1.22)	(2.33)	—	(.63)	(1.04)	(2.53)
N	9	21	18	21	20	11	8	0	11	27	15
Boundiali-Ferkéssédougou											
Price	19,490	24,500	27,909	22,649	24,770	19,075	30,385	24,987	23,499	26,089	—
(s.d.)	(7,619)	(11,886)	(17,048)	(13,446)	(12,356)	(6,876)	(12,709)	(9,527)	(8,915)	(8,934)	—
N	43	30	33	41	38	26	33	68	49	28	0
Age	2.72	3.33	4.44	3.17	3.68	3.31	3.03	3.76	2.66	2.68	—
(s.d.)	(.93)	(1.88)	(1.95)	(2.29)	(1.53)	(1.98)	(1.33)	(3.17)	(.96)	(1.36)	—
N	43	30	32	41	38	26	33	68	47	28	0
Korhogo											
Price	22,475	23,323	22,133	19,984	17,933	20,981	23,906	21,544	22,664	35,245	24,287
(s.d.)	(7,931)	(8,680)	(8,261)	(8,965)	(6,556)	(8,176)	(12,571)	(7,005)	(10,257)	(13,982)	(12,199)
N	67	65	60	51	30	48	32	34	29	22	73

Region	1976						1977				
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May
BULLS AND STEERS (continued)											
Age	3.45	3.23	2.93	2.76	2.77	2.86	2.91	3.35	2.76	3.19	2.58
(s.d.)	(2.02)	(1.56)	(1.16)	(1.07)	(2.50)	(1.30)	(1.20)	(1.86)	(1.66)	(1.72)	(1.24)
N	67	65	60	51	30	43	32	34	29	21	72
Bouna											
Price	15,800	19,342	17,875	18,643	15,857	19,917	19,985	19,559	19,629	17,556	18,900
(s.d.)	(3,977)	(2,651)	(5,487)	(4,728)	(3,399)	(3,497)	(5,302)	(3,956)	(7,344)	(3,820)	(4,979)
N	15	19	20	21	14	15	65	17	19	9	15
Age	3.93	3.83	2.83	3.92	3.43	3.00	3.20	3.29	3.06	3.33	2.27
(s.d.)	(1.27)	(1.25)	(.92)	(1.73)	(1.28)	(1.04)	(1.69)	(1.16)	(1.39)	(.87)	(.79)
N	14	18	18	12	14	14	64	17	18	9	11
FEMALES											
Odienné											
Price	22,558	20,741	19,255	21,385	20,778	20,643	24,229	21,442	24,529	27,429	24,375
(s.d.)	(5,752)	(5,742)	(5,352)	(5,021)	(5,445)	(5,104)	(5,317)	(6,539)	(5,665)	(7,440)	(3,762)
N	13	29	29	26	38	14	12	12	7	21	16
Age	5.15	6.55	6.24	4.42	6.87	6.14	6.58	4.33	6.14	5.11	5.06
(s.d.)	(1.91)	(3.93)	(3.39)	(2.66)	(3.43)	(2.68)	(3.96)	(2.27)	(3.39)	(2.58)	(2.72)
N	13	29	29	26	38	14	12	12	7	19	16
Touba											
Price	22,277	25,965	28,063	31,265	25,518	23,500	22,950	36,000	28,580	29,036	28,317
(s.d.)	(7,478)	(7,359)	(5,947)	(7,446)	(3,518)	(10,50.)	(5,262)	---	(10,699)	(10,832)	(8,033)
N	11	17	16	17	14	5	9	1	5	14	6
Age	3.73	5.82	7.00	5.71	6.64	3.20	5.56	9.00	6.40	6.23	4.67
(s.d.)	(1.35)	(3.61)	(3.29)	(2.66)	(3.32)	(1 64)	(1.13)	---	(2.79)	(2.24)	(2.07)
N	11	17	16	17	14	5	9	1	5	13	6
Boundiali-Ferkéssédougou											
Price	17,977	20,400	18,730	20,517	21,181	17,763	18,370	21,615	22,074	24,813	---
(s.d.)	(5,116)	(4,734)	(6,397)	(8,051)	(8,366)	(5,519)	(6,621)	(4,411)	(4,604)	(4,521)	---
N	22	30	30	29	47	39	27	65	125	31	0

Region	1976						1977				
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May
	FEMALES (continued)										
Age	5.00	5.36	8.10	6.31	5.81	6.20	7.19	4..7	3.49	4.94	---
(s.d.)	(3.07)	(3.20)	(3.61)	(3.20)	(3.37)	(3.43)	(3.62)	(3.63)	(2.47)	(4.83)	---
N	22	28	30	29	47	39	27	65	119	31	0
Korhogo											
Price	21,564	21,672	19,381	15,483	19,641	19,002	20,305	19,125	21,886	22,377	19,959
(s.d.)	(2,207)	(7,983)	(5,698)	(5,885)	(5,813)	(7,418)	(6,354)	(6,881)	(8,510)	(2,554)	(7,134)
N	125	54	42	30	32	46	41	16	22	22	37
Age	3.34	5.67	6.86	9.53	7.25	9.53	8.82	7.06	7.18	8.91	6.62
(s.d.)	(3.25)	(4.36)	(4.30)	(4.16)	(4.05)	(4.07)	(4.53)	(4.48)	(4.70)	(3.54)	(4.79)
N	125	54	42	30	32	43	38	16	22	22	37
Bouna											
Price	15,000	18,500	18,556	18,575	15,182	17,375	19,464	19,750	20,917	17,167	22,033
(s.d.)	(2,937)	---	(5,447)	(5,475)	(3,926)	(6,945)	(5,440)	(5,331)	(5,130)	(6,760)	(5,360)
N	5	1	18	10	11	4	7	4	12	9	5
Age	4.50	7.00	6.85	6.60	8.64	8.50	9.14	8.25	4.17	6.13	6.40
(s.d.)	(1.91)	---	(3.00)	(4.22)	(3.78)	(1.29)	(3.98)	(5.32)	(1.85)	(4.36)	(2.53)
N	4	1	13	5	11	4	7	4	12	8	15

SOURCE   Calculated from SODEPRA, Opération Nord, Cellule Statistique, unpublished data.

[a]Standard deviation

TABLE 8A.6

MONTHLY RECORDED EXITS (EXCLUDING MORTALITY) FROM SODEPRA -
AFFILIATED HERDS IN NORTHERN IVORY COAST: JULY, 1976 - MARCH, 1977[a]

Zone	1976						1977			Average	Estimated Annual Off-take (percent)[b]
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March		
Odienné											
Animals covered by SODEPRA program	24,571	24,735	24,935	24,868	25,223	25,813	26,693	27,370	27,860	25,785	
Exits											
No.	165	266	249	332	366	286	185	200	126	241.8	
Monthly offtake (%)	.67	1.08	1.00	1.34	1.43	1.11	.69	.73	.45	.94	11.3
Index of supply[c]	71	115	106	113	154	118	73	78	48		
Touba											
Animals covered by SODEPRA program	10,223	10,374	10,865	11,143	11,659	12,634	13,522	14,476	14,920	12,202	
Exits											
No.	78	172	163	172	230	148	185	192	79	157.7	
Monthly offtake (%)	.76	1.66	1.50	1.54	1.97	1.17	1.37	1.33	.53	.1.29	15.5
Index of supply	59	129	116	119	153	91	106	103	41		
Boundiali-											
Ferkéssédougou											
Animals covered by SODEPRA program	31,724	31,777	32,207	33,562	35,271	36,992	38,136	38,538	39,155	35,262	
Exits											
No.	329	270	216	599	60	418	262	382	295	3,146	
Monthly offtake (%)	1.04	.85	.67	1.78	.17	1.13	.69	.99	.75	.89	10.7
Index of supply	117	96	75	200	19	127	78	111	84		
Korhogo											
Animals covered by SODEPRA program	37,918	41,480	42,062	44,306	45,632	47,022	47,477	49,197	50,505	45,067	
Exits											
No.	542	627	336	359	581	502	388	450	288	452.6	
Monthly offtake (%)	1.43	1.51	.80	.81	1.27	1.07	.82	.90	.56	1.00	12.0
Index of supply	143	151	80	81	127	107	82	90	56		

Zone	1976						1977			Average	Estimated Annual Off-take (percent)
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March		
Boune											
Animals covered by SODEPRA programs	12,147	12,458	13,497	14,517	15,898	17,176	18,046	18,385	19,200	15,703	
Exits											
No.	161	138	127	194	110	110	148	147	201	148.4	
Monthly Offtake (%)	1.33	1.12	.94	1.34	.69	.64	.82	.80	1.05	.95	11.4
Index of supply	140	118	99	141	73	67	86	84	111		

SOURCE Calculated from data in SODEPRA, Opération Nord, Cellule Statistique, "Recapitulatif par zone des données chiffrées enregistrées de juillet 1976 à mars 1977 dans les parcs encadrés" (Korhogo: 1977).

[a] Exits include sales, gifts, loans, family slaughter, and consignments of animals to others.

[b] Average monthly offtake for the 9-month period multiplied by 12.

[c] Index of supply equals the offtake rate for a given month divided by the average monthly offtake for the 9-month period.

APPENDIX 8B

ESTIMATED DEMAND EQUATIONS FOR FEMALES SOLD FROM SODEPRA-AFFILIATED
HERDS IN NORTHERN IVORY COAST 1976-77[a]

Variable[a]	Age	
	Less than 5 years	5 years and older
Dependent Variable: P(Price per animal in CFAF)		
Independent Variables:		
Constant	1,271[**]	25,717[**]
	(10.2)	(9.6)
Age Terms		
A (Age)	948	-932[#]
	(1.0)	(1.8)
A^2 (Age squared)	90	25
	(0.5)	(1.0)
Age-Breed Interaction Terms		
AN (Age, if N'dama)	724	-20
	(1.4)	(0.1)
AZ (Age, if zebu)	-2,726	16,380[**]
	(0.0)	(3.4)
AC (Age, if crossbreed)	-1,984[#]	628
	(1.9)	(0.9)
Breed Dummy Variables		
N (N'dama)	-3,164[##]	1,637
	(2.2)	(0.7)
Z (zebu)	63	-123,150[**]
	(0.0)	(3.2)
C (zebu-taurin crossbreed)	2,838	-5,168
	(1.1)	(0.9)

APPENDIX 8B - CONTINUED

Variable[a]	Age	
	Less than 5 years	5 years and older
Location of Sale Dummy Variables		
O (Odienné)	3,107[**]	-455
	(3.2)	(0.3)
T (Touba)	4,220[**]	8,199[**]
	(3.9)	(5.7)
BF (Boundiali-Ferkéssédougou)	1,125[##]	-1,889[**]
	(2.0)	(2.6)
BO (Bouna)	36	-1,026
	(0.0)	(0.9)
SU (Semi-Urban Area)	2,205[**]	1,071
	(2.8)	(1.5)
Buyer Dummy Variables		
V (Villager)	483	-1,939[#]
	(0.5)	(1.7)
M (Cattle Merchant)	1,717[#]	1,714
	(1.8)	(1.5)
SA (SODEPRA)	6,615[**]	5,432[##]
	(10.8)	(2.1)
SE (Other Parastatal Companies)	—	1,887
		(0.3)
F (Fulani)	-589	829
	(0.5)	(0.6)
P (Peasant Cultivator)	7,095[**]	1,323
	(8.5)	(1.2)
E (Cattle Raiser)	1,163	4,762[**]
	(1.0)	(2.7)
VS (Veterinary Service)	—	873
		(0.1)

APPENDIX 8B - CONTINUED

Variable[a]	Age	
	Less than 5 years	5 years and older
Time of Sale Dummy Variables		
Q4 (4th quarter, 1976)	-447	24
	(0.8)	(0.1)
Q1 (1st quarter, 1977)	-137	-38
	(0.2)	(0.1)
Q2 (2nd quarter, 1977)	2,922**	1,051
	(4.6)	(1.2)
Characteristics of the Estimated Equations		
N[b]	460	622
D.F.[c]	436	598
R^2	.37	.26
$\bar{R}^2$[d]	.34	.23

[a] See below for description of variables. The figures in parentheses are t-ratios.

[b] Number of observations

[c] Degrees of freedom

[d] R^2 adjusted for differing degrees of freedom in order to allow comparison of the R^2's of the two different equations.

$$\bar{R}^2 = \frac{1 - k}{n - k} + \frac{n - 1}{n - k} R^2$$

where k = number of independent variables, and
n = number of observations (35, pp. 129-30)

* Coefficient significantly different from zero at the .10 level.
** Coefficient significantly different from zero at the .05 level.
* Coefficient significantly different from zero at the .02 level.
** Coefficient significantly different from zero at the .01 level.
-- Variable not included in estimated equation.

where

P = price of the animal in CFA7;

A = age of the animal in years;

A^2 = age squared;

AN = age-breed interaction variable equal to the age of the animal if the animal is N'dama, zero otherwise;

AZ = age-breed interaction variable equal to the age of the animal if the animal is zebu, zero otherwise;

AC = age-breed interaction variable equal to age of the animal if the animal is a zebu-taurin crossbreed, zero otherwise;

N = dummy variable equal to one if the animal is N'dama, zero otherwise;

Z = dummy variable equal to one if the animal is zebu, zero otherwise;

C = dummy variable equal to one if the animal is a zebu-taurin crossbreed, zero otherwise;

O = dummy variable equal to one if the sale took place in the Odienné, zero otherwise;

T = dummy variable equal to one if the sale took palce in Touba, zero otherwise:

BF = dummy variable equal to one if the sale took place in Boundiali-Ferkéssédougou, zero otherwise;

BO = dummy variable equal to one if the sale took place in Bouna, zero otherwise;

SU = dummy variable equal to one if the seller lived near a major town, zero otherwise;

V = dummy variable equal to one if the animal was sold to villagers, zero otherwise;

M = dummy variable equal to one if the animal was sold to a cattle merchant, zero otherwise;

SA = dummy variable euqal to one if the animal was sold to SODEPRA, zero otherwise:

SE = dummy variable equal to one if the animal was sold to a state-owned company other than SODEPRA, zero otherwise;

F = dummy variable equal to one if the animal was sold to a Fulani, zero otherwise;

P = dummy variable equal to one if the animal was sold to a peasant cultivator, zero otherwise;

E = dummy variable equal to one if the animal was sold to a livestock raiser, zero otherwise;

CO = dummy variable equal to one if the animal was sold to a village cooperative feedlot, zero otherwise;

VS = dummy variable equal to one if the animal was sold to the Veterinary Service, zero otherwise; and

Q4, Q1, and Q2 = dummy variables indicating, respectively, the last quarter of 1976, the first quarter of 1977, and the second quarter of 1977.

The excluded dummy variables correspond to:

1) Breed.--Baoulé

2) Zone.--Korhogo

3) Buyer.--Butcher

4) Area.--Rural

5) Quarter.--Third quarter of 1976.

SOURCE: Estimated from unpublished data of SODEPRA, Opération Nord, Cellule Statistique. See text for details.

AVERAGE CARCASS WEIGHTS BY AGE OF CATTLE SLAUGHTERED IN
ODIENNE, BOUNDIALI, AND BOUNA FROM JULY, 1976 TO MAY, 1977[a]
(in kg.)

Breed / Age Class	Bulls	Steers	Females
N'dama			
1-2 years	69.2	76.3	74.0
(s.d.)[b]	(18.1)	(4.0)	(16.8)
N	45	3	21
3-4 years	101.7	112.5	98.5
(s.d.)	(25.8)	(30.8)	(21.5)
N	88	26	107
5-6 years	110.9	121.3	102.0
(s.d.)	(25.5)	(29.4)	(18.7)
N	159	66	265
7-8 years	103.5	126.5	97.7
(s.d.)	(27.2)	(32.1)	(22.9)
N	112	67	250
9 + years	111.4	101.7	93.8
(s.d.)	(21.6)	(13.0)	(17.0)
N	12	7	50
Zeboulé			
1-2 years	65.0	70.5	69.5
(s.d.)	(17.9)	(11.7)	(6.3)
N	43	4	2
3-4 years	74.8	85.4	79.2
(s.d.)	(14.6)	(17.2)	(20.2)
N	87	25	39

APPENDIX 9A

DATA ON CATTLE SLAUGHTERED
IN ODIENNE, BOUNDIALI AND BOUNA: 1976-77

Breed / Age Class	Bulls	Steers	Females
Baoulé			
5-6 years	82.2	91.2	83.2
(s.d.)	(14.4)	(14.8)	(15.5)
N	75	17	84
7-8 years	87.0	90.0	83.2
(s.d.)	(12.2)	(18.4)	(14.0)
N	43	6	65
9 + years	-	-	73.0
(s.d.)	-	-	(7.2)
N	0	0	5
Zebus			
1-2 years	74.4	95.1	76.4
(s.d.)	(20.4)	(17.0)	(20.4)
N	95	15	44
3-4 years	112.8	117.7	103.0
(s.d.)	(19.6)	(26.2)	(20.5)
N	52	23	65
5-6 years	131.4	156.7	111.8
(s.d.)	(40.9)	(43.7)	(22.7)
N	33	31	108
7-8 years	131.0	185.5	108.7
(s.d.)	(40.3)	(34.8)	(23.1)
N	17	6	52
9 + years	105.2	236.0	101.4
(s.d.)	(20.2)	-	(20.3)
N	5	1	54

SOURCE: Calculated from unpublished data of SODEPRA, Opération Nord, Cellule Statistique.

[a]Data are for cattle slaughtered in Odienne, Boundiali, and Bouna during the following periods:

      Odienné: July, 1976 - March, 1977
      Boundiali: July, 1976 - April, 1977
      Bouna· July - October, 1976 and January - May, 1977

See Chapter 9 for details on how the data were collected.

[b]Standard deviation.

TABLE 9A.1

CHARACTERISTICS OF CATTLE SLAUGHTERED IN ODIENNÉ, BOUNDIALI,
AND BOUNA FOR WHICH SODEPRA COLLECTED PRICE INFORMATION

City / Breed	Months for which data are available	Bulls	Steers	Cows	Total
Odienné	July, 1976 - March, 1977				
N'dama		376	140	616	1,132
Baoulé		0	0	0	0
Zebu		33	4	24	61
Zebu - taurin crossbreed		0	0	0	0
Breed not recorded		2	2	5	9
Total: Odienné		411	146	645	1,202
Boundiali	July, 1976 - April, 1977				
N'dama		21	10	56	87
Baoulé		4	2	7	13
Zebu		169	70	300	539
Zebu - taurin crossbreed		8	10	9	27
Breed not recorded		0	0	0	0
Total: Boundiali		202	92	372	666
Bouna	July - October, 1976 January - May, 1977[a]				
N'dama		23	19	23	65
Baoulé		244	51	189	484
Zebu		5	4	1	10
Zebu - taurin crossbreed		2	5	1	8
Breed not recorded		1	0	0	1
Total: Bouna		275	79	214	568

SOURCE   SODEPRA, Operation Nord, unpublished data.

a. Data were not collected in Bouna during November and December, 1976.

TABLE 9A.2

AVERAGE MONTHLY PRICES PER ANIMAL IN THE CITIES OF ODIENNÉ,
BOUNDIALI, AND BOUNA AND IN THE SURROUNDING COUNTRYSIDE

Zone / City		Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Odienné												
City:	Males	-	-	-	31,460	34,676	32,393	34,425	32,227	33,110	-	-
	Females	-	-	-	28,968	28,203	29,541	30,477	28,310	28,208	-	-
Zone:	Males	18,688	23,476	23,478	24,088	21,925	22,967	17,917	19,833	20,727	24,144	26,538
	Females	22,558	20,741	19,255	21,385	20,778	20,643	24,229	21,447	24,579	27,429	24,375
Boundiali												
City:	Males	26,911	29,014	32,326	29,309	27,514	24,750	27,952	28,155	29,444	25,475	-
	Females	26,121	26,583	29,416	27,119	25,148	27,796	25,490	25,667	25,163	24,286	-
Zone:	Males	19,490	24,500	27,909	22,649	24,770	19,075	30,385	24,987	23,499	26,089	-
	Females	17,977	20,400	18,730	20,517	21,181	17,763	18,370	21,615	22,074	24,813	-
Bouna												
City:	Males	26,427	24,553	26,609	24,150	-	-	23,284	24,037	20,938	24,520	23,171
	Females	25,658	24,576	25,750	25,500	-	-	19,081	18,831	23,370	23,462	25,447
Zone:	Males	15,800	19,342	17,875	18,643	15,857	19,917	19,985	19,559	19,629	17,556	18,990
	Females	15,000	[18,500]	18,556	18,575	15,182	17,375	19,464	19,750	20,917	17,167	22,033

SOURCES: Table 7.4 and SODEPRA. Opération Nord, Cellule Statistique, unpublished data.

a. N = 1.

AVERAGE MONTHLY PRICES, AGES, AND WEIGHTS OF CATTLE SLAUGHTERED
IN ODIENNÉ, BOUNDIALI, AND BOUNA: JULY, 1976 − MAY, 1977

City / Sex	Jul. Aug.	Sep.[a]	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Odienné										
Steers/Bulls: N	177	31	62	68	56	60	49	50	n.a.	n.a.
Price per kg carcass[b]	296	293	298	299	301	309	290	304	n.a.	n.a.
(s.d.)[c]	(35)	(54)	(51)	(42)	(29)	(49)	(56)	(36)	n.a.	n.a.
Age (years)	5.4	4.6	5.6	5.6	5.4	6.0	6.3	6.3	n.a.	n.a.
(s.d.)	(2.0)	(1.9)	(1.7)	(2.1)	(2.3)	(1.5)	(1.6)	(2.6)	n.a.	n.a.
Carcass weight (kg)	110	100	107	116	108	112	112	109	n.a.	n.a.
(s.d.)	(30)	(41)	(31)	(26)	(22)	(23)	(29)	(35)	n.a.	n.a.
Females: N	245	31	74	61	63	56	50	60	n.a.	n.a.
Price per kg carcass	296	284	296	303	299	305	293	299	n.a.	n.a.
(s.d.)	(40)	(56)	(85)	(46)	(36)	(64)	(33)	(38)	n.a.	n.a.
Age (years)	6.0	5.8	5.5	5.7	6.1	6.5	6.7	7.0	n.a.	n.a.
(s.d.)	(1.8)	(1.6)	(1.7)	(1.9)	(1.5)	(1.8)	(1.5)	(2.3)	n.a.	n.a.
Carcass weight (kg)	104	103	98	99	101	100	96	94	n.a.	n.a.
(s.d.)	(23)	(23)	(23)	(21)	(15)	(17)	(12)	(17)	n.a.	n.a.

City / Sex	Jul.	Aug.	Sep.[a]	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Boundiali											
Steers/Bulls: N	28	37	23	33	36	30	31	29	27	20	n.a.
Price per kg carcass	240	267	317	269	263	263	253	268	287	295	n.a.
(s.d.)	(54)	(42)	(54)	(43)	(39)	(31)	(35)	(68)	(110)	(72)	n.a.
Age (years)	3.4	3.9	3.3	3.6	2.6	3.0	4.0	3.3	3.6	2.7	n.a.
(s.d.)	(2.5)	(1.7)	(2.0)	(2.3)	(1.8)	(2.0)	(3.5)	(2.3)	(2.4)	(2.4)	n.a.
Carcass weight (kg)	110	110	102	110	104	94	111	104	105	89	n.a.
(s.d.)	(60)	(47)	(39)	(35)	(48)	(37)	(45)	(41)	(43)	(31)	n.a.
Females: N	29	30	19	47	27	55	52	39	46	28	n.a.
Price per kg carcass	245	254	282	264	258	266	260	256	269	272	n.a.
(s.d.)	(45)	(42)	(61)	(50)	(26)	(40)	(35)	(33)	(53)	(45)	n.a.
Age (years)	7.6	5.9	6.9	5.8	4.3	5.8	6.1	5.6	6.8	5.9	n.a.
(s.d.)	(2.7)	(3.2)	(4.0)	(2.4)	(2.3)	(3.2)	(3.4)	(2.9)	(3.3)	(3.8)	n.a.
Carcass weight (kg)	107	105	105	105	99	103	98	100	93	89	n.a.
(s.d.)	(22)	(20)	(19)	(24)	(24)	(32)	(26)	(25)	(18)	(22)	n.a.

City / Sex	Jul.	Aug.	Sep.[a]	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Bouna											
Steers/Bulls: N	44	59	55	30	–	–	58	27	20	25	35
Price per kg carcass	307	296	311	288	–	–	312	253	288	304	292
(s.d.)	(35)	(35)	(54)	(38)	–	–	(44)	(44)	(44)	(33)	(43)
Age (years)	4.0	4.0	3.6	5.0	–	–	6.1	7.2	6.6	6.0	4.4
(s.d.)	(1.6)	(1.0)	(1.2)	(2.5)	–	–	(1.8)	(1.3)	(1.4)	(1.9)	(1.6)
Carcass weight (kg)	85	82	85	93	–	–	75	97	74	81	81
(s.d.)	(19)	(19)	(17)	(17)	–	–	(25)	(21)	(16)	(20)	(17)
Females: N	19	33	30	23	–	–	37	13	27	13	19
Price per kg carcass	292	300	303	290	–	–	295	248	279	320	296
(s.d.)	(34)	(31)	(51)	(28)	–	–	(56)	(52)	(39)	(48)	(31)
Age (years)	5.3	5.1	5.7	6.3	–	–	7.2	6.9	7.2	5.7	6.5
(s.d.)	(1.7)	(2.7)	(2.7)	(1.8)	–	–	(1.4)	(1.6)	(1.5)	(1.0)	(1.4)
Carcass weight (kg)	88	82	84	88	–	–	64	78	85	74	86
(s.d.)	(11)	(12)	(21)	(18)	–	–	(13)	(16)	(14)	(11)	(11)

SOURCE: Calculated from unpublished data provided by SODEPRA, Opération Nord, Cellule Statistique.

TABLE 9A.3 — Continued

a. For Odienné, data is for the last 10 days of September only. Data for the first 20 days are included in the figures for July-August.

b. In CFAF.

c. Figures in parentheses are standard deviations.

APPENDIX 10.A

DRESSING PERCENTAGES BY TYPE OF ANIMAL[a]

Breed/Sex	N	Average Liveweight	Dressing Percentage
Zebus			
Steers and Bulls			
200-299 kg liveweight	36	271	48.9
300-349 kg liveweight	41	325	49.6
350 + kg liveweight	55	389	49.5
Cows	12	286	48.4
Zebu-Taurin Crossbreeds	30	307	48.3
Taurins: Traditional System	7	243	48.4
Government Agencies	25	281	49.9
and Ranches			

SOURCE: Field research data, Bouaké.

[a] The dressing percentage is defined as the carcass weight divided by the liveweight. The dressing percentages shown here correspond to the carcasses as they were weighed in Bouaké, without tails and kidneys, and usually with about 1 kg of the flank and 1 kg of meat surrounding the trachea removed. Hooves were removed at the first joint. Including the preceding parts in the carcass weights would raise the dressing percentages by between 1.0 and 1.5 percent.

APPENDIX 1F.A

CALCULATION OF RATES OF RETURN TO CAPITAL IN CATTLE TRADING[a]

Tingrela to Bouaké - trek

1. Assumed average weight loss = 0

2. Average size of trade herd = 50 head

3. Average net margin per animal = 2,375 CFAF

4. Average net margin per herd = 50 x 2,375 = 118,750 CFAF

5. Average length of capital rotation = 47 days

6. Average net margin per month = 118,750 x 30/47 = 75,798 CFAF

7. Monthly return to capital = 75,798 - 30,000 = 45,798 CFAF

8. Annual return to capital = 45,798 x 12 = 549,576 CFAF

9. Average capital investment = 50 head x 52,075 CFA F/head[b] = 2,603,750 CFAF

10. Annual rate of return to capital = 21.1%

Rural Northern Ivory Coast to Bouaké - trek

1. Assumed average weight loss = 0

2. Average size of trader herd = 50 head

3. Average net margin per animal = 3,275 CFAF

4. Average net margin per herd = 50 x 3,275 = 163,750 CFAF

5. Average length of capital rotation = 70 days

6. Average net margin per month = 163,750 x 30/70 = 70,179 CFAF

7. Monthly return to capital = 70,179 - 30,000 = 40,179 CFAF

8. Annual return to capital = 40,179 x 12 = 482,148 CFAF

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[a]Assuming a shadow wage for the trader of 30,000 CFAF per month
[b]Purchase price of animal plus transport and selling costs

Rural Northern Ivory Coast to Bouaké - trek - Continued

9. Average capital investment = 50 head x 31,975 CFAF/head =
   1,598,750 CFAF

10. Annual rate of return to capital = 30.2%

Koutiala to Bouaké - Trek

1. Assumed average weight loss:

   8 months @ no weight loss

   4 months @ 3% net weight loss

2. Average size of trader herd = 50 head

3. Average net margin per head = 2/3 (3,977) + 1/3 (2,308) = 3,421 CFAF

4. Average net margin per herd = 3,421 x 50 = 171,050 CFAF

5. Average length of capital rotation = 80 days

6. Average net margin per month = 171,050 x 30/80 = 64,144 CFAF

7. Monthly return to capital = 64,144 - 30,000 = 34,144 CFAF

8. Annual return to capital = 34,144 x 12 = 409,728 CFAF

9. Average capital investment = 50 head x 50,473 CFAF/head =
   2,523,650 CFAF

10. Annual rate of return to capital = 16.2%

Tingrela to Abidjan - Trek & Truck

1. Assumed average weight loss = 1%

2. Average size of trade herd = 50 head

3. Average net margin per head = 5,126 CFAF

4. Average net margin per head = 50 x 5,126 = 256,300 CFAF

5. Average length of capital rotation = 49 days

6. Average net margin per month = 256,300 x 30/49 = 156,918 CFAF

Tingrela to Abidjan - Trek & Truck (Continued)

7. Monthly return to capital = 156,918 - 30,000 = 126,918 CFAF

8. Annual return to capital = 126,918 x 12 = 1,523,016 CFAF

9. Average capital investment = 50 head x 55,430 .CFAF/head = 2,771,500 CFAF

10. Annual rate of return to capital = 55.0%

Koutiala to Abidjan - Trek & Train

1. Assumed weight loss = 5%

2. Average size of trade herd = 50 head

3. Average net margin per head = 4,185 CFAF

4. Average net margin per herd = 50 x 4,185 = 209,250 CFAF

5. Average length of capital rotation = 72 days

6. Average net margin per month = 209,250 x 30/72 = 87,188 CFAF

7. Monthly return to capital = 87,188 - 30,000 = 57,188 CFAF

8. Annual return to capital = 57,188 x 1w = 686,256 CFAF

9. Average capital investment = 50 head x 53,895 CFAF/head = 2,694,750 CFAF

10. Annual rate of return to capital = 25.5%

Ouagadougou - Abidjan (Rail)

1. Assumed average weight loss = 9%

2. Average size of trade herd = 25 head

3. Average net margin per head = 3,981 CFAF

4. Average net margin per herd = 3,981 x 25 = 99,525 CFAF

5. Average length of capital rotation = 30 days

6. Average net margin per month = 99,525 CFAF

Ouagadougou - Abidjan (Rail) (Continued)

7. Average return to capital per month = 99,525 - 30,000 = 69,525 CFAF

8. Annual return to capital:

   a) 6 x 69,525 = 417,150 CFAF

   b) 12 x 69,525 = 834,300 CFAF

9. Average capital investment = 25 head x 51,483 = 1,287,075 CFAF

10. Annual rate of return to capital = 32.4% - 64.8%

APPENDIX ?].B

CALCULATION OF THE VARIANCE OF PROFITS

OF MERCHANTS SELLING CATTLE IN ABIDJAN

Let $\pi = P_A$ 150 (1-S) (1-M) - C

where π = profit per head assuming an initial carcass weight of 150 kg

P_A = the price per kg carcass weight of cattle sold in Abidjan

S = carcass shrinkage en route (expressed as proportion of original carcass weight)

M = the mortality en route (expressed as a decimal)

Let Q = 150 (1-S) (1-M). Q was generated directly from the data.

$$\sigma_\pi^2 = E\ (P_A^2)\ E\ (Q^2) - [E(P_A)]^2\ [E(Q)]^2$$

$E(P_A) = 416$

$\sigma_{PA} = 45.3$ (average of 4 monthly standard deviations)

$E(Q) = 135$

$\sigma_{PA} = (45.3)^2 = 2,652.09$

$\sigma_Q \approx 4.55$

$\sigma_Q^2 = (4.55)^2 = 20.70$

$\sigma_{PA}^2 = E(P_A^2) - [E\ (PA)]^2$ $\therefore$ $E(P_A^2) = \sigma_{PA}^2 + [E\ (P_A)]^2$

$2,052.09 + (416)^2 = 2,052.09 + 173,056 = 175,108.09$

Similarly,

$$E(Q^2) = \sigma_Q^2 + (E\ Q)^2 = 20.70 + (135)^2 = 20.70 + 18,225 = 18,245.7$$

$$\sigma_\pi^2 = (1,751.0809)\ x10^2 \ x\ (182.457)\ x10^2 - (1,730.56)\ x10^2 \ x\ (182.25)\ x10^2$$

$$= 319,493.465609\ x\ 10^4 - 315,394.56\ x10^4 = 4,098.905609\ x\ 10^4 = \sigma_\pi^2$$

$$\sigma_\pi = \sqrt{4,098.905609}\ x\ 10^2 = 64.02\ x\ 10^2 = 6,402$$

APPENDIX 12.A

DATA ON BEEF SOLD BY TAS IN BOUAKÉ AND ABIDJAN
1976-77.

TABLE 12A.1

CHARACTERISTICS OF BEEF PURCHASED BY TAS FOR RETAIL
PRICE SURVEY IN BOUAKE, 1976-77[a]

Price of Tas	Number of Purchases		
	Total	Central Market	Other Markets
25 CFAF	148	145	3
50 CFAF	145	144	1
100 CFAF	216	151	65
200 CFAF	60	60	0
Totals	569	500	69

[a]25, 50, and 100 CFAF tas were purchased between June 1976 and July,
1977. 200 CFAF tas were purchased between January and July, 1977.

TABLE 12A.2

CHARACTERISTICS OF BEEF PURCHASED BY TAS FOR RETAIL
PRICE SURVEY IN ABIDJAN, DECEMBER, 1976 - JUNE, 1977

Price of Tas	Number of Purchases			
	Total	Treich ville	Adjamé	Koumassi
25 CFAF	2	0	2	0
50 CFAF	33	10	17	6
75 CFAF	12	2	10	0
100 CFAF	28	10	13	5
Totals	75	22	42	11

TABLE 12A.3

MONTHLY AVERAGE PRICES AND COMPOSITION OF 200-CFAF TAS OF BEEF SOLD IN

THE MAIN MARKET OF BOUAKE IN 1977

(Weights in Grams; Prices in CFAF)

	Feb.	Mar.	Apr.	May	June	Jul.
N^a	9	9	12	12	12	6
Total weight	511	523	485	512	512	519
(s.d.)^b	(40)	(51)	(38)	(15)	(17)	(14)
Weight meat	326	347	347	335	350	354
(s.d.)	(31)	(49)	(44)	(29)	(36)	(62)
Weight fat	48	31	36	33	36	29
(s.d.)	(32)	(31)	(39)	(20)	(37)	(24)
Weight offals	42	41	19	38	42	37
(s.d.)	(31)	(41)	(19)	(31)	(29)	(28)
Weight bone	94	103	83	105	82	106
(s.d.)	(40)	(32)	(38)	(36)	(30)	(47)
Price/kg total	394	386	415	391	391	385
(s.d.)	(32)	(35)	(35)	(11)	(13)	(10)
Price/kg meat	618	588	585	602	577	580
(s.d.)	(59)	(94)	(74)	(54)	(63)	(101)
Price/kg boneless^c	486	482	504	496	468	508
(s.d.)	(51)	(52)	(62)	(42)	(27)	(47)
Price/kg protein^d	548	519	554	542	518	539
(s.d.)	(53)	(46)	(67)	(62)	(76)	(66)
Percent meat	64.1	66.7	71.8	65.4	68.5	65.5
Percent fat	9.2	5.9	7.3	6.4	7.3	4.0
Percent offals	8.3	7.8	3.9	7.4	8.1	7.0
Percent bones	18.4	19.6	17.0	20.6	16.1	23.5

a Number of observations

^{b}Standard deviation.

^{c}Total price divided by the weight of meat, offals, and fat.

^{d}Total price divided by the weight of meat and offals.

MONTHLY AVERAGE PRICES AND COMPOSITION OF TAS OF BEEF SOLD IN THE MAIN MARKET OF BOUAKÉ

1976 - 77 100 CFAF

(Weights in Grams; Prices in CFAF)

	1976						1977
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
n^a	12	15	9	15	12	15	9
Total weight	275	273	258	252	246	237	221
(s.d.)[b]	(30)	(45)	(44)	(25)	(38)	(42)	(21)
Weight meat	169	172	170	152	145	138	138
(s.d.)	(40)	(36)	(56)	(25)	(37)	(37)	(32)
Weight fat	45	30	22	34	29	30	34
(s.d.)	(38)	(24)	(15)	(33)	(24)	(22)	(28)
Weight offals	20	18	20	29	31	26	13
(s.d.)	(28)	(31)	(26)	(23)	(35)	(25)	(12)
Weight bone	41	52	45	37	42	43	35
(s.d.)	(18)	(22)	(7)	(24)	(23)	(16)	(12)
Price per kg total	367	376	397	401	415	456	458
(s.d.)	(42)	(62)	(63)	(39)	(60)	(88)	(44)
Price per kg meat	624	605	626	676	734	777	787
(s.d.)	(160)	(125)	(139)	(116)	(203)	(224)	(317)
Price per kg boneless[c]	434	463	483	474	496	539	551
(s.d.)	(69)	(69)	(85)	(68)	(61)	(127)	(79)
Price per kg protein[d]	561	539	555	566	588	644	715
(s.d.)	(160)	(85)	(134)	(85)	(115)	(154)	(259)
Percent meat	61.3	63.3	65.6	60.4	59.5	59.1	62.6
Percent fat	16.5	10.8	9.2	13.6	11.5	12.4	15.5
Percent offals	7.4	7.0	7.7	11.4	12.6	10.2	5.6
Percent bones	14.8	18.8	17.6	14.6	16.4	18.3	16.2

	1977					
	Feb.	Mar.	Apr.	May	Jun.	July
n	12	10	12	12	12	6
Total weight	256	262	215	216	256	263
(s.d.)	(32)	(53)	(31)	(34)	(54)	(14)
Weight meat	160	129	140	116	143	172
(s.d.)	(41)	(36)	(33)	(36)	(44)	(24)
Weight fat	32	38	22	26	48	10
(s.d.)	(30)	(33)	(15)	(19)	(45)	(10)
Weight offals	16	57	24	35	39	36
(s.d.)	(15)	(63)	(20)	(42)	(28)	(28)
Weight bone	48	36	28	38	27	44
(s.d.)	(18)	(16)	(16)	(17)	(15)	(17)
Price per kg total	397	395	476	476	403	381
(s.d.)	(55)	(72)	(76)	(82)	(71)	(19)
Price per kg meat	665	879	753	945	773	591
(s.d.)	(168)	(452)	(177)	(320)	(277)	(82)
Price per kg boneless	489	469	553	582	452	463
(s.d.)	(68)	(102)	(99)	(109)	(79)	(62)
Price per kg protein	596	556	634	696	567	494
(s.d.)	(135)	(98)	(123)	(172)	(106)	(100)
Percent meat	62.2	51.6	65.2	54.4	56.2	65.5
Percent fat	12.9	13.3	10.6	12.3	17.3	4.0
Percent offals	6.3	20.7	10.9	15.7	15.8	12.5
Percent bones	18.7	14.4	13.2	17.5	10.6	16.9

[a] Number of observations
[b] Standard deviation.
[c] See note c, Table 12A.3
[d] See note c, Table 12A.3

TABLE 12A.5

MONTHLY AVERAGE PRICES AND COMPOSITION 50-CFAF TAS OF BEEF SOLD IN THE MAIN MARKET OF BOUAKÉ 1976-77

(Weight in Grams; Prices in CFAF)

	1976						1977						
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
N [a]	11	15	9	15	11	12	9	12	8	12	12	12	6
Total weight	239	251	255	229	235	211	212	179	206	198	206	216	221
(s.d.) [b]	(26)	(27)	(30)	(31)	(22)	(36)	(29)	(28)	(32)	(15)	(22)	(29)	(32)
Weight meat	114	87	79	86	79	64	78	73	76	80	79	76	77
(s.d.)	(27)	(27)	(25)	(29)	(21)	(15)	(19)	(31)	(16)	(24)	(28)	(13)	(12)
Weight fat	49	39	44	47	45	42	40	32	34	35	51	45	32
(s.d.)	(38)	(24)	(21)	(23)	(25)	(17)	(24)	(27)	(29)	(23)	(30)	(19)	(19)
Weight offals	38	100	109	73	87	87	69	65	70	63	53	75	83
(s.d.)	(39)	(34)	(42)	(39)	(26)	(37)	(29)	(37)	(12)	(20)	(35)	(36)	(44)
Weight bone	37	26	23	24	24	18	25	10	26	19	23	18	31
(s.d.)	(30)	(11)	(12)	(15)	(14)	(12)	(8)	(14)	(11)	(14)	(13)	(14)	(23)
Price/kg total	211	202	198	221	215	242	241	285	248	253	245	236	230
(s.d.)	(24)	(20)	(23)	(28)	(21)	(39)	(44)	(43)	(28)	(19)	(29)	(33)	(38)
Price/kg meat	471	627	697	652	680	832	679	802	685	681	691	673	669
(s.d.)	(161)	(183)	(256)	(227)	(190)	(229)	(188)	(319)	(156)	(217)	(202)	(126)	(120)
Price/kg boneless [c]	261	225	220	252	241	269	273	299	286	282	276	259	277
(s.d.)	(67)	(25)	(29)	(55)	(34)	(53)	(48)	(37)	(54)	(27)	(28)	(38)	(83)
Price/kg protein	350	276	269	339	308	358	347	378	344	357	402	349	349
(s.d.)	(108)	(48)	(34)	(109)	(48)	(101)	(54)	(83)	(28)	(55)	(129)	(85)	(161)
Percent meat	48.6	34.7	31.4	37.5	33.6	30.2	37.5	41.8	37.0	40.8	39.0	35.9	34.7
Percent fat	20.2	15.6	16.8	20.5	19.2	20.5	18.1	17.4	15.0	17.6	24.4	21.6	14.4
Percent offals	15.0	39.4	42.5	31.1	37.0	40.3	32.8	35.8	35.1	31.9	25.6	34.1	36.3
Percent bones	16.3	10.3	9.2	10.8	10.2	9.0	11.5	5.0	12.9	9.6	10.9	8.4	14.6

[a] Number of observations
[b] Standard deviation.

[c] See note c, Table 12A.3

[d] See note d, Table 12A.3

TABLE 12A.6

MONTHLY AVERAGE PRICES AND COMPOSITION OF 25-CFAF TAS OF BEEF SOLD IN THE MAIN MARKET OF BOUAKÉ 1976-77

(Weight in Grams; Prices in CFAF)

	1976									1977			
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
n [a]	11	15	8	15	12	15	9	12	6	12	12	12	6
Total weight	114	119	100	114	118	106	92	90	93	94	94	98	96
(s.d.) [b]	(16)	(18)	(13)	(19)	(18)	(28)	(16)	(15)	(15)	(20)	(17)	(14)	(17)
Weight meat	56	47	36	45	39	33	43	37	41	40	39	40	44
(s.d.)	(29)	(18)	(13)	(21)	(14)	(16)	(19)	(22)	(14)	(14)	(15)	(19)	(18)
Weight fat	15	27	17	29	24	31	24	14	17	14	19	23	23
(s.d.)	(14)	(23)	(16)	(20)	(16)	(15)	(15)	(15)	(8)	(13)	(23)	(11)	(17)
Weight offals	34	43	37	31	44	33	18	31	26	32	30	26	21
(s.d.)	(21)	(23)	(16)	(23)	(26)	(25)	(10)	(22)	(14)	(21)	(16)	(17)	(7)
Weight bone	9	2	11	9	9	3	6	8	8	9	5	9	7
(s.d.)	(15)	(7)	(8)	(11)	(9)	(8)	(8)	(10)	(7)	(8)	(6)	(6)	(9)
Price/kg total	223	214	252	225	217	251	276	285	274	275	274	259	268
(s.d.)	(31)	(33)	(33)	(36)	(37)	(64)	(40)	(41)	(44)	(51)	(43)	(34)	(43)
Price/kg meat	561	665	741	662	716	805	699	814	663	644	712	724	616
(s.d.)	(264)	(212)	(233)	(281)	(234)	(337)	(333)	(264)	(207)	(204)	(221)	(269)	(212)
Price/kg boneless	242	218	292	251	241	279	298	313	305	317	295	286	293
(s.d.)	(31)	(33)	(46)	(62)	(62)	(77)	(46)	(45)	(55)	(87)	(60)	(39)	(65)
Price/kg protein [d]	290	279	369	360	339	423	427	420	383	388	378	399	408
(s.d.)	(67)	(75)	(104)	(110)	(157)	(139)	(93)	(182)	(71)	(116)	(88)	(108)	(115)
Percent meat	48.7	39.5	35.8	40.0	33.3	32.6	47.0	39.0	44.4	42.0	41.1	39.9	67.2
Percent fat	13.1	22.2	16.6	25.1	21.2	29.4	25.8	16.0	17.9	14.8	18.3	23.0	23.2
Percent offals	30.9	36.7	36.0	26.6	37.3	29.5	20.6	36.2	27.4	32.7	34.6	27.7	21.4
Percent bone	7.3	1.7	11.6	8.2	8.2	8.6	6.5	8.7	8.3	10.5	5.9	9.4	8.2

[a] Number of observations
[b] Standard deviation.
[c] See note c, Table 12A.3
[d] See note d Table 12A.3

TABLE 12A.7

MONTHLY AVERAGE PRICES AND COMPOSITION OF 100-CFAF TAS

OF BEEF SOLD IN AHOUGNASSOU MARKET, BOUAKE, 1977

(Weights in Grams; Prices in CFAF)

	Feb.	Mar.	Apr.	May	June	Jul.
N[a]	12	6	12	12	12	6
Total weight	233	250	231	247	256	248
(s.d.)[b]	(33)	(20)	(25)	(32)	(15)	(13)
Weight meat	149	123	120	110	137	133
(s.d.)	(34)	(19)	(11)	(19)	(20)	(26)
Weight fat	27	35	41	43	42	38
(s.d.)	(29)	(20)	(23)	(45)	(20)	(21)
Weight offals	24	64	32	60	37	35
(s.d.)	(25)	(39)	(19)	(39)	(21)	(25)
Weight bone	34	25	37	33	40	42
(s.d.)	(11)	(21)	(29)	(20)	(12)	(16)
Price/kg total	437	403	438	411	392	404
(s.d.)	(67)	(31)	(49)	(51)	(25)	(213)
Price/kg meat	707	827	839	933	745	781
(s.d.)	(179)	(130)	(73)	(162)	(105)	(169)
Price/kg boneless[c]	515	459	539	480	467	488
(s.d.)	(90)	(76)	(121)	(78)	(39)	(27)
Price/kg protein[d]	622	564	670	633	584	610
(s.d.)	(182)	(154)	(104)	(177)	(77)	(95)
Percent meat	64.0	49.7	52.6	45.0	53.5	53.9
Percent fat	12.0	14.4	17.5	18.0	16.3	15.3
Percent offals	9.3	25.3	13.6	23.5	14.5	13.9
Percent bone	14.7	10.6	16.3	13.5	15.7	16.9

[a] Number of observations

[b] Standard deviation.

[c] See note c, Table 12A.3

[d] See note d, Table 12A.3

TABLE 12.A.8

MONTHLY AVERAGE PRICES AND COMPOSITION OF 100-CFAF TAS

OF BEEF SOLD IN ABIDJAN, 1976-77

(Weights in Grams; Prices in CFAF)

	1976 Dec.	Jan.	Feb.	1977 Mar.	Apr.	May
N^a	7	4	4	4	5	4
Total weight	367	365	268	311	463	277
(s.d.)^b	(153)	(104)	(9)	(167)	(184)	(30)
Weight meat	162	183	188	139	96	158
(s.d.)	(50)	(17)	(22)	(86)	(99)	(13)
Weight fat	49	15	23	28	95	50
(s.d.)	(46)	(30)	(29)	(55)	(136)	(34)
Weight offals	57	0	5	110	215	0
(s.d.)	(97)	-	(10)	(147)	(158)	-
Weight bone	102	175	51	38	55	70
(s.d.)	(89)	(98)	(24)	(29)	(46)	(20)
Price/kg total	306	292	374	376	248	365
(s.d.)	(97)	(83)	(12)	(138)	(111)	(37)
Price/kg meat	725	551	539	2,090	700	638
(s.d.)	(422)	(54)	(66)	(3,052)	(284)	(54)
Price/kg boneless^c	407	509	469	440	315	488
(s.d.)	(118)	(43)	(52)	(196)	(193)	(68)
Price/kg protein^d	618	551	529	514	385	638
(s.d.)	(477)	(54)	(81)	(226)	(233)	(54)
Percent meat	51.1	52.8	70.3	49.5	26.1	57.2
Percent fat	14.3	3.2	8.7	10.8	16.7	17.6
Percent offals	10.2	0	1.8	26.6	41.7	0
Percent bone	24.3	44.0	19.2	13.1	15.4	25.2

[a] Number of observations
[b] Standard deviation.

[a] See note a, Table 12A.3

[d] See note d, Table 12A.3

APPENDIX 12.B

COMPOSITE RETAIL BEEF PRICE, BOUAKE

Month	Price per kg [a]
1976	
July	335
August	335
September	359
October	359
November	359
December	384
1977	
January	367
February	387
March	384
April	386
May	388
June	383
July	382

[a]The composite price is a weighted average based on the data presented in Table 12.2. It is defined as follows:

0.87 x ("Most Common Price" of fresh beef with bones)+

0.17 x (Average of price per kg of 25, 50, and 100-CFAF tas).

The weights were chosen on the basis of interviews with Bouaké butchers that indicate the butchers sell roughly 17 percent of their beef by tas.

APPENDIX 12C

OBSERVED PRICES FOR BEEF SOLD BY WEIGHT, CLASS 2 MARKET, ABIDJAN, 1977

MONTH	TREICHVILLE Fresh Beef With Bones	Boneless	Frozen Beef With Bones	Boneless	ADJAME Fresh Beef With Bones	Boneless	Frozen Beef With Bones	Boneless	KOUMASSI Fresh Beef With Bones	Boneless	Frozen Beef With Bones	Boneless
January												
Range	450	500	400	450	400	450	300	350	450	500	350	400
Most Common Price(s)	450	500	400-450	450	400	450	300	350	450	500	350	400
February												
Range	450	600-600	350-400	400-450	450	500	300-400	350-500	450	500	300-400	350-450
Most Common Price(s)	450	570	350-400	400-450	450	500	400	450	450	500	300-400	350-450
March												
Range	500	600-650	400	400-500	400-500	500-650	350-450	400-550	450	550	400	450
Most Common Price(s)	500	600	400	450	450	600	400	450	450	550	400	450
April												
Range	500	600	300-400	400-450	450-500	500-600	300-400	350-450	500	600	450-500	500-600
Most Common Price(s)	500	600	350	400-450	450-500	550	350	400	500	600	450	550
May												
Range	450-500	500-600	375-400	425-450	450-500	500-600	400-425	450-500	450-500	500-600	400	450-500
Most Common Price(s)	500	600	400	450	450	500	400	450	450	500	400	450
June												
Range	450	500	375-400	425-450	450-500	500-600	400	450	n.a.	n.a.	n.a.	n.a.
Most Common Price(s)	450	500	375-400	425-450	450-500	500-600	400	450	n.a.	n.a.	n.a.	n.a.

APPENDIX 12 D

RETAIL VALUE OF FIFTH QUARTER
IN BOUAKE AND ABIDJAN

TABLE 12D.1

RETAIL VALUE OF FIFTH QUARTER IN BOUAKE[a]

(Prices as of May - June, 1977)

Item	Price (CFAF)
Tongue	250
Meat from the neck (collier)[b]	
1.2 kg @ 400 CFAF/kg	480
Liver	
5 kg @ 400 CFAF/kg	2,000
Heart	
1 kg @ 400 CFAF/kg	400
Kidneys	
375 CFAF each	750
Brain	
100 CFAF each	100
Hooves	
250 CFAF each	1,000
Tail	
600 CFAF each	600
Muscle and skin of head	1,000
Other meat 1.5 kg	
Intestines 7.6 kg	
Spleen 1.4 kg	
Fat 2.5 kg	
Lungs 3.5 kg	
Meat from head 10.0 kg	
26.5 kg @ 241 CFAF/kg [c]	6,387
Hide	350
TOTAL	13,317

Losses through condemnations:

7.6 percent of the abats rouges (heart, liver, spleen, tongue, kidneys and lungs) = .076 x 4,581 = 348 CFAF

Total Average Receipts for Fifth Quarter = 12,969

[a] Weights of offals based on actual weighings in Bouaké of offals from animals having carcass between 140 and 159 kg. The sample size varied from 28 to 61 depending on the particular organs weighed.

[b] In kind payment to the slaughterer.

[c] Average price per kg of 50 CFAF tes in May - June, 1977. (See Table 12.1)

TABLE 12D.2

RETAIL VALUE OF THE FIFTH QUARTER IN ABIDJAN[a]

(Prices as of May, 1977)

Item	Price (CFAF)
Tail	800
Tongue	300
Kidneys	
150 CFAF each	300
Hooves	
400 CFAF each	1,600
Liver	
5 kg @ 400 CFAF/kg	2,000
Heart	
1 kg 425 CFAF/kg	425
Stomach	
8.5 kg @ 425 CFAF/kg	3,613
Brain	200
Muscle and skin of head	1,500
Other meat 1.5 kg	
Intestines 7.6 kg	
Spleen 1.4 kg	
Fat 2.5 kg	
Lungs 3.5 kg	
Meat from head 10.0 kg	
Total 26.5 kg at 231 CFAF/kg [b]	6,122
Hide	
TOTAL	17,960

[a]See note a, Table 12D.1

[b]Average price of all tas recorded in Abidjan that contained less than 30 percent meat.

APPENDIX 12.E

ESTIMATED BUTCHERS' MARGINS IN BOUAKE

SEPTEMBER - NOVEMBER 1976, AND

DECEMBER 1976

TABLE 12E.1

ESTIMATED NET MARGIN OF A BUTCHER SLAUGHTERING A 150-KG CARCASS
WEIGHT ZEBU MALE IN BOUAKE (IN CFAF)

(Prices and Costs as of September - November 1976)

Expenses

Purchase of animal: 150 kg at 342 CFAF [a] per kg	51,300
Other expenses as shown in Table 12.5	3,380
Total expenses	54,680

Receipts

Typical situation - 65 percent of meat sold retail, 35 percent wholesale

Filet 4 kg at 600 CFAF per kg	2,400
146 kg of remaining carcass plus 8.5 kg of stomach, of which:	
54 kg sold wholesale @ 350 CFAF per kg	18,900
100.5 kg sold retail, of which 83.5 kg sold by weight and 17 kg sold by tas.	
10 kg sold boneless @ 400 CFAF per kg	4,000
68 kg sold with bones @ 375 CFAF per kg	25,500
5.5 kg sold the next day @ 325 CFAF per kg	1,138
17 kg sold by tas, of which:	
10 kg sold in 100 CFAF tas @ 404 CFAF per kg [b]	4,040
7 kg sold in 50 CFAF tas @ 240 CFAF per kg [c]	1,680
2 kg wastage	0
Hide	350
Fifth quarter: sold to apprentices @	5,000
Total Receipts	63,008

Net Margin   8,328

- 15.2% of butcher's costs
- 13.2% of butcher's receipts

[a] Average price of 130-159 kg carcass weight zebu males sold in Bouaké between September and November, 1976. (See Table 10.2).

[b] Average price per kg of 100 CFAF tas sold in Bouaké between September and November, 1976. (See Table 12.1.)

[c] Average price per kg of 50 CFAF tas sold in Bouaké between September and November, 1976. (See Table 12.1.)

TABLE 12 E.2

ESTIMATED NET MARGIN OF A BUTCHER SLAUGHTERING A 150-KG

CARCASS WEIGHT ZEBU MALE IN BOUAKE (IN CFAF)

(Prices and Costs as of Early and Mid December, 1976)

Expenses

Purchase of animal: 150 kg at 395 CFAF[a] per kg	59,250
Other expenses as shown in Table 12.5	3,380
Total expenses	62,630

Receipts

Typical situation - 65 percent of meat sold retail, 35 percent wholesale

Sales by kg - receipts as shown in Table 12 E.1	51,938
17 kg sold by tas, of which:	
10 kg sold in 100 CFAF tas @ 436 CFAF per kg [b]	4,360
7 kg sold in 50 CFAF tas @ 242 CFAF per kg [c]	1,694
2 kg wastage	0
Hide	350
Fifth quarter: sold to apprentices @	5,000
Total receipts	63,342

Net Margin   712

- 1.1% of butcher's costs

- 1.1% of butcher's receipts

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[a]Average price of 130-159 kg carcass weight zebu males sold in Bouaké during December, 1976. (See Table 10.2).

[b]Average price per kg of 100-CFAF tas sold in Bouaké in December 1976.

[c]Average price per kg of 50-CFAF tas sold in Bouaké in December 1976.