BIBLIOGRAPHIC DATA SHEET PN-AAJ-214

LIVESTOCK AND MEAT MARKETING IN WEST AFRICA, VOL III: IVORY COAST AND MALI

PERSONAL AUTHORS - DELGADO, CHRISTOPHER
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CORPORATE AUTHORS - MICH. UNIV. CTR. FOR RESEARCH ON ECONOMIC DEVELOPMENT

1980, 455P.
(VOLS. I - V: PN-AAJ-212 - PN-AAJ-216)

ARC NUMBER - AFR338.1762.M264
CONTRACT NUMBER - REDSO/WA-77-105
PROJECT NUMBERS -
SUBJECT CLASS - AL000000G190

DESCRIPTORS -

IVORY COAST	EXPORTS
MARKETING	LIVESTOCK
LIVESTOCK MARKETING	POULTRY
SUPPLY	MALI
PRICES	IMPORTS
SHEEP	GOATS
POLICIES	FISHES
DEMAND	WEST AFRICA

AFR
338.1762
M624
v.3

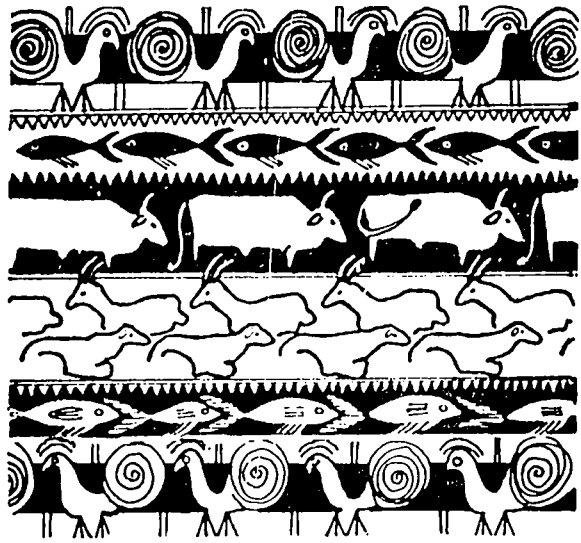
PN-AAJ-214

LIVESTOCK AND MEAT MARKETING IN WEST AFRICA

VOLUME III

Ivory Coast and Mali

Christopher Delgado
John Staatz



Prepared by the CENTER FOR RESEARCH
ON ECONOMIC DEVELOPMENT,
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LIVESTOCK AND MEAT MARKETING IN WEST AFRICA

VOLUME III

Ivory Coast
Mali

Christopher L. Delgado
John Staatz

prepared by
Center for Research on Economic Development
The University of Michigan
for
Regional Economic Development Services Office, West Africa
Agency for International Development
Contract No. REDSO/WA 77-105

February 1980

LIVESTOCK AND MEAT MARKETING
IN WEST AFRICA
VOLUME III

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PREFACE

This is the third volume of a study of livestock and meat marketing in Central West Africa conducted by the Center for Research on Economic Development of the University of Michigan under contract to the REDSO/WA office of the United States Agency for International Development.

The subject of the study has been the marketing of red meat and livestock in five West African coastal countries -- Liberia, Ivory Coast, Ghana, Togo and Benin. Until recently the principal sources of these products have been two Sahelian countries -- Mali and Upper Volta. Together the seven countries constitute a Central West African "corridor" along which there has long been an active trade in live animals from states in the interior to the centers of consumption near the coast.

Prolonged, severe drought in the Sahel in the early 1970s disrupted the customary trade pattern. By 1975 coastal consumers began to turn to non-African suppliers to an unexpected degree, and the countries on the Gulf of Guinea became part of the world meat market. It was soon clear that this change might have important implications in the Sahelian countries for livestock production policies which were predicated on virtually exclusive access to the coastal markets. The desirability of studying this development and its implications provides the main rationale for this study.

Volume III contains country reports on the principal supplier, Mali, and the main consumer, Ivory Coast. The authors are former Research Associates of the Center for Research on Economic Development who earlier contributed monographs to the Center's study of Livestock Production and Marketing in the Entente States of West Africa (1979). Many individuals have greatly contributed to the successful completion of these reports. Each author acknowledges their assistance, and we join in expressing our appreciation. Three African institutions provided invaluable help to the authors by giving them a base of operations in the country being studied and by contributing to the fullest measure their knowledge of livestock production and marketing. All three operated under sub-contract to the University of Michigan. In alphabetical order, the institutions are the Centre Ivoirien de Recherches Economiques et Sociales (CIRES--Ivory Coast), the Institut de Productivité et de Gestion Prévisionnelle (IPGP--Mali) and the Office Malien du Bétail et de la Viande (OMBEVI--Mali). The contributions of OMBEVI are particularly noteworthy because of its vast store of knowledge of the Malian livestock sector, as will be readily apparent when the reader examines the text and the bibliography of the Mali report. We wish to express our deep gratitude to all three institutions.

The other volumes in this study contain reports on the other four coastal meat-deficit countries; on the other Sahelian supplier country (Upper Volta); on six non-African supplier countries in Europe, Oceania and South America; on developments in the world meat market during the last decade; on market potential for Sahelian livestock products in North Africa; and a synthesis of the whole study. French translations of the five volumes are forthcoming.

We wish to record our appreciation for the fine work and professional dedication of Center staff in the preparation of these volumes. Beth Fredrickson ably coordinated the project's far-flung and numerous activities and edited the final reports. Under the direction of Jayne Owen, the secretarial staff of Tony Nuismer, Lori Roy and Jeane Walkowski worked overtime with great skill and patience to prepare the reports for the printer. Jane McCormick designed the cover, prepared the graphics and added numerous small touches with her usual flair.

Ann Arbor, Michigan
February, 1980

Edgar J. Ariza-Niño
Charles Steedman

PART I

MEAT SUPPLY IN IVORY COAST, 1967-1985

by John Staatz

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IVORY COAST

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ACKNOWLEDGEMENTS

This report is based on data collected during a six-week visit to Ivory Coast in July and August 1978. The report also draws heavily on my earlier research on cattle marketing in Ivory Coast, conducted over 18 months during 1976-77. The earlier research was part of the Center for Research on Economic Development's Entente Livestock Project, funded by USAID. The findings of the earlier research are available in John Staatz, The Economics of Cattle and Meat Marketing in Ivory Coast (Ann Arbor: CRED, 1979).

The research for this report was made possible by the cooperation received from many people both in Ivory Coast and the United States. I want to thank Dr. Dicoh Garba, Ivory Coast's Minister of Animal Production, for all the help I received from members of his Ministry throughout the country with whom I dealt. Special thanks go to Dr. Pierre Aloui and Mr. Guy De Gonneville, Conseillers Techniques at the Ministry headquarters in Abidjan, for the time they spent providing me with statistics on the livestock and meat trades and discussing Ivory Coast's livestock development plans. I also want to thank Ministry, Veterinary Service, and SODEPRA officials throughout the country for their help with this study. Thanks are also due to researchers at the Centre de Recherches Zootechniques (CRZ) at Bouaké for their assistance. Special thanks go to Amone Tamboura of CRZ and Laye Camara of SODEPRA, Bouaké, for help in collecting some of the price data. Thanks also go to officials of AGRIPAC and DISTRIPAC for information on meat imports.

While in Ivory Coast I worked in collaboration with the Centre Ivoirien de Recherche Economique et Sociale (CIRES) of the Université Nationale de Côte d'Ivoire. I would like to thank the Director of CIRES, H.J. Pegatienan, as well as three CIRES researchers who helped me with data collection: Assane Marcel, Mody Barry, and Bernard Kouassi.

Early drafts of the report were critiqued by Wilford Morris of Purdue University and the participants at a USAID review session held in Abidjan in July 1979. The report greatly benefitted from these critiques.

Finally, I want to thank all the butchers, traders, farmers and other market participants in Ivory Coast who spent time teaching me about their professions.

Any remaining errors in the study are, of course, my own.

John Staatz
Ann Arbor, January 1980

NOTE ON EXCHANGE RATES AND TERMINOLOGY

Unless otherwise noted, the following annual average exchange rates between the CFA franc and the U.S. dollar are used in this report:

	CFA F per U.S.$
1960-68	246.9
1969	256.3
1970	277.7
1971	277.7
1972	252.2
1973	222.7
1974	240.5
1975	214.3
1976	239.0
1977	245.7
1978	225.6

SOURCE: International Monetary Fund, International Financial Statistics, various issues.

The term ton, as used in this report, refers to metric tons.

CHAPTER ONE

INTRODUCTION

Ivory Coast is the largest export market for Sahelian cattle and small ruminants in the central corridor of West Africa. This chapter provides background information on Ivory Coast, on the level of animal protein consumption in the country, and on the factors that have increased the demand for cattle and small ruminants in Ivory Coast since independence in 1960. The chapter is divided into three parts. The first part discusses Ivory Coast's geography, climate, and economy, with special emphasis given to the role of livestock in the economy. The second part presents estimates of the current levels of animal protein consumption in the country, showing the relative importance of beef, small ruminant meat, fish, poultry, pork, and other sources of animal protein in the Ivorian diet. The final part of the chapter discusses the factors that have influenced the demand for animal protein in Ivory Coast since 1960, including population growth, urbanization, and changes in per capita incomes.

The chapter shows that rapid increases in income, population, and urbanization have resulted in a strong demand for animal protein in Ivory Coast. Domestic livestock production, however, plays a small role in the Ivorian economy; so the demand is met primarily by imports of livestock, meat, fish, and dairy products. Beef and small ruminant meat account for less than a quarter of the animal protein consumed by Ivorians; fish is the most important source of animal protein, accounting for about half of total consumption.

I. - Background Information on Ivory Coast

A. - Geography and Climate

Ivory Coast, which is bordered on the west by Liberia and Guinea, on the north by Mali and Upper Volta, on the east by Ghana, and on the south by the Gulf of Guinea, covers an area of 322,463 km^2 (roughly the same area as Italy) and has a population of approximately 7 million (Figure 1.1). The land in Ivory Coast slopes gradually upward from the coast, reaching an elevation of between 300 and 400 meters along the northern border. The only bold relief in the country is in the west, near Man, where mountains rise up to 1,300 meters. The country's natural vegetation varies from tropical rainforest in the southern third of the country to sparsely forested savannah in the north. Annual rainfall ranges from about 900 mm in the extreme northeast to over 2,300 mm in the extreme southwest (Jeune Afrique, 1978, p. 13). Rainfall occurs seasonally; in the south there are two rainy seasons, the first running from May to July and the second running from September to October. In the north, there is a single rainy season, from June to September.

FIGURE 1.1

Ivory Coast

B. - The Ivorian Economy

Ivory Coast's economy is among the strongest in West Africa, having grown steadily since the 1950s. Between 1950 and 1975, the annual rate of increase in real gross domestic product (GDP) averaged between 7 and 8 percent [International Bank for Reconstruction and Development, (IBRD), 1976] . Much of the increase came about through increased production of export crops, primarily coffee and cocoa, and expansion of the logging industry. Per capita incomes in Ivory Coast are far above those in neighboring countries; as a result, substantial immigration to Ivory Coast has occurred, particularly from Upper Volta, Mali, and Guinea.

1) - Patterns of Production

Ivory Coast is primarily an agricultural country. Agriculture is the largest single contributor to GDP and the major source of employment and export earnings. In the savannah areas of the north, production is primarily concentrated on annual food crops (manioc, yams, rice, sorghum, and millet), although cotton has also become important in recent years. In the more humid south, conditions permit cultivation of perennial tree crops, the most important of which are coffee and cocoa. Ivory Coast is the world's third largest coffee producer and the world's largest cocoa producer. Since the 1960s the Ivorian government has promoted crop diversification in the south in order to reduce the country's vulnerability to fluctuations in world coffee and cocoa prices. Under this policy, pineapples, oil palm, bananas, rubber and coconuts have become important crops.

Although Ivory Coast is primarily an agricultural country, some manufacturing has developed. The most important industries, in terms of employment, are lumber and woodworking, food processing, and textiles [Ministère du Plan (PLAN), 1976a, p. 169]. Mining has played a minor role in the economy. A small amount of diamond mining takes place, and oil was discovered off the southeast coast in 1976, with production scheduled to begin in 1980. Officials expect that oil production will lessen Ivory Coast's dependence on petroleum imports considerably.

Table 1.1 presents Ivory Coast's estimated gross domestic product in 1975, broken down by sector. The primary sector (agriculture, forestry, livestock, and fishing) accounted for 37 percent of the country's GDP in 1975, of which about 30 percent was attributable to agriculture, 4 percent to forestry, 2 percent to livestock, and 1 percent to fishing. Manufacturing and mining made up about 14 percent of GDP, while total services accounted for 39 percent. The output of services, as measured here, includes the value added in commerce, transport and communications; services provided to businesses, government, and individuals; and import taxes. Of these, commerce was the most important, accounting for over two-thirds of the GDP attributable to the tertiary sector (PLAN, 1976b, Vol. III, Part IV, p. 195).

TABLE 1.1

IVORY COAST'S GROSS DOMESTIC PRODUCT BY SECTOR

1975

Sector	Value (Billions of CFA F)		Percent of Total	
Primary Sector	285.2		37.0	
Food crops, livestock, and fishing		116.4		15.1
Cash crops and logging		168.8		21.9
Secondary Sector	184.5		23.9	
Construction and Public Works		54.9		7.1
Energy and Water		30.2		3.9
Industrial Products for the Domestic Market		69.0		9.0
Industrial Products for Export		30.4		3.9
Tertiary Sector (Services)	301.3		39.1	
TOTAL	771.0		[illegible].0	
Population	6,670,000			
GDP per Capita	115,592 CFA F (US$ 540)[a]			

SOURCE: République de Côte d'Ivoire, Ministère du Plan, Projet de plan quinquennal de développement économique, social, et culturel 1976-1980 (Abidjan: 1976), Vol. II, p. 243; and République de Côte d'Ivoire, Ministère du Plan, La Côte d'Ivoire en chiffres, Edition 76 (Abidjan: 1976), p. 11.

[a]Exchange rate used: 214 CFAF=US $1. (Source: IMF, 1978, p. 202).

Although agriculture is the backbone of the Ivorian economy and agricultural growth has been the main engine of Ivorian economic growth, the relative importance of agriculture has declined steadily since independence in 1960. In 1960, the primary sector (essentially agriculture) accounted for 47 percent of GDP, while the secondary sector accounted for 15 percent, and the tertiary sector made up 38 percent (PLAN, 1976a, p. 38). The decline in the relative importance of agriculture has been even greater than the figures in Table 1.1 suggest. In 1975, value added in agriculture (and hence, agriculture's share of GDP) was usually high because of very favorable coffee and cocoa prices; in 1974, the primary sector accounted for only 29 percent of GDP (PLAN, 1976a, p. 38).

2) - Economic Policy

The Ivorian economy is based on entrepreneurial freedom, within a framework of state planning, regulation, and some direct government investment in industry. Private enterprise is encouraged, and the government is favorably disposed toward foreign investment. The government, nonetheless, plays important roles in the economy, stabilizing farm prices for certain commodities, fixing retail prices for certain products (including beef and small ruminant meat), establishing minimum wages, marketing certain products, and investing in sectors of the economy where private investment is deemed insufficient. Although the government has emphasized economic growth as its main goal, it has shown willingness in recent years to sacrifice some economic growth to attain certain social objectives, e.g. a more equitable distribution of income among different regions of the country.

In order to meet its goal of rapid economic expansion, Ivory Coast has relied heavily on imported capital, labor, and technical expertise. Almost 25 percent of Ivory Coast's population is made up of foreigners [Ministère de l'Economie, des Finances et du Plan, (MEFP), 1977a, p. 26] , the most numerous of whom are Voltaics, Malians, Guineans, Lebanese, and Europeans. Much of the labor used in cash crop production in the forest zone is provided by Voltaic workers, while a large part of commerce is controlled by Malians, Guineans, and Lebanese. Europeans, primarily French, numbered roughly 50,000 in 1975 and were concentrated around Abidjan. They provide much of the technical expertise used in both government and business. Although the government has promoted Ivorization since the mid 1960s (i.e. increased control of the economy by Ivory Coast nationals), the government has stressed that Ivorization should not take place at the expense of technical competence. Given the large number of jobs requiring technical expertise in the Ivorian economy and the relatively small supply of trained local manpower, a large expatriate population is likely to remain in Ivory Coast for the next ten to fifteen years.

The large foreign influence in the economy has two important consequences for livestock marketing. First, the European expatriate population in the major cities, especially Abidjan, creates a demand for high-quality meat. A two-tiered marketing system

for meat has therefore arisen in Ivory Coast. The class 1 market, consisting of supermarkets and European-style butcher shops, sells high-quality meat to expatriates and high-income Africans. The class 2 market, made up of butchers selling in open market stalls, sells lower-quality meat to the bulk of the population. Until 1975, the class 2 market sold only locally slaughtered meat, while the class 1 market sold both imported and locally slaughtered meat. Since 1975, however, large amounts of imported frozen beef have been sold on the class 2 market.

For livestock marketing the second consequence of the heavy foreign influence in the economy is that Ivorians have increasingly resented foreign domination of commerce in the country. This resentment has led the government to advocate increased Ivorian control over commerce, including the cattle and meat trades, which are controlled by butchers and merchants originally from the Sahelian countries. This, in turn, has often put the government into an adversary position vis-a-vis butchers and traders, which sometimes has hindered implementation of marketing policies.

3) - The Role of Livestock in the Economy

Traditionally, livestock 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 meat from its northern neighbors (largely in the form of live animals) than to produce the meat itself.

Table 1.2 shows the small role that livestock production plays in the Ivorian economy. In 1975, total livestock and game production accounted for only 2.1 percent of Ivory Coast's GDP, with 0.8 percent of this attributable to red meat production (excluding game) and merely 0.3 percent attributable to cattle production. Poultry is the most important form of domestic livestock production in value terms, accounting for 1.1 percent of GDP in 1975. In contrast to livestock, agriculture accounted for 29.8 percent of Ivory Coast's GDP in 1975. The figures for Ivory Coast are in sharp contrast to those for Mali, where in 1972 livestock production accounted for 31.9 percent of GDP (IBRD, 1976a, Table 2.1).

Because Ivory Coast's domestic livestock production has consistently fallen far short of domestic consumption, the country has represented a major market for livestock and meat from the Sahelian countries, particularly Mali and Upper Volta. Throughout the 1960s and early 1970s, Ivory Coast imported over 80 percent of its beef supply, mostly 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 it an important outlet for livestock production from these other countries. In 1970, 71 percent of Upper Volta's total

cattle exports and 82 percent of its small ruminant exports went to Ivory Coast (Makinen and Herman, 1980). In the same year, Mali sent 61 percent of its cattle exports and 78 percent of its small ruminant exports to Ivory Coast (Delgado, 1980). Moreover, these countries have become increasingly dependent on the Ivorian market in recent years as the demand for livestock in Ghana has dwindled. In 1975, 87 percent of Upper Volta's recorded cattle exports and 88 percent of Mali's recorded cattle exports went to Ivory Coast (Makinen and Herman, 1980; Delgado, 1980).

TABLE 1.2

ESTIMATED VALUE OF LIVESTOCK PRODUCTION IN IVORY COAST IN 1975[a]
(in millions of CFA F)

	Cattle	Sheep/Goats	Swine	Poultry	Game	Total
Value	2,490	2,125	1,410	7,890	1,600	15,515
Percent of GDP	0.3	0.3	0.2	1.1	0.2	2.1

SOURCE: République de Côte d'Ivoire, Ministère du Plan, Les Comptes de nation 1975: Comptes provisoires (Abidjan: 1977).

[a]Excludes production of eggs, hides, and milk, which totaled 0.2 percent of GDP in 1974.

II. - Current Levels of Animal Protein Consumption

Beef, mutton, and goat meat are only three of several sources of animal protein for Ivory Coast. Other important sources include fish, poultry, pork, game and dairy products. Ivorian consumers often substitute one source of animal protein for another in their diet as relative prices change; therefore, it is useful to analyze the consumption patterns for beef, mutton, and goat meat within the larger context of the consumption patterns for all major sources of animal protein.

Table 1.3 presents the estimated per capita consumption of different sources of animal protein in Ivory Coast in 1977. As the table makes clear, red meat accounted for only 30 percent of the animal protein consumed in Ivory Coast in 1977, and beef and small ruminant meat accounted for only 22 percent. By far the most important source of animal protein was fish, making up nearly half of total consumption. Fish was followed in order of importance by beef, dairy products, and poultry. Mutton and goat meat ranked near the

TABLE 1.3

PER CAPITA CONSUMPTION OF ANIMAL PROTEIN IN IVORY COAST IN 1977

Source	Protein Content (gm per kg)	Per Capita Consumption (kg per year)	Animal Protein Intake	
			Gm per day	Percent of Total
Beef	155	6.6	2.8	19.4
Mutton/Goat Meat	122	1.3	0.4	2.8
Pork	98	1.0	0.3	2.1
Game	150	2.1	0.9	6.3
Total Red Meat		11.0	4.4	30.6
Excluding Game		8.9	3.5	24.3
Poultry	154	2.6	1.1	7.6
Eggs	110	0.6	0.2	1.4
Fish[a]	115	21.5	6.8	47.2
Dairy Products	35	19.6	1.9	13.2
TOTAL			14.4	100.0

SOURCES: République de Côte d'Ivoire, Ministère de l'Economie, des Finances et du Plan, unpublished data; République de Côte d'Ivoire, Ministère de la Production Animale, Bureau des Projets, Programme de développement de la production porcine, (Abidjan: 1978), p. 7; République de Côte d'Ivoire, Ministère de la Production Animale, Bureau des Projets, La production avicole en Côte d'Ivoire: programme de développement (Abidjan: 1978), part 2, pp. 4-5.

[a]Figures in fresh equivalent.

[b]Figures in fresh whole milk equivalent.

bottom of the list, along with pork and eggs. Total animal protein consumption was low, 14.4 grams per day, compared with 72 grams for the United States (FAO, 1977).

Since Ivorian consumers adjust their patterns of protein consumption as the relative prices of different sources of animal protein change, price movement for fish and poultry can have a large impact on the demand for beef and small ruminant meat. This report therefore analyzes not only the Ivorian markets for beef, mutton, and goat meat, but also examines, in less detail, those for fish, poultry, and pork. The market for fish is analyzed not only because fish is the largest source of animal protein in the diet, but also because the data indicate that Ivorian consumers increasingly substituted fish for beef in their diets from 1970 through 1975 as the price of beef rose relative to that of fish. Although poultry and pork contribute less protein to the diet than does beef, the markets for these products are analyzed because the Ivorian government has strongly promoted pork and poultry production in recent years, hoping to substitute domestically produced poultry and pork for imported beef in the Ivorian diet.

This report does not deal with consumption of game by Ivorians, nor does it analyze the markets for dairy products or eggs. Reliable data on game consumption are almost totally lacking. It is likely, however, that the importance of game in the diet will decline in the future as the population becomes more urbanized and as the natural habitat of game is reduced through expansion of agriculture. Dairy products, almost all of which are imported from Europe (mainly in the form of dried and condensed milk), contribute important amounts of protein to the Ivorian diet. The degree of substitution between dairy products and meat appears small, however; therefore, this study does not analyze the market for dairy products in Ivory Coast. The market for eggs is not considered because of the small contribution eggs make to total protein consumption and because eggs seem to be rarely substituted for meat in the diet.

III. - Demand for Animal Protein in Ivory Coast

Three factors have increased total demand for animal protein in Ivory Coast since independence in 1960: population growth, increasing urbanization, and increases in per capita real income.

A. - 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 situation 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 1.4.

TABLE 1.4

OFFICIAL ESTIMATES OF IVORY COAST'S POPULATION
1960-75 (in thousands)

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

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 1.4 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. Some of the increase in immigration in the 1970s was probably due to the drought in the Sahel. The population figures shown in Table 1.4 for years prior to 1975, however, 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 estimates can be made:

TABLE 1.5

REVISED ESTIMATES OF THE IVORIAN POPULATION, 1960-78

Year	Population	Year	Population
1960	4,001,460	1970	5,429,840
1961	4,113,500	1971	5,657,900
1962	4,288,680	1972	5,895,530
1963	4,347,090	1973	6,143,140
1964	4,468,800	1974	6,401,150
1965	4,593,930	1975	6,670,000
1966	4,750,130	1976	6,950,140
1967	4,911,630	1977	7,242,050
1968	5,078,620	1978	7,546,200
1969	5,251,300		

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
1970-78: 4.2 percent

B. - 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 1.6 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 1.7 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.

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 17 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

TABLE 1.6

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 1.7

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.

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. 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 to 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 1.8). This continuing urbanization will put great demands on the meat marketing system in the coming years.

C. - Changes in Real Income and Its Distribution

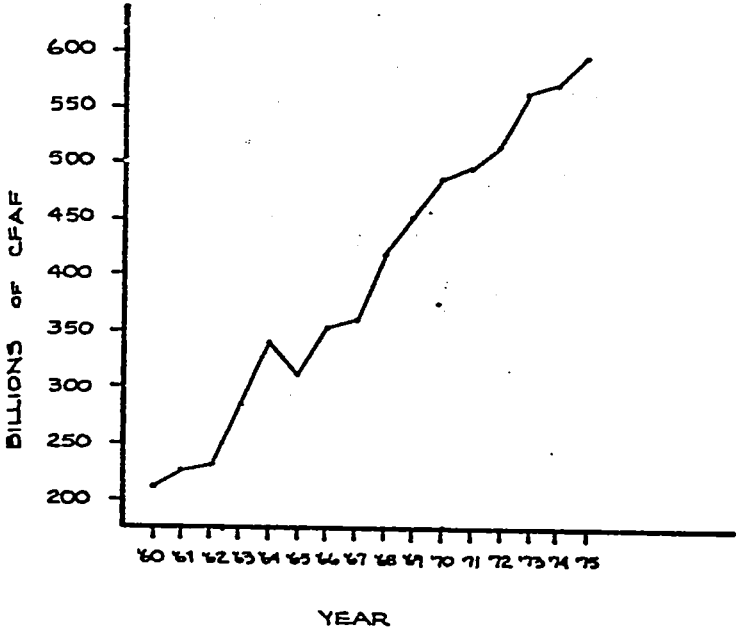
Since independence in 1960, Ivory Coast has experienced the steadiest economic growth of any country in West Africa. Between 1960 and 1970, total real domestic income more than doubled, rising from 212.0 billion CFA F to 491.7 billion CFA F. (Figures are in 1973 francs.) Over the same period, real per capita domestic income rose by roughly 70 percent, or approximately 5.4 percent per year (IBRD, 1976b). The growth of both total and per capita real domestic income from 1960 through 1975 is shown in Table 1.9 and graphically in Figure 1.2. 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 1.2 (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 in fact 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

FIGURE 1.2

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

(a) Total



(b) Per Capita

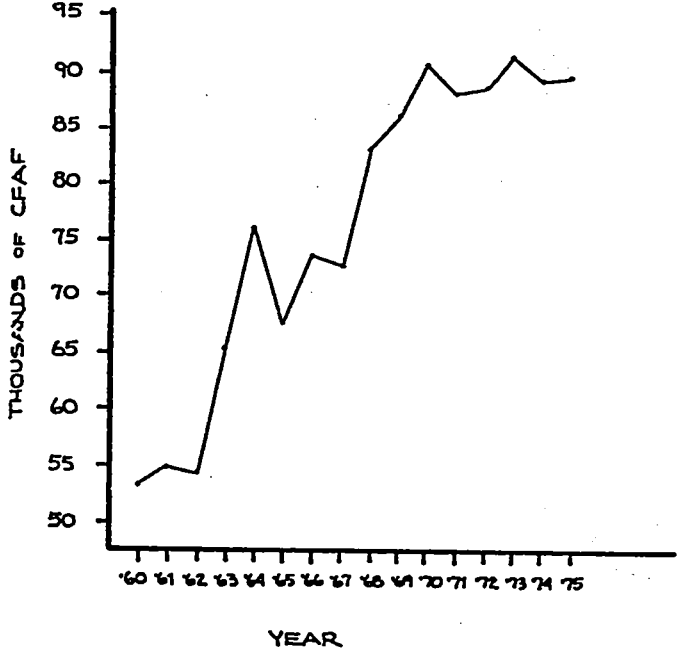


TABLE 1.8

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 1.8 - (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.

TABLE 1.9

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

Year	Total Real Domestic Income (billions of CFA F)	Population	Real Per Capita Domestic Income CFA F	Real Per Capita Domestic Income 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 1.5.

[a]Revenu intérieur brut.

[b]Exchange rate used: US$1 = 223 CFA F.

Table 1.10). Few 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, income distribution (Stolper, 1976). Not much evidence exists to support Montgomery's assertion (Montgomery, 1975) that income distribution has become less equal in recent years.

TABLE 1.10

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)	10.9	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.

CHAPTER TWO

THE IVORIAN BEEF SUPPLY, 1967-78

This chapter traces the evolution of the Ivorian beef supply from 1967 through 1978, looking at the growth in domestic beef production, cattle imports, and imports of chilled and frozen beef over the twelve-year period. The analysis of cattle and meat imports is based on official Ivorian import statistics, the accuracy of which is discussed in Appendix A.

The bulk of the Ivorian beef supply is imported in the form of meat and live animals. Prior to 1975, imports of cattle from Mali, Upper Volta, and Mauritania supplied most of Ivory Coast's beef. Between 1967 and 1970, recorded cattle imports into Ivory Coast grew rapidly in response to increasing demand for meat that resulted from rapid increases in per capita income. Although per capita incomes in Ivory Coast did not increase after 1970, cattle imports continued to grow during the early 1970s because Sahelian cattle raisers were forced to destock their herds in the face of the drought. By 1975, however, the drought was over and the destocking had run its course, and cattle imports into Ivory Coast dropped sharply. They were replaced by imports of chilled and frozen beef from Latin America, Europe, and southern Africa. As a result, in 1976, 38 percent of Ivory Coast's beef supply came from outside of West Africa, compared with 0.3 percent in 1974.

I. - Domestic Beef Production

In 1977 domestic beef production accounted for only about 17 percent of Ivory Coast's total beef consumption. Production is concentrated in northern Ivory Coast, and about 70 percent of the cattle are breeds having some resistance to trypanosomiasis. From 1970 onward the number of zebus (Sahelian cattle having no resistance to trypanosomiasis) has increased rapidly in Ivory Coast, as Fulani cattlemen from Mali and Upper Volta have moved their herds south to escape drought farther north and to take advantage of new areas opened up to grazing in Ivory Coast.

A. - Breeds

Two types of cattle are raised in Ivory Coast, taurins and zebus. Taurins are humpless cattle, varieties of the species Bos taurus. Taurins indigenous to West Africa are usually smaller than zebus, and have some natural resistance to trypanosomiasis. Zebus are humped cattle, varieties of the species Bos indicus. They are found primarily in the drier areas of West Africa and are well adapted to conditions in these arid regions. They lack resistance to trypanosomiasis, however, and therefore cannot be raised in humid areas of the south where tsetse, the vector of trypanosomiasis, is present.

1) - Taurins

Three breeds of taurins are raised in Ivory Coast: Baoulés, N'damas, and lagunaires.

(a.) - Baoulés. Baoulés are the most widely held type of cattle in Ivory Coast. They account for about 310,000 head (out of a total cattle population of about 550,000 head) and are found mainly in the northern and central regions of the country. A type of West African shorthorn, Baoulés are small. Liveweights at four years average approximately 225 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 hardiness 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 [Ministère de la Production Animale, (MPA), 1975, p. 18].

(b.) - N'damas. N'damas originated in Guinea and are found in Ivory Coast mainly in the northwest area of the country, around Odiénné. Although numerically less important than Baoulés (N'damas number between 40,000 and 60,000), they 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 therefore require more careful management. Their rate of fecundity is slightly higher than that of Baoulés (87 percent), but they calve later (age at first calving is roughly three years). They therefore have a lower numerical productivity than Baoulés (MPA, 1975, pp. 19-20). Most Ivorian government cattle projects (ranches, selection programs) are based on the N'dama breed.

(c.) - Lagunaires. Lagoon 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), langunaires are very trypano-tolerant, which permits them to survive in an environment too demanding for other cattle breeds.

2) - Zebus

In 1977 there were about 160,000 zebus in Ivory Coast, all of them in the north. The most important varieties are the White Fulani (zébu peul blanc), the Sudanese zebu (zébu soudanais), and the Moorish zebu (zébu maure). Crossbreeding among these varieties

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*Footnotes begin on Page 178.

is frequent. Livewelghts of adult zebus in Ivory Coast typically run between 300 and 350 kg for males and 250 and 300 kg for females [République Française, Ministère de la Coopération, (MC), 1974, pp. 1040-43]. West African zebus evolved in the Sudanese and Sahelian zones and are well adapted to those arid areas, especially in their ability to survive on very sparse grazing during the long dry season. They are, however, also characterized by susceptibility to trypanosomiasis, late maturity (typically, females calve for the first time at about four years), and a low rate of fecundity, about 66 percent (SEDES, 1969, p. 11). Zebus typically perform better in fattening trials than taurins, gaining between 600 and 1000 grams per day (MPA, 1975, pp. 24-25).

It is somewhat misleading to speak of separate breeds of cattle in northern Ivory Coast, however, as a tremendous amount of cross-breeding has taken place in the region. The most common practice among sedentary cattle raisers is to cross Baoulé females with N'dama bulls in order to increase the size of the animals while retaining most of the hardiness inherent in the Baoulé breed. The Fulani 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 mérés.

B. - Systems of Production

There are two major systems of cattle production in Ivory Coast: sedentary production of taurins by agriculturalists and transhumant production of zebus by Fulani. In addition to these two production systems, a relatively small number of cattle are produced in government-owned facilities, including palm plantations that are stocked with taurins, three ranches that produce improved N'dama breeding stock, and a feedlot that fattens imported zebus.

1) - Geographic Distribution of Cattle

Table 2.1 presents an estimate of Ivory Coast's cattle population in 1977, based on censuses conducted by Ivorian government agencies. The table shows that 85 percent of Ivory Coast's cattle, including all of its zebus, are raised in the north. The central region of the country is the only other area that has an appreciable number of cattle (60,000 head, or

TABLE 2.1

CATTLE POPULATION OF IVORY COAST AS OF DECEMBER, 1977

Breed/Type of Production System	Region					
	North[a]	Center[b]	Southeast[c]	Southwest[d]	West[e]	Total
Traditional Modes of Production						
Taurins						
Covered by extension programs	176,300	24,100	-	-	-	200,400
Not covered by extension programs	120,100	31,900	7,700	4,700	5,500	169,900
Subtotal	296,400	56,000	7,700	4,700	5,500	370,300
Zebus	160,000	-	-	-	-	160,000
Subtotal: Traditional Production	456,400	56,000	7,700	4,700	5,500	530,300
Ranches and Feedlots						
Taurins	7,700	4,000	5,200	800		17,700
Zebus	2,000	-	-	-	-	2,000
Subtotal: Ranches and Feedlots	9,700	4,000	5,200	800	-	19,700
Totals						
Taurins	304,100	60,000	12,900	5,500	5,500	388,000
Zebu	162,000	-	-	-	-	162,000
Total Cattle	466,100	60,000	12,900	5,500	5,500	550,000

SOURCE: République de Côte d'Ivoire, Ministère de la Production Animale, unpublished data (based on censuses conducted by the Ministry, SODEPRA, and SODEPALM)

[a]Départments of Korhogo, Ferkéssédougou, Boundiali, Odiéné, Touba, Bérébourg, Séguéla and [illegible]

TABLE 2.1 continued

[b]Départments of Bouaké, Bouaflé, Dimbokro, Katiola, Dabakala, and Bondoukou.

[c]Départments of Abidjan, Agboville, Adzopé, Abengourou, and Aboisso.

[d]Departments of Gagnoa, Divo, and Sassandra.

[e]Départments of Daloa, Man, Danané, and Guiglo.

11 percent of the country's total). Cattle are concentrated in the north for two reasons. First, the incidence of disease is much lower in the north than in the more humid south. Second, as a result of its higher rainfall, the south has a comparative advantage in export-crop production.

Over 96 percent of Ivory Coast's cattle, both taurin and zebu, are raised by smallholders, with ranches and feedlots accounting for fewer than 20,000 head. In 1977, about 68 percent of Ivory Coast's cattle were owned by sedentary agriculturalists, while transhumant Fulani producers held about 29 percent. About half the taurins were in herds covered by government extension programs. These programs, which aim at improving the health and management of village herds, are discussed in Chapter Six.

2) - Sedentary Production of Taurins

(a.) - Description of Production System. Most of the taurins in Ivory Coast are owned by agriculturalists, but few of these agriculturalists practice mixed farming. Data from the 1975 national agricultural census indicate that roughly one out of three households in rural northern Ivory Coast owns taurins, with the number of taurins per cattle-owner averaging about eight. Ownership of taurin herds is fairly concentrated, however, with 10 to 15 percent of the taurin owners having about 50 percent of the total animals. Average herd size among these larger cattle owners is between thirty and thirty-five head. On the other end of the spectrum, 60 percent of taurin owners have only one or two animals (Chataigner, 1978, pp. 7-8).

Since most taurin owners have few animals, they typically pool their animals into a common village herd, which is entrusted to a herdsman, usually a Fulani. Many taurin herds are entrusted to herdsmen only during the growing season, when the animals have to be kept away from the crops, and are left to fend for themselves during the dry season. The herdsman is typically paid in kind, e.g., by being allowed to sell milk from the herd and/or by being given a certain proportion of the calves born into the herd.

(b.) - Management Practices. It appears that most agriculturalists in Ivory Coast regard cattle raising primarily as a means of savings (one of the few interest-bearing forms of savings available in rural areas) and as a means of meeting certain social obligations, rather than as a commercial venture. Owners of taurins earn the bulk of their incomes through agriculture, and although use of animal traction is becoming more widespread in northern Ivory Coast,[2] in general there is little integration of agriculture and cattle raising.

Since most taurin owners only have a few animals, the cattle make a small contribution to their owners' incomes. The goal of most taurin owners appears not to be the maximization of cash income from their herds but the maintenance of the herds as a source of savings. These savings are tapped when the owner must make unexpected cash expenditures or when he must slaughter an animal for social or religious reasons (e.g., for

marriages or funerals). This pattern of management is reflected in the figures in Table 2.2, which show the pattern of offtake from taurin herds in northern Ivory Coast in 1976-77. Only about 42 percent of the animals removed from taurin herds in northern Ivory Coast in 1976-77 were sold; an equal number were consumed locally, and the remainder were either given away, lost, stolen, or used by their owner for animal traction. Although taurins appear to be held primarily as a form of savings, the data from northern Ivory Coast also suggest some degree of supply-responsiveness on the part of cattle owners. In 1976-77 commercial offtake, which averaged 4.5 percent for all taurin herds in the north, was highest (7.4 percent) around Touba, where cattle prices are higher than in any other region of northern Ivory Coast, and commercial offtake was lowest (3.3 percent) around Bouna, where cattle prices are lowest [Société pour le Développement des Productions Animales, (SODEPRA), 1977, pp. 69-77; Staatz, 1979, pp. 298-99]. This suggests that producers may respond to higher prices by increasing offtake from their herds.

TABLE 2.2

PATTERN OF OFFTAKE FROM TAURIN HERDS
IN NORTHERN IVORY COAST IN 1976-77 (IN PERCENT)

	Males	Females	Total[a]
Total Offtake[b]	5.6	5.0	10.6
Sales	2.5	2.0	4.5
Consumed within the village	2.1	2.4	4.5
Healthy Animals	1.3	0.9	2.2
Sick or Dead Animals	0.8	1.5	2.3
Animal Traction	0.6	-	0.6
Other (Gifts, Lost, Stolen)	0.5	0.6	1.1

SOURCE: Calculated from data in Société pour le Développment des Productions Animales (SODEPRA), Opération Encadrement Bovin Nord, Cellule d'Evaluation, Rapport annuel de synthèse 1976-77. The data cover 1,417 herds, which included 165,700 head of cattle in northern Ivory Coast.

[a]Sum of subtotals may not equal totals due to rounding.

[b]Total offtake is defined here as follows: (sales + home slaughter + dead animals consumed + lost and stolen animals + gifts + animals used for traction) ÷ Average size of herd.

3) - Transhumant Production of Zebus

(a.) Description of Production System. Prior to 1958, there were practically no zebus in Ivory Coast. Since that time, however, a substantial number of Fulani cattle raisers from Mali and Upper Volta have immigrated to Ivory Coast with their zebu herds, and in 1977 the zebu population of Ivory Coast stood at approximately 160,000. Among the factors inducing the Fulani to move south were increases in head taxes on cattle in Mali and Upper Volta (Ivory Coast imposes no head taxes), increasing competition for land between herders and agriculturalists in Mali and Upper Volta, the availability of free veterinary services in Ivory Coast, and, since the late 1960s, drought in Mali and Upper Volta (Barry, 1975a, p. 76; Chataigner, 1978, pp. 3-4). The drought not only reduced grazing in the north but also shifted the zone of tsetse infestation in Ivory Coast southward, which allowed the Fulani to move their zebus into certain areas of Ivory Coast without the animals contracting trypanosomiasis. As mentioned above, many of the Fulani also crossbred their animals with taurins as they moved southward to get a degree of disease resistance in their herds. Since 1975 the Ivorian government has taken a number of actions, described in Chapter Six, aimed at encouraging the immigration of Fulani herdsmen into Ivory Coast. The government hopes that the installation of a large number of Fulani herds in northern Ivory Coast will increase domestic beef production and reduce the country's dependence on cattle and meat imports.

(b.) - Management Practices. Unlike northern Ivorian agriculturalists who hold cattle primarily as a means of savings, the Fulani in northern Ivory Coast derive most of their incomes from their herds. Typically, several members of a Fulani extended family hold their animals together in a single herd, and the average herd size is about 240 head (Chataigner, 1978, p. 8). The zebu herds are usually divided into two parts: a milk herd, made up of female stock, calves, and a few breeding bulls, which is kept near the encampments; and a commercial herd, made up of steers, cull animals, and young stock, which may go on transhumance during the dry season, in search of new pasture and water (Barry, 1978b, p. 79). Most Fulani herds in northern Ivory Coast go on very short transhumances, however, on the order of forty to fifty km [Bureaux Nationaux d'Etudes Techniques et de Développement, (BNETD) , 1975, p. 33].

Most Fulani herds in Ivory Coast are managed as dairy herds. Typically, sales of milk and butter from the herd cover the Fulani's daily living expenses, sales of cull cows cover costs of maintaining the herd, and sales of steers and bulls cover large expenses (medical expenses, pilgrimages, etc.) (Barry, 1975b, p. 81). No detailed studies of the management practices of Fulani herders in northern Ivory Coast have taken place, but most authors assert that the goal of the Fulani in managing their herds is to "obtain the subsistence needs for the family with the least expenditure of capital (i.e., animals). For example, the choice of animals to be sold in order to meet the family's needs depends on the size of the expenses to be covered" (Chataigner, 1978, p. 2). A detailed study of the sex and age structure of zebu

herds in Ivory Coast (BNETD, 1975), however, failed to find a large excess of adult males in the herds, which one would expect to find if the Fulani were mainly interested in increasing the size of their herds.[3] The annual offtake rate from Ivory Coast's zebu herd is estimated at 12 percent (BNETD, 1975, p. 35). Unlike in the taurin herd, almost all of this offtake is sold, and is not consumed by the cattle raisers themselves.

C. - Evolution of Domestic Beef Production from 1967 to 1977

Officials of the Ivorian Ministry of Animal Production estimate that over the past fifteen years the national taurin herd has been increasing at about 3 percent per year (MPA, unpublished). The zebu herd has increased much more rapidly, largely because of immigration. It grew from approximately 38,000 head in 1966 to 160,000 head in 1977, an annual rate of increase of about 14 percent (SEDES, 1969, Vol. I, p. 107; MPA, unpublished).

Table 2.3 presents the evolution of Ivory Coast's cattle population from 1966 through 1977, along with estimates of the tonnage of beef domestically produced during that period. Details of how the cattle population figures in Table 2.3 were derived are presented in Appendix B and are contrasted with official government estimates of the livestock population made in various years.

Table 2.3 indicates that domestic Ivorian beef production more than doubled between 1966 and 1977, rising from about 3,700 tons to 7,650 tons. The average annual rate of increase during the period was nearly 7 percent. The reason for the rapid increase in production was the influx of zebu herds into the country. Between 1966 and 1977 the share of domestic beef production accounted for by zebus more than doubled, from 22 percent to 46 percent. Even with the rapid increase in domestic production, however, Ivory Coast still only produced 17 percent of its total beef consumption in 1977. Per capita domestic beef production totaled 1.1 kg in 1977, up from 0.8 kg in 1966. All the increase in per capita production was attributable to the increase in beef from zebus; production from taurins just kept pace with the population. The outlook for further increases in domestic production is discussed in Chapter Six.

II. - Cattle Imports

Cattle imports from the Sahelian countries, particularly from Mali and Upper Volta, have traditionally provided the bulk of Ivory Coast's beef supply. During the 1960s and early 1970s these imports accounted for over 80 percent of Ivory Coast's beef consumption. Between 1973 and 1976, however, the number of cattle imported fell by half, and although imports increased from 1976 to 1978, they were still far below their levels of the early 1970s.

TABLE 2.3

ESTIMATE OF IVORIAN DOMESTIC BEEF PRODUCTION, 1966–1977 (tons)

Year	Cattle Population	Offtake Rate	Number Slaughtered	Ave. Carcass Weight (kg)	Meat Production (tons)	Edible Offals[a] (tons)	Domestic Production Total (tons)	Domestic Production Per capita[b] (kg)
Taurins								
1966	268,500	10%	26,850	85	2,282	571	2,853	0.60
1967	277,000	10%	27,700	85	2,355	589	2,944	0.60
1968	286,100	10%	28,610	85	2,432	608	3,040	0.60
1969	295,700	10%	29,570	85	2,513	628	3,141	0.60
1970	306,100	10%	30,610	85	2,602	651	3,253	0.60
1971	316,000	10%	31,600	85	2,686	672	3,358	0.59
1972	326,200	10%	32,620	85	2,773	693	3,466	0.59
1973	337,000	10%	33,700	85	2,865	716	3,581	0.58
1974	347,900	10%	34,790	85	2,957	739	3,696	0.58
1975	359,000	10%	35,900	85	3,052	763	3,815	0.57
1976	373,000	10%	37,300	85	3,171	793	3,964	0.57
1977	388,000	10%	38,800	85	3,298	825	4,123	0.57
Zebus								
1966	38,000	12%	4,560	145	661	165	826	0.17
1967	40,700	12%	4,884	145	708	177	885	0.18
1968	43,600	12%	5,232	145	759	190	949	0.19
1969	46,700	12%	5,604	145	813	203	1,016	0.19
1970	50,000	12%	6,000	145	870	218	1,088	0.20
1971	70,000	12%	8,400	145	1,218	305	1,523	0.27
1972	77,000	12%	9,240	145	1,340	335	1,675	0.28
1973	85,000	12%	10,200	145	1,479	370	1,849	0.30

TABLE 2.3 continued

Year	Cattle Population	Offtake Rate	Number Slaughtered	Ave. Carcass Weight (kg)	Meat Production (tons)	Edible Offals[a] (tons)	Domestic Production Total (tons)	Domestic Production Per Capita[b] (kg)
1974	105,000	12%	12,600	145	1,827	457	2,284	0.36
1975	115,000	12%	13,800	145	2,001	500	2,501	0.37
1976	120,000	12%	14,400	145	2,088	522	2,610	0.38
1977	162,000	12%	19,440	145	2,819	705	3,524	0.49
Total Production								
1966	306,500		31,410		2,943	736	3,679	0.77
1967	317,700		32,584		3,063	766	3,829	0.78
1968	329,700		33,842		3,191	798	3,989	0.79
1969	342,400		35,174		3,326	831	4,157	0.79
1970	356,100		36,610		3,472	869	4,341	0.80
1971	386,000		40,000		3,904	977	4,881	0.86
1972	403,200		41,860		4,113	1,028	5,141	0.87
1973	422,000		43,900		4,344	1,086	5,430	0.88
1974	452,900		47,390		4,784	1,196	5,980	0.93
1975	474,000		49,700		5,053	1,263	6,316	0.95
1976	493,000		51,700		5,259	1,315	6,574	0.95
1977	550,000		58,240		6,117	1,530	7,647	1.06

SOURCES: 1) Cattle population - See Appendix B.

2) Offtake rates: Taurins - Table 2.2 shows a total annual offtake rate from taurin herds in northern Ivory Coast of 10.6 percent, of which 0.6 percent was attributable to animals removed from the herd for traction projects and 10 percent was attributable to sales, home consumption, gifts, losses and thefts. When calculating annual meat production, offtake for traction projects should be excluded. Aloui (1977, p. 6) found the offtake of taurin herds in central Ivory Coast to be 9.9 percent.

Zebus - Offtake figure taken from BNETD, 1975, p. 35.

TABLE 2.3 continued

3) Carcass Weights: Taurins - Until 1977, the Ivorian Ministry of Animal Production estimated the average carcass weight of taurins in Ivory Coast at 100 kg. In 1977, however, the estimate was revised downward to 80 kg, reflecting the belief that the weight of young animals slaughtered in northern Ivory Coast had been overestimated. Inspection of slaughter weights for three cities in northern Ivory Coast (Odiénné, Boundiali, and Bouna) lead the investigator to believe that while the 100 kg figure is probably too high, the 80 kg figure may be too low. The average carcass weight of N'damas slaughtered in these cities in 1976-77 (N = 1,278) was 103 kg; that of Baoulés (N = 495) was 80 kg (Staatz, 1979, Appendix 8C). Young animals slaughtered in villages may have weighed less than those slaughtered in Odiénné, Boundiali, and Bouna, while those shipped to major consumption centers in the south weighed more. The average carcass weight of 81 taurins slaughtered in Bouaké during 1976-77 was 126 kg (Staatz, 1979, p. 33); Zebus - Figure provided by the Ivorian Ministry of Animal Production.

[a]Estimated at 25 percent of carcass weight.

[b]Calculated using population figures from Table 1.5.

A. - Evolution of Cattle Imports from 1966 to 1978

Table 2.4 presents officially recorded cattle imports into Ivory Coast from 1966 through 1978. Between 1966 and 1970, officially recorded cattle imports increased steadily, rising from 101,600 head to 198,000 head. The annual average rate of increase in recorded cattle imports during this period was in excess of 18 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 much of the increase during this period. Mali's share of the market increased from 31 percent in 1965 to 66 percent in 1969. 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 reflected 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).[4] Much of the recorded increase, however, was probably due to the lifting of Malian exchange controls in 1967, the devaluation of the Malian franc, and the reduction in the Malian export tax on cattle in 1969 (Stryker, 1973, p. 9). The growth in Malian exports was also tied to the growth of the urban centers such as Daloa, Yamoussoukro, San Pedro, and Bouaké, whose meat supply is met by Malian animals transported south on the hoof.

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 in 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. Many of the cattle which normally would have been exported to Ghana ended up in the Ivory Coast during this period.

In 1974, total recorded cattle imports into Ivory Coast fell by 30,000 head from the previous year, and the decline 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 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.[5] Imports were also reduced because of the hostilities between Upper Volta and Mali, which essentially ended the transit

TABLE 2.4

OFFICIALLY RECORDED IMPORTS OF CATTLE INTO IVORY COAST: 1965-78

Year	Mali		Mauritania		Upper Volta		Niger		France		Total	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent[a]
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	—	—	172,044	100.0
1970	143,080[b]	72.1[b]	b	b	51,199	25.8	4,121	2.1	—	—	198,400	100.0
1971	--	--	--	--	--	--	--	--	—	—	175,896	100.0
1972	137,074	65.5[b]	b	b	73,658	34.7	1,746	0.8	—	—	212,418	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	75,851	67.5	830	0.7	35,264	31.4	—	—	369	0.3	112,314	100.0
1977	97,523	71.2	1,019	0.7	38,330	28.0	191	0.1	—	—	137,063	100.0
1978	92,325	62.6	1,033	0.7	57,007	36.6	68	—	—	—	147,433	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, Receuil 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 Receuil 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 statistiques 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.

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

[b]Figures for Mauritania included in the figures for Mali.

of Malian animals through Upper Volta along the route Mopti-San-Bobo Dioulasso-Ouangolodougou (Ivory Coast). This is reflected in the 37 percent drop in recorded imports from Mali between 1974 and 1975. As a result, Mali's relative share of the import market fell from 64 percent to 55 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 about 112,000 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.[6] 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.) Second, part of Ivory Coast's "normal" supply of cattle, particularly from Upper Volta, apparently was diverted toward more profitable markets in Niger and Nigeria.

This latter development 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. Because the port of Lagos was blocked throughout 1976, Nigeria was unable to adopt the Ivorian expedient of importing large quantities of frozen meat in order to hold down retail meat prices. As a result, prices for cattle in Lagos reportedly rose to approximately 300 CFA F per kg liveweight near the end of 1976, compared with roughly 210 CFA F per kg liveweight in Abidjan (Montenez, personal communication).

There are, unfortunately, no statistics on the volume of the 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 importing large amounts of cheap frozen meat to make up for the shortfall in cattle imports from the Sahel in 1975 actually helped perpetuate that shortfall into 1976-77 by diverting part of the traditional supply of slaughter animals, particularly from Upper Volta, to more profitable markets elsewhere.

In 1977, total recorded imports rose to 137,000 head. Mali's share of the market continued to increase, to over 71 percent, while Upper Volta's share continued to fall, to 28 percent. In 1978 total imports increased to 147,400 head, and imports from Upper Volta went up markedly, to 54,000 head, or 37 percent of the total. Mauritania and Niger, on the other hand, have exported very few cattle to Ivory Coast since 1976.

Higher cattle prices in Ivory Coast may have accounted for some of the increase in cattle imports from the Sahelian countries in 1977. Prices of both fresh and frozen beef in Ivory Coast rose during 1977, leading to higher cattle prices. (See Chapter Three.) At the same time, the port of Lagos was finally cleared in 1977, allowing Nigeria to begin importing frozen beef by sea. These imports may have dampened increases in the price of beef in Nigeria. The higher prices in Ivory Coast, combined with lower, or at least more slowly rising prices in Nigeria, may have lured back to Ivory Coast some of the Voltaic and Malian traders who had begun shipping their cattle to Niger and Nigeria in 1976. Even though recorded Ivorian cattle imports increased 22 percent between 1976 and 1977, however, they were still considerably below the levels of 1968-1975.

B. - Tonnage of Beef Imported on the Hoof

1) - Sex Structure of Slaughter

Not only did the number of slaughter cattle imported into Ivory Coast change markedly between 1967 and 1977, so did the relative numbers of steers, bulls, and cows. These changes were reflected in the sex structure of cattle slaughter in Abidjan. Being one of the most important consumption markets in West Africa, Abidjan traditionally attracted the best quality slaughter animals, typically steers from five to eight years old. As shown in Table 2.5, however, the sex composition of cattle slaughter in Abidjan changed radically between 1967 and 1975. Steers, which made up 84 percent of slaughter in 1967, accounted for only 42 percent in 1975. Cows, which made up 6.5 percent of slaughter in 1967, accounted for a quarter of the animals killed in 1975. Bulls, generally young animals (males are typically castrated between four and five years of age in the Sahelian countries), made up 9 percent of slaughter in 1965 but 33 percent in 1975. From 1975 to 1978, the earlier pattern of slaughter began to reassert itself, with the proportion of slaughter made up of steers increasing and that of bulls and cows decreasing. Nevertheless, in 1977 the proportion of total slaughter accounted for by bulls was still well above the levels observed in the late sixties.

Three factors accounted for the change in the relative numbers of steers, bulls, and cows slaughtered in Abidjan during the 1970s. By far the most important factor was the drought in the Sahelian countries, which reduced herd sizes and forced cattle owners to sell even females and young stock in order to get money to buy foodgrains. The two other factors were the increased importance of the Nigerian market for beef in recent years and the decision by herders, for economic or ecological reasons, to reduce the average age at which animals were sold from their herds. The high prices offered for cattle in Nigeria may have induced Voltaic and Malian cattle traders to ship their choicest animals to Nigeria, leaving mainly cows and young bulls to send to Abidjan. The shift of zebu herds southward

during the drought may have also led to an earlier average age of sale from these herds.[7] Data from Mali and Ivory Coast (see Appendix C) suggest that sales of young males are much more prevalent in zebu herds raised in more humid southern zones than in herds raised in the Sahel. The younger age offtake might be attributable to three factors: 1) better grazing in the south, which allows animals to mature faster; 2) shorter distances between the zone of production and the major consumption markets, which allows younger animals to survive the trek to market; and 3) higher relative producer prices in the south than in the north for young as opposed to mature animals, partly because young animals in the south can survive the trip to major consumption markets.

Because of the changing sex/age composition of cattle imported, the average slaughter weight in Abidjan appears to have declined from 1967 through 1975. Unfortunately, actual slaughter weights are not recorded in Abidjan. They can be estimated, however, by using the Ivorian Ministry of Animal Production's figures for the average carcass weight of zebu steers, bulls and cows (160 kg, 130 kg, and 110 kg, respectively) and applying these weights to the slaughter proportions indicated in Table 2.5. (Virtually all cattle slaughtered in Abidjan are zebus.) This technique gives a conservative estimate of changes in average slaughter weights during the drought because it takes account only of changes in the sex composition of slaughter, not changes in the nutritional state of the animals. Using the estimated average weights for steers, bulls, and cows and the figures shown in Table 2.5, one obtains the following average carcass weights for cattle slaughtered in Abidjan from 1967 to 1977:

1967:	154 kg	1973:	139 kg
1968:	152 kg	1974:	140 kg
1969:	151 kg	1975:	138 kg
1970:	151 kg	1976:	143 kg
1971:	149 kg	1977:	149 kg
1972:	142 kg		

From 1967 through 1971, average carcass weights declined slightly, from 154 kg to 149 kg. When the massive destocking of Sahelian herds took place from 1972-75, slaughter weights fell sharply, as the number of females and young males increased. By 1977, however, the average carcass weight had increased back to the level estimated for 1971.

2) - Tonnage Imported

If one assumes that the average carcass weight of all imported cattle equalled that of cattle slaughtered in Abidjan, then the tonnage of beef imported on the hoof from 1967 through 1978 can be calculated as in Table 2.6. Table 2.6 shows that between 1967 and 1973 the tonnage of beef imported on the hoof into Ivory Coast doubled, from 19,560 tons to 38,900 tons. Per capita imports increased over the same period, from 4.0 to 6.3 kg. Much of the increase in imports between 1967 and 1970 probably resulted from higher demand

TABLE 2.5

RECORDED CATTLE SLAUGHTER AT ABIDJAN BY SEX OF ANIMAL: 1967-77

Year	Steers		Bulls		Females		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1967	36,273	84.1	4,029	9.3	2,810	6.5	43,112	100.0
1968	36,038	78.3	5,789	12.6	4,191	9.1	46,018	100.0
1969	37,251	76.8	6,533	13.5	4,736	9.8	48,520	100.0
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	24,944	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
1977	25,674	69.5	7,634	20.7	3,618	9.8	36,926	100.0

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

TABLE 2.6

ESTIMATED TONNAGE OF BEEF IMPORTED INTO IVORY COAST
ON THE HOOF FROM 1967 to 1978

Year	Number of Cattle Imported	Average Carcass Weight (kg)	Meat (tons)	Edible Offals (tons)[a]	Total (tons)	Per Capita Imports[b] (kg)
1967	101,622	154	15,650	3,912	19,562	3.98
1968	119,643	152	18,186	4,546	22,732	4.48
1969	164,758	151	24,878	6,220	31,098	5.92
1970	198,400	151	29,958	7,490	37,448	6.90
1971	175,896	149	26,209	6,522	32,761	5.79
1972	212,478	142	30,172	7,543	37,715	6.40
1973	223,935	139	31,127	7,782	38,909	6.33
1974	193,629	140	27,108	6,777	33,885	5.29
1975	140,970	138	19,454	4,863	24,317	3.65
1976	112,314	143	16,061	4,015	20,076	2.89
1977	137,063	149	20,422	5,106	25,528	3.52
1978	147,433	150[c]	22,115	5,529	27,644	3.66

SOURCE: Table 2.4 and average carcass weights (see text).

[a]Estimated at 25 percent of carcass weight.

[b]Calculated using population figures from Table 1.5.

[c]Author's estimate.

stemming from increases in per capita income during the period (See Table 1.10). Although per capita income stagnated after 1970, annual per capita imports remained around six kg through 1973 because of the destocking of Sahelian herds. From 1974 through 1976, however, both total and per capita imports fell sharply. A small part of the decline in imports was offset by the increase in domestic production that resulted from Fulani herders moving their animals into Ivory Coast from Mali and Upper Volta to escape the drought (see Table 2.3), but most of it was not met by a corresponding increase in other fresh beef supplies. The result was a declining total and per capita fresh beef supply throughout the period. Although cattle imports increased from 1976 to 1978, total recorded imports in 1978 were lower than they had been in 1969, and per capita imports were even lower than they had been in 1967.

C. - Seasonality of Cattle Imports

Data on quarterly imports of cattle are available for only five years, 1974 through 1978. During one of these years, 1975, imports were falling rapidly, and this obscured normal patterns of seasonal variation in imports, not only in 1975, but in late 1974 and early 1976 as well. Despite these problems a pattern of seasonal variation in imports can be inferred from Figure 2.1, which graphs quarterly cattle imports from 1974 through 1978 (see Appendix E for the data on which Figure 2.1 is based).

In most years, cattle imports were highest during the fourth quarter. The fourth quarter is a period of peak supply and demand for cattle. Supply is high because from October through December cattle in the producing areas of the north fatten on pastures that have been rejuvenated by rains that fall from June through September. The cattle are therefore in good shape and fetch good prices. Demand for cattle in Ivory Coast is high during the last quarter as well. Cash incomes in rural areas of the south are high because of receipts from the coffee and cocoa harvests, and the large number of religious and other festivals at this time further strengthens demand.

Imports drop off after the fourth quarter, reaching a low point either in the second or third quarter of the year. Again, both supply and demand factors are important. The first two quarters of the year correspond to the hot, dry season in cattle-producing areas of the north. Cattle often lose weight at this time, and many producers are reluctant to sell animals in poor shape for fear of getting low prices. Furthermore, many of the herds, especially in Mali, go on transhumance at this time, which makes it more difficult for cattle merchants to find animals to ship south. The third quarter corresponds to the rainy season, when producers want to hold onto their animals to allow them to fatten on the new pastures. The pattern of demand reinforces this supply pattern. During the dry season rural incomes, which depend on crop receipts, are low. Urban demand is more steady but falls during the summer months (the second and third quarters), as a result of the outflow of expatriates, high income Africans, and students during the summer vacation period.

Figure 2.1 shows that for every year except 1975, when imports were severely disrupted, the seasonal patterns of imports from Mali and Upper Volta, Ivory Coast's two largest suppliers, were very similar.

III. - Imports of Chilled and Frozen Beef

A. - Evolution of Beef Imports: 1960-1978

In addition to domestic production and cattle imports, imports of chilled and frozen beef are the other main source of beef for Ivory Coast. A relatively small amount of canned beef is also imported (imports in 1977 totaled 616 tons -- carcass weight equivalent -- or 0.09 kg per capita), but due to a lack of data on canned beef imports prior to 1977, they are not discussed below.

Prior to 1975, imports of frozen and chilled beef were few 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 beef being sold on the traditional African market. Table 2.7 shows how Ivory Coast's recorded imports of chilled and frozen beef evolved from 1960 through 1978.

From 1960 through 1969, total recorded imports increased fairly steadily, from 400 tons to 1,500 tons. Imports per capita also increased over this period, but even in 1969 they represented a small quantity, 0.3 kg per year. From 1960 through 1969 the proportion of total imports coming from the Sahelian countries, particularly Upper Volta and Niger, increased steadily, from 65 percent in 1960 to 93 percent in 1969. Annual imports from Europe, mainly France, usually averaged between 100 and 140 tons during this period.

From 1969 through 1974 total recorded imports fell (from 1,500 tons to 1,200 tons) as did per capita imports (from 0.3 kg to 0.2 kg). The decline in imports reflected the ending of meat exports from Mali to Ivory Coast and a decline in the reliability of refrigerated rail transport between Upper Volta and Ivory Coast, which discouraged shipments of chilled meat between the two countries. It may have also reflected the effects of the drought in the Sahelian countries, which reduced the supply of fattened animals, and hence high quality meat, for export from the north.

The decline in imports of chilled and frozen beef continued through the first half of 1975. The abrupt drop in cattle imports in 1975 sharply reduced Ivory Coast's beef supply, and in order to check the resulting price rise, the Ivorian government, through its para-statal company AGRIPAC, began importing surplus frozen beef from the European Economic Community (EEC). Total recorded beef imports quintupled from 1974 to 1975, from 1,200 tons to 6,000 tons, with most of this meat being imported during the second half of 1975. In 1976, chilled and frozen beef imports increased even more, to 16,611 tons, or 2.4 kg per capita. Although Europe remained an important supplier of frozen meat in 1976, South

FIGURE 2.1
QUARTERLY CATTLE IMPORTS
1974-1978

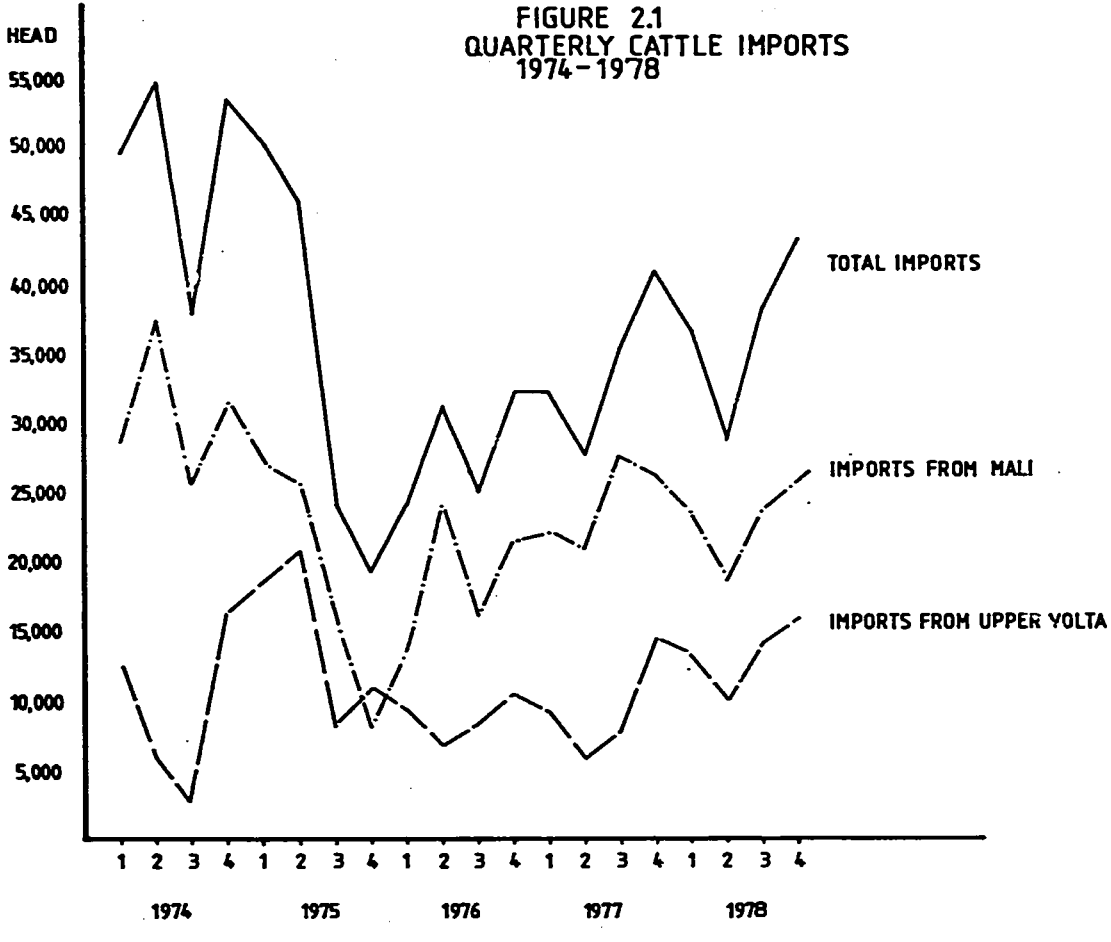


TABLE 2.7

RECORDED IMPORTS OF CHILLED AND FROZEN BEEF BY COUNTRY OF ORIGIN: 1960-78 (tons)

Year	Mali		Upper Volta		Niger		Other African Countries		Total African Countries		Europe		South America		Total[a]		Imports Per Capita[b]
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	(kg.)
1960	68	16.7	172	42.4	26	6.4	-	-	266	65.5	140	34.5	-	-	406	100.0	.10
1961	-	-	226	39.6	135	23.7	-	-	361	63.3	209	36.7	-	-	570	100.0	.14
1962	-	-	531	71.7	108	14.6	-	-	639	86.2	102	13.8	-	-	741	100.0	.18
1963	79	8.3	588	61.5	147	15.4	-	-	814	85.1	142	14.9	-	-	956	100.0	.22
1964	174	17.1	548	54.0	149	14.7	-	-	871	85.8	144	14.2	-	-	1,015	100.0	.23
1965	167	17.0	524	53.3	177	18.0	-	-	868	88.3	115	11.7	-	-	983	100.0	.21
1966	305	23.7	469	36.4	406	31.5	-	-	1,180	91.5	109	8.5	-	-	1,289	100.0	.27
1967	57	4.2	881	65.2	311	23.0	-	-	1,249	92.4	103	7.6	-	-	1,352	100.0	.28
1968	95	6.5	941	64.2	340	23.2	-	-	1,376	93.9	89	6.1	-	-	1,466	100.0	.29
1969	179	11.8	932	61.3	308	20.2	-	-	1,419	93.3	102	6.7	-	-	1,521	100.0	.29
1970	153	10.4	865	58.6	357	24.2	-	-	1,375	93.1	102	6.9	-	-	1,477	100.0	.27
1971	-	-	1,041	74.1	260	18.5	-	-	1,301	92.6	104	7.4	-	-	1,405	100.0	.25
1972	-	-	889	73.8	182	15.1	-	-	1,071	89.0	133	11.0	-	-	1,204	100.0	.20
1973	-	-	794	73.7	146	13.6	-	-	940	87.3	138	12.8	-	-	1,077	100.0	.18
1974	-	-	958	77.0	134	10.8	8	0.6	1,100	88.5	142	11.4	-	-	1,243	100.0	.19
1975	-	-	510	8.4	225	3.7	891	14.6	1,626	26.7	3,887	63.8	580	9.5	6,093	100.0	.91
1976	-	-	199	1.2	80	0.5	892	5.4	1,171	7.0	2,624	15.8	12,816	77.2	16,611	100.0	2.39
1977	-	-	181[c]	1.4	c	c	538	4.1	709	5.5	225	1.8	11,861	92.7	12,794	100.0	1.77
1978	-	-	86	0.5	-	-	1,060	5.9	1,146	6.4	303	1.7	16,512	91.9	17,961	100.0	2.38

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

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

[b]Calculated using the population figures in Table 1.5.

[c]Data for Niger included with data for Upper Volta.

America, especially Argentina, became the most important source, accounting for 77 percent of total frozen and chilled beef imports.

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 April and May 1975, and it was not until September that the massive frozen meat imports began. Once started, however, the sales of inexpensive 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.

Three important changes occurred in the pattern of chilled and frozen beef imports between 1974 and 1976. First, the total quantity imported increased greatly, from 1,243 tons to 16,611 tons. Second, the average quality of the beef imported declined. Until 1975, only high-quality beef (e.g., rear quarters, veal, and filets) were imported, and this beef was sold exclusively on the class 1 market to high-income consumers, primarily in Abidjan. In 1975 and 1976, however, Ivory Coast imported large quantities of lower quality (deuxième choix) front quarters, which were sold on the class 2 market. About 80 percent of this frozen beef was sold in Abidjan, with the remainder being trucked to cities in the interior. In 1976, the frozen beef undersold locally slaughtered beef by 50 to 100 CFA F per kg at a time when fresh beef sold in Abidjan for 350-400 CFA F per kg. Data presented elsewhere (Staatz, 1979, p. 58) indicate that in 1976 imported frozen and chilled beef made up about three-fourths of all beef consumed in Abidjan.

The change in the quality of beef imported can be seen in Table 2.8, which shows the pattern of beef imports by means of transport. Imports of high quality beef generally arrive by air, rail and truck, while lower quality beef is shipped by sea. From 1967 through 1974, between two-thirds and three-fourths of Ivory Coast's beef imports arrived from Upper Volta by rail. About a quarter of total imports arrived by air, and usually less than 5 percent arrived by sea. In 1975, however, large quantities of frozen beef began to arrive by sea, and by 1976 they accounted for 90 percent of total chilled and frozen beef imports. Imports by air also increased, as non-West African beef replaced Voltaic beef in the high-quality market.

The third major change in frozen and chilled beef imports between 1974 and 1976 occurred in the pattern of supply. Between 1965 and 1974, the Sahelian countries provided roughly 90 percent of Ivory Coast's imports of frozen and chilled beef, and Europe supplied the remaining 10 percent. Chief among the Sahelian suppliers was Upper Volta. In 1975, however, 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 88 percent to 12 percent, and by 1976 it represented less than 2 percent of total recorded beef imports. The decline in the market share of the Sahelian countries reflected both the large imports of frozen beef for the class 2 market and the replacement of Sahelian beef in the class 1 market by non-West African beef. In 1975 and 1976, the bulk of the high-quality beef imported came by air from Rhodesia. It was imported through Gabon and sold

TABLE 2.8

RECORDED IMPORTS OF CHILLED AND FROZEN BEEF
BY MEANS OF TRANSPORT: 1960-78 (tons)

Year	Air		Sea		Rail		Truck		Total[a]	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
1960	161	39.7	120	29.6	124	30.5	-	-	406	100.0
1961	248	43.5	187	32.8	134	23.5	-	-	570	100.0
1962	191	25.8	87	11.7	462	62.3	3	0.4	741	100.0
1963	277	29.0	113	11.8	555	58.1	11	1.2	956	100.0
1964	210	20.7	109	10.7	538	53.0	158	15.6	1,015	100.0
1965	248	25.2	83	8.4	517	52.6	135	13.7	983	100.0
1966	735	57.0	77	6.0	464	36.0	12	0.9	1,289	100.0
1967	352	26.0	74	5.5	876	64.8	50	3.7	1,352	100.0
1968	398	27.1	50	3.4	922	62.9	95	6.5	1,466	100.0
1969	357	23.5	60	3.9	925	60.8	179	11.8	1,521	100.0
1970	395	26.7	64	4.3	865	58.6	153	10.4	1,477	100.0
1971	322	22.9	52	3.7	1,031	73.4	-	-	1,405	100.0
1972	274	22.8	53	4.4	878	72.9	-	-	1,204	100.0
1973	314	29.2	55	5.1	709	65.8	-	-	1,077	100.0
1974	362	29.1	42	3.4	834	67.1	5	0.4	1,243	100.0
1975	1,234	20.3	4,405	72.3	429	7.0	25	0.4	6,093	100.0
1976	1,293	7.8	15,092	90.9	189	1.1	37	0.2	16,611	100.0
1977	1,173	9.2	11,499	89.8	112	0.9	10	0.1	12,794	100.0
1978	1,657	9.2	16,217	90.3	86	0.5	-	-	17,961	100.0

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

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

under the name boeuf de la Zambèze. (This meat is recorded as imports from "other African countries" in Table 2.7).

In 1977 total frozen and chilled beef imports fell to slightly under 13,000 tons, but they rebounded to 18,000 tons in 1978. Over 90 percent of total imports in 1977 and 1978 came from South America; Argentina was the most important source, followed by Brazil and Uruguay. Europe, which had sold a large amount of surplus beef on the class 2 market in 1975 and 1976, became a much less important supplier to Ivory Coast in 1977-78, shipping between 200 and 300 tons annually. The market share of the Sahelian countries continued to drop, accounting for only 0.5 percent of total frozen and chilled beef imports in 1978. In the meantime, imports from southern Africa (Botswana, South Africa, and Mozambique) grew to over 1,000 tons and accounted for 6 percent of total imports in 1978. The 18,000 tons of frozen and chilled beef imported in 1978 were equivalent to approximately 96,000 head of Sahelian cattle (assuming an average carcass weight of 150 kg and edible offals equal to 25 percent of carcass weight).

B. - Factors Leading to the New Pattern of Imports

1) - The Class 2 Market

Non-African suppliers entered the Ivorian beef market in 1975, particularly the class 2 market, for two reasons. Beef prices in Ivory Coast rose sharply in the first half of 1975 because of the shortage of local slaughter animals, making Ivory Coast a more attractive market to overseas meat suppliers. More importantly, the world's traditional beef exporting countries, especially Argentina, Australia, and New Zealand, 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 1973, however, the doubling of petroleum prices by the Organization of Oil Exporting Countries (OPEC) threw much of the industrial world (particularly Europe) into recession. This reduced effective world demand for beef. At the same time, grain prices were rising, increasing the costs of producing beef in Europe and North America, both major beef importing regions. Although producers in these regions tried to pass on their increased costs to consumers, in the face of recession and increasing inflation, consumers resisted, and per capita beef consumption fell in both Europe and the U.S.

Faced with increased production costs and falling demand, producers reduced cattle numbers, increasing the short-run 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 have cut imports drastically since 1974. The United States negotiated a voluntary restraint

agreement with major suppliers in 1975 in order to protect domestic producers. As a result of these actions, total beef and veal imports to the U.S., EEC, and Japan fell from 1,886,100 tons in 1973 to 934,400 tons in 1975 [United States Department of Agriculture (USDA), 1977a, pp. 2,10].

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 (carcass weight equivalent) to 2,411,000 tons. At the same time, Argentine exports fell from 500,000 tons to 266,000 tons. Similar situations existed in the other major meat exporting countries such as Australia (USDA, 1977b, 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 (USDA, 1977a, p. 5). Many of the French exports went to the United Kingdom, which, after joining the EEC, had to substitute French beef for imports from Argentina and Australia. This put further pressure on Argentina and Australia to find new markets for their production (Ariza-Niño, 1979, p. 17, in Volume IV of this series).

By 1975, these changes had 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 (USDA, 1977a, p. 2). Thus, while the non-traditional 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 entrance of lower quality non-West African frozen beef into the Ivorian class 2 market can therefore be viewed primarily as the result of agricultural support policies in the developed countries (especially the EEC) combining with the cyclical pattern of beef production in the major meat exporting countries to create a surplus of beef on the world market. The surplus allowed Ivory Coast to purchase inexpensive frozen beef just at the time Ivory Coast's traditional beef suppliers, the Sahelian countries, were unable to meet Ivory Coast's demand for beef because of the drought.

2) - The Class 1 Market

Not only did non-West African beef make great inroads into the class 2 market (the traditional market) in Ivory Coast between 1975 and 1977; it also largely replaced Sahelian beef in the class 1 (deluxe) market. Prior to 1975, most of the beef sold in class 1 market

was either Sahelian beef slaughtered in Abidjan or chilled meat imported from Upper Volta. The imported chilled meat, totalling between 800 and 1,000 tons per year during the period 1967-74, was slaughtered in Ouagadougou and Bobo-Dioulasso and shipped to Ivory Coast by refrigerated rail car. It was supplemented by beef imported from Niamey by air (between 150 and 400 tons per year), locally slaughtered beef, and very high quality beef and veal imported from Europe (roughly 100 tons per year). Between 1975 and 1978, however, Voltaic and Nigerien beef was largely replaced in the class 1 market by beef from southern Africa and Latin America. In 1975 and 1976, Rhodesia was the single most important source of beef sold on the class 1 market in Ivory Coast. Beef imports from Rhodesia totaled 865 tons in 1976, over half the total beef imports destined for the class 1 market. Argentina was the second most important source of supply, with shipments of high-quality beef totaling 273 tons, or about 17 percent of the imports destined for the class 1 market (Staatz, 1979, p. 45).

Imports from Rhodesia were halted for political reasons in April 1976. They were replaced by increased imports from Latin America and by imports from other southern African countries (Botswana, Mozambique and South Africa). This can be seen in Table 2.9, which presents a detailed picture of chilled and frozen beef imports in 1977. Imports by air, rail, and truck were destined for the class 1 market, while imports by sea were destined almost exclusively for the class 2 market. Southern Africa was the single largest source of beef imports for the class 1 market, accounting for about 41 percent of the total, followed by South America (Argentina, Uruguay, and Brazil), which accounted for about 37 percent. Imports from Upper Volta and Niger, Ivory Coast's traditional suppliers of high quality beef, were only 181 tons, or about 14 percent of total imports destined for the class 1 market.

Three factors contributed to the replacement of Voltaic and Nigerien beef by non-West African beef in the class 1 market. The first was the world beef supply situation, which, as discussed above, caused beef exporting countries in Latin America and southern Africa to prospect for new markets. The second was the increasing political pressure put on the Rhodesian regime in 1975 and 1976, which made Rhodesian exporters willing to sign export contracts at fairly low prices in order to insure an inflow of foreign exchange. The third factor was a sharp decline in the reliability of refrigerated rail service between Upper Volta and Ivory Coast. The refrigerated rail cars used to ship meat between Upper Volta and Ivory Coast are owned by a private company, the Fruitière Ivoirienne, which has the monopoly on refrigerated rail transport between the two countries, through its contract with the RAN (Régie de Chemin de Fer Abidjan-Niger, the railroad owned by the Ivorian and Voltaic governments that links Abidjan and Ouagadougou). Because the Fruitière Ivoirienne did not maintain the refrigerated wagons, breakdowns of the compressors were frequent, resulting in heavy losses for the exporters, who were only paid for their meat after it arrived safely in Abidjan. This had two results: fewer butchers in Ouagadougou and Bobo-Dioulasso were 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, turned to other sources, notably southern Africa and South America. In order to overcome these transport problems, the

TABLE 2.9

CHILLED AND FROZEN BEEF IMPORTS
BY REGION OF ORIGIN AND TRANSPORT, 1977

	Air	Sea	Rail	Truck	Total[a]
South America	474	11,387	-	-	11,861
Europe	112	113	-	-	225
Upper Volta and Niger	59	-	112	10	181
Southern Africa	528	-	-	-	528
Total	1,173	11,500	112	10	11,794

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

[a]Totals may not equal sum of subtotals due to rounding.

Voltaic and Ivorian governments created a joint state-owned company for refrigerated rail transport in 1976, but as of mid-1978 it had yet to begin shipments of meat between Upper Volta and Ivory Coast.

IV. - Ivory Coast's Beef Supply: A Summary

A. - Changes In Total and Per Capita Beef Supply: 1967-78

Table 2.10 summarizes changes in the Ivorian beef supply between 1967 and 1978. Over the entire period, the total beef supply more than doubled, from from 25,000 tons to 53,500 tons. Because of population growth, however, per capita availability rose only from 5.0 kg to 7.1 kg. Almost all of the increase in the total beef supply, however, occurred in two periods: between 1967 and 1970, and between 1977 and 1978. From 1970 through 1977 the total beef supply increased only slightly, from 43,200 tons to 46,000 tons.

The beef supply increased rapidly from 1967 through 1970, and annual per capita availability rose by 60 percent, from 5 kg to 8 kg. Between 1970 and 1974, the total beef supply varied between 39,000 tons and 45,400 tons, and per ccapita consumption fell to 6.7 kg. In 1975, as a result of the sharp drop in cattle imports, the total beef supply declined to 36,700 tons, and per apita consumption fell to 5.5 kg. By 1977, however, total availability had increased to 46,000 tons, largely as a result of the heavy imports of frozen beef from Latin America. In 1978, the total beef supply increased to 53,500 tons, and per capita

TABLE 2.10

THE IVORIAN BEEF SUPPLY: 1967-78[a]
(Tons of Meat and Edible Offals)

Year	Domestic Production		Imports						Total[b]		Availability per Capita[c] (kg)
			Live Animals		Frozen and Chilled Meat		Total Imports				
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	
1967	3,829	15.5	19,562	79.1	1,352	5.5	20,914	84.5	24,743	100.0	5.04
1968	3,989	14.2	22,732	80.6	1,466	5.2	24,198	85.8	28,187	100.0	5.55
1969	4,157	11.3	31,098	84.6	1,521	4.1	32,619	88.7	36,776	100.0	7.00
1970	4,341	10.0	37,448	86.6	1,477	3.4	38,925	90.0	43,266	100.0	7.97
1971	4,881	12.5	32,761	83.9	1,405	3.6	34,166	87.5	39,047	100.0	6.90
1972	5,141	11.7	37,715	85.6	1,204	2.7	38,919	88.3	44,060	100.0	7.47
1973	5,430	12.0	38,909	85.7	1,077	2.4	39,986	88.0	45,416	100.0	7.39
1974	5,980	14.5	33,885	82.4	1,243	3.0	35,128	85.5	41,108	100.0	6.69
1975	6,316	17.2	24,317	66.2	6,093	16.6	30,410	82.8	36,726	100.0	5.51
1976	6,574	15.2	20,076	46.4	16,611	38.4	36,687	84.8	43,261	100.0	6.22
1977	7,647	16.6	25,528	55.5	12,794	27.8	38,322	83.4	45,969	100.0	6.35
1978	7,876[d]	14.7	27,644	51.7	17,961	33.6	45,605	85.3	53,481	100.0	7.09

SOURCE: Tables 2.3, 2.6, and 2.7.

[a]Excludes consumption of canned beef, which totaled 616 tons (0.09 kg per capita) in 1977

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

[c]Calculated using the population figures in Table 1.5.

[d]Estimated at 3 percent above the 1977 level.

consumption stood at 7.1 kg , roughly the same level as in 1969. As is shown in Chapter Five, the decline in per capita beef consumption between 1970 and 1977 was offset by an increase in per capita fish consumption.

B. - Changes in the Pattern of Supply: 1967-78

Throughout the period 1967-78 imports of cattle and meat accounted for between 83 and 90 percent of the total beef supply. The share of total beef consumption met by domestic production generally declined from 1967 through 1970, as total beef consumption increased rapidly. From 1971 to 1973, about 12 percent of total consumption was met by domestic production; this increased to between 15 and 17 percent in 1974-77, as a large number of zebus from Mali and Upper Volta moved into the country.

From 1967 through 1974, imports of cattle from the Sahelian countries accounted for between 79 and 87 percent of the total Ivorian beef supply. During this same period imports of chilled and frozen beef made up between 2 and 6 percent of the total supply. In 1975, however, cattle imports dropped sharply, and by 1976 they accounted for only 46 percent of the total beef supply. Cattle imports were replaced in part by frozen meat imports, which in 1976 accounted for 38 percent of the total beef supply. Both cattle and meat imports increased substantially between 1976 and 1978, and in 1978 cattle imports accounted for 52 percent of total beef consumption and meat imports made up 34 percent. The share of consumption met by chilled and frozen beef imports in 1978 was over ten times higher than in 1972-74.

The large increase in frozen beef imports in 1975 signaled the integration of the Ivorian market for beef with the world market. This is seen in Table 2.11, which shows the evolution of the Ivorian beef supply from 1967 through 1978 by region of origin. Prior to 1975, virtually all of Ivory Coast's beef supply came from West Africa, either from domestic production or from imports of cattle and meat from the Sahelian countries. In 1975 the situation changed markedly, with large beef imports arriving from Europe, Latin America, and southern Africa. By 1976, 38 percent of Ivory Coast's beef supply came from outside West Africa: 30 percent from South America (mainly Argentina), 6 percent from Europe and 2 percent from southern Africa. In 1977, Europe ceased to be an important beef exporter to Ivory Coast, beef imports from South America and southern Africa declined slightly, and domestic production and cattle imports both increased. As a result, the proportion of the total Ivorian beef supply originating outside of West Africa declined to 27 percent. In 1978, however, it rose to 33 percent, owing to an increase in imports from Latin America.

The changes that occurred in the Ivorian market for beef between 1975 and 1978 had a large impact on the Sahelian countries. For the first time, they were faced with the specter of having to compete with non-West African meat exporters for a share of the Ivorian market. Ivory Coast itself was also trying to increase domestic livestock production during this period in order to reduce the country's reliance on livestock and meat imports from all

TABLE 2.11

THE IVORIAN BEEF SUPPLY BY REGION OF ORIGIN: 1967-78[a]

(Tons of Meat and Edible Offals)

Year	Domestic Production		Sahelian Countries[b]		Other African Countries		Total African Imports		Europe		South America		Total[c]	
	Tons	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent
1967	3,829	15.5	20,811	84.1	-	-	20,811	84.1	103	0.4	-	-	24,743	100.0
1968	3,989	14.2	24,108	85.5	-	-	24,108	85.5	89	0.3	-	-	28,187	100.0
1969	4,157	11.3	32,517	88.4	-	-	32,517	88.4	102	0.3	-	-	36,776	100.0
1970	4,341	10.0	38,823	89.7	-	-	38,823	89.7	102	0.2	-	-	43,266	100.0
1971	4,881	12.5	34,062	87.2	-	-	34,062	87.2	104	0.3	-	-	39,047	100.0
1972	5,141	11.7	38,786	88.0	-	-	38,786	88.0	133	0.3	-	-	44,060	100.0
1973	5,430	12.0	39,848	87.7	-	-	39,848	87.7	138	0.3	-	-	45,416	100.0
1974	5,980	14.5	34,977	85.1	8	-	34,985	85.1	142	0.3	-	-	41,108	100.0
1975	6,316	17.2	25,052	68.2	891	2.4	25,943	70.6	3,887	10.6	580	1.6	36,726	100.0
1976	6,574	15.2	20,263	46.8	892	2.1	21,155	48.9	2,716[d]	6.3	12,816	29.6	43,261	100.0
1977	7,647	16.6	25,709	55.9	528	1.1	26,237	57.1	225	0.5	11,861	25.8	45,969	100.0
1978	7,876	14.7	27,730	51.9	1,060	2.0	28,790	53.9	303	0.6	16,512	30.9	53,481	100.0

SOURCE: Tables 2.3, 2.6, 2.7, and 2.10.

[a]Excludes consumption of canned beef, which totaled 616 tons (carcass weight equivalent) in 1977, all of it imported from Europe.

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

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

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

sources. Within the context of this changing supply pattern, the question of the efficiency of the traditional cattle and beef marketing system became especially important. Was inefficiency in the traditional marketing system partly to blame for the Sahelian countries' declining share of the Ivorian market? Did exploitative livestock traders offer extremely low prices to Ivorian cattle producers, thus discouraging domestic production? Could the traditional marketing system adapt to the new supply conditions, or were new marketing structures needed? The following chapter discusses the current structure of cattle and beef marketing in Ivory Coast, constraints on the expansion of the trade, and the changes in cattle and beef prices that accompanied the changing supply situation from 1967 through 1978.

CHAPTER THREE

MARKET ORGANIZATION AND PRICES FOR CATTLE AND BEEF

This chapter briefly describes the structure of cattle and beef marketing in Ivory Coast and the evolution of cattle and beef prices from 1965 through 1978. It also provides information on the relative prices of Sahelian and non-Sahelian beef in the Ivorian market in recent years. The chapter shows that marketing cattle and beef in Ivory Coast is fairly costly, but that the high costs are attributable mainly to high transportation costs and taxes, not to excessive profits by cattle merchants and butchers. The chapter also shows that cattle and beef prices tripled in Ivory Coast between 1965 and 1978, with the most rapid price increases occurring after 1974. The rapidly rising prices for Sahelian cattle induced the Ivorian government to greatly increase its imports of frozen beef from overseas and to promote programs aimed at boosting domestic livestock production.

The chapter is divided into six parts. The first part briefly describes the major trade routes and types of cattle markets that exist in Ivory Coast. Part II discusses the roles of the different market participants involved in cattle and meat marketing in Ivory Coast. Part III focuses on the costs of transporting cattle and beef between the Sahelian states and Ivory Coast, and looks at the implications of these costs for future livestock transportation policy. In the hope of gaining some insight into whether the current marketing system will be able to handle the challenges it must face in the future, Part IV looks at how adaptable the system has proven in the past. Part V looks at how cattle and beef prices in Ivory Coast changed from 1965 through 1978. It also examines the relative prices of Sahelian and non-Sahelian beef in the Ivorian market in recent years. Finally, Part VI summarizes the major conclusions of the chapter.

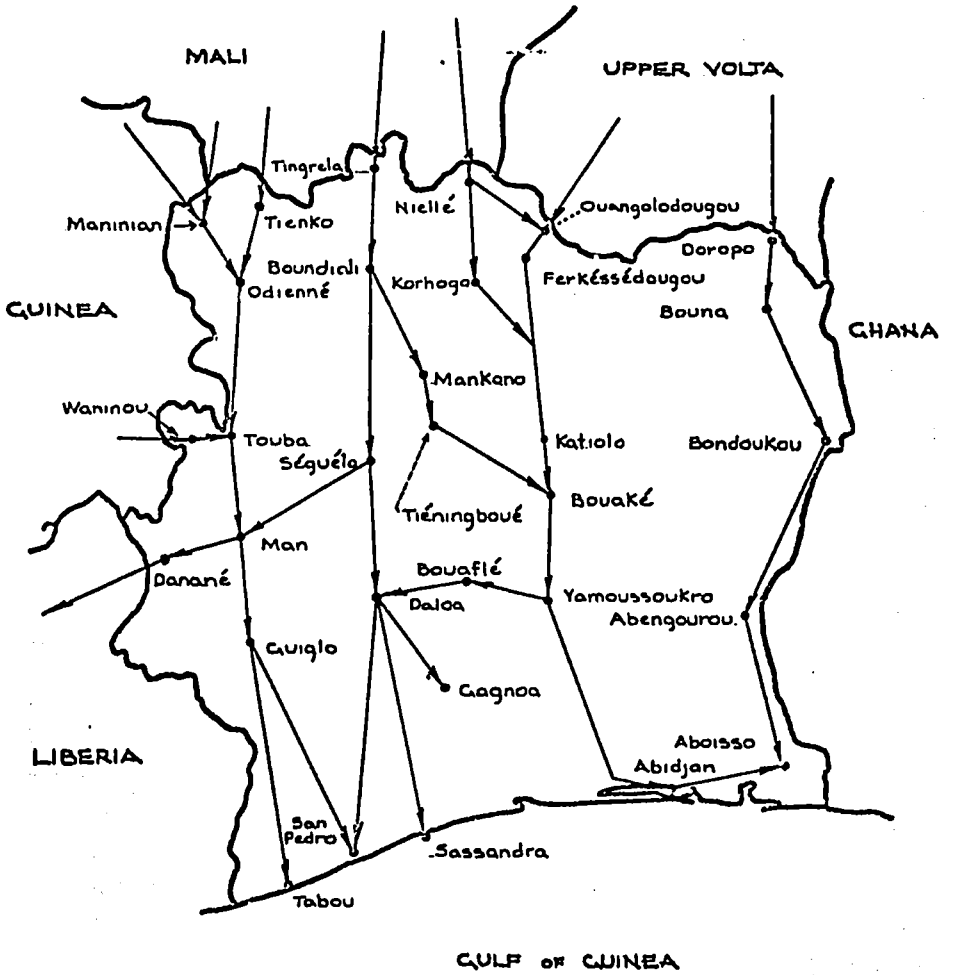
I. - Cattle Markets and Trade Corridors in Ivory Coast

A. - Trade Routes

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 3.1.) In the west, the two major border-crossing points are Tienko and Maninian, both near Odiénné. Tienko receives cattle from Mali while Maninian receives both Malian and Guinean animals. These animals pass south, mainly on the hoof, through Odiénné and Touba to Man. Additional animals enter the corridor from Guinea at the town of Waninou (near Touba). At Man, the animals are redirected to Danané and from there exported to Liberia, or

FIGURE 3.1

MAJOR TRADE ROUTES FOR CATTLE IN IVORY COAST



slaughtered in Man itself, or shipped to markets farther south (Guiglo,Tabou, and San Pedro). In 1976, about 10,000 head of cattle passed along this corridor, with about half of them eventually going to Liberia (Staatz, 1979, pp. 75-76).

A second cattle corridor lies in eastern Ivory Coast. Voltaic animals enter the country, mainly on the hoof, at Doropo and pass south to Bouna and to the major cities of the east (Bondoukou, Abengourou, and Agnibilekrou). Formerly, this was an important trade route for animals going to Ghana; they would exit Ivory Coast at Bondoukou and Agnibilekrou. As the economic situation in Ghana worsened in recent years, the volume of animals passing along this corridor dropped. SEDES (1969, Vol. I, p. 281) estimated that in 1966 7,000 imported animals moved along this corridor annually. By 1976, Ivorian Veterinary Service statistics indicated that only 1,970 cattle entered the country at Doropo (MPA, unpublished).

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 and the largest cattle market in northern Ivory Coast. Here, in addition to sales of imported cattle, 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 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 or to other markets throughout the southwest (e.g. Gagnoa, 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. 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. These shipments from Bouaké to Abidjan are very seasonal, taking place mainly from April through July; and are mainly by truck, although some go by train. Cattle are often trekked to the secondary markets within 200 km of Bouaké, but it is illegal to trek them all the way to Abidjan, and they are rarely trekked south of Toumodi.

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 southeast to Ouangolodougou. At Ouangolodougou, animals also enter Ivory Coast from Upper Volta, both on the hoof and by rail. Malian

animals that arrive at Ouangolodougou generally continue south on the hoof to Ferkéssédougou, where those destined for Abidjan and some of those destined for Bouaké are loaded on the train for the trip south. The rest continue south on the 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.

B. - Types of Cattle Markets in Ivory Coast

There are three types of cattle markets in Ivory Coast: collection markets, redistribution markets, and consumption markets. 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 reorganized. Local butchers buy 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 south. Animals arriving in these markets are slaughtered for local consumption.

These definitions of market types are not mutually exclusive. 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. Indeed, 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. The most important redistribution markets are in the north and west, and include Tingrela, Boundiali, Odiénné, Waninou and Touba. (The latter two 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 most important of all, Abidjan. Typically, the largest consumption centers are supplied almost exclusively with imported cattle and meat. Smaller cities, particularly in the north and central parts of the country, rely more heavily on locally produced cattle.

C. - Market Infrastructure

The infrastructure in most cattle markets in Ivory Coast is extremely simple, consisting mainly of a corral and a vaccination chute. Although the Ivorian government, through CEBV and CEAO programs, has provided cattle scales to several markets since 1976, these scales have remained unused because of the difficulties and risk of injury involved in weighing the cattle. A few markets boast more elaborate infrastructure. Large covered market facilities with holding pens, etc., exist in Abidjan, but they remain unused, as merchants prefer to conduct their business in the open field behind the structure. In addition, five newly-equipped cattle markets along the northern border (at Tienko, Tingrela, Niéllé, Ouangolodougou, and Doropo) were scheduled to open in 1978-79. These markets, financed by USAID as part of a program to create major control posts for imported livestock, are equipped with holding pens, scales, loading ramps, small slaughterhouses, and housing for veterinary personnel.

Slaughter facilities are likewise unelaborate in Ivory Coast. Abidjan has a refrigerated abattoir, built in 1958, but it has not been maintained and is in very poor condition. Most other cities have simple cement slaughter slabs, often without carcass hoists or running water. USAID funded the construction of several new slaughterhouses in intermediate-sized towns in the mid-1970s, but disputes between the Veterinary Service and the contractor about the quality of the workmanship have kept the facilities out of operation (see Staatz, 1979, pp. 64-5).

As noted in Chapter One, there are two types of retail market facilities in Ivory Coast. The Class 1 butchers, who cater to a high-income urban clientele, sell in supermarkets and European-style butcher shops. The bulk of the meat sold in Ivory Coast, however, passes through class 2 markets; butchers in these markets sell in open market stalls, which lack refrigeration equipment. Few cuts of meat are differentiated, the main distinctions being among boneless meat, bone-in meat, and offals. In the major cities, butchers sell meat both by weight and in small unweighed piles called tas. In small towns, meat is sold only by tas.

II. - Agents Involved in Cattle and Meat Marketing

Many different types of market agents are involved in selling cattle and meat in Ivory Coast, including cattle traders, intermediaries, butchers, and apprentices. The marketing system for cattle and meat is largely traditional, with very little government involvement until recently. The trade is also almost entirely in the hands of non-Ivorian Africans, mainly men originally from the cattle-producing countries to the north of Ivory Coast (Mali, Upper Volta, Mauritania, and Guinea). The fact that the cattle and meat marketing system has remained in the hands of foreigners, largely outside of government control, has led the

Ivorian government at times to call for greater participation of both the state and of Ivorian nationals in the marketing system (e.g., see SIGES, 1972; SIGES, 1974). This has led to uncertainty among traditional butchers and livestock traders about their position in Ivory Coast and has made them wary of government interventions in marketing.

A brief description follows of the types of agents involved in cattle and meat marketing and their activities. For more details, see Staatz, 1979.

A. - Cattle Merchants

There are three types of merchants involved in the cattle trade in Ivory Coast: long-distance traders based in the Sahelian countries, long-distance traders based in the southern Ivory Coast, and intermediate and short-distance traders based all along the marketing chain. The long-distance traders based in the Sahel buy cattle mainly in collection and redistribution markets in the Sahel for shipment to consumption markets in the coastal countries. The activities of Ivory Coast-based merchants are similar, although they often buy through agents in the Sahel, rather than purchasing the animals directly themselves. Because of their better contacts in the south, Ivory Coast-based merchants often deal directly with southern buyers, rather than selling through a broker, as do their northern counterparts. Frequently, cattle trading is a family enterprise, with one family member based in the Sahel and one in Ivory Coast.

Intermediate-distance traders usually operate on a smaller scale than do long-distance traders. They usually buy a few animals in redistribution markets for shipment to smaller surrounding markets. They also occasionally buy animals for resale in the same market at a later time, hoping to profit from temporal price variations.

B. - Intermediaries

Intermediaries act as cattle brokers, arranging sales between two merchants or between a merchant and a butcher, but not actually purchasing the animals themselves. The intermediary often acts as the guarantor of the purchaser's credit, as well as guaranteeing to the purchaser that the animal is in good health and is not stolen. In return for his services, the intermediary receives a fixed commission per animal sold (paid by the buyer) and a gift from the seller. Large-scale intermediaries often consign animals to smaller intermediaries or employ sales agents to speed up the sale of the animals. Intermediaries also sometimes purchase animals themselves for resale, which may create a conflict of interest between the intermediaries and the merchants who consign animals to them to sell. (See Staatz, 1979, Chapter 3).

C. - Butchers

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.

As mentioned above, official regulations further distinguish two types of retail butchers: class 1 retailers, which include supermarkets and European-style butcher shops; and class 2 retailers, which include butchers who sell meat in open market stalls. In addition, there are a large number of meat vendors in major cities. These vendors have no market stalls; they walk around markets and neighborhoods, selling small unweighed piles of meat for between 25 and 100 CFAF. Often the vendors are agents of class 2 retailers and receive a commission on the meat they sell.

D. - Apprentices

Most large cattle merchants and butchers are assisted by one or more apprentices. The apprentices do much of the physical labor involved in cattle and meat marketing. For example, butchers' apprentices do the actual dressing out of the animal and retail some of the meat and offals. Apprenticeships usually last for several years, during which time the apprentices learn the basics of their profession and accumulate the capital needed to enter the trade. Virtually all traders and butchers active in Abidjan and Bouaké spent several years as apprentices before going into business for themselves (Staatz, 1979, Chapters 3 and 4).

E. - Efficiency of the Traditional Marketing System

Some authors (e.g. Lacrouts, 1975) and some government officials have suggested that the multiplicity of agents, particularly intermediaries, involved in selling cattle and meat results in an inefficient marketing system. These observers point out that the cattle and meat change hands several times before finally reaching the consumer; they believe that these multiple transactions needlessly bid up prices because at each transaction a profit is made by someone. A detailed study by the author, however, indicated that although gross marketing margins in the cattle and meat trade are large, net margins are modest. (The gross marketing margin equals the difference between the producer price and the retail price. The net margin equals the net return to the merchant's capital, labor, and management.) Although the gross marketing margin accounted for over half the retail price

of beef in Abidjan in 1977, net returns to the capital, labor and management of all merchants and butchers involved in the marketing chain between Upper Volta and Abidjan made up only 17 percent of the retail price. (Table 3.1). Intermediaries' charges, often decried as extremely inflationary, accounted for only about 2 percent of the retail price. The rate of return to capital invested in shipping cattle to Bouaké from Mali and northern Ivory Coast in 1977 was estimated at between 16 and 30 percent annually (Staatz,1979, pp. 377-78). Although profitable, the cattle trade does not appear to be markedly more profitable than many other activities in West Africa, where the rate of return to capital is commonly cited as 20 to 30 percent.

In short, the data indicate that marketing cattle in West Africa involves some very high costs, but that monopoly profits on the part of traders and intermediaries are not major elements of those costs. Much of the rest of the chapter looks at what the major costs are and how they might be reduced.

Table 3.1 indicates that transport costs and tax and license fees account for over half of the gross margin on an animal shipped from Ouagadougou to Abidjan and for about 27 percent of the retail price of beef in Abidjan. Export taxes from Upper Volta (6,700 CFA F per head) and from Mali (4,400 CFA F per head) are the largest single cash costs of shipping cattle from the Sahelian countries to Ivory Coast. Although there has been some talk of lowering trade barriers in the context of regional economic integration (CEBV, CEAO, ECOWAS), it seems unlikely that Mali and Upper Volta will lower their export taxes in the forseeable future unless they are somehow compensated by the importing states. Much more room exists for lowering the gross marketing margin through reduction of transportation costs. This is discussed in the following section.

III. - Cattle and Meat Transport

A. - Cattle Transport

Cattle travel to market in Ivory Coast by truck, trek, rail, or some combination of these methods. Almost all cattle trek at least part of the way to market, although cattle destined for Abidjan eventually board trucks or trains for the final leg of their journey. The railroad is used extensively to ship cattle long distances, especially between Upper Volta and Abidjan.

Within the savannah zone, it is usually more profitable for a merchant to trek his cattle to market than to truck them, even taking into account the faster capital rotation involved in trucking. Trucking within the savannah zone is rarely done. When it is used, it is mainly in response to a temporary shortage of cattle in a consumption market; this leads to large inter-market price differentials. Once cattle reach the forest zone, however, trekking

TABLE 3.1

EVOLUTION OF THE COST OF BEEF AND OFFALS SOLD RETAIL IN ABIDJAN IN 1977[a]

Item	Percent of Final Sale Price
1. Purchase of animal in Ouagadougou	46.8
2. Labor	
Shipping cattle	0.5
Slaughter	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[b]	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

SOURCE: Staatz, 1979, p.429

[a]Based on a 150-kg carcass-weight steer purchased in Ouagadougou and shipped to Abidjan by rail.

[b]Includes an estimated total cost of selling offals (stall rental, labor transport, and wastage) of 2,500 CFA F per animal.

becomes difficult and costly because of dense vegetation and heavy tsetse infestation, and in some forest areas trekking is forbidden. Therefore, trucking of cattle within the forest zone (e.g., between Bouaké and Abidjan) is quite common.

The advantage of trekking over trucking in the savannah is illustrated in Tables 3.2 and 3.3, which outline the costs and returns of trekking and trucking cattle from Tingrela to Bouaké in 1976-77. Table 3.2 indicates that in 1976-77 trucking cattle between Tingrela and Bouaké cost more than twice as much per head as did trekking. Table 3.3 shows that because of the higher cost, under normal price conditions during 1976-77 it did not pay to truck cattle from Tingrela to Bouaké. As a result, only about 4 percent of the cattle arriving in Bouaké during the first half of 1977 came by truck (Staatz, 1979, p.4). By far the largest cost involved in trucking was the rental fee for the truck. This fee reflected the high cost of fuel, maintenance, and the amortization of the truck. It appears that rapid increases in fuel prices since 1973 have led to a reduction in the number of cattle transported by truck in recent years. (Staatz, 1979 pp. 180-1).

Trucking cattle long distances is also more expensive and less profitable than a mixture of trekking and rail transport. This is illustrated in Tables 3.4 and 3.5, which compare the costs and returns of trucking cattle from Koutiala, Mali, to Abidjan in 1977 with those incurred using a combination of trekking and rail transport. Again, trucking was more than twice as expensive per head as the alternative (see Table 3.4), and would have resulted in substantial losses under normal price conditions. The exact level of loss would depend on the weight loss suffered by the animals during trucking. For this route, the average carcass weight loss would probably be 5 to 7 percent. See Staatz, 1979, pp.242-3 for details.

Over very long distances (800-1,200 km), it is more practical to ship cattle by rail than to trek them. Trekking would tie up merchants' capital for a long time, and poor grazing, particularly in the dry season, might lead to excessive weight loss. For these reasons, virtually all cattle shipped from Upper Volta to Abidjan travel by rail. Table 3.6 outlines the costs involved in exporting cattle from Ouagadougou to Abidjan in 1977, while Table 3.7 shows that such exports yielded a net return to traders' capital and management of between 3,700 and 4,600 CFA F per head. The major costs of shipping cattle along this route were the Voltaic export tax (6,700 CFA F per animal); the net weight loss of the animals, estimated at 9 percent of carcass weight (a loss equal to 5,600 CFA F for a 150-kg carcass-weight animal, given 1977 prices); and the rental cost of the train car (4,200 CFA F per animal). It seems unlikely that either the export tax or train car rental rates will fall in the near future, but there is considerable room for lowering transport costs through a reduction in weight loss. The 9 percent weight loss is the equivalent of losing one out of every eleven animals shipped. The heavy weight loss results from the long time (averaging 3.5 days), that the animals spend in transit without food or water between the time they are loaded in Ouagadougou and when they are unloaded in Abidjan. This time is lengthened by frequent

TABLE 3.2

COST OF TRANSPORTING FIFTY HEAD OF CATTLE FROM TINGRELA TO BOUAKE BY TREKKING AND BY TRUCK: 1976-77 (in CFA F)

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 3.2 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		30		1

SOURCE: Staatz, 1979, pp. 206-7.

TABLE 3.3

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 3.2)	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 3.3 - 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

SOURCE: Staatz, 1979, pp. 368-9.

[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. Liveweights converted to carcass weight equivalents by assuming a 49 percent dressing-out rate.

[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 1977.

[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 3.4

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 3.4 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	[illegible],000	—	—
15. Gift to the landlord	0-5,000	0-100	0-5,000	0-100
Total cost (excluding weight losses):	1,149,900 - 1,154,000	22,998 - 23,098	517,266 - 517,266	10,345 - 10,445
Days in transit	3		31	

SOURCE: Staatz, 1979, pp. 234-5.

[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 CFA F per person).

[c]Includes unofficial payments to RAN employees for reserving a train car and other services.

TABLE 3.5

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 3.4)	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 CFAF per kg carcass weight, assuming:		
No carcass weight loss	-	62,400
Margin	-	7,255 to 7,355
Percent return to capital & labor	-	13.6%
3% carcass weight loss	60,528	60,528
Margin	-7,270 to -7,170	5,383 to 5,483
Percent return to capital & labor	-10.8%	10.1%

TABLE 3.5 - Continued

Item	Truck	Trek to Ferkéssédougou Rail from Ferkéssédougou t- Abidjan
Receipts (cont'd)		
5% carcass weight loss	59,280	59,280
Margin	-8,518 to -8,418	4,135 to 4,235
Percent return to capital & labor	-12.7%	7.8%
9% carcass weight loss	56,784	56,784
Margin	-11,014 to -10,914	1,629 to 1,739
Percent return to capital & labor	-16.5%	3.1%
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

SOURCE: Staatz, 1979, pp. 382-3.

[a]Prices in Abidjan as of November 1976 - February 1977.

[b]See note c, Table 3.3

TABLE 3.6

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 H12 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: Staatz, 1979, p. 237.

TABLE 3.7

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 3.6)	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 CFAF per kg carcass weight, assuming:	
9% loss of carcass weight	56,784
Margin	3,651 to 4,551
Return to capital and labor	8.0%
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

[a] Prices as of November, 1976 - February, 1977.

[b] See note c, Table 3.3.

delays at departure (waiting for customs clearance in Ouagadougou) and on arrival (waiting for the cars to be sent from the Abidjan train station to the cattle market).

B. - Meat Transport

In order to avoid the weight and mortality losses involved in transporting live animals, many development projects in West Africa have tried to promote slaughter in the livestock 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. The poor profitability of slaughtering in the north and of shipping chilled beef carcasses south is illustrated in Table 3.8, which shows the costs and returns of shipping beef by truck between Bamako and Abidjan in early 1977. Van de Putte (1977) showed that is cheaper to ship chilled meat by refrigerated truck than by air. Given 1977 prices, it was not profitable to ship entire beef carcasses between Bamako and Abidjan. If only higher-valued rear quarters were shipped, a small profit of 2,500 CFA F per animal could be earned. This was less than that which could be earned shipping live animals over the same route and helps explain why there have been no meat shipments between Bamako and Abidjan in recent years. Furthermore, the profit margin estimated in Table 3.8 makes no allowance for losses due to breakdown of refrigeration equipment en route. In reality, these losses could be substantial.

Three factors are crucial in determining whether it is more profitable to ship live animals or meat from northern livestock-producing areas to coastal consumption centers: the cash costs of shipping live animals and meat, the amount of carcass shrinkage during shipment of live animals and meat, and the prices of edible offals and by- products (hereafter called "the fifth quarter") in the producing and consuming regions (Staatz, 1979, pp. 258-71). These factors work in opposite directions. For example, there is usually much less carcass shrinkage when meat, rather than live animals, is shipped; therefore, this factor improves the relative profitability of meat shipments. On the other hand, the fees for refrigerated transport are much higher than the cost of shipping live animals, and this tends to favor shipment of live animals. The price of fifth quarter is also usually much higher in the south than in the north, and this gives merchants further incentive to ship live animals rather than meat. Without processing, most offals cannot be shipped long distances; therefore, slaughtering in the north means foregoing the higher price paid for the fifth quarter in the south. It is often more profitable to ship live animals than meat south, because the price of the animal in the south includes not only the higher price of meat in the southern consumption centers but also the higher price of offals.

TABLE 3.8

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[d]	-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.

Contrary to what is sometimes asserted, there is no reason to expect that it will become relatively more profitable to export meat than live animals from the Sahelian states to the coastal countries in the next five to ten years. On the one hand, rising meat prices along the coast will increase the value of the weight lost during shipment and hence tend to favor shipment of meat. On the other hand, higher meat prices along the coast will also mean higher prices for offals, which will increase the relative profitability of live animal shipments. Furthermore, refrigerated meat transport is more energy-intensive than shipment of live animals. If petroleum prices continue to increase, this could put meat exports at a disadvantage relative to exports of live animals.

C. - Policy Implications for Cattle and Meat Transport

Three major policy implications follow from the preceding discussion. First, given its low cost, trekking of cattle within the savannah zone should not be discouraged. Forcing merchants to truck their cattle, as some officials have advocated, would force up cattle transport costs, thus forcing up retail meat prices and driving down producer livestock prices. Furthermore, without a great expansion in the number of trucks available, seasonal transport bottlenecks would occur during periods of peak demand for trucks, e.g. during the coffee, cocoa, and cotton harvests (November - February). Cattle merchants are not adverse to trucking animals when it is profitable to do so, as the heavy reliance on trucking within the forest zone testifies. As roads improve and cattle prices increase (thus increasing merchants' capital investment), many merchants are likely to turn to truck transport spontaneously.

A second policy implication relates to rail transport. Research showed that weight loss, forced sales, and mortalities during shipment constitute very major costs of exporting cattle from Upper Volta to Abidjan. These costs are due primarily to the long time the animals spend in the train cars without food or water. A secondary cause of these losses is the poor design of the cars used to ship cattle; these cars are basically boxcars, with very little ventilation. Better scheduling of trains carrying livestock (e.g., creating special express trains for cattle), improving loading facilities in Upper Volta and unloading facilities in Abidjan to reduce delays at departure and on arrival, and providing better ventilated cattle cars, all could substantially reduce transport costs and improve the competitive position of Voltaic cattle in the Abidjan market.

Finally, research showed that in the next five to ten years it will probably remain more profitable to export live animals than meat from the Sahelian countries to the coastal states. Therefore, construction in the Sahelian countries of large abattoirs designed for exporting meat to Ivory Coast probably should not be encouraged. If the chilled meat trade is to develop from those Sahelian slaughterhouses already in existence, more attention should be given to the problem of earning a high profit on the sale of the fifth quarter. If some type of low-cost processing of offals were developed to allow the fifth quarter to be

shipped to the coastal areas where the demand for it is high, the relative profitability of meat exports could be improved. (For a fuller development of this argument, see Staatz, 1979, pp. 258-71.)

IV. - Adaptability of the Marketing System

Some observers, while admitting that the traditional marketing system has been fairly efficient in the past, suggest that it lacks the flexibility to adapt to the challenges of the future. The past performance of the system in adapting to new markets, new modes of transport, and new products, however, suggests that the trade is quite flexible in adapting to new conditions.

A. - New Markets

West African cattle traders have been quick to perceive new markets for their product and to exploit them. The most recent example of this was the shift in trade patterns in 1976 away from Ivory Coast toward Niger and Nigeria in response to the high prices paid in the latter two countries for breeding and slaughter stock. Traditionally, most trade animals from the Niger delta area of Mali and from the northern part of Upper Volta traveled south to be sold in Ivory Coast, Ghana, or Togo. In 1976, however, Niger began offering high prices for cattle as part of its national herd reconstruction program. At the same time, a shortage of slaughter stock developed in Nigeria (in part because of Niger's ban on exports), and Nigerian cattle prices rose sharply. In response to the high prices, the pattern of trade shifted from exclusively north-south to both north-south and west-east, with a large number of Voltaic and Malian animals flowing into Niger, both for the herd reconstruction program and in transit for Nigeria. (For details, see Herman, 1979).

B. - New Modes of Transport

Merchants' adoption of trucking of cattle within the forest zone and rail shipment of cattle over longer distances indicates the willingness of traders to adopt new transport methods when there is a clear financial incentive to do so. Traders are quite sensitive to relative transport costs, with some merchants even shifting between trekking and rail transport depending on the season (and hence, on the relative weight loss suffered in the two means of transportation - see Staatz, 1979, p. 217). The recent shift of traders away from long distance trucking as fuel prices have increased further suggests traders' willingness to adapt to changing transport costs.

C. - New Products

Perhaps the most marked example of the flexibility of the traditional marketing system is the speed with which class 2 butchers adapted to the availability of imported frozen beef. Very soon after frozen meat was introduced in 1975, butchers had developed credit arrangements to handle it wholesale, broken their ties with traditional suppliers, and introduced their customers to the new product. By 1976, frozen beef accounted for about three fourths of all beef sold in Abidjan and was also sold in a number of markets in the interior. (Staatz, 1979, p. 57). Clearly, if the past is any guide, the traditional marketing system has a great deal of flexibility and adaptability.

V. - The Evolution of Cattle and Beef Prices from 1965 to 1978

A. - Cattle Prices

This section examines how cattle prices in Ivory Coast changed between 1965 and 1978. Until 1977, no agency in Ivory Coast routinely recorded prices in major cattle markets; therefore, the analysis is based on data from a number of diverse studies.

1) - The Evolution of Cattle Prices in Major Urban Areas, 1965-78

(a.) - Abidjan. Between 1965/66 and 1978, the price of cattle in Abidjan tripled, with the largest increase occurring between 1975 and 1977 (see Table 3.9). Prices rose by about 4.5 percent per year between the mid-1960s and the early 1970s, for a total increase of 50 percent between 1965 and 1973. In late 1975, in response to the drought-induced shortage of slaughter cattle in Ivory Coast, prices began to rise rapidly. Between 1975 and 1977 prices increased by 50 percent, and by 1978 they were 76 percent above their 1975 levels. The annual rate of increase in cattle prices therefore rose from about 4.5 percent in the late 1960s to 25 percent between 1975 and 1978. While some of the increase in prices was due to an increase in the general rate of inflation, cattle prices during this period were increasing in real as well as in nominal terms. Between 1975 and mid-1978, the consumer price index in Abidjan rose by 63 percent, while cattle prices rose by 76 percent (MEFP, v.I.).

(b.) - Bouaké. Figures from Bouaké, possibly more reliable than the Abidjan data because the Bouaké figures are based on actual purchases of cattle, show that slaughter cattle prices were stable from 1968 through 1974, then increased from 1975 onward (Table 3.10 and Figure 3.2). The stable prices during the early 1970s were probably due partly to heavy supplies of cattle, resulting from the destocking of Sahelian herds because of the drought. Prices rose abruptly beginning in 1975, and by 1978 they were 80 percent above their 1975 levels.

TABLE 3.9

PRICES OF SLAUGHTER CATTLE IN ABIDJAN 1965-78
(Zebu Males with Carcass Weights of Approximately 150 kg)

Year	Price Per Kilogram (CFAF) Liveweight[a]	Carcass Weight	Source of Data
1965-66	80	160	1
1970-71	90-100	180-200	1
1972	110	220	1
1973	120	240	1
1975	140	280	1
1977 (Jan.-June)	219	438	2
1977 (Sept.-Dec.)	210	420	3
1978 (Jan.-May)	214	428	3
1978 (August)	247	493	4

SOURCES: 1. SEDES, Receuil statistique de la production animale (Paris: 1975), p. 457.

2. Staatz, John, The Economics of Cattle and Meat Marketing in Ivory Coast (Ann Arbor: CRED, 1979), p. 356.

3. Ivory Coast, Ministère de la Production Animale, unpublished data.

4. Author's field observations.

[a]Liveweights calculated from carcass weights assuming 50 percent killing-out rate.

TABLE 3.10

PRICES OF ZEBU MALES SOLD FOR SLAUGHTER IN BOUAKE
1968-78

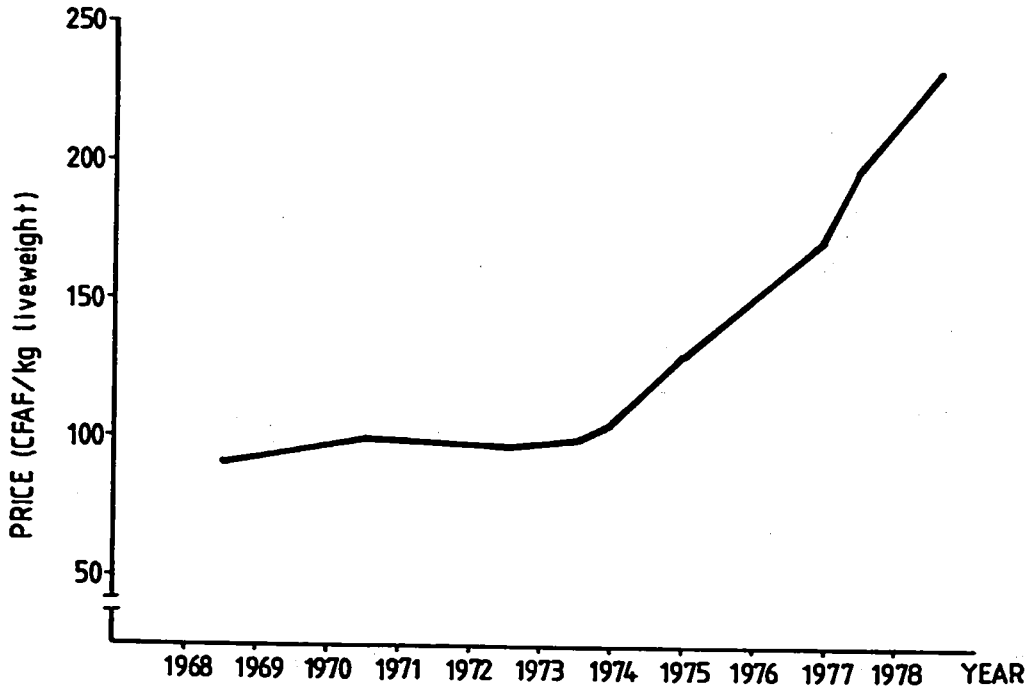
Month/Year	Number	Ages (Years)	Average Liveweight (kg)	Price Per Kilogram (CFAF) Liveweight	Carcass Weight[a]
July, 1968	12	5-9	332	90	180
July, 1970	15	3-5	232	99	198
July, 1972	33	5-10	262	96	192
July, 1973	40	N.A.	316	99	198
November, 1973	20	N.A.	361	103	206
January, 1975	30	7-8	257	130	260
November, 1976	24	7	285	173	243
June, 1977	50	5	254	296	392
August, 1978	10	4-9	362	233	465

SOURCE: Data from 1968-77 from various reports of the Centre de Recherches Zootechniques de Minankro-Bouaké (Ministère de la Recherche Scientifique). 1978 data from author's field data collection.

[a] Carcass weights calculated assuming a 50 percent killing-out rate

N.A.= Not Available

FIGURE 3.2
Prices of Zebu Males in Bouaké: 1968-78



Source: Table 3.10

The figures for Bouaké and Abidjan illustrate the profound effect that the drought an the shift of some of the cattle trade toward Nigeria in 1976 had on cattle prices in Ivor Coast. The figures also show that while the massive imports of inexpensive frozen bee from overseas that began in 1975 may have dampened increases in cattle prices, they by n means stopped them. Because of increasing cattle prices from 1975 through 1978, the pric of fresh beef rose relative to the price of imported frozen beef during this period (se section V-B below).

2) - Cattle Prices in Rural Areas, 1976-78

Reliable data on cattle prices in the cattle producing areas of northern Ivory Coa were first collected in 1976. These data, summarized in Table 3.11, indicate that catt prices in the north increased substantially between 1976 and 1978. Prices of slaughter catt in urban areas of the north increased between 5 and 35 percent, depending on the breed ar the city, and producer prices increased between 5 and 32 percent. The increase in produc prices reflected higher prices paid by private butchers and merchants for cattle; during th period, the price paid to producers by the SODEPRA (para-statal) marketing servic remained unchanged. The figures in Table 3.11 indicate that in northern Ivory Coa producers profited from the increase in urban meat prices that occurred between 1976 ar 1978. The fact that producer prices went up markedly in response to the increase in urba meat prices suggests that the cattle marketing system is fairly competitive. Catt merchants, at least in northern Ivory Coast, apparently did not have enough market power t capture for themselves all of the benefits of the increased cattle and meat prices.

3) - The Geographical Distribution of Cattle Prices in Ivory Coast

Cattle prices in Ivory Coast follow a north-south gradient, reflecting increase transport costs as animals are shipped farther south. Prices also tend to be higher in th west than in other parts of the country because of strong demand in the west for cattle t ship to Liberia.

Table 3.12 presents the price of cattle in various cities in Ivory Coast in May-Jur 1977, while Table 3.13 and Figure 3.3 show the prices in those same cities (plus San Pedr about one year later. In 1977, prices in Man and Daloa were below prices in Abidjan, but b 1978 they were above Abidjan levels. It is not clear whether this was a temporar phenomenon or whether prices in the smaller urban areas, which are not well supplied wi imported frozen beef, are now rising more rapidly than prices in Abidjan and Bouaké. either case, the figures show that with the possible exception of Ferkéssédougou, the rap increase in beef prices in recent years has affected the entire country, not just Abidjan ar

TABLE 3.11

EVOLUTION OF CATTLE PRICES IN NORTHERN IVORY COAST 1976-78

I. CATTLE SLAUGHTERED IN MAJOR TOWNS

Town	July 1976 - March 1977				July 1977 - March 1978				Percentage Increase 1976/77 - 1977/78
	No.	Ave. Age (yrs.)	Ave. Carcass Weight	Ave. Price CFA F/kg Carcass	No.	Ave. Age (yrs.)	Ave. Carcass Weight	Ave. Price CFA F/kg Carcass	
Boundiali (zebus)									
Males	242	4.0	108	269	214	4.3	98	317	18
Females	290	5.9	102	263	239	5.7	101	309	17
Bouna (Baoulés)									
Males	243	5.4	80	296	375	5.7	80	320	8
Females	159	6.4	82	289	222	7.4	73	310	7
Odiénné (N'damas)									
Males	504	6.6	110	232	574	6.6	113	313	35
Females	595	6.8	101	292	586	7.2	106	307	5

TABLE 3.11 (Continued)

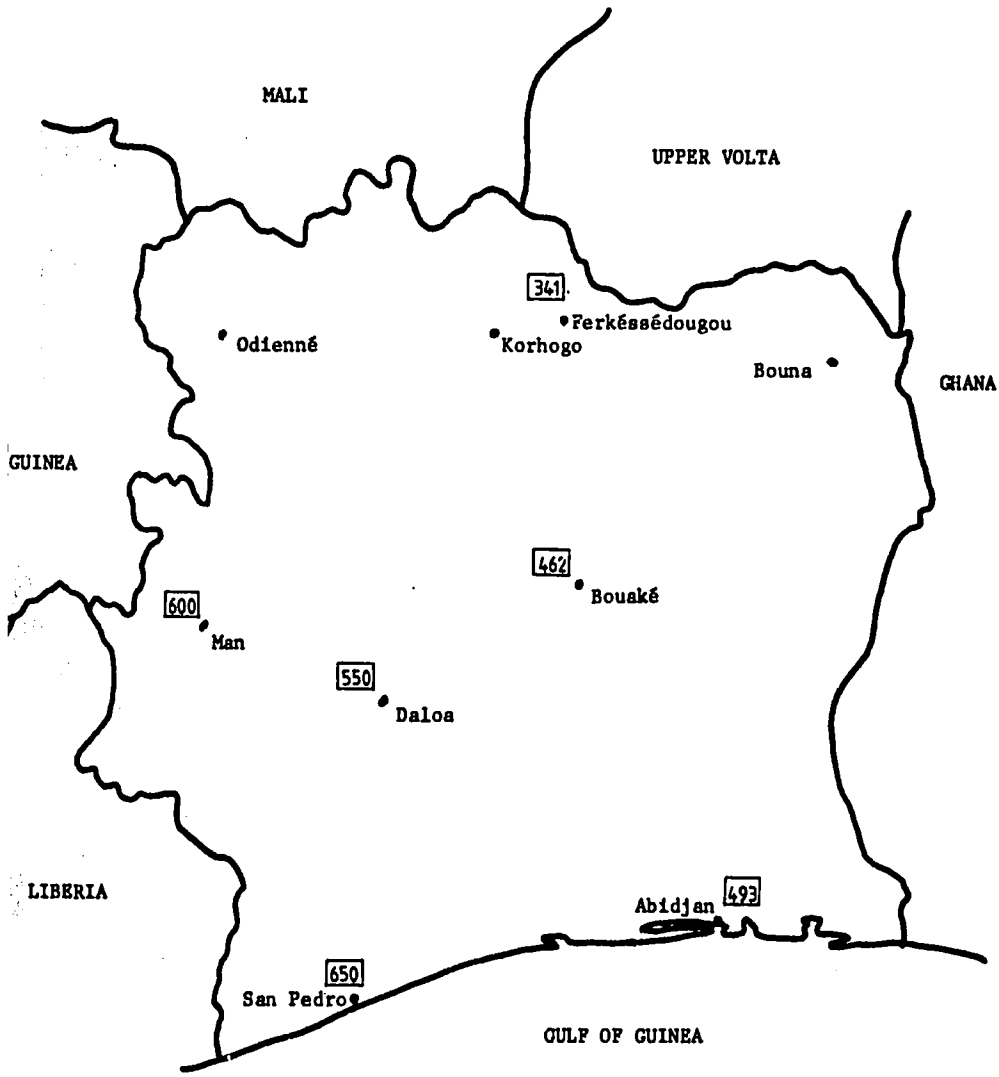
II. PRICES RECEIVED BY CATTLE PRODUCERS COVERED BY SODEPRA EXTENSION PROGRAMS[a]

SODEPRA Zone	July 1976 - March 1977			July 1977 - March 1978			Percentage Increase 1976/77 - 1977/78
	No.	Ave. Age (yrs.)	Ave. Price CFA F/Animal	No.	Ave. Age (yrs.)	Ave. Price CFA F/Animal	
Touba							
Males	135	4.0	26,570	161	3.4	30,881	16
Females	107	5.7	26,544	135	5.5	28,403	7
Odiénné							
Males	129	3.6	21,766	159	3.9	26,042	20
Females	198	6.4	21,168	230	6.9	24,630	16
Boundiali-Ferkéssédougou							
Males	345	3.7	23,544	422	3.5	27,666	18
Females	376	5.6	20,890	347	7.2	21,963	5
Korhogo							
Males	408	3.4	21,280	467	3.6	24,249	14
Females	431	6.4	19,770	401	7.6	21,753	10
Bouna							
Males	208	3.8	18,414	378	3.6	24,249	32
Females	68	6.1	18,750	189	5.7	21,773	16

SOURCE: SODEPRA, Cellule d'Evaluation, unpublished data

[a]No weights were recorded of cattle sold in the villages.

FIGURE 3.3
Cattle Prices in Ivory Coast: June-August, 1978
(CFAF per kg carcass weight)



Bouaké. In fact, the data suggest that price increases have been most rapid in some of the smaller cities, where the marketing system may not be as well developed as in Abidjan and Bouaké.

TABLE 3.12

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, Projet d'Embouche Bovine, unpublished data. Prices in Daloa and Man from the author's observations. Prices in Abidjan and Bouaké are averages of prices in May and June, 1977, taken from Staatz, 1979, pp. 333, 356.

[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)

TABLE 3.13

CATTLE PRICES IN IVORY COAST JULY-AUGUST, 1978
(CFA F/kg carcass weight)

City	Breeds	Price per kg Carcass Weight	Source of Information
Ferkéssédougou	Taurins	341[a]	1
Abidjan	Zebus	493	2
Bouaké	Zebus	462	2
Daloa	Zebus & Taurins	550	3
Man	Zebus & Taurins	600	3
San Pedro	Zebus & Taurins	650	3

SOURCES: (1) SODEPRA, Projet d'Embouche Bovine, unpublished data; (2) Author's field investigations; (3) Price survey by Dr. Pierre Aloui, Ministère de la Production Animale.

[a]Carcass weight calculated assuming a 50 percent killing-out rate.

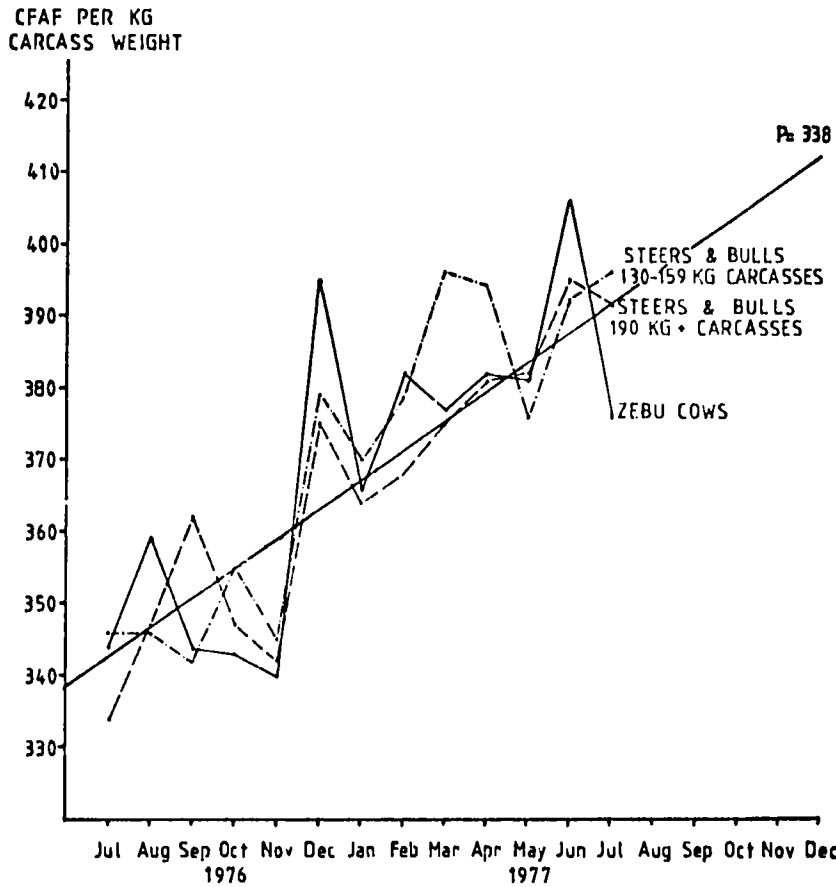
4) - Seasonality of Cattle Prices

The only data currently available on seasonal variations in cattle prices in major consumption markets in Ivory Coast are those reported for Bouaké in Staatz 1979. These data refer to the period July 1976 -July 1977, a year that most market participants reported was fairly typical in terms of seasonal price variations.

Figure 3.4 graphs monthly slaughter cattle prices in Bouaké over this period. Two distinct periods are apparent in the graph. The first, from July through November 1976 was the period during and just after the rainy season. During this time, prices showed no consistent upward trend, although prices were higher in September than in the rest of the period. Adequate grazing was available in most of the cattle-producing areas, and as a result, supplies of well-fed slaughter cattle were ample. Beginning in late November, however, the effects of the dry season began to be felt, and prices rose. Pastures dried up, cattle lost weight, and prices continued to rise until June, when the rains began again. The price increase reflected the costs, including weight losses, of storing meat on the hoof during the dry season.

In addition to the general seasonal pattern of price variation just described, there were important month-to-month fluctuations in prices, attributable mainly to demand factors. The two most important of these were the increases in prices in September and December. The increase in September was due to a surge in demand stemming from the return of students to the city for the start of the new school year and the celebration of the Moslem

FIGURE 3.4 Cattle Prices in Bouaké, 1976-77
(Zebus)



holy month of Ramadan. The large increase in prices in December, which butchers and traders report happens annually, was the result of increased demand for meat for the Christmas and New Year holidays. It was also due to a large increase in the demand for beef in rural areas. At this time, farmers were being paid for their coffee and cocoa harvests, and their cash incomes were at a yearly apogee. During this time . large number of merchants bought cattle in Bouaké and Abidjan for resale in the rural areas.

In summary, the seasonal price fluctuations do not appear to be random; they seem to be closely tied to seasonal changes in the supply of and demand for cattle.

B. - Retail Beef Prices

1) - The Evolution of Retail Beef Prices, 1967-78

This section looks at how retail beef prices in Abidjan changed between 1967 and 1978. The analysis is based on data collected by the Statistics Division of the Ministry of Economics, Finance and Planning on retail prices of bone-in beef sold on the class 2 market in Abidjan (MEFP, v.i.). These figures tend to understate the true level of retail prices.[1] Nonetheless, they do give a reasonable idea of how retail prices have changed since 1967. Figure 3.5 graphs these prices and shows that retail beef prices in Abidjan generally followed the pattern of cattle prices between 1967 and 1978. (Appendix F presents the retail prices in tabular form.) Retail prices were fairly stable from 1967 through 1974, then rose dramatically from 1975 onward. Between the second quarter of 1975 and the third quarter of 1978, recorded retail beef prices in Abidjan rose by 72 percent, roughly the same rate of increase as cattle prices (76 percent). Overall, retail beef prices more than tripled between 1967 and 1978. As will be shown in Chapter Five, the increase in beef prices was paralleled by an increase in the price of fish, the main substitute for beef in the Ivorian diet.

The figures on retail beef prices show, as did the figures on cattle prices, that the large imports of non-West African beef beginning in 1975 did not prevent Ivorian meat prices from increasing rapidly between 1975 and 1978. The rapid price increases beginning in 1975 demonstrated to Ivorian government officials how vulnerable the country was to changes in supply conditions outside of its own borders. This realization increased the sense of urgency with which the Ivorian government began promoting programs, described in subsequent chapters, to increase domestic production of animal protein.

2) - Retail Prices for Different Grades of Beef

Class 1 retailers distinguish a wide variety of cuts, while class 2 butchers offer a more limited range of products. This section looks at retail prices of different cuts of beef in class 1 and class 2 establishments during 1977 and 1978.

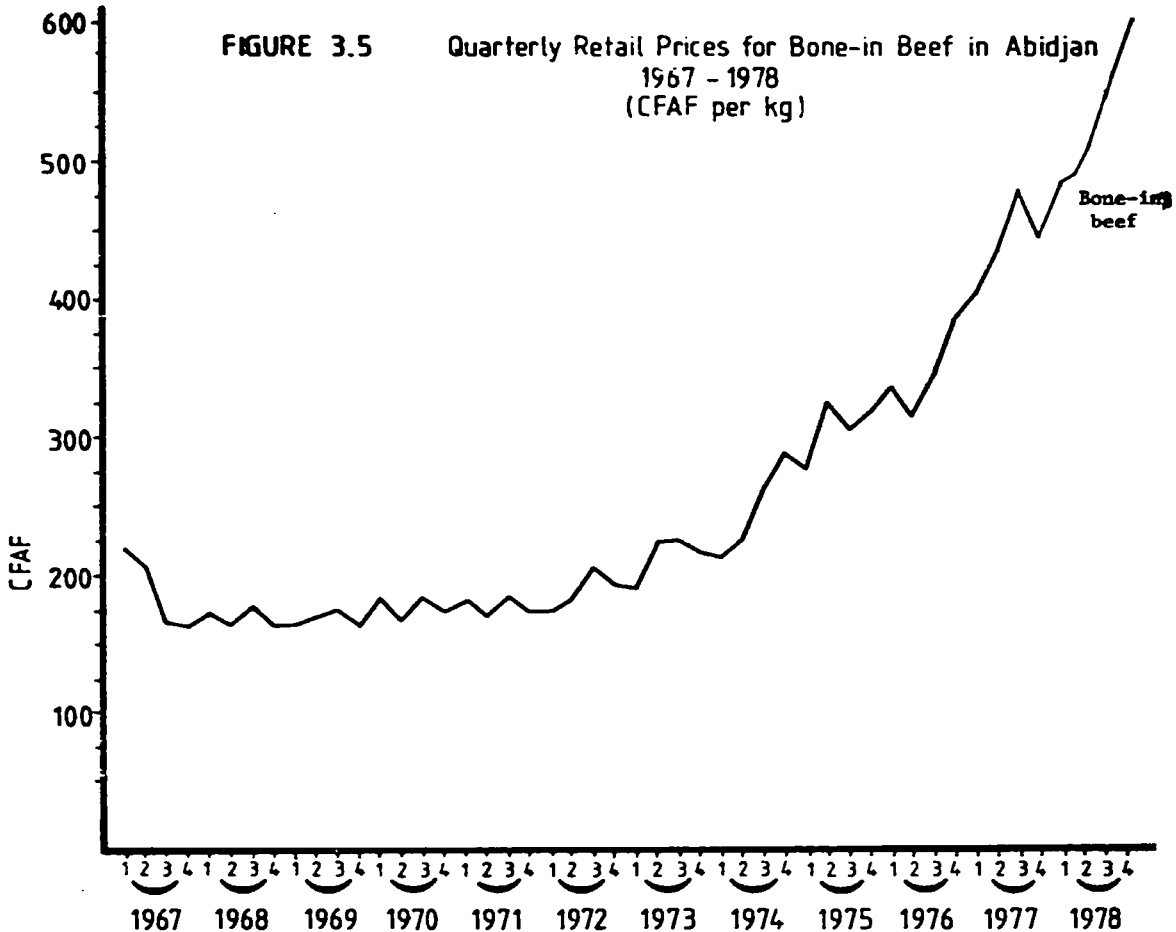


FIGURE 3.5 Quarterly Retail Prices for Bone-in Beef in Abidjan 1967 - 1978 (CFAF per kg)

(a.) - Class 1 Retailers. Until 1978 a complex set of price regulations governed the prices that class 1 retailers could legally charge for beef. The Ivorian government set legal maximum prices for cuts of different quality beef. In addition to the official prices, between 1975 and 1978 there existed a set of "tolerated" prices for locally slaughtered beef that were higher than the official prices. Beginning in 1975, the government also allowed class 1 retailers to tie the retail price of imported chilled beef to its wholesale price. A set of indexes was established to calculate the maximum allowable retail price of different cuts of imported beef based on the wholesale price of the carcass. For example, if a class 1 retailer purchased a rear quarter of Argentine chilled beef for 700 CFA F per kg, he was permitted to sell the filet for 3.6 x 700 = 2,520 CFA F per kg; steaks could be sold for 3.2 x 700 = 2,240 CFA F per kg; and so forth. The indexes were designed to allow the butcher a 33 percent profit margin. In 1978, this indexing system was extended to cover locally slaughtered as well as imported beef.

Table 3.14 presents the official and tolerated prices for beef in class 1 establishments that were in force through 1977, along with the indexes currently used to calculate retail prices. In 1977, most retailers were selling locally slaughtered beef at the "tolerated" prices. In 1978, these retailers were allowed to tie the retail price of locally slaughtered beef to its wholesale price and retail prices rose, as indicated by the figures in Table 3.15, which show prevailing prices in class 1 establishments in Abidjan during July and August 1978. The extension of the indexing system to cover locally slaughtered beef increased the incentive for class 1 butchers to sell this beef. Under the old system, where the price of locally slaughtered beef was fixed but the price of imported beef was indexed, butchers could earn more selling imported beef than selling local beef.

Imported beef still accounts for the bulk of the beef sold in class 1 establishments. It accounted for over 60 percent of the total in 1977 (see Staatz, 1979, p. 167). There seems to be some increase in the proportion of locally slaughtered meat moving into the class 1 market, however, mainly from animals fattened in feedlots in Upper Volta and Ivory Coast. It should be noted that the total size of the class 1 market for beef is relatively small, roughly 2,000 tons per year; so the scope for import substitution is modest.

(b.) - Class 2 Retailers. Most of the beef sold in the class 2 market is classified as bone-in beef, boneless beef, or a mixture of meat, bones, and offals sold in small unweighed piles called tas. (The relative amount of offals and skeletal meat varies in different sized tas, providing the consumer with a range of quality and price combinations.) A further distinction is made between locally slaughtered and imported frozen beef. Consumers prefer locally slaughtered beef, and it sells at a higher price than imported frozen beef.

TABLE 3.14

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 (Extended to Cover Locally Slaughtered Beef in 1978)
	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
Meats 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.

TABLE 3.15

RETAIL PRICES IN CLASS 1 BUTCHER SHOPS IN ABIDJAN JULY-AUGUST, 1978

Cut of Beef	Price per kg (CFA F) Locally Slaughtered	Imported (from Botswana)
Filet	1,900	N.A.
Meat for Grilling	1,460	2,380
Roasts, biftek	1,150	1,980
Meat for Braising	680	1,280
Stew Meat	450-500	500

SOURCE: Author's field observations.
NOTE: N.A. = not available.

In theory, the government sets control prices for beef sold in the class 2 market. The administrative procedure for revising these prices in light of new conditions is quite complicated, however, and in most urban areas the official prices are completely outdated. In most cities, butchers would lose money if forced to sell at the control prices (see Staatz, 1979, p. 421); so they generally ignore these prices. The main effect of the control prices in major urban areas seems to be in slowing the speed with which butchers pass on their higher costs to consumers. Although price control officials usually turn a blind eye to butchers who sell above the control price, officials may take action if prices rise too rapidly. Therefore, in periods of rapidly increasing cattle prices, butchers may sustain losses rather than immediately pass on the full increase in their costs to consumers. This behavior partly explains the tenuous financial position of many butchers in Abidjan.

In some smaller urban areas, particularly in the north, officials sometimes do try to enforce the price controls on beef. This has the effect of inducing cattle merchants to ship their cattle away from these areas towards the larger cities of the south, where meat prices are freer and hence cattle prices are more attractive. The net effect is to reduce the beef supply in the northern cities.

Table 3.16 shows the price of different types of beef sold in class 2 markets in Abidjan and Bouaké during 1977 and 1978. In both cities, the cheapest type of beef available was sold in tas. This mixture cost between 50 and 60 percent as much as fresh bone-in beef,

formerly the most widely purchased type of beef. The tas were of much lower quality than the bone-in beef, however, containing a large proportion of fat and offals.[2] The tas were followed in price by bone-in and boneless frozen beef, which account for much of the beef sold in Abidjan, then by bone-in and boneless fresh beef.

Table 3.16 indicates that between 1977 and 1978 the price of frozen beef relative to fresh beef fell by about 15 percent. This resulted from stable prices for imported frozen beef and increasing prices for slaughter cattle. Because of the strong consumer preference for fresh beef, however, butchers reported few problems selling their supplies of fresh beef. Nonetheless, the large imports of frozen beef undoubtedly kept fresh beef prices from rising as much as they would have in the absence of imports. Furthermore, one cannot expect fresh beef to maintain a share of the market indefinitely if its price continues to increase relative to that of frozen beef. Although Ivorian consumers are willing to pay more for fresh beef than for frozen beef, there is a limit to how much more they will pay. The Sahelian states must remain fairly price competitive with the exporters of frozen beef if they are to retain a sizeable share of the Ivorian market. The price of imported frozen beef will likely increase through 1985, but as figures in the following section reveal, prices would nearly have to double before frozen beef would be priced out of the class 2 market.

C. - Wholesale Costs: Fresh Versus Frozen Beef

The deep inroads made by imported frozen beef into the Ivorian market since 1975 have been due mainly to the low cost of this meat. As explained in Chapter Two, changes in the world beef market beginning in 1973 resulted in large supplies of inexpensive frozen beef becoming available to Ivory Coast just when supplies of slaughter cattle from the Sahel were falling rapidly as a result of the drought. This section examines the wholesale costs of imported beef sold in both the class 1 and the class 2 markets and compares these costs with the costs of locally slaughtered beef.

1) - The Class 2 Market

Most of the increase in beef imports between 1974 and 1978 represented frozen beef destined for the class 2 market. This beef arrived in Abidjan at extremely low prices, ranging between U.S. $500 per ton and $1,200 per ton in 1978, depending on quality (DISTRIPAC, unpublished). Prices for frozen front quarters of beef stood at $600 per ton (CIF Abidjan) throughout most of 1976, and although prices rose in early 1977, they fell again in mid-1977 and in 1978 (see Table 3.17). Furthermore, the decline in the value of the dollar (the currency in which beef prices are quoted) relative to the franc made beef imports even cheaper to Ivory Coast.

TABLE 3.16

RETAIL PRICES OF DIFFERENT TYPES OF BEEF SOLD IN CLASS 2 MARKETS IN ABIDJAN AND BOUAKE, 1977-78

Type of Beef	June, 1977		July, 1978	
	Price per kg	Price as a % of price of fresh bone-in beef	Price per kg	Price as a % of price of fresh bone-in beef
I. ABIDJAN				
Fresh beef, bone-in	500	100	600	100
Fresh boneless beef	600	120	650	108
Frozen beef, bone-in	400	80	400	67
Frozen boneless beef	500	100	500	83
Fresh beef and offals, sold in tas[a]	257	51	Data not available	
II. BOUAKE				
Fresh beef, bone-in	400	100	500	100
Fresh boneless beef	450	113	550	110
Frozen beef, bone-in	350	88	375	75
Frozen boneless beef	400	100	425	85
Fresh beef and offals, sold in tas[a]	236	59	303	61

SOURCE: Staatz, 1979, p. 434 and author's field observations.

[a]Price per kg of mixture of beef and offals sold in 50 CFAF tas.

TABLE 3.17

PRICES (CIF ABIDJAN) OF FROZEN FRONT QUARTERS OF BEEF (2 ème Choix) IMPORTED FROM ARGENTINA

Month/Year	Price (US $ per ton)	Price (CFA F per kg)[a]
Most of 1976	600	144
December, 1976	750	188
January-February, 1977	1,100	275
March, 1977	1,260	315
April, 1977	870	217
August, 1978	500-600	110-132

SOURCE: Ivory Coast, Ministère de la Production Animale, unpublished data; DISTRIPAC, unpublished data.

[a]Exchange rates used: 1976: $1 = 240 CFA F
1977: $1 = 250 CFA F
1978: $1 = 220 CFA F

The two major Ivorian importing agencies, AGRIPAC and DISTRIPAC (which were merged into a single entity in 1979) typically imported not just front quarters, as indicated in Table 3.17, but a mixture of front and rear quarters. Table 3.18 provides a detailed breakdown of the costs involved in importing such a mixture from Argentina in mid-1978. (Costs were similar for beef imported from other Latin American countries.) The total cost of the beef, delivered and stored in Abidjan, was $1,018 to $1,045 per ton. The FOB price ($730 per ton) accounted for about 70 percent of the total cost, transport and insurance accounted for 13 percent, and other charges made up the remaining 17 percent. The total delivered cost of the meat was the equivalent of between 225 and 231 CFA F per kg. DISTRIPAC resold this meat to wholesale butchers for 280 CFA F per kg. This same beef was eventually sold on the retail market in Abidjan for about 400 CFA F per kg (bone-in).

In contrast, the wholesale price of fresh beef in Abidjan during this period was about 400 CFA F per kg for front quarters and 450 CFA F per kg for rear quarters. (The wholesale price of beef was below the net price per kg carcass weight shown in Table 3.9 because butchers also earned 12,000 to 15,000 CFA F from the sale of the offals and by-products, or the equivalent of an "extra" 80 to 100 CFA F per kg for a typical animal.) Therefore, a mixture of locally slaughtered beef containing the same mix of front and rear quarters as that shown in Table 3.18 would cost 417 CFA F per kg ($1,895 per ton) or 81 percent more than the imported frozen beef. On the retail level, fresh beef sold for 50 percent more than

frozen beef in mid-1978. (See Table 3.16.) Butchers apparently did not pass on the entire cost difference between fresh and frozen beef to their customers, perhaps preferring to take a lower profit on fresh beef sales in order to maintain their sales volume. That retail prices for fresh beef could be maintained 50 percent above frozen beef prices testifies to the strong preference consumers have for fresh beef.

TABLE 3.18

COST OF IMPORTING FROZEN BEEF TO IVORY COAST FROM ARGENTINA, AUGUST 1978[a]

Item	Cost (US $ per ton)	Cost (CFA F per kg)[b]
Price of Meat FOB Argentina	730.00	161
Transport-Argentina-Abidjan (by sea)	130.00	29
Insurance (0.75% of cost-freight value)	6.45	1
Financial charges, including interest (5% of cost-freight value)	43.00	10
Transit Charges (unloading, port taxes, etc.)	32.00	7
Sanitary Inspection tax and fees	50.00	11
Cold Storage-Port of Abidjan (Cost per month)	27.00-55.00	6-12
Total cost, Delivered and stored in Abidjan	1,018-1,045	225-231

SOURCE: DISTRIPAC, unpublished data.

[a]Based on a mixture of quartiers compensés (2/3 front quarters, 1/3 rear quarters)

[b]Exchange rate: $ 1 = 220 CFA F.

The figures in Table 3.18 suggest that the FOB price of Latin American beef could increase substantially without eliminating the price advantage this beef has in the Ivorian market. It is therefore likely that Ivory Coast will continue to import frozen beef from Latin America through 1985. Although a market will remain for Sahelian cattle in Ivory Coast, it is not a market that can be taken totally for granted. Sahelian exporters must be very cost-conscious if the market share of the Sahelian states is not to decline further.

2) - The Class 1 Market

Since 1975, chilled meat imported from Latin America and southern Africa has largely displaced beef imports from the Sahelian states in the class 1 market. Again, cost has been a major factor, but quality considerations have also been important.

Table 3.19 outlines the costs involved in importing chilled beef by air from Botswana and Argentina in August 1978. (Costs were similar for beef from other southern African and Latin American exporters.) The total cost of this beef, delivered and stored in Abidjan, was 600 to 650 CFA F per kg, 60 to 65 percent of which was attributable to the FOB price. This beef was resold to class 1 retailers in Abidjan for between 725 and 750 CFA F per kg. In contrast, rear quarters of cattle fattened in SODEPRA's feedlot in Ferkéssédougou sold wholesale in Abidjan at this time for between 525 and 550 CFA F per kg. Many of the class 1 butchers contacted by the author indicated that the price difference between the imported beef and the domestically produced beef was not large enough to induce them to sell the domestic beef because they considered the imported beef to be of much higher quality.

TABLE 3.19

COST OF REAR QUARTERS OF BEEF, IMPORTED TO ABIDJAN BY AIR, AUGUST 1978 (CFAF per kg)

Item	Beef from Botswana	Beef from Argentina
Price, FOB	398	402
Insurance	6	6
Freight Charges	163	207
Other Charges (Transit, taxes, etc.)	35-40	35-40
Total Cost, Delivered and Stored in Abidjan	602-607	650-655

SOURCE: AGRIPAC, Unpublished data.

Therefore, although the inexpensive beef imported by sea for the class 2 market is considered by most butchers and consumers to be of lower quality than locally slaughtered beef, the chilled beef imported by air for the class 1 market is considered a superior product. This implies that unless prices change dramatically, it may be difficult for Sahelian exporters to displace overseas exporters from the class 1 market.

VI. - Conclusions

This chapter has attempted to show that the current, traditionally organized cattle and beef marketing system in Ivory Coast is rather efficient given the institutional and infrastructural framework within which it operates. Marketing of cattle between the Sahelian states and Ivory Coast is costly, but the costs are attributable mainly to high transportation costs and export taxes, not monopoly profits of traders and butchers. This implies that if decreasing marketing costs is a major objective, attention should first focus on transportation and tax problems, not massive reorganization of the trade to break up alleged cartels. It must be remembered, however, that the Ivorian government has objectives in addition to that of minimizing marketing costs. Among these are assuring stability of the meat supply and increasing the participation of Ivorian nationals in sectors of the economy that are dominated by foreigners. These objectives explain some of the policies, described in subsequent chapters, followed by the Ivorian government.

The analysis showed that within the savannah zone, trekking cattle is usually more economical than trucking cattle, even taking into account the faster capital rotation involved in trucking. This situation is likely to be maintained in the next five to ten years, as petroleum prices continue to rise. Within the forest zone, however, trucking is widely used, as trekking is quite costly. Rail transportation is used extensively to ship cattle long distances, especially between Upper Volta and Abidjan. Considerable room exists for reducing rail transport costs for cattle and hence improving the competitive position of Voltaic cattle in the Ivorian market. Most of these efforts should focus on reducing mortalities and weight losses en route through reducing the length of time cattle spend in transit (currently in excess of three days) and on improving the design of the rail cars used to ship cattle.

This chapter also showed that under 1977 prices it was much more profitable to export cattle from the Sahelian states to Ivory Coast than to export chilled carcasses. Furthermore, without a marked reduction in the cost of refrigerated meat transport relative to cattle transport, it seems unlikely that the chilled meat trade between the Sahelian states and Ivory Coast will expand much in the next five to ten years. If donors and the Sahelian countries do decide to try to promote this trade, they should pay particular attention to by-product processing, as the profit made on the fifth quarter is a crucial determinant of the relative profitability of meat versus live animal exports.

The chapter showed that in the past, the marketing system for beef has adapted rapidly to opportunities offered by new markets, new modes of transport and new products. This suggests that given appropriate government assistance, the system may be able to adapt to future challenges.

The data presented in Part V of this chapter demonstrated the profound effect that changes in the supply-demand situation for beef since 1975 have had on cattle and retail beef prices in Ivory Coast. Between 1975 and 1978, cattle prices went up by 75 to 80 percent, and retail prices of fresh beef followed suit. As a result, the price of fresh beef rose relative to that of imported frozen beef during this period. Data from the northern Ivory Coast indicate that increased urban meat prices were passed back to cattle producers in the form of higher prices for their animals. This suggests that the marketing system for cattle is fairly competitive. Although the price of imported frozen beef is likely to rise in the next five years, the FOB price of this beef could nearly double before frozen beef would lose its price advantage over fresh beef in the Ivorian market. Although Ivorian consumers strongly prefer fresh beef, substitution of frozen beef for fresh beef has been common, especially in Abidjan. This means that Sahelian exporters must become very cost-conscious if they are to remain competitive in the Ivorian market. In addition to competition from overseas, Sahelian exporters will also increasingly face competition from domestic Ivorian livestock production, as Ivory Coast attempts to reduce its vulnerability to external supply disruptions by increasing domestic production.

CHAPTER FOUR

THE MARKET FOR SMALL RUMINANTS

This chapter examines the evolution of the market for small ruminants (goats and sheep) in Ivory Coast from 1967 to 1978. The first part of the chapter discusses domestic production while parts II and III look at imports of live animals and imports of chilled and frozen mutton. Part IV presents figures on how the supply of small ruminant meat in Ivory Coast has changed since 1967. The final part of the chapter discusses the structure of the market for sheep and goats and looks at how wholesale and retail prices for sheep and goat meat changed between 1967 and 1978.

Small ruminant meat plays a much smaller role in the Ivorian diet than does beef. Annual per capita consumption of goat and sheep meat stood at 1.3 kg in 1978, compared with over 6 kg of beef. Domestic production of small ruminants has stagnated in recent years, and imports have fallen, resulting in declining per capita consumption. As a result, both the absolute and relative prices of mutton (compared with beef) have risen markedly since 1972. Mutton remains a highly desired meat, however, especially for ceremonial occasions.

I. - Domestic Production of Small Ruminants

Domestic production accounts for approximately 37 percent of the small ruminant meat consumed in Ivory Coast and 4 percent of all red meat produced in the country. Unlike cattle, which are concentrated in the north, sheep and goats are found throughout Ivory Coast, with the largest concentration in the central region.

A. - Breeds

1) - Sheep

Almost all sheep in Ivory Coast are Djalonké, a breed found throughout the humid regions of West Africa. Djalonké are small animals, averaging 40 to 60 cm tall at the shoulder. Liveweights vary between 20 and 30 kg for females and 25 and 35 kg. for males. The average size of Djalonké sheep is larger in northern Ivory Coast than in the south (Rombaut and Van Vlaenderen, 1976, pp. 159-160).

Djalonké are raised exclusively for meat. The dressing-out rate (the carcass weight divided by the liveweight) varies between 40 and 45 percent in traditional production systems, although it may reach 50 percent if the animal is fattened. The animals are

prolific, with the fecundity rate estimated at 206 percent in village conditions. Approximately 27 percent of births are twins (Rombaut and Van Vlaenderen, 1976, pp. 160, 164-5).

2) - Goats

Goats raised in Ivory Coast are of the Guinean breed, a dwarf variety found throughout the southern parts of central West Africa. The animals are small, measuring 40 to 50 cm at the shoulder and having liveweights between 15 and 20 kg. Like the Djalonké, Guinean goats are generally larger in northern Ivory Coast than in the south.

Guinean goats are hardy and prolific. They are resistant to trypanosomiasis and other diseases endemic in Ivory Coast and therefore can be raised throughout the country. They are more prolific than Djalonké, with twinning the rule. Like the Djalonké, they are raised almost exclusively for their meat.

B. - System of Production

1) - Geographic Distribution of Small Ruminants in Ivory Coast

Data on the number of small ruminants in Ivory Coast are much less reliable than data on the cattle population. Estimates of the small ruminant population range from approximately 1.3 million (the estimate of the 1975 agricultural census) to 1.8 million (the estimate of the Ministry of Economics, Finance, and Planning). The geographic distribution of the small ruminant population in 1975, as established by the agricultural census, is shown in Table 4.1.

Table 4.1 shows that Ivory Coast's sheep and goat population is more evenly distributed than the cattle population. The north, which contains about 85 percent of the cattle, accounts for only about a quarter of the small ruminants. The central region, on the other hand, includes about 40 percent of the country's small ruminants, and the west accounts for 18 percent. The remaining 17 percent are held in the southeast and southwest.

It is difficult to judge the accuracy of the figures in Table 4.1 because there are few other detailed population estimates against which to compare them. In five departments in the central region, where another census of small ruminants was conducted in 1977, the results showed 15 percent fewer small ruminants than were found in agricultural census. Differences in the estimates by department varied by as much as 220 percent (MPA, 1977a). On the other hand, in the department of Bouna in the northeast, the Veterinary Service estimated that in 1979 these were over twice as many goats and sheep as were found in the agricultural census (MA, 1978, Annex Vol. 3, p. 7). Therefore, the population figures in Table 4.1 should be interpreted with caution.

TABLE 4.1

ESTIMATED SMALL RUMINANT POPULATION
IN IVORY COAST (HEAD), 1975

Region	Sheep		Goats		Total	
	Number	Percent	Number	Percent	Number	Percent
North[a]	175,600	24,3	144,500	25.5	320,100	24.8
Center[b]	271,200	37.5	234,100	41.4	505,300	39.2
Southeast[c]	78,900	10.9	31,000	5.5	109,900	8.5
Southwest[d]	63,800	8.8	53,200	9.4	117,000	9.1
West[e]	133,100	18.4	103,200	18.2	236,300	18.3
TOTAL	722,600	100.0	566,000	100.0	1,288,600	100.0

SOURCE: The data are from the 1975 National Agricultural Census carried out by the Ivorian Ministry of Agriculture. They were provided to the author by the Ivorian Ministry of Animal Production.

[a]Départements of Korhogo, Ferkéssédougou, Boundiali, Odiénné, Touba, Biankouma, Séguéla, and Bouna.

[b]Départements of Bouaké, Bouaflé, Dimbokro, Katiola, Dabakala, and Bondoukou.

[c]Départements of Abidjan, Agboville, Adzopé, Abengourou, and Aboisso.

[d]Départements of Gagnoa, Divo, and Sassandra.

[e]Départements of Daloa, Man, Danané, and Guiglo.

2) - Management Practices

Virtually all sheep and goats in Ivory Coast are raised in villages under a very low level of herd management. Typically, the animals are left to fend for themselves during the dry season, although they are sometimes given household scraps (e.g., yam peelings) as a supplement to their diet. During the rainy season, however, the animals are closely watched to prevent them from damaging crops. Sheep are usually kept in a corral at night and are taken to pasture during the day. Goats, on the other hand, are staked individually to the area they are to graze. Villagers report that goats are not gregarious and cannot be herded together.

The average size of small ruminant herds is small, on the order of eight to twelve head per owner (MA, 1978, Annex Vol. 3, p. 25; Chataigner and N'daw, 1978, p. 8). Unlike cattle, which are often entrusted to Fulani herders, goats and sheep are usually watched by the owner or his family. The animals receive very little veterinary care, and no effort is made at selective breeding. The result is very high mortality among young stock; 60 percent of the sheep are estimated to die before one year of age (Rombaut, personal communication).

Officials of the Ivorian Ministry of Animal Production consider the high mortality among small ruminants, especially sheep, as the largest obstacle to increased small ruminant production. The high mortality is attributable to widespread disease and parasite infestation, reduced disease resistance because of poor breeding, and negative selection of breeding stock.

(a.) - Disease and Parasites. Diseases are very prevalent among small ruminants in Ivory Coast, the most important being small ruminant plague, coccidiosis, and tuberculosis. Animals are also often infested with both external and internal parasites. Normally, the inherent hardiness of the Djalonké and Guinean breeds would prevent the diseases and parasites from exacting a heavy toll on the animals, but poor selection and breeding practices reduce disease resistance (Rombaut and Van Vlaenderen, 1976).

(b.) - Poor Breeding Practices. The hardiness of small ruminants is reduced by females being bred too early, by inadequate spacing of births, and by excessive inbreeding. Females typically are bred when they first come into heat (five to seven months of age). The early breeding has three results:

1) The females do not attain normal adult size because the food they consume goes to nourish the growing fetus;

2) Ewes typically produce underweight and poorly developed lambs, which have a very high mortality rate. Rombaut and Van Vlaenderen (1976, pp. 162-3) found that in a typical village herd in southern Ivory Coast, 58 percent of the newborn lambs weighed less than 1.5 kg, and 84 percent of these died before reaching six months of age;

3) The ewes usually do not produce enough milk for their lambs, contributing to the high lamb mortality rate.

The inadequate spacing of births means that even if a ewe does produce enough milk for her lamb, she soon has another lamb, and competition for milk between the two offspring usually results in the younger animal being short-changed. In addition to the problems of poor development and nutrition of young stock, herd productivity is reduced because producers seldom change rams in their herds. This leads to excessive inbreeding, which tends to break down the inherent hardiness of the Djalonké.

(c.) - Negative Selection of Breeding Stock. Small ruminants, particularly sheep, are primarily consumed during ceremonial occasions (religious festivals, marriages, visits of

honored guests, etc.). In most of these occasions, the appearance of the animal slaughtered is an important consideration; therefore the largest, best looking animals are usually chosen for slaughter. This leaves inferior stock for breeding, and leads to a gradual degeneration in the size and quality of the animals

In order to overcome these problems, the Ivorian government, through its animal production agency, SODEPRA, is urging producers to adopt a number of new management practices. These are discussed in Chapter Six.

(d.) - Offtake Rates. In most studies prior to 1977, the annual offtake rate from small ruminant herds in Ivory Coast was assumed to be 30 percent. Recent studies in central Ivory Coast, however, have established that in that region at least, the annual offtake rate is much lower, on the order of 10 to 12 percent (Rombaut, personal communication; MA, 1978, Annex I, pp. 24-5). The Ivorian Ministry of Agriculture estimates that for the country as a whole, the annual offtake rate for sheep is approximately 21 percent (MA, 1978, Summary, p. 56).

The previous overestimation of the offtake rate was based on an underestimation of the mortality rate among lambs and kids. The underestimation of the mortality rate also led to an overestimation of the annual rate of herd growth, which in the past was estimated at between 3.4 percent and 5 percent (Lacrouts, 1975. p. 14; Ministère de l'Economie et des Finances (MEF) and MPA, 1973, p. 32). Based on studies conducted in central Ivory Coast, Ivorian officials currently believe that herd growth is practically nil and that the number of goats and sheep in the country has remained constant since 1970. They estimate that domestic production of meat and offals from small ruminants totaled about 3,500 tons per year from 1970 through 1978. This figure must be used with caution, however, because of uncertainty about both national herd size and the offtake rate (MA, 1978, Annex I, pp. 24-5).

C. - Evolution of Domestic Production, 1967-77

Data on the past and current levels of domestic small ruminant production are very weak. Lacking more precise estimates, this study accepts the official Ivorian estimate of 3 500 tons of annual meat and offal production from 1970 through 1978. The most reasonable basis for this figure would appear to be a total small ruminant population of 1.8 million, an offtake rate of 16 percent, and an average carcass and offal weight of 12 kg per animal. From 1967 to 1970, production is assumed to have increased by one percent annually, although, again, the data on which to base such a figure are very weak. Given these figures, the evolution of domestic small ruminant production from 1967 through 1977 would be as shown in Table 4.2.

Table 4.2 indicates that stagnant domestic production, combined with rapidly growing population, has resulted in a decline in per capita domestic production of small ruminant meat and offals from 0.7 kg per year to 0.5 kg per year. While the exact magnitude of the

TABLE 4.2

EVOLUTION OF DOMESTIC SMALL RUMINANT PRODUCTION: 1967-78

Year	Total Production (tons)	Production Per Capita[a] (kg)
1967	3,397	0.69
1968	3,431	0.67
1969	3,465	0.65
1970	3,500	0.64
1971	3,500	0.61
1972	3,500	0.59
1973	3,500	0.56
1974	3,500	0.54
1975	3,500	0.52
1976	3,500	0.50
1977	3,500	0.48
1978	3,500	0.46

SOURCE: Official Ivorian government estimates -- see text for details.

[a]Calculated using population figures from Table 1.5.

figures in Table 4.2 may be open to question, the fact that small ruminant herds have failed to expand in recent years is fairly well documented by Rombaut's research (the only research on this subject that has been undertaken in Ivory Coast). Since most of the domestically produced small ruminants are consumed in rural areas, the fall in per capita production between 1967 and 1977 probably resulted primarily in a decline in the per capita availability of small ruminant meat in villages rather than a decline in the number of animals entering urban markets.

II. - Imports of Sheep and Goats

A. - Number of Animals Imported

The data on imports of sheep and goats into Ivory Coast, like the data on domestic production, are of questionable reliability, particularly for the years prior to 1975. Four sources of information on Ivorian imports of small ruminants are available: Ivorian statistics on officially recorded imports (MPA, unpublished); Voltaic statistics on officially recorded

exports of sheep and goats to Ivory Coast (RHV, v.i.); Malian statistics on officially recorded exports of small ruminants to Ivory Coast (Van de Putte, 1977); and Malian estimates of total (officially recorded plus clandestine) exports to Ivory Coast (Van de Putte, 1977). The official Ivorian statistics are presented in Table 4.3, and the Malian and Voltaic statistics are presented in Appendix D.

Unfortunately, the various sources of data are not consistent with one another, either in terms of the number of small ruminants imported or even, at times, in terms of the trends in imports. For example, Ivorian statistics show sheep and goat imports from Mali falling from about 165,700 head in 1974 to 96,000 head in 1975, while Malian statistics indicate that total small ruminant exports to Ivory Coast rose from 110,000 head in 1974 to 150,000 head in 1975 (see Appendix Table D.7). Most authors (e.g., SEDES, 1969; SEDES, 1975a; Staatz, 1979) have argued that official Ivorian statistics underestimate total small ruminant imports, pointing out that in most years officially recorded exports from Upper Volta to Ivory Coast exceeded Ivorian figures on imports from Upper Volta. The Ivorian Planning Ministry (PLAN, 1977b, Table 10) presents figures for imports that are 12 percent above the officially recorded levels in 1970 and 16 percent above the officially recorded levels in 1975. Similarly, SEDES (1975a, p. 451) estimated that total sheep and goat imports in 1970 were 13 percent above officially recorded levels.

In 1976 and 1977, official Ivorian figures on small ruminant imports exceeded Voltaic figures for the first time. It is unclear whether this reflected an improvement in the coverage of the Ivorian import statistics, a decline in the quality of the Voltaic export statistics, or other factors. Chief among the latter could be a decline in the transits of Malian small ruminants through Upper Volta (see Appendix Table D.2). It is possible that Malian animals in transit through Upper Volta were recorded as Voltaic animals when they left Upper Volta but as Malian animals by Ivorian authorities when they entered Ivory Coast.

Based on examination of the exporting countries' statistics, the author believes that the official Ivorian import statistics underestimate total small ruminant imports by approximately 10 percent. Figures on total imports are probably more reliable than figures for imports from individual countries because of the difficulty of determining the true origin of animals in transit through Upper Volta.

Despite these problems with the Ivorian import statistics, one can draw several inferences from the figures in Table 4.3. First, between 1965 and 1976 total recorded imports of small ruminants followed a pattern similar to that of total recorded cattle imports. Recorded small ruminant imports more than doubled between 1965 and 1970, then declined slightly from 1970 to 1971, increased sharply in 1972 and 1973, and declined markedly from 1973 through 1976. Unlike recorded cattle imports, however, which increased slightly in 1977, sheep and goat imports continued to fall from 1976 to 1977. They rose again in 1978, however, reaching 309,000 head. It appears that the same forces that affected cattle imports influenced sheep and goat imports. Rapidly rising incomes in the

TABLE 4.3

OFFICIALLY RECORDED IMPORTS OF SHEEP AND GOATS INTO IVORY COAST: 1965-78

Year	Mali		Mauritania		Upper Volta		Niger		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	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	165,710	42.9	29,919	7.8	187,804	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	—	—	167,298	55.7	2,263	0.8	300,305	100.0
1977	112,493	40.5	—	—	164,016	59.1	1,205	0.4	277,714	100.0
1978	152,678	49.4	140	—	154,282	49.9	2,184	0.7	309,284	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, Receuil statistique de la production animale, study done for République Française, Ministère de la Coopération (Paris: 1975), p. 451.

NOTES: -- Not available; — None or negligible.

The Ivorian Ministry of Animal Production accepts the figures published in the Receuil 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 Services's statistics and the SEDES figures, the latter are used. Figures for the years 1973-78 are from unpublished data of the Ministry of Animal Production.

[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 Ministère de la Production Animale.

period 1965-70 stimulated demand for meat, and imports grew. 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 1977 as the number of animals available for sale from the Sahelian countries dropped. 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 1978, recorded sheep and goat imports stood at the same level as in 1970, whereas recorded cattle imports were considerably below their 1970 levels.

Upper Volta is the largest exporter of sheep and goats to Ivory Coast, usually supplying between 50 and 70 percent of Ivory Coast's total small ruminant imports. This is in sharp contrast to the pattern of cattle imports, where Upper Volta's share of the market has fallen to less than 30 percent in recent years (see Table 2.4). Mali, which supplies about 70 percent of Ivory Coast's total cattle imports, usually accounts for only 40 percent of total sheep and goat imports. As was the case with cattle, Mauritania and Niger have ceased to be important exporters to Ivory Coast since 1974.

B. - Tonnage Imported on the Hoof

Table 4.4 presents the estimated tonnage of small ruminant meat and offals imported into Ivory Coast on the hoof between 1967 and 1978. Unfortunately, there are no data available that indicate how much average carcass weights of imported sheep and goats changed over the period 1967-1977. Lacking such data, a constant carcass weight of 16 kg is assumed.

Table 4.4 indicates that the total tonnage of small ruminant meat and offals imported on the hoof increased from roughly 3,650 tons in 1967 to 8,640 tons in 1973. During the same period, per capita imports doubled, from 0.7 kg per year to 1.4 kg per year. By 1978, total imports had fallen to approximately 6,260 tons, or 0.8 kg per capita, only slightly above per capita imports in 1967.

C. - Seasonality of Small Ruminant Imports

The small ruminant trade is highly seasonal, with imports and consumption, particularly of sheep, peaking around Tabaski. In recent years Tabaski has fallen in November and December, and as a result, between 30 and 40 percent of total imports have occurred in the fourth quarter. Figure 4.1 shows the quarterly pattern of imports from 1974 through 1978, the only years for which complete data are available. (Appendix E presents the figures on which Figure 4.1 is based.) In every year except 1975 (a year of very low imports due to the drought) imports were highest in the fourth quarter and lowest in the

FIGURE 4.1 Quarterly Small Ruminant Imports

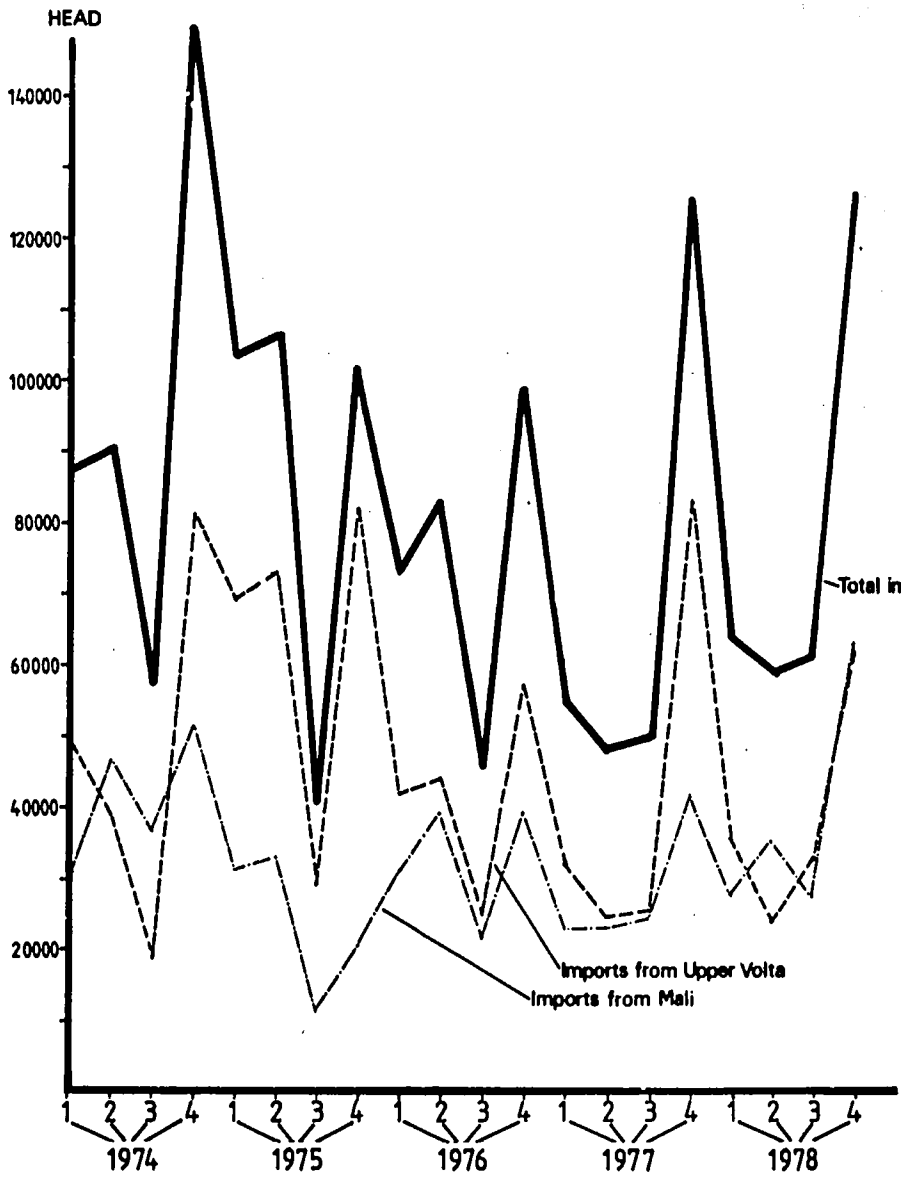


TABLE 4.4

ESTIMATED TONNAGE OF SMALL RUMINANT MEAT IMPORTED INTO IVORY COAST ON THE HOOF FROM 1967 THROUGH 1978

Year	Number of Animals Imported	Average Carcass Weight (kg)	Meat (tons)	Edible Offals[a] (tons)	Total (tons)	Imports Per Capita (kg)[b]
1967	198,600	16	3,177.6	476.6	3,654.2	0.74
1968	247,700	16	3,963.2	594.5	4,557.7	0.90
1969	307,300	16	4,916.8	737.5	5,654.3	1.08
1970	340,300	16	5,444.8	816.7	6,261.5	1.15
1971	333,800	16	5,340.8	801.1	6,141.9	1.09
1972	433,400	16	6,934.4	1,040.2	7,974.6	1.35
1973	469,800	16	7,516.8	1,127.5	8,644.3	1.41
1974	424,400	16	6,790.4	1,018.6	7,809.0	1.22
1975	387,900	16	6,206.4	931.0	7,137.4	1.07
1976	330,300	16	5,284.8	972.7	6,077.5	0.87
1977	305,500	16	4,888.0	733.2	5,621.2	0.78
1978	340,200	16	5,443.2	816.5	6,259.7	0.83

SOURCE: Total imports are estimated at 10 percent above the levels indicated in Table 4.3. Average carcass weight was supplied by the Ivorian Ministry of Animal Production.

[a]Estimated at 15 percent of carcass weight.

[b]Estimated using the population figures in Table 1.5.

third quarter (the rainy season). A similar pattern of imports also occurs in Nigeria and Ghana (Staatz, 1976a and 1976b).

Because of the strong demand for sheep for Tabaski, prices follow a pattern similar to that of imports, peaking in the fourth quarter. The seasonality of demand creates the possibility of timing production (both lambing schedules and fattening projects) to take advantage of the peak demand. Similarly, there is scope for temporal arbitrage, buying and holding animals in anticipation of the seasonal price rise. In order to benefit from these seasonal price changes, however, it is necessary to have access to transport to move the animals to major consumption centers for the holiday. This has sometimes proven difficult in recent years because Tabaski has fallen at the time of the coffee and cocoa harvests, a period of high demand for transport. Since Tabaski is scheduled according to an uncorrected lunar calendar, however, the date of celebration shifts by 11 days per year; so in coming years the transport bottleneck may not prove to be as critical.

III. - Imports of Chilled and Frozen Meat

A small quantity of chilled and frozen lamb and mutton is imported into Ivory Coast and is sold exclusively through class 1 retailers. Imports of chilled and frozen small ruminant meat have not increased rapidly in recent years as have frozen beef imports, but like beef imports, the pattern of supply of lamb and mutton imports has changed drastically since 1975.

Table 4.5 presents recorded imports of chilled and frozen mutton and goat meat from 1960 through 1978. It is clear that these imports play a minor role in supplying Ivory Coast with meat. Recorded imports have never exceeded 400 tons annually, and per capita imports have always been less than 0.1 kg per year.

Table 4.6 shows that up until 1975, the Sahelian countries (primarily Upper Volta and Niger) supplied between 80 and 95 percent of Ivory Coast's imports of frozen and chilled small ruminant meat, with Europe (mainly France) supplying the remainder. In 1975, the pattern began to change, with Upper Volta's market share falling and Europe's share increasing. In 1976 Argentina entered the market and quickly gained a dominant position, supplying 71 percent of total imports in 1976, 64 percent in 1977, and 80 percent in 1978. In 1977 Upper Volta and Niger's combined market share fell to 17 percent, and by 1978 Upper Volta supplied only 2 percent of total imports and Niger exported no mutton or lamb to Ivory Coast. The declining market share of the Sahelian countries reflected both their falling exports and the growth in the volume of total imports.

TABLE 4.5

RECORDED IMPORTS OF CHILLED AND FROZEN MUTTON & GOAT MEAT BY COUNTRY OF ORIGIN: 1960-78
(tons)

Year	Mali		Upper Volta		Niger		Other African Countries		Total African Countries		Europe		South America		Total[a]		Imports Per Capita[b] (kg)
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	
1960	9	12.5	43	59.7	15	20.8	-	-	67	93.0	5	6.9	-	-	73	100.0	.02
1961	-	-	127	74.3	36	21.0	-	-	163	95.3	8	4.7	-	-	171	100.0	.04
1962	-	-	136	62.7	55	25.3	-	-	191	88.0	26	12.0	-	-	217	100.0	.05
1963	16	5.0	170	53.3	79	24.8	-	-	265	83.1	54	16.9	-	-	319	100.0	.07
1964	7	2.0	237	67.7	58	16.6	-	-	302	86.3	47	13.4	-	-	350	100.0	.08
1965	1	0.3	247	68.6	59	16.4	-	-	307	85.3	53	14.7	-	-	360	100.0	.08
1966	4	1.0	270	69.0	67	17.1	-	-	341	87.1	51	13.0	-	-	391	100.0	.08
1967	-	-	245	71.2	51	14.8	-	-	296	86.0	48	14.0	-	-	345	100.0	.07
1968	-	-	225	66.4	73	21.5	-	-	298	87.9	41	12.1	-	-	339	100.0	.07
1969	-	-	141	52.4	82	30.5	-	-	223	82.9	46	17.1	-	-	269	100.0	.05
1970	-	-	151	49.7	108	35.5	-	-	259	85.2	45	14.8	-	-	305	100.0	.06
1971	-	-	137	57.1	65	27.1	-	-	202	84.2	38	15.8	-	-	240	100.0	.04
1972	-	-	84	51.5	44	27.0	-	-	128	78.5	35	21.5	-	-	163	100.0	.03
1973	-	-	66	48.9	42	31.1	-	-	108	80.0	27	20.0	-	-	135	100.0	.02
1974	-	-	66	45.5	53	36.6	-	-	119	82.1	26	17.9	-	-	145	100.0	.02
1975	-	-	35	28.7	43	35.2	-	-	78	63.9	44	36.1	-	-	122	100.0	.02
1976	-	-	23	6.8	65	19.2	4	1.2	92	27.1	7	2.1	240	70.8	339	100.0	.05
1977	-	-	42[c]	17.4	c	c	-	-	42	17.4	45	18.6	155	64.0	243	100.0	.03
1978	-	-	6	2.4	-	-	23	9.3	29	11.7	21	8.5	198	79.8	248	100.0	.03

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

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

[b]Estimated using the population figures in Table 1.5.

[c]Figures for Niger combined with figures for Upper Volta.

TABLE 4.6

THE IVORIAN MUTTON AND GOAT MEAT SUPPLY: 1967-78
(Tons of Meat and Edible Offals)

	DOMESTIC PRODUCTION		IMPORTS						TOTAL[a]		
			Live Animals		Frozen and Chilled Meat		Total Imports				
Year	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Availability Per Capita (kg)
1967	3,377	45.5	3,654	49.8	345	4.7	3,999	54.5	7,336	100.0	1.49
1968	3,431	41.2	4,558	54.7	339	4.1	4,897	53.8	8,328	100.0	1.64
1969	3,465	36.9	5,654	60.2	269	2.9	5,923	63.1	9,388	100.0	1.79
1970	3,500	34.8	6,262	62.2	305	3.0	6,567	65.2	10,067	100.0	1.85
1971	3,500	35.4	6,142	62.2	240	2.4	6,382	64.6	9,882	100.0	1.75
1972	3,500	30.1	7,975	68.5	163	1.4	8,138	69.9	11,638	100.0	1.97
1973	3,500	28.5	8,644	70.4	135	1.1	8,779	71.5	12,279	100.0	2.00
1974	3,500	30.6	7,809	68.2	145	1.3	7,954	69.4	11,454	100.0	1.79
1975	3,500	32.5	7,137	66.3	122	1.1	7,259	67.5	10,759	100.0	1.61
1976	3,500	35.3	6,076	61.3	339	3.4	6,415	64.7	9,915	100.0	1.43
1977	3,500	37.4	5,621	60.0	243	2.6	5,864	62.6	9,364	100.0	1.29
1978	3,500	35.0	6,260	62.5	248	2.5	6,508	65.0	10,008	100.0	1.33

SOURCE: Tables 4.2, 4.4, and 4.5.

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

The decline in Upper Volta and Niger's share of the Ivorian market for imported small ruminant meat probably was caused by the drought and by forces similar to those that affected beef imports (see Chapter Two). The drought reduced the supply of choice slaughter animals in Abidjan, thus increasing the demand by class I retailers for imported meat. The drought, however, also reduced the supply of choice animals for slaughter and export in the Sahelian countries, just at the time when Ivory Coast's total imports were rising. Thus, exports from Upper Volta and Niger fell as Ivory Coast's total imports rose. The decline in the quality of refrigerated rail transport between Ouagadougou and Abidjan (see Chapter Two) may have also discouraged meat exports from Upper Volta. At the same time, forces in the world meat market, particularly the tight import quotas imposed by the EEC in 1975-77, caused Argentina to search aggressively for new markets. It was able to enter the Ivorian market just at the time when Upper Volta and Niger were unable to meet the increased demand for lamb and mutton imports.

IV. - Ivory Coast's Supply of Small Ruminant Meat: A Summary

Table 4.6 summarizes the changes in Ivory Coast's supply of small ruminant meat between 1967 and 1978. From Table 4.6 several points are apparent. First, per capita consumption of small ruminant meat in Ivory Coast is low; it averaged between 1.3 kg and 2.0 kg over the period 1967-78. This represents between one-fourth and one-fifth the level of per capita beef consumption over the same period. Second, annual per capita consumption of small ruminant meat followed the pattern of sheep and goat imports, increasing from 1.5 kg in 1967 to 2.0 kg in 1974, then falling to 1.3 kg in 1978. The share of total consumption met by domestic production fell from 46 percent in 1967 to 29 percent in 1973, then increased back to 35 percent in 1978 (even though domestic production stagnated) because of the fall in imports. In 1978 Ivory Coast imported over 60 percent of its supply of small ruminant meat (compared with over 80 percent of its beef supply). Frozen and chilled meat imports play a small role in supplying Ivory Coast with sheep and goat meat. Whereas frozen and chilled meat imports accounted for about 28 percent of the total beef supply in 1977 (see Table 2.10), they made up less than 3 percent of the supply of small ruminant meat.

Table 4.7 shows how the origin of Ivory Coast's supply of small ruminant meat varied between 1967 and 1978. Unlike the beef supply (see Table 2.11), almost all the small ruminant meat consumed in Ivory Coast comes from West Africa. Although Latin America has begun to export lamb and mutton to Ivory Coast in recent years, it still accounts for only about 2 percent of the total supply. The major sources of supply continue to be the Sahelian states and domestic production, with Latin America and Europe supplying small amounts to the class I market.

TABLE 4.7

THE IVORIAN MUTTON AND GOAT MEAT SUPPLY BY REGION OF ORIGIN: 1967-78
(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
1967	3,337	45.5	3,950	53.9	--	--	3,950	53.9	48	0.7	--	--	7,336	100.0
1968	3,431	41.2	4,856	58.3	--	--	4,856	58.3	41	0.5	--	--	8,328	100.0
1969	3,465	36.9	5,877	62.6	--	--	5,877	62.6	46	0.5	--	--	9,388	100.0
1970	3,500	34.8	6,521	64.8	--	--	6,521	64.8	45	0.4	--	--	10,067	100.0
1971	3,500	35.4	6,344	64.2	--	--	6,344	64.2	38	0.4	--	--	9,882	100.0
1972	3,500	30.1	8,103	69.6	--	--	8,103	69.6	35	0.3	--	--	11,638	100.0
1973	3,500	28.5	8,752	71.3	--	--	8,752	71.3	27	0.2	--	--	12,279	100.0
1974	3,500	30.6	7,928	69.2	--	--	7,928	69.2	26	0.2	--	--	11,454	100.0
1975	3,500	32.5	7,215	67.1	--	--	7,215	67.1	44	0.4	--	--	10,759	100.0
1976	3,500	35.3	6,164	62.2	4	--	6,168	62.2	7	0.1	240	2.4	9,915	100.0
1977	3,500	37.4	5,664	60.5	--	--	5,664	60.5	45	0.5	155	1.7	9,364	100.0
1978	3,500	35.0	6,284	62.8	23	0.2	6,307	63.1	21	0.2	198	2.0	10,008	100.0

SOURCE: Tables 4.3, 4.4, and 4.5.

[a]Mali, Upper Volta, Mauritânia, Niger.

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

V. - Market Structure and Prices

A. - Market Structure

Small ruminant marketing differs from cattle and beef marketing in several important ways because of differences in the nature of the animals traded. Small ruminants are much smaller than cattle, they cannot be trekked long distances, and they are often slaughtered in the home.

The small size of sheep and goats makes them much more suitable than cattle for slaughter in rural areas. There usually is not enough effective demand for meat in rural villages to justify slaughtering a bovine. Since villagers lack refrigeration, all the meat would have to be eaten within a day or two or smoked to preserve it. In most villages, however, effective demand is high enough to justify slaughtering a sheep or goat. As a result, consumption of small ruminant meat is much more a rural phenomenon than is beef consumption. For example, Abidjan accounted for 40 percent of total Ivorian beef consumption in 1976 (Staatz, 1979, p. 58) but only 20 percent of all small ruminant meat consumed in that year.[1] Per capita beef consumption in Abidjan in 1976 was 175 percent higher than the national average, 17.3 kg versus 6.3 kg (Staatz, 1979, pp. 55, 59), but per capita consumption of small ruminant meat was only 36 percent higher than the national average, 1.9 kg versus 1.4 kg. Furthermore, a large part of domestic production of small ruminants is consumed near where it is produced, often without entering the marketing system. The major cities are supplied primarily with imported animals. (In this respect, the marketing system is similar to that for cattle.)

It is difficult and costly to trek small ruminants long distances to market, as is done with cattle, because the animals travel more slowly than cattle (and thus immobilize a trader's capital for a longer time) and because the animals must be closely watched to prevent them from damaging crops along the route. Almost all small ruminants sold in major markets in Ivory Coast travel to market by truck or train. While this sometimes allows merchants to respond quickly to changing market conditions (e.g., by shipping animals to markets experiencing temporary shortages), it also makes the trade quite sensitive to transportation bottlenecks. When trucks and train cars are unavailable, prices in terminal markets rise rapidly because merchants do not have the option of trekking their animals to market.

Perhaps the most important marketing characteristic of small ruminants, particularly sheep, is the importance these animals play in ceremonial occasions. Whereas cattle, at least in urban areas, are slaughtered in public abattoirs to supply meat to the retail market, sheep and goats are mainly slaughtered in individual households for celebration of important occasions (religious festivals, marriages, etc.). This is seen most clearly at the Moslem feast of Tabaski, when every Moslem head of household who is financially able to do so is

obligated to slaughter a ram. The ceremonial importance of small ruminants has several consequences for the marketing system:

1) A much smaller proportion of marketed production passes through retail butcher shops than does beef. Whereas 94 percent of all cattle recorded as entering the Abidjan livestock market in 1977 were slaughtered in the municipal abattoir (and presumably had their meat sold through the retail market), only 18 percent of the small ruminants recorded as entering the market passed through the abattoir (CEIB, unpublished.) Most of the remainder were slaughtered in individual households in Abidjan. The retail market for small ruminant meat is therefore much thinner (relative to total production) than is the retail beef market.
2) The demand for small ruminants is much more seasonal than the demand for beef, depending on the timing of major holidays, particularly Tabaski, when demand is highest. The exact dates of these periods of peak demand vary from year to year; this seasonality of demand combines with the thinness of the market to lead to more volatile prices than occur in the cattle market. It is not unusual for sheep prices to double as Tabaski approaches.
3) Because small ruminants are slaughtered on ceremonial occasions, the physical appearance of an animal as well as its weight is an important determinant of price. Prices are therefore not as closely tied to carcass weight as are cattle prices. For example, prices per kg are highest for pure white Sahelian sheep, and prices per kg are lower for locally produced animals and mottled Sahelian animals (Camara, 1978).

In some aspects, however, the marketing system for sheep and goats resembles that for cattle. The trade is almost entirely in the hands of non-Ivorians, mainly former residents of Mali, Niger, and Upper Volta. There are even fewer government interventions in small ruminant marketing than in cattle marketing, with the government's role limited mainly to licensing traders and inspecting the animals and meat sold.[2]

The retail market, like that for red meat, is divided into class 1 and class 2 establishments. The major wholesale distributor of meat to class 1 establishments in Abidjan estimated that in 1976 class 1 shops in Abidjan sold approximately 312 tons of small ruminant meat per year (Pauvert, personal communication). Class 1 establishments thus accounted for about 17 percent of all small ruminant meat sold in Abidjan. Bouaké is the only other city where a significant amount of meat is sold through class 1 retailers. In 1976,

approximately 17 tons of lamb were sold by class 1 retailers in Bouaké (Staatz, 1979, p. 168). For the country as a whole, class 1 retailers account for no more than 360 tons of lamb and mutton per year, less than 4 percent of the total supply. The remaining 96 percent is either consumed locally without entering the marketing system or is handled by class 2 butchers.

In the major cities class 2 butchers usually specialize either in beef or in small ruminants, with few slaughtering and selling both. Most butchers who sell mutton, like their colleagues who sell beef, are non-Ivorians, most of them from the Sahelian countries. Since the price per kg of sheep is usually higher than that of goats (sheep are more desired for ceremonial occasions), the bulk of the mouton sold through the retail market in major cities is in reality goat meat.

B. - The Evolution of Prices, 1967-78

Until 1978 no agency systematically collected prices of sheep, goats, or small ruminant meat in Ivory Coast.[3] A few estimates of goat and sheep prices are available from studies by SEDES (reported in SEDES, 1975a) and by the author. Similarly, a few studies report retail prices and officially set government ceiling prices. Although the latter obviously do not reflect the true variability in retail prices, they give some indication of the general trend in prices.

1) - Prices of Goats and Sheep

Table 4.8 presents figures on small ruminant prices in Abidjan between 1965 and 1978. During this period, prices per kg carcass weight increased by a factor of almost six, from 135 CFA F to 780 CFA F. The most rapid increase in prices occurred between 1975 and mid-1977, when imports of small ruminants fell by 75,000 head (see Table 4.3).

The wholesale price of mutton appears to have increased substantially relative to beef since 1966 (cf. Table 3.9). Whereas mutton cost only 85 percent as much as beef on a per-kg-carcass-weight basis on the wholesale market in 1966, it cost 158 percent as much as beef in 1978. The decrease in the relative price of beef is not solely attributable to the large imports of frozen beef. By 1973, two years before the large frozen beef imports began, beef had become cheaper than mutton. The increase in the relative price of mutton may account in part for the fall in per capita consumption since 1973.

TABLE 4.8

SMALL RUMINANT PRICES IN ABIDJAN: 1965-78

Year	Type of Animal	Price per kg carcass (CFA F)	Source of Informat
1965/66	All goats and sheep	135	(1)
1970/71		230	(1)
1972		280-290	(1) (2)
1973		300	(1)
1975		350	(1)
1977 (May)		622	(3)
1978 (August)		780	(3)

SOURCES: (1) SEDES, Receuil statistique de la production animale (Paris: 1 p. 457. (2) République de Côte d'Ivoire, Ministère du Plan, Office National de promotion de l'entreprise ivoirienne (OPEI), Le secteur de la boucherie artisina à Abidjan [Abidjan: Société Ivoirienne de Gestion, d'Etudes, et des Services (SIGES), 1972, p. 47.] (3) Data collected by the author (1977: N = 25; 1978; N = 6).

2) - Retail Meat Prices

(a.) - The Class 2 Market. Table 4.9 presents the evolution of retail prices of muttor in the class 2 market between 1970 and 1978. Retail prices increased from 275 CFA F pe kg to 850 CFA F per kg over this period, a rate of increase slightly lower than that of live animal prices. The lower rate of increase may be due to butchers' other costs rising at a slower rate than small ruminant prices. Table 4.9 also shows that although official government ceiling prices were close to the market price in 1970-71, by 1978 they were less than half the market price. The control price in Abidjan is rarely enforced, because officials realize that butchers would lose money selling at this price.

(b.) - The Class 1 Market. The class 1 market accounts for about 4 percent of the mutton consumed in Ivory Coast. Most of the lamb and mutton sold by class 1 establishments is imported, primarily from Latin America. Most imported mutton and lamb comes by air, and in 1978 it wholesaled to butchers at 900 to 1,120 CFA F per kg carcassweight. A small amount of lamb came by sea and sold for 450 CFA F per kg (supplies of this meat were very irregular, however). In contrast, locally slaughtered lamb wholesaled to class 1 butchers in 1978 for 750 CFA F per kg. Class 1 butchers complained that the locally slaughtered animals were too lean, and were willing to pay a premium for the

imported meat. There may therefore be some room for import substitution through fattening local or imported sheep for the class 1 market. The total class 1 demand for mutton probably does not exceed 350 to 400 tons annually; so fattening programs should not be over-ambitious. The total class 1 demand could be met by fattening 23,300 to 26,700 head of Djalonké sheep to carcassweights of 15 kg, or 14,000 to 16,000 Sahelian sheep to carcassweights of 25 kg.

TABLE 4.9

RETAIL MUTTON PRICES IN ABIDJAN: 1970-78
(Class 2 Market Bone-In Meat)

Year	Market Price (CFA F/kg)	Official Price[a] (CFA F/kg	Source of Data
1970-71	275-300	175-300	1, 2
1974	500	350-370	1, 3
1975	540	350-370	1, 3
1977 (May)	750	350-370	3, 4
1978 (August)	800-850	350-370	3, 4

SOURCES: (1) SEDES, Recueil statistique de la production animale (Paris: 1975) p. 457 (market prices); (2) République de Côte d'Ivoire, Ministère de l'Economie et des Finances, Arrêt No. 2538 du 16/11/1964 (official prices); (3) République de Côte d'Ivoire, Ministère de l'Economie et des Finances, Arrêt No. 816/MEF du 30/5/1974 (official prices); (4) Data collected by author.

[a]The first price cited for stew meat, the second for leg of lamb.

Retail lamb and mutton prices in class 1 establishments were officially under price controls until 1976. In 1976, the government allowed class 1 butchers to index the retail price of imported mutton to the wholesale price of the carcass. Locally slaughtered mutton remained under price controls until 1978, however, when indexing of its retail price was allowed. The indexing system set retail prices at certain multiples of the wholesale price. For example, butchers were allowed to sell center-cut lamb chops at twice the wholesale price of the carcass. (The indices were developed to permit a 33 percent net margin for the butcher.) The control prices and indices are presented in Table 4.10. The control price for class 1 establishments was generally about double the control price for the class 2 market. In 1978, however, under the indexing system, local mutton sold in class 1 establishments for only about 50 percent more than in the class 2 establishments.

TABLE 4.10

RETAIL MUTTON PRICES IN CLASS 1 ESTABLISHMENTS IN ABIDJAN: 1967-78
(CFA F/kg)

Cut	Control Prices 1967-74	Control Prices 1974-76 (Imported) 1974-78 (Locally Slaughtered) First Quality	Control Prices 1974-76 (Imported) 1974-78 (Locally Slaughtered) Extra Quality	Indexes: 1976 onward for imported meat; 1978 onward for locally slaughtered	Retail Prices July 1978 Local	Retail Prices July 1978 Imported
Leg of Lamb	445	660	800	1.9 x wholesale price	1,200 - 1,400	1,980
Chops (1st Rib)	450	660	800	2.0 x wholesale price	1,020 - 1,200	
Shoulder	385	600	650	1.7 x wholesale price	900	1,880
Stew Meat	210	260	300	1.18 x wholesale price	590	

SOURCES: Control Prices, République de Côte d'Ivoire, Ministère de l'Economie et des Finances, Arrêt Nos. 2538 du 16/11/1964 and 816/MEF du 30/5/1974.

Indexes: Ministère de la Production Animale, unpublished data.

Retail Prices: Author's observations.

C. - Seasonality of Prices

Small ruminant prices (particularly for sheep) are highly seasonal, reaching a peak near Tabaski, the Moslem fete du mouton. For example, in 1977, the price of sheep in Tingrela (northern Ivory Coast) rose from 300 CFA F per kg liveweight three months prior to Tabaski to 550 CFA F per kg liveweight at Tabaski itself (SODEPRA, unpublished). As noted before, discussion with Ivorian officials and livestock traders indicated that sheep prices frequently double when Tabaski approaches. Some traders buy sheep a few months prior to Tabaski and hold them in anticipation of the price rise, but there seems to be scope for much more of this temporal arbitrage. In Ivory Coast, SODEPRA has recently introduced such a holding program through cooperatives in northern Ivory Coast.

IV. - Conclusions

Although small ruminants currently play a minor role in supplying Ivory Coast with meat, there is room for them to play a much more important role in the future. Domestic production, which has stagnated since 1970, could be greatly increased through improved health and management practices. The demand for imported Sahelian animals is also likely to remain strong during the next five to ten years. Sahelian sheep, which are highly desired for ceremonial purposes, are less subject than cattle to direct competition from overseas meat exporters; most ceremonies require that a live animal be killed, not just that mutton be consumed. Furthermore, the price of mutton has been increasing in recent years relative to the price of beef, which suggests that the effective demand for mutton and goat is strong in Ivory Coast. Bollinger's study (1975) supports this view; he found that mutton was the most highly preferred source of animal protein among Ivorian consumers (See Table 5.2, Chapter Five).

There are two areas where small ruminant projects might prove especially profitable. One would be fattening a small number of animals (14,000 to 16,000 head) of Sahelian sheep per year for the class 1 market. Class 1 butchers in Abidjan indicated a willingness to sell more locally produced rather than imported lamb if the locally produced animals were well-fed and price competitive with the imported meat. The second area for potential projects would be buying and fattening sheep in anticipation of Tabaski. The very large price increases that accompany Tabaski could make such projects potentially very profitable.

Projects that aim at increasing the amount of goat and sheep meat sold through class 2 butcher shops should proceed cautiously. Currently only a small proportion of total production passes through the retail marketing system, and any program that aims at greatly

increasing this proportion may run into problems as the marketing system encounters growing pains. This is not to say that such projects should be discouraged, only that they should expand production slowly enough for the retail marketing system to keep pace.

CHAPTER FIVE

THE OTHER SOURCES OF ANIMAL PROTEIN: POULTRY, PORK AND FISH

Poultry, pork, and fish represent three important sources of animal protein in the Ivorian diet in addition to beef and small ruminant meat. The Ivorian government is counting heavily on increased domestic production of these items, along with increased imports of frozen fish, to decrease the country's dependence on livestock imports from the Sahelian countries during the next decade. This chapter briefly examines recent trends in the production and consumption of pork, poultry and fish in Ivory Coast and discusses how consumption of these products affects the demand for beef and small ruminant meat.

The chapter is divided into five parts. Part I looks at the place of poultry, pork and fish in the Ivorian diet and compares the importance of these foods with that of beef and small ruminant meat. Part II looks in more detail at how production and consumption of fish in Ivory Coast has changed since the mid-1960s. This is important because fish is the main substitute for beef in the Ivorian diet. Part III looks at trends in poultry production and consumption, and Part IV examines pork production and consumption. Part V summarizes the main conclusions of the chapter.

The chapter shows that between the mid-1960s and 1976 Ivorian production and per capita consumption of poultry, pork and fish all increased. Between 1976 and 1978, however, fish consumption per capita dropped by 30 percent. Although poultry and pork production have continued to increase, they are unlikely to increase in the near future as quickly as envisaged in government plans. Therefore, the demand for beef, the major substitute, is likely to remain strong through 1985.

I - The Place of Poultry, Pork and Fish in the Ivorian Diet

Fish is the single most important source of animal protein in the Ivorian diet, accounting for about half the animal protein consumed in Ivory Coast (see Table 1.3 in Chapter One). Poultry and pork are much less important in the diet; poultry accounting for 8 percent of total animal protein consumption and pork for 2 percent. (In contrast, beef makes up 19 percent and small ruminant meat accounts for 3 percent.) Although poultry and pork consumption currently are low in Ivory Coast, analysis of the demand and supply conditions for these meats should be included in any discussion of the red meat situation. Developments in the poultry and pork sectors will help determine the future demand for Sahelian beef.

TABLE 5.1

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	500	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-CFA F 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).

The relatively heavy consumption of fish in Ivory Coast is largely attributable to the low price of fish compared with other sources of animal protein. Table 5.1 shows that in 1977 frozen fish (chinchard, the cheapest and most widely eaten fish) cost only about one-third as much as fresh bone-in beef in Abidjan and about half as much as fresh beef in Bouaké. Even smoked fish, which has a much lower moisture content than fresh fish, cost less than both frozen and fresh bone-in beef in Abidjan and Bouaké.

Poultry and pork are both more expensive than beef and fish. In Bouaké in 1977, pork cost 13 percent more than fresh bone-in beef and poultry cost nearly 80 percent more. A major objective of government programs in Ivory Coast is to lower the prices of pork and poultry relative to beef to encourage consumers to substitute these meats for beef in the diet.

Consumer preferences as well as prices determine current consumption patterns. For example, per capita consumption of poultry is over three times greater than that of pork even though chicken costs over 50 percent more than pork. In a nationwide survey of consumer preferences for different types of meat, Bollinger (1975) found that chicken was the third most preferred source of animal protein in Ivory Coast, while pork ranked thirteenth (Table 5.2). One main reason for pork's low rating is that roughly one-third of Ivory Coast's population is Moslem.

TABLE 5.2

RANKING OF CONSUMER PREFERENCES FOR DIFFERENT SOURCES OF ANIMAL PROTEIN IN IVORY COAST, 1975

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, (Suresnes, France: IDET-CEGOS, 1975), Vol. I, p. 42.

The following sections of the chapter look at the supply and demand situations for poultry, pork and fish.

II. - Changes in Ivory Coast's Fish Supply, 1964-78

A. - Pattern of Supply

Although Ivory Coast has a long coastline and several large rivers, the country is far from self-sufficient in fish. In 1976, imports accounted for nearly 60 percent of total domestic fish consumption, up from about 20 percent in 1965 (see Table 5.3). The continental shelf off Ivory Coast is short and poorly stocked with fish; therefore, as demand for fish rose in recent years, domestic production failed to keep pace with demand.

Until 1969, Ivory Coast had two major sources of fish: domestic production and imports of smoked and dried fish from other West African countries. A small amount of canned fish was also imported from Europe and North Africa. Chief among the countries that exported fish to Ivory Coast was Mali, which shipped smoked and dried fish from the Niger River delta region. Smaller amounts of smoked fish were also imported from other coastal states. Owing to a lack of refrigeration, much of the domestic catch was also smoked or dried before sale. Even in 1978, about three quarters of the domestic catch was smoked (Barry, 1978, p. 6n). Throughout the 1960s Ivory Coast exported a small amount of fish to Europe, mainly tuna and shrimp. There was also some export of smoked fish to Ghana.

In 1969, the pattern of supply began to change with the growth of large Eastern European and Japanese fishing fleets off the coast of Senegal. Ivory Coast began importing a large amount of inexpensive frozen fish from these fleets, which caught and froze the fish off Senegal, then unloaded part of the catch in Abidjan. The frozen fish arrived in Abidjan much more cheaply than dried fish from Mali. The supply of the Malian fish may have been declining at this time because of the drought. Because of the large imports of cheap frozen fish and the smaller supply of smoked and dried fish from Mali, the relative price of Malian smoked fish compared with fresh and frozen fish in Abidjan rose from 2.45 in 1970 to 3.45 in 1978 (MEFP, v.i.).

Ivorian consumers were quick to substitute the relatively cheap imported frozen fish for the increasingly scarce smoked and dried fish from Mali. In addition, people along the coast (particularly around Abidjan) who previously smoked fresh fish expanded their operations and began smoking frozen fish as well. This smoked fish was then shipped inland, as well as sold in the coastal areas. The Ivorian government further facilitated the distribution of frozen fish by constructing a network of over 100 cold storage lockers throughout the country. These lockers have also been used since 1975 to aid in the distribution of imported frozen beef.

TABLE 5.3

IVORY COAST'S FISH SUPPLY, 1964-78
[tons (fresh equivalent)]

Year	Domestic Production Traditional	Domestic Production Industrial	Domestic Production Total	Exports	Imports	Total Supply	Availability per capita (kg/person)[a]
1964	N.A.	N.A.	55,916	6,748[b]	13,165	75,829	17.0
1965	20,000	45,000	65,000	2,000	15,000	78,000	17.0
1966	20,000	42,000	62,000	2,000	N.A.	N.A.	N.A.
1967	21,000	47,000	68,000	2,000	N.A.	N.A.	N.A.
1968	20,000	45,000	65,000	2,000	N.A.	N.A.	N.A.
1969	21,000	48,000	69,000	2,000	N.A.	N.A.	N.A.
1970	22,000	52,000	74,000	2,000	23,000	95,000	17.5
1971	22,000	53,000	75,000	3,000	28,500	100,500	17.8
1972	25,000	59,000	84,000	4,000	38,000	118,000	20.0
1973	26,000	45,000	71,000	4,000	83,000	150,000	24.6
1974	29,000	43,500	64,000	6,200	85,700	143,500	22.4
1975	32,700	53,800	86,500	9,500	92,200	169,200	25.2
1976	37,000	58,900	95,900	11,500	111,200	195,600	28.1
1977	41,000	73,500	114,500	17,500	61,000	158,000	21.8
1978	40,000	55,000	95,000	16,000	68,000	147,000	19.5

SOURCES: Data for 1964 from Lagoin, J. and G. Salmon, Etude technique et économique comparée de distribution du poisson de mer dans les pays de l'ouest africain: Etude régionale (Paris: Secrétariat d'Etat aux Affaires Etrangères Chargé de la Coopération, 1967), pp. 53, 90; data for 1965-73 from Ministère de la Production Animale, Cinquième Séminaire de la Production Animale, Cahier No. 1, Annex 1 (Abidjan: 1976); data for 1974-78 from Ministère de la Production Animale, Service des Pêches, unpublished data.

[a]Based on population figures in Table 1.5.

[b]Includes an estimated 5,000 tons exported to Ghana. Exports to Ghana are not included in subsequent export figures.

N.A. = Not available.

Table 5.4 shows how frozen fish imports displaced smoked and dried fish imports between 1964 and 1977. Between 1964 and 1976, imports of smoked and dried fish fell by three quarters, from 17,000 tons (fresh equivalent) to fewer than 4,000 tons. During the same period, imports of frozen fish jumped from about 1,700 tons to over 105,000 tons. Most of the decrease in dried fish imports and most of the increase in froze fish imports occurred between 1972 and 1974, which may reflect the impact of the drought on the fish catch in Mali. Whereas in the mid-1960s Mali was the largest fish exporter to Ivory Coast, by 1977 the eastern European countries (especially Poland and the USSR) were the most important sources of frozen fish, accounting for about 70 percent of total imports. (The fish was caught off the coast of West Africa.) Senegal was the second major source of imports, accounting for about 25 percent of the total (MPA, unpublished).

B. - Per Capita Fish Consumption

The large increase in imports, coupled with modest increases in domestic production, resulted in a jump in annual per capita fish consumption from 17.5 kg in 1970 to 28.1 kg in 1976. This increase offset the declines in per capita red meat consumption outlined in Chapters Two and Three. Since 1976, however, fish imports have fallen sharply, and as a result so has per capita consumption, which in 1978 dropped below 20 kg per year for the first time since 1971. The decline in imports resulted from a 30 to 35 percent increase in the import price of frozen fish between 1976 and 1977 (MPA, unpublished). If the price of fish continues to increase in the future, it will lead consumers to bid up the price of beef, the major substitute for fish in the diet.

Fish consumption is highest in the southern parts of the country, yet even in the north it is high relative to other types of animal protein (see Table 5.5). Annual per capita fish consumption in 1975 ranged from 56.2 kg in Abidjan to 7.4 kg in northern Ivory Coast. In contrast, in 1976 per capita beef consumption in Abidjan was 17.3 kg (Staatz, 1979, p. 59). The higher per capita fish consumption in the southern areas results from higher incomes and the lower absolute and relative price of fish in those areas. Data collected by the author in mid-1978 indicate that in Abidjan frozen fish cost 38 percent as much per kg as fresh bone-in beef, while in Bouaké it cost 48 percent and in Korhogo, 60 percent.

C. - The Evolution of Retail Fish Prices, 1967-78

Retail fish prices closely paralleled retail beef prices throughout the period 1967-78, as shown on Figure 5.1. (See Appendix F for the data underlying Figure 5.1.) Although prices of the two commodities generally moved in tandem from 1967 through 1978 there was some change in relative prices over the period (Table 5.6). Between 1967 and 1970 the price of fish rose relative to beef, then it generally fell from 1970 to 1976 as imports of frozen fish increased. It was during this period of decreasing relative prices that Ivorian consumers

TABLE 5.4

IMPORTS OF SMOKED, DRIED, AND FROZEN FISH INTO IVORY COAST, 1964-74 (tons)[a]

Year	Smoked/Dried Fish (Fresh Equivalent)	Frozen Fish
1964	17,016	1,678[b]
1969	N.A.	3,600
1970	N.A.	10,000
1971	13,500	15,300
1972	13,500	23,700
1973	N.A.	55,000
1974	2,418	74,000
1975	5,019	85,434
1976	3,960	105,608
1977	2,304	54,600

SOURCES: Lagoin, Y. and G. Salmon, Etude technique et économique comparée de la distribution du poisson de mer dans les pays de l'ouest africain: Etude régionale (Paris: 1967) pp. 43-5; Ministère de la Production Animale, Situation de la pêche en Côte d'Ivoire au 31 décembre 1976 (Abidjan, 1977), pp. 13 and unpublished data; and data from the Ministère de la Production Animale cited in the following sources: SIGES, Le marché du poisson (Abidjan: 1973), p. 2; Centre de Recherche Océanographique, La pêche industrielle en Côte d'Ivoire, (Abidjan: 1977), and Barry, M.B., Etude sur l'attitude des consommateurs ivoiriens envers les produits de la pêche traités (Abidjan: CIRES, 1978), pp. 8-9.

[a]Figures in this table do not agree exactly with the totals shown in Table 5.3 because different sources of data were used.

[b]Includes imports of both fresh and frozen fish.

N.A. = Not Available.

TABLE 5.5

PER CAPITA FISH CONSUMPTION BY REGION, 1975

Region[a]	Per Capita Consumption (kg)
Abidjan	56.2
South (excluding Abidjan)	38.8
East (Abengourou)	10.4
Center (Bouaké)	17.5
Center-West (Daloa)	24.8
West (Man)	8.8
North (Korhogo)	7.4

SOURCE: Calculated from data in Ministère de la Production Animale, Cinquième seminaire de la production animale, Cahier No. 1 (Abidjan, 1976) pp. 3-4.

[a]Regions are the administrative regions of the Ministry of Animal Production. The main city in each region is shown in parentheses.

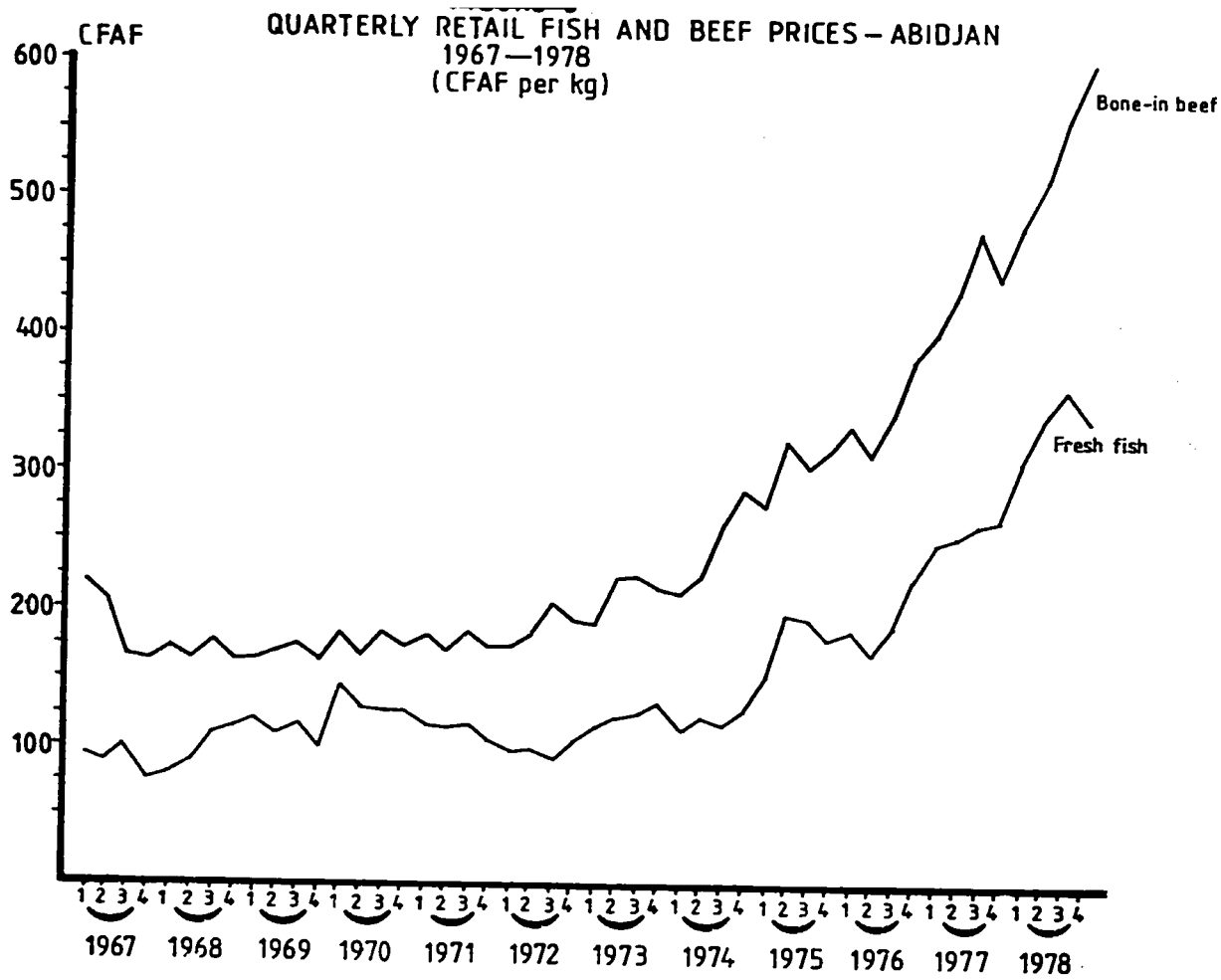
TABLE 5.6

RELATIVE PRICES OF FRESH BONE-IN BEEF, FRESH FISH, AND LIVE CHICKEN IN THE CLASS 2 MARKETS OF ABIDJAN, 1967-78

Year	Price of Fresh Fish / Price of Fresh Bone-in Beef	Price of Live Chicken (Dressed Weight Equivalent)[a] / Price of Fresh Bone-in Beef
1967	.48	1.73
1968	.58	2.01
1969	.66	1.76
1970	.74	2.03
1971	.62	1.93
1972	.52	2.00
1973	.60	1.89
1974	.49	2.02
1975	.54	1.94
1976	.52	1.95
1977	.56	2.00
1978	.61	2.15

SOURCE: Calculated from data in Appendix F.

[a]Dressed weight equivalent calculated assuming a 70 percent dressing-out rate.



Source: Data collected by the Ministère de l'Economie, des Finances, et du Plan, Direction de la Statistique.

began substituting fish for beef in their diet. Since 1976, however, the relative price of fish has been rising, and this can be expected to raise the demand for beef. Officials of AGRIPAC, one of the main importers of fish into Ivory Coast, expect the increase in fish prices that began in 1976 to continue for several years. Therefore, unlike the early 1970s, when most of the increase in demand for animal protein in Ivory Coast was met by increased fish consumption, in the next five to ten years, demand will have to be met in part by increased red meat consumption and be dampened in part by higher prices for both red meat and fish. Because fish plays such an important role in the food budget of most Ivorians, increases in fish prices could potentially increase the demand for beef in Ivory Coast dramatically during the next five to ten years.

III. - Poultry

A. - Production and Imports

The Ivorian government is counting on increased domestic production of poultry to make up a larger proportion of domestic animal protein consumption in the coming years. Both domestic production and per capita consumption of poultry apparently have increased modestly since the mid-1960s, although the exact magnitude of the increase is unclear because of poor data for the earlier years. SEDES (1969, Vol. I, pp. 120-21) estimated that in 1966 there were 6,000,000 fowl in Ivory Coast, and that these birds produced about 7,000 tons of meat and offals. This was complemented by 2,000 tons of poultry imported from neighboring countries, mainly Upper Volta. The 9,000-ton total supply represented an annual per capita consumption of about 2.0 kg. By 1977, domestic production had increased to 15,000 tons and imports stood at 2,500 tons (see Table 5.7). Per capita consumption in 1977 was 2.4 kg per year. In contrast to most other types of livestock, Ivory Coast is largely self-sufficient in poultry production, producing 86 percent of domestic consumption. Therefore, further increases in production will be aimed more at increasing total poultry consumption than at replacing current poultry imports.

Poultry (primarily chickens) are produced both in modern (housed) poultry farms and in traditional barnyard flocks in Ivory Coast. In 1977 there were 749 modern or improved poultry operations in Ivory Coast. Of these, 584 (78 percent) were located in the Abidjan region. Forty-seven percent of the operations around Abidjan produced broilers, 27 percent were engaged primarily in egg production (although culls were sold for meat), and 26 percent were mixed operations. Most of the improved farms were small by U.S. standards: 95 percent of the broiler operations had fewer than 4,000 birds and nearly 40 percent had fewer than 500 birds. The number of modern poultry operations grew very rapidly in recent years, in part because of strong government promotion and extension programs aimed at

encouraging people to go into poultry production. Sixty-five percent of all the modern poultry operations around Abidjan in 1977 had been in operation for less than one year (MPA, 1978a, pp. 12-16). Most of the eggs sold in urban areas are produced on modern poultry farms, and Ivory Coast is entirely self-sufficient in egg production.

TABLE 5.7

THE IVORIAN POULTRY SUPPLY IN 1977 (DRESSED WEIGHT + OFFALS)

	Tons	
Domestic Production		
Traditional Production	13,000	(13 million)[a]
Modern Poultry Farms	2,000	(1.5 million)[a]
Total: Domestic Production	15,000	
Imports		
Live Birds from Upper Volta	2,400	
Dressed Poultry from Europe	102	
Total Imports	2,500	
Total Availability, 1977	17,500	
Population, 1977 (Table 1.5)	7,242,000	
Availability per Capita	2.4 kg	

SOURCE: Calculated from data in Ministère de la Production Animale, Bureau des Projets, La production avicole en Côte d'Ivoire: programme de développement (Abidjan: 1978), pp. 12-26.

[a]Figures in parentheses are the estimated number of birds in each type of production system.

Most poultry production in Ivory Coast still occurs in small household flocks which are usually left to scavenge for food in the towns and villages where they are raised, although they are sometimes also fed household scraps. The birds are typically quite hardy, but not very productive, either in meat or eggs. Traditional production takes place mainly in the central and northern part of the country, with one percent of the birds located in the central region, 31 percent in the north, and 28 percent in the south. On a per capita basis there are over three times as many birds in the north (1.9 birds per person) than in the south (0.6 birds per person). In the central region there is one bird per capita.

B. - Trends in Per Capita Consumption and Prices

Although modern poultry farms accounted for only 13 percent of total poultry production in 1977, government development plans (described in the following chapter) call for them to make up 56 percent of total production in 1985. The plans envisage total production in 1985 equaling 40,000 tons, nearly three times the amount produced in 1977. Annual per capita consumption is projected as 4.1 kg, 70 percent above 1977 levels (MEFP, unpublished). To date, however, attempts to induce Ivorian consumers to substitute domestically produced poultry from these improved farms for imported beef have failed because poultry remains more expensive than beef. For example, in 1977 the cost of producing chickens in improved facilities in the central region of Ivory Coast (the area around Bouaké) was estimated at 690 CFA F per bird, or 657 CFA F per kg dressed weight (Ben David and Sanssens, 1978).[1] At this time, frozen bone-in beef sold in Bouaké for 375 CFA F per kg and fresh bone-in beef sold for 500 CFA F. The cost figure for poultry includes only the cost of production, not the marketing costs. Even if marketing costs (including transport costs and total profits to the producer and to the poultry merchant) were only 10 percent of production costs, poultry would retail at nearly twice the price of frozen beef (cf. Table 5.1). The figures in Table 5.6 indicate that in Abidjan between 1967 and 1978, chickens retailed (on a dressed weight equivalent basis) for about twice as much as fresh bone-in beef. The figures also suggest that chicken prices rose slightly relative to fresh beef prices between 1975 and 1978, even though fresh beef prices were increasing quite rapidly during this period.

The prospects for increased domestic production of poultry in the coming years and the impact this could have on the demand for beef are discussed in Chapter Six.

IV. - Pork

A. - The Pork Supply

Pork currently plays a minor role in the Ivorian diet, but the Ivorian government is counting on domestic pork production, like chicken production, to increase rapidly between now and 1990. Ivorian pork production did increase substantially between 1966 and 1977, nearly tripling from 2,200 tons to about 6,000 (Table 5.8). Annual per capita consumption is estimated to have increased from 0.5 kg in 1966 to 1.0 kg in 1977 (SEDES, 1969, Vol. I, p. 120; MPA, unpublished). Imports, mainly processed pork products from Europe, varied between 700 and 1,300 tons per year during the period 1974-77; they therefore accounted for about 20 percent of the total pork supply (MPA, 1978b, p. 6).[2]

TABLE 5.8

ESTIMATED PORK PRODUCTION IN IVORY COAST, 1966-77

Year	Number of Animals in Country	Offtake Rate (%)	Number of Animals Slaughtered	Average Carcass Weight (kg)	Meat Production (tons)	Offals Production (tons)[a]	Total Production (tons)
1967							
Traditional	100,000	60	60,000	25	1,500	150	1,650
Improved	11,500	75	8,500	60	510	51	561
Total	111,500		68,500		2,010	201	2,211
1974							
Traditional	200,000	60	120,000	25			3,427
Improved	25,000	80	20,000	65			1,287
Total	225,000		140,000				4,534
1975							
Traditional	216,300	60	129,000	25	3,245	325	3,570
Improved	25,000	80	20,400	65	1,327	133	1,460
Total	241,800		150,200		4,572	458	5,030
1976							
Traditional	235,200	60	141,100	25	3,527	353	3,880
Improved	29,000	80	23,200	65	1,509	151	1,660
Total	264,200		164,300		5,036	504	5,540
1977							
Traditional	254,000	60	152,400	25	3,810	380	4,190
Improved	31,000	80	24,800	65	1,610	160	1,770
Total	285,000		177,200		5,420	540	5,960

SOURCES: Data for 1966 and 1974 from Ministère de la Production Animale cited in D. Bollinger, Le marché Ivorien des volailles, des oeufs, des porcs, et de la charcuterie, (Suresnes, France: IDET-CEGOS, 1975), Vol. II, pp. 57, 87. Data for 1974-77 from Ministère de la Production Animale.

[a]Calculated at 10 percent of carcass weight.

B. - Characteristics of Domestic Pork Production

There are three modes of pork production in Ivory Coast: traditional village-level production, improved village-level production, and large-scale modern production. Traditional village level production, which accounts for about 70 percent of total production, involves raising small local breeds, which are left to roam the villages, scavenging for food. Improved village-level production occurs mainly in northern Ivory Coast. This type of production is often based on the Korhogo swine, a crossbreed of the Yorkshire and indigenous breeds, first developed in Ivory Coast in the 1930s. The pigs are grown out in traditional village conditions, then are penned in a small area for a one-to-two month fattening period. They are then shipped to major urban areas for sale (MPA, 1978b, p. 2).

Large-scale modern piggeries are located near major cities. These operations, based on the Korhogo and Yorkshire breeds, usually have 20 or more sows. The piggeries are owned both by full-time hog producers and by urban dwellers (often civil servants) who raise pigs as a secondary enterprise. The proportion of modern sector pork production accounted for by full-time producers increased from only 10 percent in 1972 to between 40 and 50 percent in 1977 (MPA, 1978b, p. 3).

Swine production takes place mainly around urban areas because agricultural by-products are more available in these areas for feed and because the cities offer a market for the hogs. In 1977, 149,000 head, or over half the total swine population, was living in the central region of the country, with 70 percent of these animals raised around the cities of Bouaké, Dimbokro, Daloa, and Bouaflé. About 110,000 head (39 percent of the total population) were located in the southern region of the country, of which 30,000 head were around Abidjan. The remaining 29,000 head (10 percent of the total) were located in the north, mainly around Korhogo (MPA, 1978b, p. 3).

C. - Marketing and Prices

Almost all traditional village-level pork production, which accounts for 70 percent of total pork production, is consumed in the village where it is produced and therefore does not enter the marketing system. Almost all modern sector and improved village level production does enter the marketing system, with Abidjan being by far the most important market. In 1977, the Abidjan market absorbed 1,512 tons of domestically produced pork meat and offals, or 94 percent of the total recorded pig slaughter in Ivory Coast. All other urban areas accounted for only 96 tons. (Calculated from data in MPA 1978b, pp. 5-6.)

Since most class 2 butchers in Ivory Coast are Moslems, very little pork is retailed through the class 2 marketing system. Most passes through the class 1 market although government plans call for increased sales to take place through small chain stores located throughout the country. Retail pork prices were under price control until 1974, when controls were lifted in an effort to stimulate domestic production. In 1977, in a further

move aimed at stimulating production, the government instituted a floor price for pigs. In the Abidjan region for example, butchers were required to pay 300 CFA F per kg liveweight for pigs, the equivalent of 429 CFA F per kg dressed weight (assuming a 70 percent dressing out rate). Since the cost of production was estimated at about 200 CFA F per kg liveweight, the price support was designed to guarantee the farmer and pig merchant a combined return of 8,000 to 10,000 CFA F per animal (MPA, unpublished).

Because pork prices were unregulated while beef and lamb prices were under price control until 1977, butchers apparently took high profit margins on pork to make up for the low margin they were forced to take on other meats. The Ministry of Animal Production estimated that the gross margin of wholesale and retail butchers accounted for 56 percent of the retail price of pork in class 1 establishments in 1974 (MPA, 1978b, p. 7). Therefore, even though pork could be produced domestically at a cost competitive with beef, pork sold retail at a price far above the price for which beef could be purchased on the class 2 market. For example, in July 1978, the retail price of different cuts of fresh pork in the class 1 market in Abidjan varied between 1,000 and 1,500 CFA F per kg, compared with a retail price of fresh beef on the class 2 market of 600 CFA F per kg. The high price of pork, coupled with its availability mainly through class 1 retailers, who are usually located in high-income areas away from the bulk of the population, has discouraged rapid expansion of pork consumption. If annual per capita pork consumption is to increase from 1.0 kg in 1977 to 3.9 kg in 1990, as current government plans envisage (MPA, 1978b, p. 11), a major challenge will be to develop a retail marketing network that can deliver pork to the consumer, in the form that he wants it, at a price competitive with beef. There is a potential market in urban areas for increased pork production, particularly for processed pork. In Abidjan, for example, an indigenous fast food industry, based on selling pork lunchmeat sandwiches to urban workers, has arisen in recent years. The problems of tapping this market, as well as other problems in expanding domestic pork production, are discussed briefly in the following chapter.

V. - Conclusions

This chapter has shown that Ivorian production and per capita consumption of fish, poultry and pork have all increased since the mid-1960s. The increase in per capita fish consumption was the most dramatic, rising from 17 kg in 1965 to 28 kg in 1976. This increased fish consumption resulted from huge increases in imports of cheap frozen fish. The frozen fish displaced imports of dried fish from Mali and increasingly substituted for beef in the Ivorian diet between 1970 and 1976. Decreased fish imports in 1977 and 1978, however, and the increasing price of fish relative to beef, suggest that the pattern of substitution may reverse itself between now and 1985. This could substantially increase the demand for beef and other meats in Ivory Coast in the next five to ten years.

Ivorian production and per capita consumption of poultry and pork increased modestly over the last decade. Government plans for poultry and pork production for the coming years are very ambitious, calling for domestic poultry production to nearly triple and pork production to increase by 3.6 times between 1977 and 1985 (MPA, 1978b, p. 9). The government counts on increased pork and poultry production to substitute for beef in the diet. In all likelihood, however, the projected level of production will not be met (for the reasons why, see Chapters Six and Seven), leading to further increases in the demand for beef and small ruminant meat. In the longer term (i.e. in the years after 1985), it is probable that an increasing portion of Ivorian meat consumption will be made up of domestically produced pork and poultry. Until at least 1985, however, the demand for beef in Ivory Coast should remain strong.

CHAPTER SIX

GOVERNMENT LIVESTOCK DEVELOPMENT POLICY AND THE OUTLOOK FOR DOMESTIC PRODUCTION

The Sahelian drought disrupted the flow of slaughter cattle and small ruminants into Ivory Coast and forced Ivorian policy makers to reassess government livestock policy. Prior to the drought, inexpensive slaughter cattle and small ruminants were readily available from the Sahelian countries; therefore, Ivory Coast gave little emphasis to developing domestic livestock production. Once the drought demonstrated how vulnerable Ivory Coast's meat supply was to external disruptions, however, the Ivorian government launched an ambitious program to increase domestic livestock production in order to reduce dependence on imports and assure a steady supply of meat. This chapter briefly outlines the policies and programs the Ivorian government undertook to increase domestic livestock production and describes the potential promise and problems of these programs.

The chapter is divided into five parts. Part I discusses how Ivorian livestock policy evolved during the 1970s and describes the institutions and programs the government established to stimulate domestic production. Part I also discusses the goals for livestock production that the government set for the country for 1977 through 1985. Parts II, III, and IV look more closely at government programs aimed at increasing domestic production of beef, small ruminants, poultry and pork In addition to describing the programs, the chapter develops estimates of the likely levels of domestic livestock production in 1985. Part V summarizes the major conclusions of the chapter and briefly discusses the production outlook for the years after 1985.

I. - The Evolution of Government Policy and Programs

A. - Livestock Development Strategy

As early as 1969 SEDES, using pre-drought data, warned that the Sahelian states would have difficulty satisfying Ivory Coast's growing demand for meat during the 1970s. SEDES pointed out that rapid increases in income, population, and urbanization during the middle and late 1960s were causing Ivorian demand for red meat to grow faster than the exportable surplus of slaughter animals from the Sahelian countries. SEDES therefore predicted that even in the absence of a drought Ivory Coast would face an increasing shortage of red meat during the early and mid- 1970s.

SEDES's predictions of a shortfall in the supply of meat and increasing meat prices during the early 1970s were not borne out, for two reasons. First, per capita incomes in

Ivory Coast failed to grow much after 1969, and this slowed the growth in demand for animal protein (see Table 1.9 and Figure 1.2 in Chapter One). Second, the large increase in the availability of cheap imported frozen fish (see Chapter Five) absorbed much of the increase in demand for animal protein that otherwise would have translated into higher demand for red meat.

Even though SEDES's forecast of a meat shortage in Ivory Coast was not immediately borne out, it became increasingly clear to Ivorian policy makers during the early 1970s that rising demand for animal protein in Ivory Coast, coupled with the effect that the Sahelian drought was having on the supply of slaughter animals, would soon lead to a shortfall in the supply of meat. This led the government, in 1973, to develop a policy aimed at increasing the country's self-sufficiency in animal protein in order to reduce the foreign exchange cost of importing fish and meat and to lower the vulnerability of the country to external supply disruptions (MEF and MPA, 1973). In addition, increased investment in domestic livestock production was seen as a way of fostering economic growth in the interior regions of the country, particularly the north. This coincided with a major political goal of the government, that of reducing regional disparities in income (MPA, 1977c, p. 12).

Ivorian officials saw two major obstacles to increasing domestic livestock production: the small number of breeding stock, particularly cattle, in the country; and the lack of a strong tradition of livestock raising among Ivorian farmers. The small number of breeding stock meant that even large percentage increases in domestic production would result in only small absolute increases in the amount of meat produced. To overcome this problem, the government decided to put major emphasis on producing animals with short reproductive cycles, such as chickens, swine, goats, and sheep, because meat production from these sources could be increased much more rapidly than beef production. The stated aim of the government became one of encouraging consumers, through advertising and induced changes in relative prices, to substitute domestically produced poultry, pork and small ruminant meat for imported beef. The implication of this policy was summarized in 1976 by Philippe Yace, then Secretary General of the P.D.C.I. (Ivory Coast's sole political party): "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" (cited in MPA, 1976, p. 3).

Yet if government policy emphasized small animal production, beef production was by no means ignored. One of the major goals of policy was to encourage the importation of cattle breeding stock so that subsequent percentage increases in domestic cattle production would translate into larger absolute increases in the amount of beef produced. The main way of doing this was by encouraging Fulani herdsmen from Mali and Upper Volta to settle permanently in northern Ivory Coast with their herds

In order to overcome the problem posed by the lack of a tradition of livestock and raising in Ivory Coast, the government opted for creating large-scale modern production

units, often run during their early years by foreign experts. At the same time, the government planned extension programs aimed at raising small-holder livestock production. Officials believed, however, that small-holder production could be increased only slowly during the early years of an extension program because Ivorian farmers had so little experience raising livestock. Therefore, initially the major increases in production would have to come from large-scale operations. The 1976-1980 Development Plan (PLAN 1976b) puts heavy emphasis on the development of large-scale farms, to be run by para-statal enterprises and private investors, for the production of beef, milk, poultry, and pork. To date, however, most of the large-scale units for beef and milk production that the Plan envisaged have not been established, forcing the government to put more emphasis on small-holder extension programs. In poultry and pork production, large-scale operations have been established, but the government has also put considerable effort into encouraging small-holder production.

B. - Government Institutions

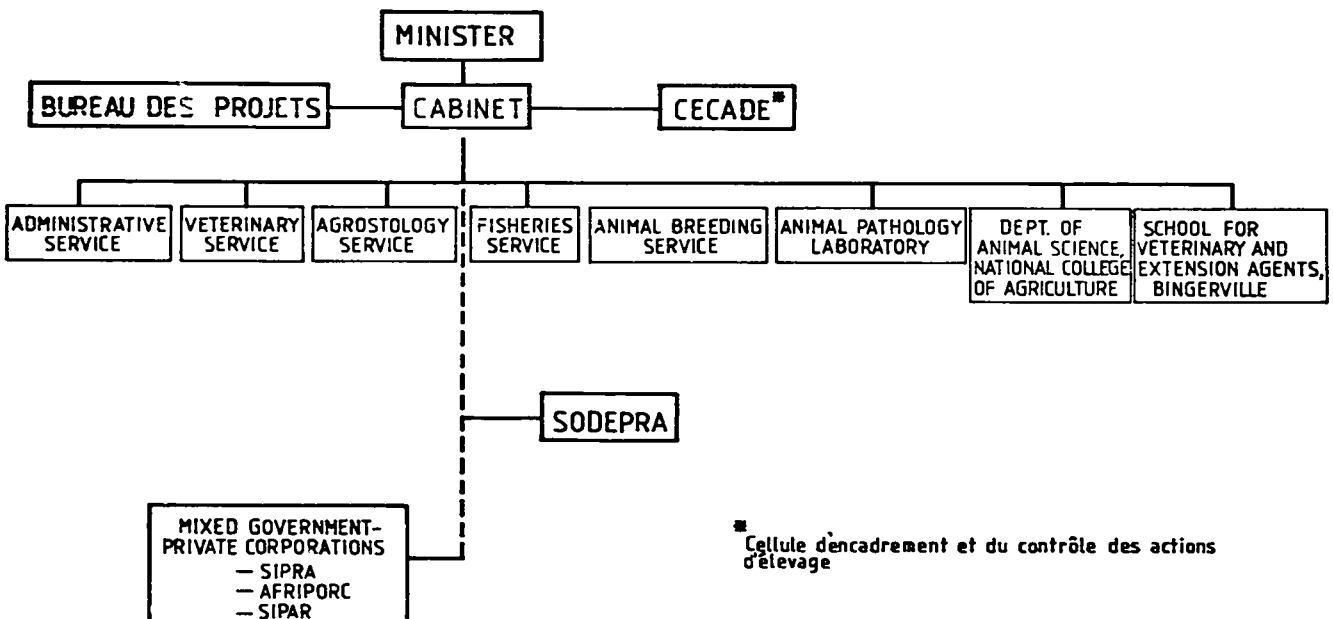
1) - Ministry of Animal Production and Related Agencies

In 1970, the Ivorian government established a separate Ministry of Animal Production to coordinate government programs aimed at increasing domestic livestock and fish production. The organization of the Ministry is shown in Figure 6.1. The main policy-making body of the Ministry is the cabinet. It includes not only the Minister's advisors but also a planning and evaluation unit (the bureau des projets) and a unit for carrying out technical research and pilot studies (the cellule d'encadrement et du controle des actions d'élevage). Directly responsible to the cabinet are eight subdivisions of the ministry, which are in charge of carrying out different aspects of the ministry's program. These include the Administrative Service, the Veterinary Service, the Agrostology Service, the Fisheries Service, the Livestock Breeding Service, the Laboratory of Animal Pathology, the Department of Animal Science at the National Agricultural College, and the school for veterinary and livestock agents. Of these eight subdivisions, the one most directly involved in livestock marketing is the Veterinary Service, which in addition to its health care duties runs most of the country's abattoirs and livestock markets.

In addition to the eight subdivisions of the ministry just listed, several semi-autonomous para-statals and mixed private/government corporations are under the Ministry of Animal Production. The most important of these is SODEPRA, the Société de Développement des Productions Animales. SODEPRA is the agency in charge of implementing most government livestock production projects. SODEPRA's activities include:

FIGURE 6.1

ORGANIZATION OF THE MINISTRY OF ANIMAL PRODUCTION



SOURCE: MA, 1978, Annex II, p.43

-- running extension programs for Ivorian livestock producers;
-- providing some veterinary care for farmers' animals, in addition to that provided by the Veterinary Service;
-- running a marketing service that purchases cattle from producers in northern Ivory Coast and sells the animals to butchers, farmers, and animal traction projects;
-- selling production inputs (feeds and supplements, tick sprays, etc.) to farmers;
-- developing water points for cattle in northern Ivory Coast;
-- managing three government cattle ranches which produce improved breeding stock for distribution to farmers;
-- running a feedlot in Ferkéssédougou for the fattening of imported and locally produced cattle;
-- managing a pastoral zone in northern Ivory Coast that was established for Fulani cattlemen who migrated with their herds to Ivory Coast from Mali and Upper Volta during the early 1970s;
-- working with other government agencies to establish producer cooperatives for the fattening of cattle and sheep (MA, 1978, Annex 2, pp. 41-56).

In addition to SODEPRA, three mixed ownership (government and private) corporations promote different types of animal production have been created. SIPRA (Société pirienne des Productions Animales) was established in 1976 to promote poultry production. PRA owns a large poultry farm, an egg-packing facility, and a poultry slaughterhouse tside of Abidjan. In addition to producing broilers and eggs, SIPRA is charged with selling proved day-old chicks to farmers and with running extension programs for small-scale ultry producers near its main poultry farm. It also handles the marketing of those oducers' chickens.

AFRIPORC is a corporation based in Dimbokro in charge of expanding pork production. owns a large pig farm in Dimbokro, and like SIPRA, is charged with running extension and arketing programs for small-scale producers in the surrounding area. SIPAR (Société pirienne de Peche et d'Armement) is in charge of increasing the catch of Ivory Coast's tuna et. Most of this tuna is exported. In addition to SIPRA, AFRIPORC, and SIPAR, the eation of a fourth corporation, this one in charge of large-scale sheep production, was der study in late 1978 (SEDES, 1978).

The increased importance the Ivorian government assigned to domestic livesto production is seen in the growth of the budget of the Ministry of Animal Production, whi tripled between 1970 and 1978 (although its relative share of the budget remained unchang -- see Table 6.1). The figures in Table 6.1 actually grossly understate the growth government involvement in animal production, since they mainly cover just the cost Ministry personnel. Beginning in 1974, investments in government livestock projects fr sources outside the main government budget grew phenomenally. (These sources includ the government special investment budget, foreign aid, and private investment in jo government-private corporations.) By June 1976, the government had secured 23.85 billi CFA F (US $108 million) from these outside sources to finance projects that ran from 19 through 1981. The average investment per year was 5.03 billion CFA F (US $22.85 million over five times the total salary bill for Ministry personnel in 1978 (MPA, unpublished).

TABLE 6.1

EVOLUTION OF THE BUDGET OF THE MINISTRY OF ANIMAL PRODUCTION: 1970-78 (in current CFA F)

Year	Personnel (Million CFA F)	Equipment (Million CFA F)	Total	
			Million CFA F[a]	Percent of Total Budget[b]
1970	329.4	189.1	518.5	1.0
1971	411.2	159.6	570.8	0.9
1972	419.4	173.4	592.8	0.9
1973	433.7	188.2	621.9	0.7
1974	500.3	230.1	730.4	0.7
1975	631.5	279.7	911.2	0.7
1976	668.3	225.0	896.5	0.6
1977	876.4	346.7	1,223.1	1.2
1978	1,026.8	413.7	1,458.5	1.1

SOURCE: République de Côte d'Ivoire, Ministère de l'Economie, des Finance et du Plan, Budget Général de Fonctionnement, various years.

[a]Total includes transfers to individuals and agencies.

[b]Percent of total Budget Général de Fonctionnement.

?) - Other Agencies Involved in Livestock Production and Marketing

In addition to the Ministry of Animal Production, the Ministry of Economics, Finance and Planning, the Ministry of Commerce, the Ministry of Agriculture, and the Ministry of Scientific Research are all involved in aspects of livestock production and meat marketing in Ivory Coast. The Ministry of Economics, Finance, and Planning is the most powerful ministry of the government. It draws up government development plans (based on information supplied by the technical ministries), arranges financing for projects, and along with the President's office, coordinates programs among ministries. All projects proposed by the Ministry of Animal Production have to be approved by the Ministry of Economics, Finance, and Planning; therefore, the latter can have a strong voice in livestock development policy.

The Ministry of Commerce is involved in the livestock sector in two ways: through its power to set retail control prices for beef and small ruminant meat in major cities and through its importation of frozen meat and fish. The Ministry of Commerce's role as price control agent has often put it in conflict with the Ministry of Animal Production. Officials of the Ministry of Animal Production have argued that control prices for meat should be increased (or entirely eliminated) in order to stimulate domestic livestock production. Ministry of Commerce officials, however, have thus far argued successfully that control prices should remain at their current levels. These officials believe that relaxing price controls would lead to rapid price increases. These, in turn, would increase the consumer price index, which is used in determining minimum wages. Thus, increases in meat prices might lead to increases in the wage structure of Ivorian industry, which could hurt Ivory Coast's competitive position in the world market. Rapid price increases would also hurt the urban poor, which could lead to political unrest.

The Ministry of Commerce, through its para-statal enterprises PAC (which until 1978 consisted of two separate companies, DISTRIPAC and AGRIPAC) has in effect a monopoly on chilled and frozen meat and fish imports into Ivory Coast. Therefore, decisions by PAC on how much to import, at what price to sell, etc., have great influence on the market for ed meat in Ivory Coast. To date, PAC has not coordinated these decisions with the evelopment policies of the Ministry of Animal Production, and some ministry officials view PAC as undercutting their efforts to increase domestic meat production.

The Ministry of Agriculture, in collaboration with regional development agencies, romotes livestock production through programs aimed at increasing mixed farming and the se of animal traction in northern and central Ivory Coast. The Ministry of Scientific esearch conducts much of the animal breeding and economics research on livestock in Ivory oast. This Ministry runs the major livestock research station in the country and is in harge of the Ivorian Center for Social and Economic Research (CIRES), which conducts tudies on the economics of livestock production and marketing.

A final state agency that has a large influence on livestock marketing in Ivory Coast the RAN (Régie de Chemin de Fer Abidjan-Niger), the railroad that runs between Abidj and Ouagadougou. The RAN, which is jointly owned by the Ivorian and Voltaic government has a strong influence on the cattle and small ruminant trade through the rates it charg for shipping livestock and through its policies regarding how livestock are transport between Upper Volta and Ivory Coast (see Chapter Three).

C. - Production Goals

The 1975-80 National Development Plan (PLAN, 1976b; PLAN, 1977b) set for extremely ambitious goals for increased domestic livestock and fish production. Betwe 1975 and 1985, beef and pork production were to quadruple, poultry production was increase by a factor of 3.7, small ruminant production was to increase by a factor of 3.5, a fish production was to triple. By mid-1978, however, it became clear that these producti goals could not be met. The Ministry of Economics, Finance and Planning therefore drew revised production goals, which are presented in Table 6.2. These production goals are st very ambitious, calling for annual increases in production ranging from 9.9 percent for fi to 15.3 percent for pork. Overall, the plans call for domestic production of beef, sm ruminant meat, poultry, and pork to increase from 33,100 tons in 1977 to 91,000 tons 1990, an annual rate of increase of 13.5 percent. Annual per capita consumption of the four meats is projected as rising from 11.2 kg in 1977 to 15.9 kg in 1985, an annual rate increase of 4.5 percent. The growth in per capita consumption is apparently based on t assumption that per capita incomes will increase and rapid urbanization will continue. P capita beef consumption is projected as growing much more slowly than consumption other types of meat. This assumes that the government will be successful in encouragi consumers to substitute domestically produced pork, poultry, and small ruminant meat f imported beef.

Despite the rapid increase planned for domestic livestock production, imports of be are projected to increase at an annual rate of 5.7 percent between 1977 and 1985, and sm ruminant imports are projected to grow at 6.5 percent per year during this period. In likelihood, however, neither domestic production nor per capita consumption will grow rapidly as shown in Table 6.2. Nonetheless, imports of beef, small ruminants, and fish a likely to increase between 1980 and 1985. The remainder of this chapter discusses h domestic livestock production is likely to increase through 1985. The following chapt looks at the likely growth of demand and the need for imports.

TABLE 6.2

IVORIAN GOVERNMENT PROJECTIONS OF ANIMAL PRODUCTION, IMPORTS, AND PER CAPITA CONSUMPTION, 1977-85

Type of Production	1977	1978	1979	1980	1981	1985	Percentage Increase 1977-85	Annual Rate of Growth[a] (Percent)
Beef								
Domestic Production (tons)	8,200	9,400	10,550	12,000	13,500	21,000	167	12.5
Imports (tons)	39,800	43,600	46,500	48,000	49,500	54,000	36	3.9
Total Supply (tons)	48,000	53,000	57,050	60,000	63,000	75,000	56	5.7
% Domestically Produced	17.0	17.7	18.5	20.0	21.4	28.0		
Per Capita Consumption (kg/year)	6.6	7.1	7.3	7.4	7.5	7.8	18	2.1
Small Ruminants								
Domestic Production (tons)	3,500	3,800	4,300	5,000	5,700	10,000	186	14.0
Imports (tons)	5,600	5,900	6,300	7,100	7,400	9,300	66	6.5
Total Supply (tons)	9,100	9,800	10,700	12,100	13,200	19,300	112	9.8
% Domestically Produced	38.5	38.6	40.3	41.3	43.2	51.8		
Per Capita Consumption (kg/year)	1.2	1.3	1.4	1.5	1.6	2.0	67	6.6
Pork								
Domestic Production (tons)	6,400	6,800	7,700	8,800	10,000	20,000	213	15.3
Imports (tons)	900	1,300	1,300	1,300	1,200	-700	Eliminated	-
Total Supply (tons)	7,300	8,100	9,000	10,100	11,200	19,300	164	12.9
% Domestically Produced	87.7	84.0	85.5	87.1	89.2	104.0		
Per Capita Consumption (kg/year)	1.0	1.1	1.2	1.3	1.3	2.0	100	9.1
Poultry (meat)								
Domestic Production (tons)	15,000	16,200	17,800	20,000	23,000	40,000	167	13.1
Imports (tons)	2,200	2,000	1,500	1,000	500	-	Eliminated	-
Total Supply (tons)	17,200	18,200	19,300	21,000	23,500	40,000	133	11.2
% Domestically Produced	87.2	89.0	92.2	95.2	97.9	100.0		
Per Capita Consumption (kg/year)	2.4	2.4	2.5	2.6	2.8	4.1	71	6.9

TABLE 6.2 - CONTINUED

Type of Production	1977	1978	1979	1980	1981	1985	Percentage Increase 1977-85	Annual Rate of Growth[a] (Percent)
Fish								
Domestic Production (tons)	114,500	110,400	131,000	152,500	176,000	226,000	97	9.9
Imports (tons)	58,300	81,300	95,700	104,500	102,000	145,000	149	12.1
Exports (tons)	17,700	18,700	26,600	33,600	33,600	37,000	109	9.7
Total Supply (tons)	155,100	173,300	200,100	223,400	244,400	334,000	115	10.0
% Domestically Produced[b]	62.4	53.1	52.2	53.2	58.3	56.6		
Per Capita Consumption (kg/year)	21.5	23.3	25.4	27.5	28.6	35.0	63	6.3

SOURCE: République de Côte d'Ivoire, Ministère de l'Economie, des Finances, et du Plan, unpublished data.

[a]Compound rate of growth.

[b](Domestic Production-Exports) ÷ Total Supply

II. - Beef Production

Government efforts to increase domestic beef production include extension programs (encadrement) for farmers and herdsmen and direct government participation in large-scale production units.

A. - Extension Programs

Most of the extension effort for cattle has focused on the northern part of the country. The extension effort, run by SODEPRA, is divided into two distinct programs: Opération Taurin and Opération Zébu. Opération Taurin works with sedentary agriculturalists who own small trypano-tolerant taurin cattle. Opération Zébu works with transhumant Fulani herdsmen who have recently migrated to Ivory Coast with their zebu cattle.

1) - Opération Taurin

By mid-1977, 165,700 head of taurin cattle, 49 percent of all taurins in the country, were in herds covered by SODEPRA extension programs (SODEPRA, 1977, p. 1). The extension programs, which began in 1974, try to increase production from these herds through better veterinary care and improved management practices. The veterinary care includes vaccinations, regular treatment for internal parasites, and spraying for ticks. The improved management practices include provision of mineral and protein supplements to the animals, early castration of males not intended for breeding, improved grazing and watering schedules, and reduced milking of cows to improve calf nutrition. Although many of the services were provided by the extension agents in the early stages of the program, increasingly SODEPRA is just selling the production inputs (tick sprays, etc.) to the producers, who administer the inputs themselves.

Initially SODEPRA worked primarily with the cattle owners rather than with the owners' hired Fulani herdsmen. Some SODEPRA officials apparently viewed the hired herdsman as an obstacle to livestock development. (For example, it was often alleged that the Fulani herdsmen over-milked cows in order to obtain more milk to sell or consume themselves, in the process leaving little for the calves.) Much of the extension effort therefore went into trying to convince cattle owners to take a larger role in the management of their own herds. This effort apparently met with little success, and by mid-1978 SODEPRA has begun including the hired Fulani herdsmen in its extension programs. Since SODEPRA's extension programs have been in operation only a few years, it is too early to tell what effect they have had in increasing cattle production in Ivory Coast.

In addition to its extension work, SODEPRA has promoted the creation of small village-level feedlots, run by cooperatives of cattle owners in each village. In 1978 there

were eighteen of these feedlots, each containing from fifty to 100 animals. The animals ar fed a ration of rice milling by-products and cottonseed cake. In addition to the feedlot SODEPRA had created eight village cooperatives specialized in growing out young anima and one cooperative specialized in cow-calf operations. Further expansion of villag cooperatives has been hindered by a lack of feed, especially rice milling by-products. Th feed shortage is a problem common to most types of livestock production in Ivory Coast an is discussed in more detail in the section below on poultry and pork production.

SODEPRA runs a marketing service, which offers to buy animals from any her covered by SODEPRA extension programs. In 1976-77, sales to SODEPRA accounted for 2 percent of the total sales from these herds (SODEPRA, 1977, p. 39). Plans also called fc SODEPRA to launch a program of well-digging in 1979 to provide dry season waterpoints fc livestock in northern Ivory Coast.

2) - Opération Zébu

Opération Zébu tries to encourage Fulani herdsmen who migrated with their herc from Mali and Upper Volta during the drought to settle permanently in northern Ivory Coast The program also tries to regulate the transhumance of Fulani cattle in the north so as t minimize conflicts with farmers over crop damage.

A major element of Opération Zébu has been the creation of a pastoral zone for th Fulani near Boundiali. This zone (the Zone Pastorale de la Palé) is intended to provide grazing area for 30,000 zebus, roughly 20 percent of the zebu population in 1977. The zon contains a number of improvements, including roads, dipping tanks, and wells, which wer financed by USAID. An extension program is being developed for the Fulani, and their rang management practices in the Palé will be closely supervised. SODEPRA envisages cattl production within the Palé as being intermediate between traditional extensive rang production and intensive ranch production. The Palé is scheduled to be fully operational b 1991, in 1977 it had 2,000 head of cattle. Heavier than expected tsetse infestation and th encroachment of crop farmers into the area may prevent the Palé from reaching its planne capacity of 30,000 head.

In addition to the Palé, Opération Zébu has tried to identify and improve small (roughl 5 km x 5 km) "microzones," which currently are not farmed, that would be suitable for Fulan to settle in with their herds. The Ministry of Animal Production has proposed tying a whol network of these microzones, located between Niéllé and M'bingué, into a single mixe farming-livestock raising area, called the Agro-Pastoral Zone of Lokpoho. This zone woul be capable of supporting 30,300 UBT,[2] the equivalent of about 25,000 zebus (MPA an BNETD, 1977). As of mid-1978, however, funding had not been found for the Lokpoh project.

In addition to its extensive programs, SODEPRA operates five border stations for imported slaughter cattle as part of Opération Zébu. These stations, which include veterinary facilities, markets, and small abattoirs, were built in conjunction with cattle trails in northern Ivory Coast to help regulate flows of trade cattle into the country and reduce the incidence of crop damage by trade herds.

B. - Direct Government Participation in Cattle Production Projects

The Ivorian government is directly involved in cattle production through its three ranches, its feedlot, and the stocking of cattle in state-owned palm plantations. The National Development Plan also calls for indirect state participation in the establishment of medium and large sized private cattle ranches (moyennes entreprises and élevages industriels).

SODEPRA runs three state-owned ranches, at Sipilou (near Man), Abokouamikro (near Yamoussoukro), and the Marahoue valley (near Mankono). The primary goal of these ranches is the production of improved N'dama breeding stock for distribution to Ivorian cattle producers, not the production of slaughter stock. Nonetheless, these ranches, which have a combined capacity of 38,000 head, do make some contribution to domestic beef production.

SODEPRA also operates a large feedlot near the sugar refinery at Ferkéssédougou. This facility fattens imported zebus and locally-produced taurins on a ration of molasses, cut-forage and cottonseed. The facility was originally intended to fatten only imported zebus, but by mid-1978 it was relying increasingly on locally-produced taurins. (Many of these taurins had previously gone through village feedlots.) The shift to taurins was partly due to SODEPRA's difficulty in obtaining enough zebus at the prices it was willing to pay. When offered SODEPRA's price (160 to 170 CFA F per kg liveweight), most cattle merchants preferred to continue with their zebu herds on to Abidjan or Bouaké.

The Ferkéssédougou feedlot was originally designed to have a capacity of 16,000 head per year, with each animal gaining between 75 and 100 kg over a six-month period. Additional feedlots were planned as Ivory Coast opened new sugar refineries in other parts of the country. Discussions with the manager of the Ferkéssédougou feedlot in 1978, however, indicated that he did not expect his facility to fatten more than 12,000 head per year when fully operational. Further expansion of feedlots in conjunction with expanded sugar production also appears questionable because the additional sugar refineries themselves probably would not be economically viable. Production from the Ferkéssédougou refinery completely satisfies domestic sugar consumption; additional production would have to be exported. The cost of producing sugar in Ivory Coast, however, is approximately US $ 0.23 per pound, compared with an IBRD forecast average world price during the 1980-85 period of only US $0.10 per pound (IBRD, 1977). Therefore, it appears that expanded sugar production could be maintained only at the cost of high government subsidy, something the Ivorian government is becoming increasingly loath to do, given the economic slowdown in the country.

SODEPALM, the para-statal agency in charge of oil palm production, has stocked trypano-tolerant cattle in its palm plantations since 1974. SODEPRA uses one of these herds as a source of improved Baoulé breeding stock for distribution to other cattle raisers. SODEPALM benefits from the cattle operation in two ways: sale of animals increases SODEPALM revenues and grazing by the cattle keeps down grasses in the plantations, considerably reducing labor costs. To date this program has worked very well, and plans call for a total of 30,000 head to be in palm plantations by 1984 (PLAN, 1976, Vol. III, Part I, p. 189; SODEPALM, 1977).

The 1976-80 National Development Plan also called for the state to participate indirectly, by extending subsidized credit and technical advice, in establishing private and cooperatively owned medium-sized ranches (moyennes entreprises). By mid-1978, however, none of the ranches had been established. Similarly, large-scale private ranches, also projected in the Plan, have not yet materialized. The impact of both these types of ranches, if any, on domestic beef production is likely to be very small before 1985.

C. - Projected Production in 1985

Table 6.3 presents a detailed picture of the Ivorian government's projection of domestic beef production in 1985. The projection, which shows domestic production exceeding 21,000 tons in 1985, is based on several very optimistic assumptions. For example, the taurin population, which historically has grown at about 3 percent per year, is hypothesized to double its growth rate to an average rate of 6 percent between 1977 and 1985. Large and medium-scale private cattle ranches, which were not even under study by investors in 1978, are hypothesized to stock 40,000 head by 1985.

Table 6.4 presents the author's revised estimate of Ivorian beef production in 1985. The projected production of 15,200 tons is based on somewhat more realistic assumptions about herd growth and project implementation. It should be noted, however, that the assumptions underlying Table 6.4 still assume a high degree of success in implementing most cattle development projects. For example, the village-level taurin population is assumed to grow at 4.1 percent annually between 1977 and 1985. This is based on the assumption that SODEPRA will succeed in raising by 50 percent (to 4.5 percent annually) the growth rate of herds covered by its extension programs. SODEPRA programs are projected to cover 70 percent of the taurin population in 1985, the same percentage as shown in Table 6.3. It is further assumed that the production goals of the state ranches and palm plantations will be met, and that meat production from zebus will be close to the level projected by the government. The projected production of fattened cattle, however, is estimated at a maximum of 15,000 head by 1985, for the reasons cited earlier. Furthermore, the contribution of medium and large-scale private ranches to domestic production is projected as being negligible in 1985. Nonetheless, the total projected production of 15,200 tons

TABLE 6.3

IVORIAN GOVERNMENT'S PROJECTION OF DOMESTIC BEEF PRODUCTION IN 1985

Type of Production	Number of Animals	Offtake Rate (percent)	Average Carcass Weight (kg)	Meat Production (tons)	Edible Offals (tons)	Total Production (tons)
Village-Level Taurin Production						
Covered by Extension Programs	415,000	11	109	4,980	1,245	6,225
Not Covered by Extension Programs	175,000	14	80	1,960	490	2,450
Zebu Production	250,000	12	150	4,500	1,125	5,625
State Ranches	35,000	N.A.	N.A.	N.A.	N.A.	665
Palm Plantations	20,000	N.A.	N.A.	N.A.	N.A.	350
Large Scale Ranches and Pilot Projects	10,000	N.A.	N.A.	N.A.	N.A.	180
Medium Sized Ranches	30,000	N.A.	N.A.	N.A.	N.A.	495
Fattening of Imported Zebus	45,000	100	117[a]	5,265[a]	—	5,265[a]
TOTAL						21,255

SOURCE: Ministère de l'Economie, des Finances, et du Plan, unpublished data.

[a]Additional weight gain only.

N.A. = Not available.

— None

TABLE 6.4

REVISED PROJECTION OF IVORIAN BEEF PRODUCTION IN 1985

Type of Production	Number of Animals	Offtake Rate (percent)	Average Carcass Weight (kg)	Meat Production (tons)	Edible Offals (tons)	Total Production (tons)
Village-Level Taurin Production						
Covered by Extension Programs	357,000	11	109	4,282	1,071	5,353
Not Covered by Extension Programs	153,100	12	80	1,470	1,368	1,838
Zebu Production	250,000	12	145	4,350	1,088	5,488
State Ranches	35,000					655
Palm Plantations	20,000					350
Large Scale Ranches and Pilot Projects	Nil					Nil
Medium Sized Ranches	Nil					Nil
Fattening of Imported Zebus	15,000	100	100[a]	1,500[a]	—	1,500[a]
TOTAL						15,194 ≈ 15,200

[a]Additional weight gain only.

— None.

should still be considered a very optimistic forecast of domestic production. To attain this level, domestic production will have to double between 1977 and 1985, growing at an annual rate of 8.8 percent.

III. - Small Ruminant Production

A. - Government Programs

SODEPRA runs programs aimed at increasing small ruminant production, but to date the programs have been much less extensive than the cattle programs. Efforts have focused exclusively on sheep. They include village-level extension programs and the establishment of a research station for sheep at Béomi (near Bouaké). The establishment of a large-scale sheep farm, capable of producing 12,000 head per year, is also under study.

In mid-1978, extension programs for sheep were in operation only in the central region of the country, although SODEPRA planned to begin programs in the north in 1979. The program in the central region began in late 1976, and by mid 1978, it covered about 80 flocks, each with from 50 to 100 head. The extension program focuses on veterinary care and improved management practices, with heavy emphasis on the latter. Villagers, who traditionally allow their sheep to roam at will around the village, are encouraged to build night corrals, establish grazing schedules, regulate the animals' breeding, and provide dietary supplements. SODEPRA hopes that such actions will reduce the very high lamb mortality in Ivorian herds (see Chapter Four).

In addition to its extension activities, SODEPRA has organized a few village-level cooperatives to fatten sheep for sale at Tabaski. SODEPRA was also planning to begin a marketing service for sheep in the central region of Ivory Coast in 1979.

The Centre National Ovin (CNO) was established in 1978 in Béomi. CNO will conduct research on forage production and improved sheep management practices. It will also carry out breeding research, with the goal of producing improved Djalonké breeding stock for distribution to producers (MPA, 1976a, p. 3). Given the time needed to establish a research program and develop improved breeding stock, the main impact of CNO's work will probably be felt after 1985.

B. - Projected Production in 1985

The government producion goals presented in Table 6.2 show domestic small ruminant production nearly tripling between 1977 and 1985, growing at an annual rate of 14 percent. Given that current herd growth is practically nil (see Chapter Four) and that less than 0.5 percent of all small ruminants in Ivory Coast were covered by SODEPRA extension programs in 1978, this production goal appears much too optimistic. The high mortality rates among

young stock and the poor management of most small ruminant herds in Ivory Coast imply much room for increased production. It will take time, however, to establish the extension and veterinary programs needed to obtain it. Given that the extension programs began only in 1976, it seems unlikely that between 1977 and 1985 small ruminant production will grow at much more than 5 percent per year. A 5 percent annual growth rate would result in about 5,200 tons of small ruminant meat and offals being produced in 1985, 49 percent more than in 1977.

IV. - Pork and Poultry Production

A. - Government Programs

Government plans to increase poultry and pork production are similar in that they call for an increasing proportion of production to be met by newly-established farms using improved production techniques. Whereas these modern farms accounted for only 13 percent of total poultry production in 1977, government plans call on them to produce 56 percent of total production in 1985 (Table 6.5). Similarly, modern farms are to increase their share of total pork production from 30 percent in 1977 to 73 percent in 1985. It should be noted, however, that although the Ministry of Economics, Finance, and Planning called for poultry production to total 40,000 tons in 1985, the Ministry of Animal Production, which is in charge of implementing the government poultry programs, forecast 1985 production at only 36,000 tons (MPA, 1978a, Part 2, p. 4).

Central to the government's development strategy for poultry and pork are two mixed government-private corporations, SIPRA and AFRIPORC. These corporations have established large poultry and pork farms and will help smaller producers by selling them breeding stock, running some extension programs, and marketing their output. In addition to its participation in SIPRA and AFRIPORC, the government will encourage poultry and pork production through SODEPRA extension programs, subsidized loans to producers, construction of feed plants, distribution of feed, and experimentation into different ways of marketing the increased output, particularly pork.

B. - Constraints to Production

There are fewer technical problems in expanding poultry and pork production in Ivory Coast than in expanding ruminant production. The main technical constraint to rapid expansion of pork production during the next three to five years, for example, will be a shortage of improved breeding stock. There are serious economic constraints to expanded production, however. The most important of these are obtaining an adequate feed supply at reasonable cost and finding a profitable market for the increased production.

TABLE 6.5

GOVERNMENT PRODUCTION GOALS: TRADITIONAL AND MODERN POULTRY AND PORK PRODUCTION
(in tons)

Type of Production	Estimated Production in 1977	Projected Production in 1985
Poultry		
Traditional Sector	13,000	17,800
Modern Sector	2,000	22,200
Total	15,000	40,000
Percent from Modern Sector	13	56
Pork		
Traditional Sector	4,190	5,796
Modern Sector	1,770	15,735
Total	5,960	21,531
Percent from Modern Sector	30	73

SOURCE: Poultry: Ministère de l'Economie et des Finances, unpublished data. Pork: Ministère de la Production Animale, Bureau des Projets, Programme de développement de la production porcine, (Abidjan: 1978), p. 9.

1) - Feed Constraint

Almost all livestock development programs in Ivory Coast rely at least in part on agricultural by-products as a source of feed. The two most widely used by-products have been molasses and rice-milling by-products (farine basse de riz). The rationale for using by-products for feed is that they cost much less than grain or forage grown for feed. Yet, when many different livestock projects all begin using these by-products at the same time, demand for them increases markedly. The result is usually higher prices and/or shortages of the by-products. In such circumstances, it is usually poultry producers who can afford to bid away most of the by-products from other users because poultry are more efficient than other types of livestock in converting the by-products into meat.

It appears that the situation described above was already occurring in Ivory Coast as early as mid-1978, when poultry producers (and to a lesser extent, pork producers) from southern Ivory Coast were travelling as far as Korhogo in northern Ivory Coast to try to buy rice-milling by-products for their animals. (As mentioned earlier, the lack of this by-product hindered expansion of village-level feedlots for cattle in northern Ivory Coast.) If pork and poultry production are to increase as rapidly as projected, expanded supplies of low-cost feed in addition to rice by-products must be found. (Unlike ruminants, poultry and

pork cannot rely on the range for feed.) Although some plans call for using molasses from new sugar refineries to fatten pigs and small ruminants, this proposition becomes questionable because the sugar refineries themselves do not appear to be economically viable (see section II-A.2 above). The Ivorian government is also encouraging corn production as a source of feed, but it remains open to question whether grain-fed poultry and pork can be produced in Ivory Coast at a price competitive with beef.

2) - Marketing Constraint

Pork and poultry producers may face problems finding remunerative markets for their expanded production. The problem is most serious with pork, very little of which currently passes through the class 2 (general) market because most class 2 butchers are Moslem. Expanding pork consumption will therefore require developing a new marketing network for pork. One alternative discussed by government officials is the development of new forms of processed pork products for distribution through chain stores and the class 2 market. Processing facilities for pork exist in Abidjan, although currently they produce only small amounts for the class 1 market. A modern, privately owned facility capable of processing 78,000 pigs per year was closed in 1978, after only a year of operation, because it could not operate near enough to capacity to make a profit.

For poultry, the main question is whether it will be possible to produce and market poultry at a price competitive with beef. As shown in Chapter 5, it was not possible to do so in 1977. Whether rising beef prices, coupled with technical improvements in poultry production, will significantly improve the competitive position of poultry remains to be seen. Currently, 57 percent of the cost of poultry production in Ivory Coast is accounted for by the cost of feed (Ben David and Sanssens, p 10); therefore, developing inexpensive sources of feed will play a crucial role in determining the future market for poultry.

C. - Projected Output

Because of the feed and marketing constraints outlined above, the government's 1985 production goals for poultry and pork appear over-zealous. It is possible that production of pork and poultry could double between 1977 and 1985 (to 12,000 tons and 30,000 tons, respectively), but even this would require substantial success in developing cheap feed sources and market outlets for the increased production. The figures of 12,000 tons of pork production and 30,000 tons of poultry production are used in the next chapter in formulating estimates of import requirements for red meat in 1985. It should be understood, however, that these figures assume considerable success in government livestock development programs.

V. - Conclusions and the Outlook After 1985

Beginning in the mid-1970's the Ivorian government launched a large number of programs aimed at increasing domestic livestock production and reducing the country's dependence on livestock imports. Over $100 million in investments were committed to livestock projects covering a ten-year period. Nonetheless, absolute increases in production during the early years of most of the projects will be modest because the country is starting from such a low initial level of production. Many of the programs call for the establishment of extension programs and the setting up of large-scale production units, which may require several years of start-up time before they add significantly to domestic production. Nonetheless, Ivorian livestock production will increase during the coming years. On the assumption that most government livestock programs will be fairly successful, this chapter projects that Ivorian red meat and poultry production will total 62,400 tons in 1985: 15,200 tons of beef; 5,200 tons of small ruminant meat; 12,000 tons of pork; and 30,000 tons of poultry. In the years after 1985, an increasing proportion of Ivorian meat consumption will probably be met by domestic production, particularly of small stock. Considerable scope exists for expansion of small ruminant and poultry production. Nonetheless, given the low level of current domestic livestock production, Ivory Coast will continue to import at least some of its meat supply through the year 2000.

CHAPTER SEVEN

THE GROWTH OF DEMAND AND ITS IMPLICATIONS FOR POLICY

Demand for beef and small ruminant meat in Ivory Coast will continue to grow through 1985 because of rapid population growth and urbanization, changes in per capita incomes, and changes in the prices of substitutes for these meats, particularly fish. The first part of this chapter discusses how these changes will affect the demand for beef and small ruminant meat in Ivory Coast and develops estimates of the demand for these meats in 1985 under differing sets of assumptions. These demand estimates are combined with the projections of domestic production developed in Chapter Six to derive estimates of Ivory Coast's import needs in 1985. The second part of the chapter discusses the implications for government and donor livestock policies of this future pattern of demand, and examines the policy implications of the other major findings of the report.

I. - The Growth in Demand For Red Meat Through 1985

A. - Determinants of Demand

The growth in demand for beef and small ruminant meat in Ivory Coast through 1985 will depend on population growth, urbanization, the growth of per capita income, and the prices of major substitutes, such as poultry, pork, and fish. Ideally, one would like to statistically estimate a demand equation for red meat taking all these factors into account, then use the estimated parameters, along with projections of the growth in population, per capita incomes, etc., to forecast future demand for red meat. Unfortunately, a lack of accurate historical data on several of these factors (e.g., pork and poultry prices, rates of urbanization) forces the author to adopt a more pedestrian approach to the projection of future demand. This approach is based on the following equation, which can be used to represent the growth in demand for any food:

$$d = p + (n)(i)$$

where:

d = percentage change in the quantity demanded;

p = percentage change in population;

n = income elasticity of demand (the percentage change in the quantity demanded per percentage change in real income); and

I = the percentage change in real income.

This equation ignores the impact of increasing urbanization and changes in the prices of substitutes, but it gives a base estimate, which then can be adjusted subjectively to take account of these other factors.

1) - Population Growth and Urbanization

Ivorian planning officials have developed two alternative projections of population growth through 1990. These projections are presented in Chapter One, Table 1.8. The first projection assumes that population growth, including immigration from neighboring countries, will slow only slightly between 1975 and 1985 and that rapid urbanization will continue. This projection foresees an annual rate of population growth of 4.1 percent between 1975 and 1985 and an annual growth of urban population of 8.5 percent. The second projection assumes that the Ivorian government will succeed in substantially reducing immigration from neighboring countries between 1975 and 1985 and that the rate of urbanization will fall because of improvement in social services and better employment opportunities in rural areas. This projection foresees total population growing at 3.3 percent annually between 1975 and 1985 and urban population growing at 6.6 percent annually. Therefore, population growth alone will cause demand for red meat to grow annually by between 3.3 and 4.1 percent. Even if the government is somewhat successful in curbing immigration, when the effect of urbanization is taken into account, demand will probably rise by a minimum of about 4 percent per year as a result of population growth and urbanization.

2) - Income Growth

As real incomes increase, consumers tend to raise their consumption of red meat. The amount that demand increases with a change in real income is expressed by the income elasticity, which is the percentage change in the quantity demanded per percentage change in real income. Shapiro (1979, p. 56) estimated the income elasticity of demand for beef in Abidjan at about 0.55. One would expect the income elasticity to be somewhat higher in rest of the country, where incomes and per capita meat consumption are lower than in Abidjan. Data from SEDES (1967) indicate that the income elasticity of demand for all meat and fish is about 0.7 in the southeast part of the country. For the country as a whole, then, an income elasticity of demand for red meat of between 0.6 and 0.7 is probably appropriate.

In order to estimate future demand for red meat, it is necessary to project growth in per capita incomes as well as specify the income elasticity of demand. Here, a range of forecasts is possible. The 1975-1980 National Development Plan (PLAN, 1976b, Vol. III, Part 4, p. 146) projects that real per capita incomes will grow at an annual rate of 2.5 percent

through 1985. Given an income elasticity of demand for red meat of 0.65, this would imply an additional annual increase in the demand for red meat of 1.6 percent due to growth in per capita real incomes. Judging from the sluggish performance of the Ivorian economy since 1970, however, this projection of per capita income growth seems overoptimistic (see Chapter I, especially Table 1.9 and Figure 1.2). If one posits that per capita incomes will not grow at all through 1985 (i.e., that the trend observed between 1970 and 1975 will continue), then growth in the demand for red meat would depend only on population growth, urbanization, and changes in the price of substitutes.

3) - Prices of Substitutes

One of the most difficult problems in forecasting the demand for beef and small ruminant meat in Ivory Coast is predicting how the prices of substitutes, particularly fish, will change. Shapiro (1979, p. 56) estimated that the cross-elasticity of demand of beef with respect to fish in Abidjan is approximately 0.38, i.e., that a one percent rise in the price of fish would result in a 0.38 percent increase in the quantity of beef demanded (assuming incomes and other prices are held constant). This cross-elasticity is relatively high, and indicates that future changes in the relative price of fish could dramatically affect the demand for beef.

Given the uncertainty about how per capita incomes and the price of substitutes for red meat will change through 1985, the following section develops three alternative forecasts of the demand for red meat in Ivory Coast in 1985. These alternative forecasts are based on differing assumptions and allow one to develop a range of estimates for Ivory Coast's demand for red meat and its import needs in 1985.

B. - Projections of Demand and Import Needs

Table 7.1 presents projections of Ivory Coast's demand for beef and small ruminant meat in 1985 and its import requirements in that year. The estimates of import requirements are calculated using the projected levels of domestic livestock production developed in Chapter Six. These projections of domestic production assume substantial success in Ivorian livestock development programs; therefore, the estimates of import requirements are conservative. If domestic livestock production fails to grow at the projected levels, then import demand will be higher than indicated in the table.

Table 7.1 presents three scenarios, based on different assumptions about future rates of population growth, urbanization, growth of per capita incomes, and the price of fish relative to red meat. For each scenario, two alternative projections are made. The first assumes that demand for all red meat and poultry grows at the same rate through 1985 and

TABLE 7.1

PROJECTIONS OF IVORY COAST'S DEMAND AND IMPORT REQUIREMENTS FOR BEEF AND SMALL RUMINANT MEAT IN 1985 (in tons)

Scenario I: Reduced Immigration and Urbanization, No Growth in Per Capita Incomes, and Little Change in the Relative Price of Fish (4 Percent Annual Growth in Demand)

	BEEF[a]	SMALL RUMINANT MEAT	TOTAL
Total Consumption in 1977	46,000	9,400	55,400
Projected Demand in 1985			
i. Assuming No Substitution of Poultry and Pork for Beef and Mutton[a]	63,000	12,900	75,900
ii. Assuming Some Substitution of Poultry and Pork for Beef and Mutton[b]	56,000	11,500	67,500
Projected Domestic Production in 1985	15,200	5,200	20,400
Import Requirements			
i. Assuming No Substitution of Poultry and Pork for Beef and Mutton	47,800	7,700	55,500
ii. Assuming Some Substitution of Poultry and Pork for Beef and Mutton	40,800	6,300	47,100
Imports in 1977	38,000	5,900	43,900
Annual Rate of Growth of Import Demand 1977-85			
i. Assuming No Substitution of Poultry and Pork for Beef and Mutton	3.0%	3.5%	3.0%
ii. Assuming Some Substitution of Poultry and Pork for Beef and Mutton	0.9%	0.8%	0.9%

TABLE 7.1 - Continued

Scenario II: Continued High Rates of Immigration and Urbanization, Modest Growth in Per Capita Incomes, and Little Change in the Relative Price of Fish (5 Percent Annual Growth in Demand)

	BEEF	SMALL RUMINANT MEAT	TOTAL
Total Consumption in 1977	46,000	9,400	55,400
Projected Demand in 1985			
i. Assuming No Substitution of Poultry and Pork for Beef and Mutton[a]	68,000	14,000	82,000
ii. Assuming Some Substitution of Poultry and Pork for Beef and Mutton[b]	63,300	12,900	76,200
Projected Domestic Production in 1985	15,200	5,200	20,400
Import Requirements			
i. Assuming No Substitution of Poultry and Pork for Beef and Mutton	52,800	8,800	61,600
ii. Assuming Some Substitution of Poultry and Pork for Beef and Mutton	48,100	7,700	55,800
Imports in 1977	38,000	5,900	43,900
Annual Rate of Growth of Import Demand 1977-85			
i. Assuming No Substitution of Poultry and Pork for Beef and Mutton	4.2%	5.1%	4.3%
ii. Assuming Some Substitution of Poultry and Pork for Beef and Mutton	3.0%	3.4%	3.1%

TABLE 7.1 - Continued

Scenario III: Continued High Rates of Immigration, Modest Growth in Per Capita Incomes, and Modest Increase in the Relative Price of Fish (6 Percent Annual Growth in Demand)

	BEEF	SMALL RUMINANT MEAT	TOTAL
Total Consumption in 1977	46,000	9,400	55,400
Projected Demand in 1985			
i. Assuming No Substitution of Poultry and Pork for Beef and Mutton[a]	73,300	15,000	88,300
ii. Assuming Some Substitution of Poultry and Pork for Beef and Mutton[b]	70,900	14,500	85,400
Projected Domestic Production in 1985	15,200	5,200	20,400
Import Requirements			
i. Assuming No Substitution of Poultry and Pork for Beef and Mutton	58,100	9,800	67,900
ii. Assuming Some Substitution of Poultry and Pork for Beef and Mutton	55,700	9,300	65,000
Imports in 1977	38,000	5,900	43,900
Annual Rate of Growth of Import Demand 1977-85			
i. Assuming No Substitution of Poultry and Pork for Beef and Mutton	5.5%	6.6%	5.6%
ii. Assuming Some Substitution of Poultry and Pork for Beef and Mutton	4.9%	5.9%	5.0%

TABLE 7.1 - Continued

SOURCES: Data on 1977 levels of consumption from Tables 2.7, 4.6, 5.3, 5.7 and Chapter Five (text). Projections of domestic production in 1985 are from Chapter Six.

[a]Includes offals.

[b]The assumption of no substitution of poultry and pork for beef and mutton implies that domestic poultry and pork production will decrease only as fast as the growth in demand for meat (four, five, or six percent annually, depending on the scenario).

[c]The assumption of some substitution of poultry and pork for beef and mutton implies that the levels of domestic poultry and pork production projected in Chapter Six will be attained and that production of these meats in excess of the general rate of growth in demand for meat will substitute for beef and mutton in the diet. In both the case of no substitution of poultry and pork and the case of some substitution, Ivory Coast would be self-sufficient in poultry and pork in 1985. Projected levels of production (in tons) in 1985 would be as follows:

	Scenario I	Scenario II	Scenario III
No Substitution			
Poultry	24,000	25,900	27,900
Pork	9,600	10,300	11,200
Total	33,600	36,200	39,100
Some Substitution			
Poultry		30,000	
Pork		12,000	
Total		42,000	

that the relative amounts of beef, small ruminant meat, pork, and poultry in the diet remain unchanged. The second alternative assumes that domestic production of poultry and pork reaches the levels projected in Chapter Six and that the government is successful, through advertising and induced changes in relative prices, in convincing consumers to substitute some of that increased production for beef and small ruminant meat in the diet.

Scenario I is based on the assumptions that the government is successful in reducing immigration and urbanization in Ivory Coast, that per capita incomes stagnate, and that the price of fish relative to red meat remains unchanged. In this situation, total demand for red meat is projected to grow at 4 percent annually due to population growth and urbanization. Among the outcomes considered possible, Scenario I would represent the least favorable situation from the point of view of countries that export livestock and meat to Ivory Coast. If the relative amounts of different types of red meat and poultry in the diet remained unchanged, demand for beef and small ruminant imports would grow at about 3 percent annually between 1978 and 1985, and beef and small ruminant import needs would total 55,500 tons in 1985. If consumers substituted domestically produced pork and poultry for imported beef and mutton, then import demand would grow at slightly under 1 percent per year, and import needs in 1985 would total 47,100 tons.

Scenarios II and III are considered much more likely than Scenario I. Scenario II posits that population growth and urbanization will decline only slightly between 1978 and 1985 and that per capita incomes will grow moderately, on the order of 1 percent annually. The price of fish relative to red meat, however, is assumed to remain unchanged. In these circumstances, total demand for red meat would increase at about 5 percent per year. Approximately a 5 percent annual increase in demand would also occur if per capita incomes remained unchanged but the price of fish relative to red meat increased by 2.0 to 2.5 percent per year. Under Scenario II, demand for beef and small ruminant imports would grow at between 3.1 and 4.3 percent annually, depending on the degree to which consumers substituted pork and poultry for beef and mutton in the diet. Total import needs in 1985 would be 61,600 tons if no substitution took place, and 55,800 tons if substitution occurred at the level implied by the production projections developed in Chapter Six.

Scenario III assumes continued rapid population growth and urbanization through 1985, modest annual increases in per capita incomes (growth of about 1 percent per year) and modest increases (2.0 to 2.5 percent per year) in the price of fish relative to red meat and poultry. In these circumstances, total demand for red meat would increase at about 6 percent per year. Demand for beef and small ruminant imports would increase at between 5.0 and 5.6 percent annually, depending on how much poultry and pork was substituted for other red meats in the diet. The total amount of beef and small ruminant imports demanded in 1985 would vary between 65,000 and 67,900 tons. If government livestock projects fail to achieve the levels of production projected in Chapter Six, or if real per capita incomes or

the price of fish relative to red meat rises rapidly, import demand for beef and small ruminants could exceed the levels shown for scenario III.

The author believes that the most likely outlook for demand lies somewhere between Scenarios II and III, i.e. an annual growth in the demand for animal protein of at least 5 percent. It also seems likely that the Ivorian government will succeed in inducing consumers to substitute some domestically produced pork and poultry for imported beef and small ruminant meat, although not to the degree envisioned in government development plans. Demand for beef and small ruminant imports is therefore likely to increase at between 3.1 and 5.0 percent annually between 1978 and 1985, and the total amount of beef and small ruminant imports demanded in 1985 will probably be between 55,800 tons and 65,000 tons. Demand for small ruminant imports is likely to grow faster than demand for beef imports from 1978 through 1985 because domestic production of small ruminants will probably grow more slowly than domestic beef production through 1985. After 1985, however, the trend is likely to reverse itself, as government projects aimed at increasing small ruminant production begin to have an impact.

C. - Sources of Future Imports and the Type of Meat Demanded

It is important to note that the figures in Table 7.1 are projections only of the increases in demand for beef and small ruminant meat between 1978 and 1985 and do not constitute predictions of how much of these meats will actually be consumed or imported. Whether the increases in demand will translate into increases in the amounts actually consumed and imported, or whether they will simply lead to higher prices, depends on how supply conditions evolve both in Ivory Coast and in the countries that export livestock and meat to Ivory Coast. Similarly, the degree to which future import needs will be met by frozen meat as opposed to live animal imports will depend on the evolution of the world meat market and the supply and demand situation in the Sahelian countries.

While detailed analysis of these factors is beyond the scope of this report, two elements deserve mention. (For more details, the reader is referred to the reports on Mali, Upper Volta, the Latin American exporters, and the world market.) The first element is the critical importance of the EEC and other developed countries' meat import policies in determining the future world price of beef. If the EEC relaxes its import quotas, the world price of beef will likely increase substantially, making it much more expensive for Ivory Coast to meet its consumption needs through frozen meat imports. The second important element will be the growth in demand for Sahelian livestock in markets outside of Ivory Coast. The most important of these markets will be Nigeria, Senegal, and the Sahelian countries themselves. To the extent that demand for livestock and meat in these other markets increases rapidly, the supply of livestock for export to Ivory Coast will decrease and its cost will increase.

Even though import demand for beef in Ivory Coast will probably grow by at least 3 percent annually between 1978 and 1985, the country will become increasingly self-sufficient in the production of high-quality beef for the class I market. The Ferkéssédougou feedlot will probably fatten about 15,000 head of cattle per year by 1985; this is the equivalent of 1,500 tons of fattened rear quarters of beef. In 1977, the total class I market demand for beef was only about 2,000 tons per year (see Chapter Two). Even if this demand increased by 50 percent between 1978 and 1985, total demand for high quality beef imports in 1985 would be only about 1,500 tons. The bulk of the import demand in 1985 will therefore be for average quality animals and meat for the class 2 (general) market, not choice meat for the deluxe market.

II. - Policy Implications

A. - The Outlook For Demand

The sudden drop in livestock imports into Ivory Coast in 1975 and 1976, coupled with a huge increase in imports of inexpensive frozen beef from Europe and Latin America, led Sahelian governments and donor agencies to fear that the Sahelian countries would soon lose their ability to compete in the Ivorian market for livestock and meat. This study has shown, however, that the changes that occurred in the Ivorian market during 1975-76 resulted from an unusual coincidence of three events: the impact of the Sahelian drought on reducing the supply of cattle for export, cyclical changes in the world beef market, and increased demand for beef in Nigeria because of rapid income growth. Such a coincidence of events is unlikely to reoccur in the near future; dispair about the Ivorian market for Sahelian beef "disappearing" is not warranted.

This is not to say, however, that the events of 1975-76 have no long-term significance for the Sahelian states. The Ivorian market for beef is now integrated into the world beef market, and it will be relatively easy for Ivory Coast to enter the world market to meet some of its import needs if prices are favorable. Although the outlook is for prices on the world beef market to rise considerably through 1985, the FOB price of Argentine frozen beef would nearly have to double before this meat would lose its cost advantage over locally slaughtered beef in the Abidjan market. Therefore, it is likely that Ivory Coast will continue to import frozen meat from Latin America through 1985 (probably on the order of 10,000 to 20,000 tons per year). Exactly how much frozen beef will be imported will depend on how the world price of beef evolves This, in turn, will depend on how the meat import policies of the developed countries, particularly the EEC, change through 1985 and how beef production in Latin America evolves.

It is likely that the EEC will maintain its tight restrictions on beef during the next few years, and expansion of EEC to include Greece, Portugal, and Spain may further reduce beef imports into Europe by 1985 (ITC, 1980, in Volume V of this series). This would reduce the market for beef exporters like Argentina and tend to depress prices. On the other hand, the beef cycle in Argentina peaked in the late 1970s and increased slaughter of breeding stock during 1978 and 1979 will lead to a drastic reduction of Argentine production and exports from1980 through 1983 (Ariza-Niño, 1979, p. 80, in Volume IV of this series). The effect of this falling production will probably more than offset the continued tightness of the European market, leading to some increase in world beef prices.

Because the Ivorian market for meat is now integrated with the world market, Sahelian exporters of livestock and meat must adopt a new cost consciousness in their operations. It cannot be assumed that Ivory Coast will absorb whatever livestock the Sahelian countries produce at whatever price they choose to charge for it. Production and marketing costs must be held down, for if they are not, Ivory Coast will put greater reliance on frozen meat imports. If costs can be held down, however the market outlook is good. Under the conditions most likely to prevail through 1985, demand for beef and small ruminant imports should grow at an annual rate of between 3.1 and 5.0 percent, with total import demand in 1985 standing between 55,800 tons and 65,000 tons.

Demand for small ruminant imports is likely to grow slightly faster than the demand for beef imports. If domestic livestock development programs perform poorly or if the price of fish increases dramatically relative to red meat prices, import demand in 1985 will be even higher than the levels indicated above. Most of the demand in 1985 will be for average quality meat destined for the class 2 (general) market. Ivory Coast will become increasingly self-sufficient in the production of high-quality beef for the class 1 (deluxe) market. Total demand for high quality beef imports will probably not exceed about 1,500 tons in 1985. This suggests that additional feedlots in the Sahelian states that depend for their profitability on the sale of high quality animals to the Ivorian market probably are not warranted at this time. It is also likely to remain more profitable to export live animals than chilled meat from the Sahelian countries to Ivory Coast during the next five to ten years. The high cost of refrigerated transport in West Africa and the high profit earned on the sale of offals in the coastal states are the main reasons why live animal exports are likely to remain more profitable than chilled meat exports.

B. - Implications for Marketing and Production Policy

Since the Sahelian states want to expand livestock and meat exports to Ivory Coast and Ivory Coast wants to assure itself an adequate supply of animal protein at reasonable cost, it

is in the interest of both parties to facilitate the livestock and meat trade between them. To the extent that marketing costs are reduced and competition within the trade is encouraged, producer prices for livestock will be higher and consumer prices for meat will be lower than they otherwise would be.

This report has shown that the indigenous livestock and meat marketing system is rather efficient, given the institutional and infrastructural constraints under which it operates, in transporting livestock between the Sahelian countries and Ivory Coast, slaughtering the animals, and distributing the meat. The system has also proven quite flexible in adapting to new market opportunities, new means of transport, and new products. Therefore, radically restructuring or replacing the current marketing system would not be the most effective way of reducing marketing costs. Changes in market infrastructure and the institutional framework within which the system operates, however, could increase the productivity of the current system and thereby reduce marketing costs.

1) - Livestock Transport

Cattle travel to market in Ivory Coast by trek, truck, and rail while small ruminants are shipped mainly by truck and train. Trekking is by far the most common way of transporting cattle within the savanna zone, and most of the cattle sold in Ivory Coast trek at least part of the way to market. The heavy reliance on trekking reflects the low cash outlay and low total cost involved. In 1977-78, it was usually more profitable for a cattle merchant to trek his animals or use a mixture of trekking and trucking than to truck the animals the entire distance to market, even taking into account the slower rate of capital rotation involved in trekking. Nonetheless, there are important private and social costs of trekking, including possible weight loss during the dry-season, the cost of the capital tied up in the animals as they walk slowly to market, damage to farmers' fields caused by trade herds, and disease spread to domestic livestock by imported herds.

These costs could be reduced through construction of clearly marked, improved cattle trails in Ivory Coast, along which imported cattle would be required to travel. Such trails have been constructed in the northern part of Ivory Coast as part of a USAID-sponsored project to build a series of border-crossing stations for imported livestock. Extension of these trails southward to the latitude of Bouaké could further reduce trekking costs. A restitution fund, financed by a small tax on trekked cattle, could help solve the problem of compensating farmers whose fields are damaged by trade herds. This would probably be preferable to the alternative frequently mentioned by Ivorian authorities, that of requiring all cattle shipped south of the border crossing stations to travel by truck or rail. Requiring mandatory trucking or rail transport throughout the country at this time would considerably increase marketing costs for cattle and could lead to shortages of cattle in major consumption markets during periods when trucks and train cars are in high demand (e.g., during the coffee, cocoa, and cotton harvests).

Although trekking is usually the most economical way of moving cattle within the savannah zone, trekking within the forest zone is quite costly because of heavy tsetse infestation, lack of grazing, and the greater chance of crop damage (since cultivation is more common in the forest zone). In some areas of the forest zone, the Ivorian government has banned trekking, and even where trekking is allowed, many merchants have shifted to trucking cattle. The shift to trucking has occurred because major roads in the forest zone are in good condition and because the cost of trekking within the forest zone is so high. The adoption of trucking within the forest zone indicates that cattle merchants are not opposed to trucking per se; they are only opposed to trucking when more economical means of transport are available.

Although trekking is the most important way of moving cattle from Mali to Ivory Coast, rail transport is extremely important in moving Voltaic cattle to Ivory Coast particularly to Abidjan. Rail transport of cattle between Upper Volta and Ivory Coast is plagued by several problems, the most important of which are the long time the animals spend en route, the poor condition of the cattle cars, seasonal shortages of cattle cars, and the lack of grazing at both loading stations and terminal markets.

On the average, cattle spend 3.5 days travelling by rail between Ouagadougou and Abidjan, during which time they receive neither food nor water. The results are very heavy weight losses and substantial mortality, which raise the final sale price of cattle in Abidjan by 8 to 10 percent. Weight loss en route is the second largest cost of exporting cattle from Ouagadougou to Abidjan (after the Voltaic export tax). Weight loss is exacerbated by the heat stress the animals suffer due to poor ventilation in the closed cattle cars. A lack of grazing, both at northern railheads and at southern terminal markets further adds to the weight loss. Cattle are often forced to spend a week or more waiting at northern railheads because of seasonal shortages of rail cars. Reducing the time animals spend in transit (e.g., by reducing the long delays at the beginning and at the end of the journey and by creating special express trains for livestock), providing better ventilated cattle cars, changing the rate structure for cattle cars in order to speed up their rotation, and providing better grazing at railheads and terminal markets all could help reduce the cost of shipping cattle by rail.

2) - Market Infrastructure

Certain types of market infrastructure could improve the performance of the marketing system. Two major infrastructure improvements needed are grazing areas in major terminal markets, especially Abidjan, and renovation of the Abidjan abattoir. The Abidjan livestock market abattoir complex is located in the industrial zone of Port Bouet. Inadequate grazing space around the market prevents merchants from holding animals off

the market for more than a few days. The inability of butchers and traders to hold a buffer stock of animals leads to highly fluctuating livestock prices in Abidjan (they are roughly 50 percent more variable than in Bouaké, where adequate grazing permits the holding of a buffer stock). The highly fluctuating prices make Abidjan a risky market in which to trade and increase the incidence of default by butchers on credit sales. Both these factors reduce the attractiveness of Abidjan as an export market for Sahelian livestock traders.

A second major infrastructure constraint in Abidjan is the abattoir, which is in a very bad state of disrepair. The rebuilding of the Abidjan abattoir is justified in terms both of public health and personnel safety. If it is rebuilt, however, administrative rules need to be designed that will insure its maintenance; otherwise, it will soon fall into disrepair again.

Given the lack of grazing space near the market and the need to rebuild the slaughterhouse, officials should seriously consider moving the market-abattoir complex out of Port Bouet to an area of the city where adequate grazing is available. Until it becomes possible to hold a buffer stock of animals in Abidjan, many of the problems associated with livestock marketing in Abidjan are likely to continue.

In planning market infrastructure, much more emphasis needs to be given to providing infrastructure that is appropriate to the prevailing prices of capital and labor in West Africa. Too often in the past, projects have provided infrastructure that is patterned after infrastructure that exists in Europe or North America, with no recognition that differences in relative factor prices might make that technology inappropriate to West Africa. For example, the modern abattoirs constructed in Mali and Upper Volta are capital-intensive and labor extensive, as are European and North American abattoirs, in spite of labor being abundant and relatively cheap in West Africa and capital being scarce and relatively expensive. This has resulted in high per-animal slaughtering costs and has thrown hundreds of people previously employed in slaughtering out of work. In future projects officials should try to develop plans suitable to local capital-labor price ratios rather than simply copying European or North American facilities, which may be inappropriate to West Africa.

3) - Price Fixing

In an attempt to hold down urban meat prices, the Ivorian government imposes retail price controls on beef and small ruminant meat. Price controls have not been highly successful in stabilizing the retail price of meat, but they have several unintended consequences. These include creation of meat shortages in areas where price controls are strictly enforced, butchers cheating on the weight of meat sold, increased butcher indebtedness, and the possibility of corruption. Perhaps the best that can be said about retail price controls is that frequently they are unenforced. In general, stimulating domestic livestock production, improving transportation infrastructure, and encouraging competition in the cattle and meat trades are more effective than price controls in holding down retail meat prices.

4) - Involvement of the State in Livestock and Meat Marketing

The state has several important roles to play in livestock and meat marketing. Many of these roles involve defining the rules under which the livestock and meat trades operate and providing certain public goods, e.g., health protection through veterinary inspection of animals and carcasses. The maintenance of market facilities and abattoirs and the collection of taxes and user fees have also historically been important roles for the state in the West African livestock trade. While these all are legitimate activities of the state, means should be found to pursue the activities of the state in a manner consistent with the objective of increased market efficiency. For example, the state has a legitimate stake in guaranteeing that butchers in Abidjan do not consistently default on their debts to cattle merchants. Chronic defaulting would soon give Abidjan a bad reputation among cattle merchants, leading them to ship their animals elsewhere, thereby reducing Abidjan's meat supply. One way of solving the problem of chronic defaulting would be to ban all credit sales of livestock. This approach, however, would greatly increase the capital needed to go into butchering, thus leading to increased concentration in the butchering trade, which could result in decreased economic efficiency. An alternative approach would be to study the underlying causes of butchers' chronic indebtedness and develop programs aimed at resolving those problems while, if possible, maintaining competition in the butchering trade.

It should be recognized, however, that the state has goals other than that of increasing market efficiency. Two important goals of the Ivorian government in recent years have been insuring a stable supply of meat (even if it necessitates a somewhat higher price than currently obtains) and increasing the participation of Ivorian nationals in the livestock and meat marketing system, which to date has been dominated by foreigners. Achieving these legitimate political objectives, however, is not likely to be costless. For example, if the government decides to replace non-Ivorian butchers (who have years of experience in the trade) with novice Ivorian butchers, there will undoubtedly be some loss of efficiency in the butchering trade, which could lead to higher meat prices. The Ivorian government should therefore carefully weigh the tradeoffs involved before deciding on how vigorously it will pursue these political objectives.

The costs of a state takeover of a large part of the livestock and meat trade would probably be very high. Marketing livestock and meat requires expertise which private traders have acquired through years of experience. It is very doubtful whether a state livestock trading agency could develop such expertise in only a few years. Certainly Ghana's poor experience with a state livestock trading monopoly should serve as a warning to other countries considering this alternative. Probably a more effective way of lowering marketing costs would be for the state to work with the current trade to identify and relieve infrastructure constraints and to take actions to encourage competition within the trade.

5) - Encouraging Domestic Livestock Production

Ivory Coast has the potential to increase domestic livestock production substantially, particularly of small stock. This is especially true for poultry and small ruminants. The latter have received little government attention until recently, and reduction of current high mortality rates could result in rapid increases in production. While it is certainly in Ivory Coast's interest to meet a larger share of its animal protein needs through domestic production, some regional specialization and trade between Ivory Coast and the Sahelian countries will benefit both parties. Ivory Coast will continue to have a comparative advantage in cash crop production while the Sahelian states' comparative advantage will remain in production of livestock, particularly cattle. Therefore, even though Ivory Coast's domestic livestock production will grow in the coming years, trade in livestock, particularly cattle, between the Sahelian countries and Ivory Coast will continue to be in the interests of both parties.

FOOTNOTES: CHAPTER TWO

[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 benefited from veterinary care, however; therefore, average weight and fecundity figures for animals in village conditions may be lower.

[2]In 1977 there were approximately 5,800 pair of work oxen in the country (Compagnie Ivoirienne de Développement des Textiles (CIDT), 1977).

[3]The study found that 31 percent of the total zebu population of Ivory Coast was male; 4.3 percent were adult bulls, 4.1 percent were adult steers, and the remaining 22.6 percent were young stock. The study estimates that given the demographic parameters of the herd, the minimum number of males necessary to maintain the herd in equilibrium would be 29 percent. Therefore, "surplus" adult males accounted for only 2 percent of the total herd. (BNETD, 1975, pp. 21, 34.)

[4]Most of the Malian cattle imported into Ivory Coast enter the country on the 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 rail and thus cross the border only at one point.

[5]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.

[6]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.

[7]Tyč (SEDES, 1975b, p. 10) estimated that in Upper Volta between 1969 and 1974 the cattle population decreased by 32 percent in the northern Sahelian part of the country, while it increased by 10 percent in the central area and by 16 percent in the southern part of the country. There was thus a redistribution of cattle toward the southern, higher rainfall areas of the country.

FOOTNOTES: CHAPTER THREE

[1]The figures tend to understate actual prices because the agents in charge of data collection sometimes ask butchers what the price of beef is rather than asking consumers who have actually purchased beef. Since there is an official control price for beef, butchers may report the official rather than the actual price to collectors.

[2]The average composition of the 50 CFA F tas sold in Bouaké during 1976-77, compared with bone-in beef, was the following:

Cut	% Skeletal Meat	% Offals	% Fat	% Bones
50 CFA F tas (N = 144)	37	34	19	10
Fresh Bone-in Beef (N = 5)	70	3	6	21

SOURCE: Staatz, 1979, p. 410.

FOOTNOTES: CHAPTER FOUR

[1]The figure of 20 percent was calculated by assuming that all recorded arrivals of small ruminants at the Abidjan livestock market in 1976 (89,275 head) were slaughtered in Abidjan. It is further assumed that their average carcass weight was 16 kg (see Table 4.4) and that they produced edible offals equal to 15 percent of their carcass weights. All 339 tons of frozen and chilled small ruminant meat imported into Ivory Coast in 1976 (Table 4.5) are also assumed to have been consumed in Abidjan. Total consumption in Abidjan in 1976 was thus 1,982 tons, or 20 percent of the total consumption of 9,915 tons shown in Table 4.6. The information on arrivals is from unpublished data of the Centre d'Exploitation Industrielle du Bétail (CEIB), the agency in charge of the Abidjan cattle and small ruminant markets.

[2]The only other government activities in marketing in 1977-78 were the sale of about 100 head of sheep from a village cooperative in Tingrela and the importation of several thousand head of live sheep by AGRIPAC before Tabaski.

[3]In the Bulletin Mensuel de Statistique (MEFP, v.i.), a price series is reported for retail lamb prices in class I establishments. The prices reported, however, are official rather than actual prices

FOOTNOTES: CHAPTER FIVE

[1]The dressed weight equivalent price is the author's estimate, based on a 1.5 kg live-weight and a 70 percent dressing-out rate.

[2]Figures on pork imports are reported both by the Customs Service and the Ministry of Animal Production. The Customs Service figures are used here. The Ministry of Animal Production reports much lower imports, on the order of 100 tons per year (See MPA, 1978b, p. 6).

FOOTNOTES: CHAPTER SIX

[1]The annual investment was calculated by dividing the total investment for each project by the number of years that project was scheduled to last. This gave the average annual investment for each project. These annual investments were then summed to give the total average annual investment.

[2]Unité bovine tropicale. 1 zebu = 1.2 U.B.T.

APPENDIX A

ERRORS IN IMPORT STATISTICS

Official Ivorian import statistics for cattle and meat 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, such as 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 in these countries. Once the cattle reach Ivory Coast, however, there is an incentive to pass through official channels. Imported cattle are not heavily taxed in Ivory Coast, but police and veterinary agents frequently check 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 for 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 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 comes 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 and export routes at all times. The most important unrecorded trade occurs in the west and northwest, where cattle are imported from Mali and Guinea without being noted in the official records and where cattle are exported (through Danané) to Liberia. Based on an examination of data collected by the Veterinary Service on cattle arriving in Man and Danané and leaving those cities for other destinations and on recorded purchases of cattle by government agencies in areas along the Guinean border, total unrecorded imports in the west can be estimated at approximately 10,400 head in 1977. Of these, roughly 44 percent came from Guinea and 56 percent from Mali. Total exports to Liberia were approximately 6,600 head in 1977, most of which passed through Danané. Adding unrecorded net cattle imports in the west would alter the estimated beef supply for 1977 shown in Table 2.9 from 45,969 tons to 46,680 tons and would raise estimated annual per capita consumption from 6.3 kg to 6.4 kg.

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 on the number of imported animals that

arrive in major cattle markets in Ivory Coast without having been previously counted at the border.[2] The figures on market arrivals are gathered by the same agents who collect the livestock market tax. Similarly, data on the amount of frozen and chilled meat imported are gathered by the same agents who collect the livestock market tax.

Whenever the collection of data on imports is combined with the payment of tax on those goods, the statistics are likely to underestimate the true volume of imports for two reasons. First, the taxes 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.[3] Under-reporting may also occur when taxes are in fact collected but records fail to reflect the corresponding import of cattle or meat. Personal observation by the author from October 1976 through June 1977 indicated 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. 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.[4] 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. These data are presented in Table A.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, but part of it probably entered Ivory Coast without being recorded. SEDES (1971, p. 8) suggested that official Ivorian estimates of frozen and chilled meat imports into Ivory Coast during the 1960s were 10 to 20 percent below the actual amount imported.

TABLE A.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

SOURCE: République de Côte d'Ivoire, Ministère de la Production Animale, unpublished data; République du Niger, Ministère du Développement Rural, Direction du Service de l'Elevage et des Industries Animales, Rapport annuel: année 1975 (Niamey: 19??).

[a]Figures from official Nigerien statistics.

[b]Figures from official Ivorian statistics.

[c]Difference expressed as a percentage of recorded exports from Niamey.

FOOTNOTES TO APPENDIX A

[1]Livestock are not subject to an import tax in Ivory Coast. Importers have to pay a modest fee (generally 2,500 CFA F per herd) for health certificates (laissez-passer sanitaires) and the cattle are subject to market taxes in certain cities.

[2]Beginning with the statsitics 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.

[3]One should not underestimate the difficulty of accurately counting several dozen cattle that arrive at a market all at once. 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 the police and veterinary agents who check the certificate along the route seldom 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.

[4]Official records show that in 1975, 140,970 cattle entered Ivory Coast; of these 41,480 head (29 percent) were recorded as arriving in Abidjan. In 1976, the corresponding figures were 112,314 and 27,911 (25 percent). 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

$$y = \frac{xA_r}{(1 - x)\ I_r + A_r}$$

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.

APPENDIX B

VARIOUS ESTIMATES OF IVORY COAST'S LIVESTOCK POPULATION

TABLE B.1

OFFICIAL ESTIMATES OF THE IVORIAN LIVESTOCK POPULATION IN VARIOUS YEARS
(HEAD)

Year	Cattle	Sheep	Goats	Swine
1944	124,000	430,000		n.a.
1951	171,000	171,000	212,000	n.a.
1960	282,000	476,000	548,000	79,000
1968	383,000	739,000	795,000	169,000
1969	396,000	829,000	778,000	167,000
1970	385,000	829,000	778,000	166,000
1971	400,000	887,000	832,000	190,000
1972	430,000	900,000	800,000	180,000
1973	435,000	900,000	800,000	178,000
1974	450,000	920,000	810,000	186,000
1975	450,000	1,000,000	800,000	200,000
1976	new	census	data	available
1977	550,000	725,000	575,000	285,000

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

Note: n.a. = not available

TABLE B.2

IVORY COAST'S ESTIMATED CATTLE POPULATION: 1966-77 (HEAD)

Year	Taurins			Zebus			Total
	Ranches[a]	Traditional Production[b]	Total	Feedlots	Traditional Production[c]	Total	
1966	1,000	267,500	268,500	-	38,000	38,000	306,500
1967	1,500	275,500	277,000	-	40,700	40,700	317,700
1968	2,300	283,800	286,100	-	43,600	43,600	329,700
1969	3,400	292,300	295,700	-	46,700	46,700	342,400
1970	5,000	301,100	306,100	-	50,000	50,000	356,100
1971	5,900	310,100	316,000	-	70,000	70,000	386,000
1972	6,800	319,400	326,200	-	77,000	77,000	403,200
1973	8,000	329,000	337,000	-	85,000	85,000	422,000
1974	9,000	338,900	347,900	-	105,000	105,000	452,900
1975	10,000	349,000	359,000	-	115,000	115,000	474,000
1976	13,500	359,500	373,000	1,000	119,000	120,000	493,000
1977	17,700	370,300	388,000	2,000	160,000	162,000	550,000

SOURCES: Calculated from data from the following sources: République de Côte d'Ivoire, Ministère de la Production Animale, Bureau des Projects, L'élevage en Côte d'Ivoire: programme de développement (Abidjan, 1976); République de Côte d'Ivoire, Ministère de la Production Animale, unpublished data; SEDES, Approvisionnement en viandes de l'Afrique centre ouest, Vol. I, pp 107-09; and SEDES, Recueil statistique de la production animale (Paris: République Française, Ministère de la Coopération, 1975), pp. 430-37.

[a]Data are available from the above sources on the number of taurins in ranches and research centers in 1966, 1970, 1973, 1975 and 1977. Figures for other years are linear extrapolations.

[b]Figures calculated on a 1977 taurin population in traditional herds of 370,300 and a 3 percent annual growth rate between 1966 and 1977 (source of 1977 population and annual growth rate: Ministère de la Production Animale) N.B. the taurin population calculated in this manner for 1966 is extremely close to SEDES's estimate of 267,000 taurins in Ivory Coast in 1966 (SEDES, 1969, Vol. I, p. 107).

[c]Data on the zebu population are available from the above sources for 1966 and 1970-77. The figures for 1967-69 were calculated by linear extrapolation.

APPENDIX C

ESTIMATED OFFTAKE FROM ZEBU HERDS IN WEST AFRICA

Type of Animal	Mali-Mopti Region (1970)		Mali-Outside of Mopti (1970)		Ivory Coast (1975)	
	Offtake (%)[a]	% of Total Offtake[b]	Offtake (%)	% of Total Offtake	Offtake (%)	% of Total Offtake
Adult Males	4.7	41	4.5	38	4.1	34
Young Males[c]	1.4	12	1.7	15	2.9	24
Sterile Females	0.7	6	1.4	12	0.8	7
Cull Cows	4.7	41	4.1	35	4.2	35
Total	11.5	100	11.7	100	12.0	100

SOURCES: Mali - SEDES, Approvissionnement en viandes de l'Afrique de l'ouest (Paris: 1975), Vol. I, pp. 254-6; Ivory Coast - BNETD, Recensement du cheptel zébu de Côte d'Ivoire (Abidjan: 1975), Vol. I, p. 29.

[a]Number of animals sold in that age/sex class as a percentage of average herd size.

[b]Number of animals sold in that age/sex class as a percentage of total sales.

[c]Males under 4 years of age.

APPENDIX D

OFFICIAL VOLTAIC AND MALIAN STATISTICS ON LIVESTOCK AND MEAT EXPORTS

TABLE D.1

RECORDED EXPORTS OF LIVESTOCK FROM UPPER VOLTA 1965-77
(number of animals)

Year	Destination									
	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	57,918	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
1977	24,729	123,263	2,835	18,063	3,834	3,047	170	—	31,892[a]	144,373

SOURCE: République de Haute Volta, Direction des Services de l'Elevage et des Industries Animales.

[a]Includes 324 head exported to Nigeria.

TABLE D.2

RECORDED TRANSITS OF LIVESTOCK THROUGH UPPER VOLTA, 1970-75[a]
(number of animals)

Year/origin	Destination									
	Ivory Coast		Ghana		Togo		Benin		Total	
	Cattle	Small Ruminants	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	3,894	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

SOURCE: République de Haute Volta, Direction des Services de l'Elevage et des Industries Animales.

RECORDED MEAT EXPORTS FROM UPPER VOLTA, 1967-77
(metric 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	85.0	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]
1977							
Ivory Coast	164.2	10.3	—	8.3	6.0	0.5	189.4

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 8.6 tons of "non-specified" meat exported from Ouagadougou in January. Most of this was probably beef.

TABLE D.4

RECORDED CATTLE EXPORTS FROM MALI, 1960-76
(number of animals)

Destination	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 D.4 (Continued)

Destination	1970	1971[b]	1972[b]	1973[b]	1974	1975[b,c]	1976[b]
Ivory Coast	49,560	44,500	49,500	32,700	26,865	13,800	17,600
Ghana	30,023	32,200	16,200	11,300	6,305	—	300
Upper Volta	37	2,100	2,400	—	70	—	—
Senegal	444	—	—	—	730	1,500	5,100
Niger	378	7,800	4,700	—	127	—	100
Liberia	1,189	500	5,000	—	2,834	—	1,700
Others[a]	78	1,100	21,100	7,800	3,780	300	100
Total	81,718	88,000	98,900	51,800	40,711	15,600	24,900

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 Robert Van de Putte, "Production, consommation, exportation de viande bovine et ovine-caprine au Mali et projections 1974-1990," (Bamako: OMBEVI, Economic Document No. 96, 1977), p. 14.

[a]Includes exports to "non-determined" destinations.

[b]Rounded figures.

[c]Mali banned livestock exports for six months of 1975; therefore recorded exports for 1975 are abnormally low.

TABLE D.5

RECORDED EXPORTS OF SMALL RUMINANTS FROM MALI, 1960-76
(number of animals)

Destination	1960	1961	1962	1963	1964	1965	1966	1967	1967	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	1,865	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	1,435	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	66,649	47,625	31,663	33,214	17,215	56,931

TABLE D.5 (Continued)

Destination	1970	1971[b]	1972[b]	1973	1974	1975[b,c]	1976[b]
Ivory Coast	83,861	86,700	81,200	n.a.	70,275	18,200	59,700
Ghana	1,360	10,500	400	n.a.	20	—	100
Upper Volta	708	2,100	400	n.a.	—	—	—
Senegal	2,009	—	—	n.a.	775	900	22,900
Niger	935	2,100	2,000	n.a.	—	—	200
Liberia	4,968	600	4,100	n.a.	4,590	—	3,100
Others[a]	13,480	24,900	9,000	n.a.	10,258	3,200	15,400
Total	107,321	126,900	97,100	n.a.	85,898	22,300	101,400

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 Robert Van de Putte, "Production, consommation, exportation de viande bovine et ovine-caprine au Mali et projections 1974-1990," (Bamako: OMBEVI, Economic document No. 96, 1977), p. 15.

NOTE: n.a. = not available

[a]Includes exports to "non-determined" destinations.

[b]Rounded figures.

[c]Mali banned livestock exports for six months of 1975; therefore recorded exports for 1975 are abnormally low.

TABLE D.6

ESTIMATED TOTAL CATTLE EXPORTS FROM MALI, 1970-76
(number of animals)

Destination	1970	1971	1972	1973	1974	1975	1976
Ivory Coast	110,000	130,000	160,000	115,000	102,000	94,000	91,000
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	5,000	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	122,000	114,000	111,000

SOURCE: Van de Putte, Robert, "Production, consommation, exportation de viande bovine et ovine-caprine au Mali et projections 1974-1990," (Bamako: OMBEVI, Economic Document No. 96, 1977), p. 14.

TABLE D.7

ESTIMATED TOTAL GROSS EXPORTS OF SMALL RUMINANTS FROM MALI, 1970-76
(number of animals)[a]

Destination	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	25,000
Niger	10,000	10,000	5,000	5,000	5,000	5,000	10,000
Algeria	20,000	20,000	15,000	15,000	15,000	10,000	15,000
Total	270,000	320,000	240,000	200,000	155,000	200,000	265,000

SOURCE: Van de Putte, Robert, "Production, consommation, exportation de viande bovine et ovine-caprine au Mali et projections 1974-1990," (Bamako: OMBEVI, Economic Document No. 96, 1977), p. 15.

[a]Mali imports a large number of small ruminants from Mauritania; therefore net exports are considerably below the totals shown in this table.

TABLE D.8

RECORDED RED MEAT EXPORTS FROM MALI, 1960-75
(metric tons)

Year	Destination							
	Ivory Coast	Ghana	Liberia	Senegal	Libya	Congo-Brazzaville	Other[a]	Total
1960	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	118.4
1961	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	115.3	115.3
1962	—	—	—	—	n.a.	—	—	—
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	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	185.0
1968	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	323.5
1969	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	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: n.a. signifies not available.
— signifies none or negligible.

[a]Includes exports to "non-determined" destinations.

APPENDIX E

RECORDED QUARTERLY LIVESTOCK IMPORTS INTO IVORY COAST 1974-78

(head)

	QUARTER 1		QUARTER 2		QUARTER 3		QUARTER 4		TOTAL	
YEAR	CATTLE	SMALL RUMINANTS	CATTLE	SMALL RUMINANTS	CATTLE	SMALL RUMINANTS	CATTLE	SMALL RUMINANTS	CATTLE	SMALL RUMINANTS
1974										
Upper Volta	12,581	48,287	6,553	39,179	3,913	19,307	16,037	81,031	39,084	187,804
Mali	28,236	30,807	37,702	46,703	25,550	36,836	31,660	51,364	123,148	165,710
Mauritania	8,885	7,891	10,507	4,139	6,256	1,698	5,749	16,191	31,397	29,919
Niger	—	991	—	312	—	66	—	1,028	—	2,397
Total	49,702	87,976	54,762	90,333	35,719	57,907	53,446	149,514	193,629	385,830
1975										
Upper Volta	18,864	69,557	20,490	73,279	8,234	28,917	10,853	81,764	58,441	253,517
Mali	27,422	31,664	25,625	32,555	15,920	11,746	8,098	20,040	77,065	96,005
Mauritania	3,662	2,617	810	170	269	24	328	—	5,069	2,811
Niger	105	70	—	239	200	—	90	—	395	309
Total	50,053	103,908	46,925	106,243	24,623	40,687	19,369	101,804	140,970	352,642
1976										
Upper Volta	9,766	41,795	7,376	43,712	7,916	24,409	10,206	57,382	35,264	167,298
Mali	13,975	31,057	23,350	39,051	16,555	21,749	21,971	38,887	75,851	130,744
Mauritania	202	—	195	—	165	—	268	—	830	—
Niger	—	—	—	—	—	—	—	2,263	—	2,263
France	—	—	—	—	—	—	369	—	369	—
Total	23,943	72,852	30,921	82,763	25,005	46,158	32,445	98,532	112,314	300,305
1977										
Upper Volta	9,849	31,671	6,318	24,382	7,662	25,439	14,501	82,524	38,330	164,016
Mali	22,384	23,293	21,154	23,235	27,475	24,390	26,510	41,575	97,523	112,493
Mauritania	236	—	193	—	86	—	504	—	1,019	—
Niger	—	—	—	—	—	—	191	—	191	1,205
Total	32,469	54,964	27,665	47,617	35,223	49,829	41,706	125,304	137,063	277,714
1978										
Upper Volta	13,075	35,772	10,313	23,833	14,485	33,276	16,134	61,401	54,007	154,282
Mali	23,849	27,698	18,592	34,933	23,373	27,579	26,511	62,468	93.325	152,678
Mauritania	216	—	58	—	337	280	598	1400	1,209	140
Niger	—	450	—	277	—	61,135	68	1,177	68	2,184
Total	37.149	63,920	28,954	59,043	38,195		43,311	125,186	147,609	309,284

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

APPENDIX F

QUARTERLY RETAIL MEAT AND FISH PRICES IN ABIDJAN 1967-78 (CFA F per kg)

Year/Quarter	Bone-in Beef	Live Chicken	Fish Fresh	Fish Smoked (Abidjan)
1967				
1	220	235	94	150
2	206	235	89	140
3	167	221	101	129
4	163	226	77	130
1968				
1	171	242	79	159
2	164	243	91	153
3	178	237	111	164
4	164	231	115	242
1969				
1	165	255	120	264
2	170	238	110	271
3	175	232	115	194
4	165	229	99	157
1970				
1	183	242	146	200
2	169	258	129	200
3	184	255	126	200
4	173	251	124	193
1971				
1	181	228	117	202
2	171	249	109	181
3	185	245	111	191
4	174	241	105	166
1972				
1	175	265	97	176
2	183	271	99	152
3	207	268	94	172
4	194	257	108	192
1973				
1	191	255	118	176
2	224	272	121	179
3	225	290	131	199
4	219	320	142	213

APPENDIX F (Continued)

Year/Quarter	Bone-in Beef	Live Chicken	Fish Fresh	Fish Smoked (Abidjan)
1974				
1	213	314	111	218
2	226	333	121	240
3	261	357	118	240
4	289	392	139	365
1975				
1	278	385	156	314
2	325	378	177	256
3	305	423	171	276
4	318	481	158	278
1976				
1	335	428	169	309
2	315	460	152	359
3	347	492	172	397
4	384	507	223	415
1977				
1	404	570	236	530
2	433[a]	n/a	236[a]	450[a]
3	479[b]	642[b]	248[b]	498[b]
4	446	644	258	529
1978				
1	481	705	289	514
2	514	801	336	680
3	560	841	355	681
4	600	890	333	721

SOURCE: République de Côte -d'Ivoire, Ministerè de l'Economie, des Finances, et du Plan, Direction de la Statistique, Bulletin mensuel de statistique, Various issues and unpublished data of the Direction de la Statistique.

[a] refers to April only.
[b] September only.

ABBREVIATIONS AND ACRONYMS

BNETD	Bureaux Nationaux d'Etudes Techniques et de Développement (Ivory Coast)
CEAO	Communauté Economique de l'Afrique de l'Ouest (Mauritania, Senegal, Mali, Upper Volta, Niger and Ivory Coast)
CEBV	Communauté Economique du Bétail et de la Viande (Ivory Coast, Upper Volta, Niger, Togo and Benin).
CEIB	Centre d'Exploitation Industrielle du Bétail, the para-statal agency in charge of the Abidjan livestock market.
CIDT	Campagnie Ivoirenne de Développement des Textiles
CIRES	Centre Ivoirien de Recherche Economique et Sociale
CRO	Centre de Recherche Océanographique (Ivory Coast).
ECOWAS	Economic Organisation of West African States
FAO	Food and Agriculture Organization of the United Nations
IBRD	International Bank for Reconstruction and Development (World Bank)
IMF	International Monetary Fund
ITC	International Trade Centre UNCTAD/GATT (Geneva)
MA	Ministère de l'Agriculture (Ivory Coast)
MC	Ministère de la Coopération (France)
MEF	Ministère de l'Economie et des Finances (Ivory Coast)
MEFP	Ministère de l'Economie, des Finances et du Plan (Ivory Coast)
MPA	Ministère de la Production Animale (Ivory Coast)
OMBEVI	Office Malien du Bétail et de la Viande
OPEI	Office National de Promotion de l'Entreprise Ivoirienne, part of the former Ministry of Planning, Ivory Coast
PLAN	Ministère du Plan (Ivory Coast)
RAN	Régie de Chemin de Fer Abidjan-Niger, the railroad linking Abidjan and Ouagadougou
RHV	République de Haute Volta

SEDES	Société d'Etudes pour le Développement Economique et Social (France)
SIGES	Société Ivoirienne de Gestion, d'Etudes et des Services
SODEPALM	Société pour le Développement et l'Exploitation du Palmier à Huile (Ivory Coast)
SODEPRA	Société pour le Développement des Productions Animales (Ivory Coast)
USDA	United States Department of Agriculture

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PART II

LIVESTOCK AND MEAT PRODUCTION, MARKETING AND EXPORTS IN MALI

by Christopher L. Delgado

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MALI

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FOREWORD

The purpose of this inquiry is to assess the constraints to and potential for the expansion of Malian livestock and meat exports to the central coastal states of West Africa. It is one of several country studies initiated by the Center for Research on Economic Development (CRED) of the University of Michigan which concern patterns of livestock and meat marketing in the central corridor of West Africa since the drought in the early seventies. The research builds upon previous work in the same domain by CRED's Entente Livestock Project, which financed fieldwork by the author in Upper Volta from 1975 to 1977 (under USAID contract Afr-c-1169).

Five weeks were spent in Mali in the fall of 1978. The trip served three main objectives: first, to converse with Malian economists and animal scientists familiar with the livestock sector; second, to obtain copies of the many existing documents and studies concerning Malian livestock; third, to become more familiar with the current situation.

Prior working arrangements between OMBEVI (Office Malien du Bétail et de la Viande) and IPGP (Institut de Productivité et de Gestion Prévisionnelle) on the one hand, and CRED on the other, were instrumental in assuring the very successful nature of the trip. These Malian organizations made their personnel, files, reports, and equipment fully available to the author on a sub-contractual basis. In the opinion of the author, this provides a successful model for future research by foreign organizations in West Africa. Despite the extensive advice received from the experts in the matter, the views expressed in this report are the personal opinions of the author and do not necessarily reflect the position of OMBEVI or IPGP. In one or two instances, the analysis of specific points will differ markedly from official Malian policy (as in the case of feedlots). This is perceived as consistent with attempts to provide an original contribution of use to policy makers.

In the course of the field visit, the author travelled over 1,000 miles by road outside the capital in the company of Dr. Moulaye Attaher of IPGP. Farms were visited in seven villages in the cotton-producing region near Fana. This afforded an opportunity to observe successful animal traction and fattening schemes, and to visit a rural collection market in an agricultural area. Two very profitable days were spent with the top officials of the Office du Niger, visiting livestock operations between Ségou and Niono. Other stops were made at the livestock development operation at Mopti (ODEM) and at rural development programs in the Bandiagara region.

Despite the useful impressions left by travel in the field, this work is essentially a library study conducted over a period of nine months. Three weeks were spent in Bamako gathering more than sixty relevant studies in the livestock sector. Many of these were

written by the helpful staff of the UNDP/FAO project within OMBEVI and by equally cordial OMBEVI staff members. Particular mention should be made of Messrs. Makadji Makan and Roger De Becker in this context. The author extends his sincere thanks to them and their colleagues for sharing their knowledge and research results without reservation. The statistical staff of OMBEVI, the Service de l'Elevage and the para-statal export agency, SOMBEPEC, were extremely patient. They spent many days helping the author dig out files of unpublished data.

Particular thanks are due to the Director-General of ECIBEV (Etablissement de Crédit et d'Investissement dans le secteur Bétail-Viande), Mr. Macky Diallo; the Director-General of CMDT (Compagnie Malienne pour le Développement des Textiles), Mr. Moriba Sissoko; and the livestock department Director of OACV (Opération Arachide et Cultures Vivrières), Mr. Cissé, for help in better understanding the symbiosis between crop farming and livestock in Mali. Each organization furnished copious statistics on their livestock operations. The CMDT regional staff in Fana was particularly helpful during the field trip. The IER (Institut d'Economie Rurale) made its excellent library resources available for consultation. The staff of the animal science research and veterinary laboratories at Sotuba were generous with their time in explaining the state of the art in Mali. Thanks are also due to the director and assistant director of the Sahel Program of ILCA (International Livestock Centre for Africa) for their encouragement and provision of data. Finally, the assistance of the staff of the livestock office in USAID/Bamako is gratefully acknowledged, as is that of the personnel of Experience, Inc. and Chemonics, contractors in the livestock field to USAID.

As in the case in all research work from secondary sources, workers in the field with an intimate knowledge of the subject may feel that errors of fact or interpretation remain in parts of the study. In some instances, the natural instinct for caution has been overruled by the need to define alternatives clearly and to make a choice between them. Professor W.H.M. Morris, Mr. Abdoulaye Niang, and Mr. Souleymane Diallo of Purdue University provided a careful commentary of an earlier draft of this report. Messrs. Niang and Diallo were division chiefs of Statistics and Economics, respectively, at OMBEVI prior to their work at Purdue. The detailed suggestions of the Purdue team have contributed in an important manner to the improvement of the final document. John Van Dusen Lewis, formerly of ILCA and currently with the Agency for International Development (DS/RAD) and Howard University, provided many helpful comments on the first six chapters concerning production.

Despite this plethora of critical expertise, I have occasionally decided to stick to my guns in spite of disagreement by a reviewer. If only for this reason, no one but the author should be blamed for the remaining deficiencies of the work. It is hoped that the study will be judged primarily by the soundness of the overall conclusions and recommendations.

Christopher L. Delgado
Ann Arbor, January 1980

SUMMARY

The justification for the Mali country study grew out of concern in USAID over the ability of the Sahelian states to maintain and possibly increase their volume of livestock and meat exports to the important consumption centers on the Gulf of Guinea within the foreseeable future. The intrusion of South American beef into hitherto safe markets such as Abidjan in 1975 raised the spectre of decline in one of Mali's crucial export sectors, already hard hit by the drought in the first half of the decade.

The basic objective of the work is to assess the outlook for different kinds of livestock and meat exports to 1985, in terms both of quantity and profitability. The information is presented as much as possible in a form useful to decision makers concerned with the maximization of Malian income from this sector. Nevertheless, adequate treatment of a complex subject requires a general assessment of those trends in animal and human populations, costs, policies, prices, preferences, and incomes (at home and abroad) that will determine the supply and demand for Malian exports in the foreseeable future. Specifically, trends in domestic production and consumption give an idea of the amount potentially "left over" for exports. The analysis of export marketing costs and the prospects for demand in export markets, on the other hand, elucidate the ability of Malian traders to fulfill this potential in 1985. Some specific thoughts for desirable policy interventions in the Malian livestock export sector are given at the end of the study.

The main conclusion of the investigation is that an optimistic outlook is warranted for traditional exports of livestock. The events in 1975 are judged to have represented the abnormal condition of a glut of Latin American beef on the world market occurring simultaneously with an absence of exports from the Sahel. While prospects are judged less good than indicated by current official predictions in Mali, the principal constraint is seen more as low Malian productivity rather than lack of a market. It seems clear that the largely unknown small ruminant sector, in particular, should receive much more attention in project design. Sheep and goats appear to offer excellent potential for augmenting income from foreign sources. On the other hand, cattle feedlot operations do not offer good prospects for donor activities designed to promote exports. Finally, there seems to be little potential for sustained meat exports within the foreseeable future.

I. - Trends in Livestock Production 1967 to 1977 and the Supply Outlook to 1985

The available evidence suggests that national cattle holdings in 1978 numbered only four-fifths of the estimated pre-drought herd. The drought had the greatest incidence in the

northeast and central portions of the country. Herds in the Gao-Tombouctou zone declined by four-fifths between 1973 and 1974, due to out-migration and mortality. Cattle numbers in the Sikasso region, on the other hand, increased by over one-fifth. It appears that the refugee herds that survived have returned to their previous pastures. Current growth trends indicate that overall stocks will attain 1970 levels towards 1986. It is generally assume that small ruminant herds were back to normal by 1976. The best guess on the size of the 1978 cattle herd is 4.25 million head, of which 29 percent were in the relatively more humid Savannah sections of the country.

Transhumant production systems account for half of national cattle holdings, while less than 10 percent of the animals are raised by nomads in the northeastern Sahel. The remaining 40 percent of the herds are kept under relatively sedentary systems, in areas also suitable for agriculture. There is a maximum of 330,000 plow oxen within this category, a very considerable number in the West African context. Estimates of the size of the national small ruminant herd are largely conjectural. The best guess is an overall figure of 12 million head in 1978, of which over half were located in areas north of Mopti. Surprisingly, the southern agricultural areas around Sikasso appear to have accounted for less than 5 percent of Malian sheep and goats at that time.

Malian and foreign studies of the livestock sector exhibit a wide range of assumptions concerning net rates of herd productivity, offtake, and growth. Gross annual herd productivity for zebu cattle is assumed by various authors to be between 12.3 and 15 percent, while the comparable figures for predominently taurin herds (mixed N'Dama-zebu) are 12.3 to 16.7 percent. The corresponding estimates of annual net offtake in the literature are 9 to 12 percent for zebu and 8.2 to 13 percent for taurin cattle, leading to overall estimates of net annual herd growth of 3.2 to 3.5 percent. The important differences between the high and low figures lead to very large discrepancies among predictions concerning exports. A one percent decline in the aggregate offtake rate is associated with approximately a one-third decrease in the amount of production assumed to be exported if part of the decline is not compensated for by a decrease in domestic consumption. The few available field studies (the two most notable ones pertain to the Mopti area in 1972 and 1977) indicate that the true parameters are close to the lower range of the estimates. It appears that most studies are over-optimistic with respect to actual livestock production and herd growth.

There are four basic objectives of Malian national livestock production policy:

-- to maximize cattle exports;

-- to export finished animals and meat rather than feedstuffs or young and thin stock;

-- to supply domestic protein needs with cull cattle, small ruminants, and poultry, rather than beef from exportable animals;

-- to favor the stratification of livestock production through promotion of the North as a breeding area and the South as a pasturing area.

Four main classes of action are employed to favor these objectives. First, the price of purchased feeds are highly subsidized within Mali. Second, administrative measures are applied to attempt to stem the flow of subsidized feedstuffs and young or thin stock over the border. Third, waterpoint construction and pasture improvement projects are promoted for northern areas. Fourth, price-fixing is used in an attempt to keep the domestic retail price of meat low. This last action is designed to assuage urban consumers and at the same time to help exports.

Of all the livestock sector projects proposed in the 1974-1978 Five-Year Plan, the donor community showed the greatest interest in range development projects. The latter emphasized waterpoint construction, range management, and various attempts to alter herder offtake strategies in the medium to long run. Prominent examples are the Western Sahel Livestock Project (USAID and Saudi Arabia - $28 million) and an ongoing IBRD project at Mopti (ODEM). Together, they account for 72 percent of the development project financing obtained from foreign sources for the livestock section of the Plan. Despite current excess capacity, the six-nation West African Economic Community (CEAO) has accorded funding for new industrial feedlot operations at Mopti and Sikasso. Libya appears to be interested in a similar facility at Gao. Despite promising field trails, donor interest in small-scale feeding programs has been minimal, accounting for only 8 percent of the monies allocated by donor agencies for livestock development between 1974 and 1978.

Production of livestock on the open range is principally constrained by the availability of pasture and water, by resource use conflicts with crop production, and by herder behavior. Despite the fact that the overall number of cattle has not yet reached pre-drought levels, herd densities in the northeast Sahel had already surpassed the maximum sustainable carrying capacity in 1976. The availability of pasture and water, therefore, effectively limits future livestock development to the western Sahel or savannah zones of Mali. The usefulness of the latter for livestock is increasingly reduced by new settlement of crop farms around waterpoints. Comparison of aerial surveys made in 1952 and 1975 shows a substantial encroachment by sedentary herds and fields upon traditional transhumance routes in the interior delta, an area that accounts for at least one-third of the national cattle herd. This trend is particularly evident in the rapid growth of state-run (2 percent p.a.) and of spontaneous (6 percent p.a.) irrigated rice farms. Furthermore, crop-oriented development projects on the drawing board cover the entire Niger Valley from Guinea to Niger. Control over access to water in fact implies control over a much larger range area.

With respect to the constraints imposed by herder behaviour, many analysts claim that herdsmen follow highly inefficient offtake strategies by retaining infertile cows and older

steers beyond the optimal economic age of sale. Accordingly, the major range development project proposals assume that offtake from range herds can expand rapidly given project guidance. In fact, the available evidence does not support the view that herdsmen are unconscious of their economic interest in making offtake decisions. In any event, it seems highly unlikely that the Western Sahel Livestock Project and ODEM as presently constituted will succeed in significantly altering offtake strategies in the immediate future.

In the light of these considerations, the official (OMBEVI) projections of cattle offtake from project areas seem too high. Close examination of the figures of ODEM in Mopti shows that they imply a willingness on the part of herdsmen to slightly decrease net herd sizes after 1983! Existing projects may increase herd productivity slightly through decreased mortality but are unlikely to alter herder offtake strategies in a significant manner by 1985. A reworking of the figures on this basis indicated a slightly greater herd size in 1985 than that projected by OMBEVI; this is due to a more pessimistic view of the size of aggregate annual offtake.

While all such projections should be interpreted cautiously, the revised production estimate for 1985 of 600,000 head is felt to be preferable for planning purposes to the official projection of 670,000 animals. The more conservative figure leads to an estimate of national production in that year of roughly 97,000 metric tons of carcass beef and edible offals (including animals exported on the hoof). This may be compared with a revised estimate of national production in 1976 of 64,000 tons, of which nearly 16,000 tons were exported.

Despite the interest shown in cattle feeding in the 1974 Plan documents, the output of feeding operations remained negligible on a national scale through 1978. The output that year of beef cattle from officially established feedlots was only 117 head, compared with an annual established capacity of 5,000 head. Under the effect of a relatively low fee structure charged to cattle owners that does not reflect the true amortization cost of the physical plant, private individuals placed roughly 1,400 head in the Tienfala lot in 1979. Whole cottonseed, rice mill by-products, and molasses are the high-energy components of the ninety-day rations being employed. Experiments with silage production have been disappointing. Average daily weight gains in 1978 in this program were 340 grams per head. A large part of the payoff to feeding lies in the maintenance of cattle at healthy weights near urban areas in order to take advantage of seasonal price rises at the end of the dry season. The social profitability of feedlots is also highly dependent upon the rate of capacity utilization, which determines the spreading of the fixed overhead.

Very ambitious Plan targets were set for small-scale farm animal feeding programs, primarily based upon the use of cull plow oxen for meat production. This model has not worked at all. In practice, farmers have been reluctant to part with trained teams before age ten. Field trails conducted on zebu oxen by Opération Riz-Ségou show that animals over this age do not perform well in feeding trails. Even if the model worked perfectly, it can be

shown that a herd of 300,000 plow oxen with 6 percent annual mortality in each age group would produce only 29,000 culls a year. This is substantially fewer than the 79,000 head estimated in a Plan document assuming the same overall number of plow oxen.

By contrast, a more successful method of small-scale cattle feeding has been developed under USAID auspices. The Embouche Paysanne program of ECIBEV (Etablissement de Crédit et d'Investissement dans le secteur Bétail-Viande) is based on the premise of a low opportunity cost of farm labor during the dry season. This permits the feeding operation to reduce overhead by restricting the off-farm input to the provision of credit, extension, veterinary services, and transport of feedstuffs. Forage cultivation and animal management that are accomplished in feedlots by salaried labor and machines are now performed by the farmer in his spare time. By early 1978, 225 farmers were feeding a total of nearly 500 animals per season. Provision of subsidized credit and services has brought an average return to the farmer of at least 10,000 Malian francs (FM) ($24) per animal over the last three seasons. This has insured eager acceptance of the program by participants. Further calculations indicate that returns can be expanded more rapidly than overhead; the operation is likely to be socially profitable (i.e., on an unsubsidized basis) once the threshold of 1,000 head a year is reached. The primary constraint, however, of maintaining sufficient extension staff year-round has yet to be overcome.

The large-scale expansion of cattle feeding in Mali, whether in feedlots or by smallholder farmers, is severely constrained by the supply of suitable feeder steers, energy feeds, and outlets for fed animals. The use of six-year-old thin but large-framed zebu steers maximizes the compensating weight gains from ninety-day feeding trails in Mali. However, it has proved difficult to obtain these animals in quantity, particularly at the start of the dry season. One calculation shows that the national herd was capable of producing only 20,000 such animals in 1976. On a practical plane, ECIBEV has discovered that rounding up only 1,000 suitable steers raises very serious problems.

High-energy feedstuffs, particularly rice mill by-products, are likely to become relatively more difficult to obtain for beef production in the near future. One estimate shows that the total number of ninety-day rations potentially available in 1985 is 37,000, and this is an absolute upper bound. Feeder steers will have difficulty in competing with plow oxen and milk cows for these supplies, since the Malian animal traction programs are based on the provision of energy feed supplements to oxen during the dry season, and milk output is a prime consideration for many owners. The proponents of feeding usually evaluate the cost of energy feeds at their subsidized prices, rather than at their opportunity cost in industry (e.g., cottonseed oil) or in sustaining plow oxen. A final difficulty for feeding programs lies in the fact that the domestic market for fed cattle does not place a large premium on fattier meat. Transport problems make it difficult to export the fattened animals. While a demand for high-quality grades exists to a small degree in coastal markets, trekking defeats

the purpose of fattening for improved quality. Feeding costs, therefore, have to be justified solely in terms of the extra weight of beef produced.

The official Malian position (as of Fall 1978) remains in favor of feeding, despite these difficulties and the apparent saturation of the small coastal market for high quality Sahelian beef with rail imports from Banfora and Ferkéssédougou. A paper published by OMBEVI at that time reiterates the official view that feeding operations will turn out 57,000 head a year by 1985. A more likely result is that annual production will be 9,000 to 10,000 head at that time. This is based on the view that private initiatives in this field outside project areas will wither away. The figure assumes, however, that the Tienfala feedlot and the new CEAO lots at Mopti and Sikasso will, as a matter of policy, be subsidized to the point where they operate at full capacity, turning out 7,600 head a year. Furthermore, the ECIBEV Embouche Paysanne program will continue to expand, provided that ECIBEV continues to receive the support of the Government of Mali (GOM) and USAID in subsidizing overhead expenses. The usual administrative constraints in the expansion of a successful program will probably limit the yearly output from this source to a maximum of 1,800 head in 1985. At least part of the fed cattle output will have to be sold on the domestic market. The overall figure of 9,000 to 10,000 head is felt to be an upper limit, since withdrawal of subsidies could prevent the actual figure from reaching this level. Beef and offals from fed cattle, therefore, can be expected to account for no more than 2.5 percent of the national beef output in 1985.

In contrast with the amount of attention devoted to the relatively insignificant question of cattle feeding, virtually nothing has been done to ascertain the actual production parameters of small ruminant herds in Mali. A recent study for Mali by ILCA assumes a 45 percent rate of annual gross herd productivity; OMBEVI and SEDES assume 30 to 35 percent; and field studies in central Ivory Coast and Mali indicate rates of 15 to 17 percent because of a much higher mortality rate than is commonly assumed. For the sake of planning estimates, OMBEVI calculates a national offtake of 3.1 million animals in 1976, rising to 4.5 million in 1985. However, it can be shown that the assumption of higher mortality rates in the inland delta and southern areas leads to an estimate of 2.5 million head in 1976 and 3.8 million in 1985, starting from the same base numbers. The more conservative figures would put the aggregate production of sheep and goat meat and edible offals at 41,000 tons in 1976 (the official estimate is 50,000 tons), rising to 62,000 tons in 1985 (the official estimate is 74,000 tons). Whatever the merits of these projections, it is clear that sheep and goats are items of major importance to the national economy, accounting for 30 to 40 percent of Malian production of red meat in 1976, and that we should learn more about the structure of production and consumption of these small ruminants.

II. - Trends in Domestic Consumption and Exports of Red Meat and Livestock

Conceptually, the net annual offtake from national livestock herds is either consumed domestically or exported. Lack of adequate data makes the estimation of the relative share of each end use difficult. Recorded slaughters and exports may understate actual numbers by as much as a factor of three. These data are useful, however, for deriving figures for average carcass weights, the distribution of operations over geographic areas, and the relative size of activity in different seasons and years. The lack of real data permitting the satisfactory estimation of supply and demand functions forces the use of more simplistic techniques to project future consumption and exports. The method used here is based upon trends in population growth, urbanization, incomes, and prices on the one hand and estimates of per capita consumption in 1974 on the other. In the first stage, the available evidence is mustered to project aggregate annual Malian consumption of red meat by 1985. This is then netted out from the best guess of the productive potential of the livestock sector in that year. The remainder is then viewed as an "exportable surplus" which may be compared to the likely demand for Malian exports. The only justification for this methodology, which is similar to the one used by OMBEVI, is the lack of alternatives.

Massive liquidation of cattle and small ruminant herds occurred in 1974 as a result of the drought. Despite the phenomenal growth of Bamako since that time, recorded cattle slaughters there by 1977 were only two-thirds of the 1974 levels. As a rule, inter-seasonal fluctuations appear to be greater than inter-annual variations since 1975. Cattle and small ruminant domestic slaughters are largely countercyclical in any given year, with mutton substituted for beef in urban areas at the end of the dry season and during the rainy period. Domestic slaughter of sheep and goats was quite low in 1975 and 1977 relative to peak periods of activity in 1974 and 1976.

In 1974, average carcass weights at slaughter in Mali reached low points of 104 kg for cattle and 12 kg for small ruminants. Cattle butchered in Bamako had carcasses weighing 125 kg on average between 1975 and 1977. The comparable figure for sheep and goats was 14 kg, with the former weighing slightly less than the latter. Cattle liveweights are typically at their lowest point in July, gaining 10 to 25 percent by the following December. Export-grade animals have average carcass weights of at least 140 kg. The average prime export steer is capable of producing a 160-kg carcass at the time of crossing the border.

Retail beef prices in traditional markets in Bamako nearly doubled between the first and third quarters of 1975. Supply was low at the time due to the aftereffects of the drought and the increased availability of grain to the herdsmen. On the other hand, demand for livestock imports on the coast was at an all-time high since the supply of Sahelian cattle had dried up. Cattle exports were officially prohibited during six months of 1975 in order to ease domestic prices. Since this period, retail prices for red meat have been increasing

steadily at roughly 10 percent per annum. Mutton has increased in price slightly faster than beef since late 1975, which is in direct contradiction with the stated policy of the GOM regarding the encouragement of substitution of mutton for beef in domestic consumption. According to official statistics, the nominal value of mutton in the fourth quarter of 1977 was 32 percent above the price prevailing during the fourth quarter of 1975, while bone-in beef sold for virtually the same price as in the earlier period.

It is felt that the large changes in meat prices during 1974 and 1975 were a temporary phenomenon; in the absence of other evidence, there is no reason to believe that domestic retail meat prices in Mali will increase on average faster than the general inflation rate within the foreseeable future. However, this position should be viewed as an operational hypothesis rather than as a firm prediction. The actual level of relative meat prices is likely to depend to a great extent upon demand in coastal export markets. This in turn will depend on developments in the world meat and fish markets in addition to general economic considerations in the coastal countries. With respect to past behavior in Mali, it is reasonable to assume that per capita beef consumption declined substantially during 1975 due to the quantum jump in values. Initially, consumers may have substituted mutton for beef in addition to curbing overall red meat consumption. Since 1975, there may have been a slight tendency to do just the opposite because of the differential rise in prices. In practice, it is difficult to separate seasonal from long-term trends in this respect. In absence of other information, it can be assumed that changes in average annual per capita consumption of beef and mutton by 1985 will be more heavily influenced by trends in real incomes than by relative price changes.

Evidence from other countries shows that the urban demand for red meat in Mali is likely to be elastic (E = 1.25 - 1.5) with respect to changes in real income. Using IBRD projections for real GDP growth in urban and rural Mali and OMBEVI projections of population changes in these sectors, the annual rate of growth of per capita real income is estimated at annual averages of 1.8 percent in urban areas and 0.12 percent in rural zones. Combined with the assumption that red meat prices will rise at the general inflation rate (and most importantly, at the same rate as staple food grains), this leads to the view that the per capita consumption of meat in towns will grow by 2 - 2.5 percent per annum to 1985, while the comparable figure for the rural sector is less than 0.25 percent.

A 1974-75 study in Bamako estimated the annual per capita consumption of beef and edible cattle offals at 29 kg and that of mutton and edible small ruminant offals at 5 kg. (Mutton is defined here as including goat meat). OMBEVI's best guess of rural per capita consumption in the same period is 4.2 kg for beef and 7.3 kg for mutton. Three main conclusions can be drawn from these estimates about actual aggregate red meat consumption in Mali in 1977, based on the price and income trends depicted above. First, beef and mutton (including offals) make equal contributions to the aggregate national consumption of red meat, accounting for roughly 45,000 tons each. Second, more than half

of aggregate beef consumption occurs in towns, although these contain only 14 percent of the population. Third, nine-tenths of domestically consumed mutton is eaten in rural areas. Simple extrapolations of these projections to 1985 suggest that aggregate Malian beef consumption may increase by more than 50 percent to 69,000 tons, and mutton consumption may increase by less than 25 percent to 57,000 tons. What actually happens will depend very much on the relative prices of the two commodities, which in turn depends very much on trends in export demand.

Recorded exports of livestock are not suitable as proxies for actual exports because of the large proportion of animals exported clandestinely on the hoof. On the other hand, the official monopoly over red meat exports held by the para-statal agency SOMBEPEC is effective; recorded exports of red meat closely approximate actual operations. However, the officially declared data for livestock do serve to give an idea of changes in the distribution of exports over destinations, seasons, and years. The most noticable aspect of export behavior thus discerned is the abrupt decline in cattle consignments sent to Ghana. This destination accounted for over half of declared shipments in 1967 but for virtually none in 1977. Similarly, the share of Ivory Coast in recorded Malian cattle exports went from 40 to 70 percent over the same period, underlining the overwhelming importance of this market for Malian foreign trade. The abrupt shift of exports originating in the Gao region from Ghana to Nigeria via Niger is seen as a further indication of the adaptability of the traditional marketing system. The periods of most intense activity for external cattle marketing occur in the cold dry season, from October to February. The end of the hot dry season in May and June is the seasonal low point. The seasonal peak period for small ruminant exports is closely associated with the Muslim feast of Tabaski, which in recent years has occurred during the fourth quarter.

The recorded export figures indicate that overall cattle consignments were not back to pre-drought levels as of 1977. However, small ruminant shipments had returned to normal at that time. Declared exports of cattle in 1977 were only three-quarters of 1967 levels and only one-third the number of official exits in 1972, the peak year. On the other hand, small ruminant consignments in 1977 were three times greater than those in 1967. Trade in sheep and goats has been helped by the growth of new markets in Senegal and Algeria, together accounting for one-third of operations. Ivory Coast receives most of the remainder. SOMBEPEC's small export trade in red meat was choked off by the combination of soaring Malian meat prices in 1974 and 1975 and relatively low prices on the world market at that time. It also seems that the margins in the meat trade are sufficiently slim and changing as to make the para-statal agency an ineffective competitor.

Export flows of livestock and meat appear to be a function of the costs pertinent to export marketing on the one hand and the price spread between domestic and export markets on the other. The costs specific to exporting are large and complex; they involve fees, taxes, transport costs, risks and the opportunity cost of tied-up resources (see the next

section for details). Furthermore, the data on retail meat prices in Bamako and Abidjan show that the price spread is highly variable, depending to a large extent on the other sources of supply available to the latter. Thus bone-in beef was actually slightly cheaper -- according to the official price series -- in Abidjan than in Bamako during the second half of 1975. Ivory Coast was at that time importing very cheap beef from the EEC and Argentina. Meat was nearly twice as expensive in Abidjan only a few months earlier, in the fourth quarter of 1974. There is some evidence that the usual order of magnitude of the spread is for meat to be 30 to 40 percent more expensive on the coast.

The use of the "exportable surplus" methodology set out at the beginning of this section and revised figures for production and domestic consumption yield an estimate of actual 1976 exports corresponding to 89,000 head of cattle and 220,000 sheep and goats. This is approximately four-fifths of estimates by OMBEVI. The figure for cattle is 3.5 times the level of recorded exits in that year. Similarly, the estimate for small ruminants is more than twice the number of recorded exports of sheep and goats.

III. - Production and Marketing Costs for Livestock and Meat

The available evidence indicates that wholesale livestock prices in the Kati market (Bamako) are commensurate with the costs of production of the animals. While it is clearly difficult to specify the cost of livestock production under traditional systems, OMBEVI has generated figures for the average cash costs associated with raising (i.e., the purchase price is not included) export quality cattle from birth to sale at age seven, under an unspecified form of husbandry (presumably in the agricultural areas). These costs include: taxes, veterinary fees, remuneration to hired herdsmen for looking after the animals, and marketing expenses such as crop damage payments during trekking. Taking into account the expected loss of investment through animal mortality and the opportunity cost of sunk funds, it is striking that over the life of the animal the sum of expected costs is very nearly equal to the average sale price of the corresponding category of livestock in 1978. In other words, the cost to an absentee proprietor of simply maintaining a newborn calf through maturity would only yield the assumed "usual" rate of return to investment in the informal sector (20 percent p.a.). If nothing else, this suggests that the traditional livestock production business in Mali is not characterized by profit levels in excess of other opportunities. In 1978, traditional producers received approximately 700 FM per kilogram of carcass meat for cattle sold in Kati market. On the other hand, extra carcass meat produced by feeding the animals another ninety days in lots cost about 900 FM/kg. This assumes a per head feeding cost of 35,000 FM, which includes a share of the overhead expenses based on full capacity utilization. The comparable figure for extra carcass meat produced through embouche

paysanne was higher in 1978; however the spreading of overhead through expansion of activities should quickly lower the average cost figure into this range.

Meat production and distribution costs in the traditional sector are modest. The combined net margin of cattle traders and wholesale butchers accounted for approximately 6 percent of the price the Malian consumer paid for beef in 1978. The average retail butcher's margin was 11 percent of the retail price. All in all, four-fifths of the cost of meat in Bamako markets is accounted for by the purchase price of the animal in northern markets. This is far from the picture of collusive traders and butchers sometimes advanced as representing the West African case. By contrast, the cost structure of the para-statal agency SOMBEPEC in 1978 was such that it could not hope to compete with the private sector. SOMBEPEC could produce wholesale carcass beef at the Bamako abattoir gate in 1978 for 825 FM/kg; the comparable figure for the private sector was 750 FM/kg, or 9 percent less.

Various official and non-official fees add substantially to the supply price of Malian livestock and meat in foreign markets. Malian export permits require visits to eight separate offices over a period of a week. On the basis of consignments of fifty head of cattle or 300 sheep and goats, cash outlays work out to 8,800 FM per head of cattle or 1,800 FM per small ruminant. This adds 50 to 60 FM/kg of beef and 100-110 FM/kg of mutton to the cost of live exports. Chilled meat exports pay a levy of 5.16 percent of the FOB value at the border, or roughly 50 FM/kg. On the other hand, automatic permission to import 75 percent of the value of exports offsets to some extent the cost of compliance with the formalities. In theory, livestock and meat are not subject to import duties within the CEAO. However, until recently only Ivory Coast among Mali's direct customers complied with the spirit of the ruling. Senegal and Niger had substantial "production taxes" payable at the border. Upper Volta levied a small transit tax. These barriers were no longer in effect by 1979, as a result of Malian activity within the CEAO. Import duties in Ghana, a non-CEAO customer, were 315 FM/kg (on average) in 1978. The duties on imported meat are similar.

Transport costs for cattle depend upon the method employed; the principal trade-off is between the cash outlay for vehicles and the time required for trekking. The most common route to the coast consists of walking the herds to Ferkéssédougou or Bouaké and then completing the final leg of the journey by train. Finally, the animals can be trucked directly to market. The three options involve rotations of capital lasting a minimum of sixty-five, seventy-seven, and twenty-one days respectively. On the other hand, vehicle costs are high. A truck capable of carrying twenty-five steers rented for 700,000 FM in early 1977. Trucking rates are highest at marketing time for cash crops in Mali (rice, cotton, peanuts) and Ivory Coast (cocoa and coffee). This occurs from November to February, precisely the period of maximum cattle export activity. Livestock may have substantial waits for rail cars at this time.

Surprisingly, transportation by truck or train is often associated with greater mortality, more forced sales, and more shrinkage than trekking. This is because animals may spend up to three days in confinement without food or water. Cattle sent by rail travel in closed boxcars without ventilation. Illustrative calculations for cattle starting from Niono, Mali, show that trekking to Bouaké is the least-cost method of exporting to Abidjan. Even taking into account the length of time the capital is immobilized, the cost per animal under this option is less than 31,000 FM per head (220 FM per kg of carcass). Comparable figures for shipments by rail from Ferkéssédougou and for truck shipments are 32,000 FM and 54,000 FM, respectively. In fact, the majority of trucked cattle appear to be confined to experimental shipments under GOM auspices.

Given the assumption that unofficial exports cross the border on the hoof, it follows that over one-half of the estimated actual exports of 220,000 sheep and goats in 1976 were trekked over the frontier. Exports by rail to Dakar and Abidjan appear to be paying propositions, particularly in the periods preceding important Muslim feast days. It costs an estimated 4,000 to 5,000 FM per head to market sheep and goats from western Mali in Dakar (including an allowance for loss), provided that rail cars are available at Kayes. Small ruminants can be exported from Ségou to Abidjan for 5,000 to 6,000 FM, all expenses included, provided that rail cars are available at Ferkéssédougou. Trucking is more expensive at 9,000 FM per head but may be advantageous at seasonal peak periods because of rail bottlenecks and the need to meet delivery deadlines. By contrast, trucking animals across the Sahara from Gao to Algiers seems to be prohibitively expensive unless small consignments are sent on a "space available" basis. One questionable estimate puts the cost as high as 36,000 FM per head if return cargo is not available. Nevertheless, 18 percent of 1977 recorded exports of Malian sheep and goats went to Algeria by truck. The costs and returns to small ruminant exports to Algeria have yet to be established in a satisfactory manner.

The feasibility of air consignments of live animals from Gao to Tripoli depends on the type of equipment used, the scheduling of flights to carry cargo on the return trip (perhaps as far as Bamako), the evolution of aviation fuel prices, and the premium consumers attach to live animals for ritual purposes. The best estimate using 1977 prices and Air Mali equipment was a cost of 26,000 FM per sheep or goat, in addition to the purchase price in Gao. This figure is likely to be considerably higher in the immediate future, but might fall if the Libya-Mali project in Gao obtains a DC8 or if the Libyan government decides to subsidize the aviation fuel. In any event, consumers would have to be prepared to pay nearly twice as much for meat from a live animal as opposed to meat on the carcass in order for live animal shipments by air to be justified from an economic standpoint. This is unlikely except possibly during religious holidays. In general the prospects appear doubtful.

Exports of red meat by refrigerated truck are in practice ruled out by frequent malfunctions in existing rolling stock and the general state of the roads. Data from 1977

show export costs of 350-400 FM per kg from Bamako to Abidjan under this option. Air consignments are subject to the same constraints mentioned in the previous paragraph. The best bet is for shipments from Bamako to Abidjan along established routes with certainty of return cargo, benefitting from preferential rates for meat exports. Even so, 1978 data show a total cost of 250-300 FM/kg for exports using this transport method. A further disadvantage is that the rates are on a "space available" basis, vitiating efforts to set up the type of regular shipment arrangements necessary in the perishable food business. Cost figures at 1977 rates for loads from Bamako to Algiers are estimated at 500 to 900 FM/kg, depending upon the existence of return cargo. Similar numbers for exports from Gao to Tripoli are 450 to 800 FM. These rates should be much higher in the near future because of fuel price rises.

IV. - The Outlook for Malian Livestock and Meat Exports to 1985

The structure of the market for Malian livestock exports in West Africa is a complex web of interrelationships. Even a seemingly unrelated event such as the relaxation of meat import quotas in the EEC can have a major influence on the domestic price of meat six months later in Bamako. In this specific example, South American exports to Europe would grow significantly, provoking a rise in the supply price of world market beef on the West African coast. Malian exports would become more competitive, leading to increased demand for export steers. Some of the better animals slaughtered domestically would now be exported, leading to a decrease in the amount of meat available on the home market and upward pressure on domestic prices. This scenario is in fact a possibility for the early 1980s as world beef supplies shrink. Despite the myriad factors influencing the supply and demand of Malian livestock exports, rainfall patterns in the Sahel and the growth of per capita income at home and abroad are likely to be the major determinants of Malian meat prices and export flows within the foreseeable future. Although the weather is unpredictable, the projections below are best guesses concerning trends in demand based on likely developments in per capita incomes.

The excess of beef and edible offal production in 1985 over Malian consumption is estimated at 28,000 metric tons, based on the projections reported above. This may be compared to the official estimate by OMBEVI of 42,000 tons. Projections for small ruminants are pure guesswork. The answer obtained depends very much upon the assumptions about average mortality rates, and these parameters remain unknown. The official estimate by OMBEVI of an exportable surplus equal to 7,000 to 8,000 tons in 1985 is middle-of-the-road.

All information available suggests that Ivory Coast will remain Mali's major trading partner; it is likely that this country will continue to consume the preponderant share of

Malian livestock exports. Ivory Coast is likely to require between 63,000 and 71,000 metric tons of beef and offals in 1985, according to projections made by John Staatz. Current Ivorian production trends extrapolated to that year show an estimated capacity of 15,000 tons, although official plans are to expand production to 22,000 tons. Thus, 48,000 tons is a minimum estimate of Ivorian requirements for beef and offals imports in 1985 even if domestic production reaches 15,000 tons. OMBEVI estimates Ivorian beef import requirements to be a minimum of 38,000 tons in that year.

On the other hand, it is unlikely that Mali will recoup its pre-1975 share of the Ivorian beef market by 1985. Mali had a mean share of 50 percent of the total Ivorian supply of beef and edible offals between 1967 and 1974. This figure shrank to an average of 37 percent in the post-drought period from 1975 to 1977. Shipment of the entire "exportable surplus" of Malian cattle to Ivory Coast in 1985 could satisfy no more than 44 percent of the estimated beef requirements in that country. Furthermore, assuming that Mali continues the post-drought pattern of sending roughly three-quarters of its cattle exports to Ivory Coast, the Malian share in the estimated beef supply of that country in 1985 would fall to a maximum of 33 percent. The scarcity of credible data on either side of the border renders futile any attempt to make quantity projections for small ruminants. The upshot of the comparison of the potential supply and demand for Malian livestock is that Mali will be in a position to export profitably all it can to Ivory Coast in 1985.

Various independent calculations indicate that trekking cattle to Ivory Coast is a highly profitable activity at 1978 prices. Each consignment of fifty cattle exported legally brings a return on capital of 10 to 11 percent. This yields annual returns at least equal to other opportunities in the informal sector if funds are rotated more than once a year. The consensus is that capital is rarely rotated more than two times a year. Maximum profits are obtained by exporting in the dry season and selling in Abidjan three months later. Returns are greater if export formalities are evaded. If all duties are paid, calculations show that there must be roughly a 35 percent premium over Malian values in per kilogram liveweight prices for cattle sold in Abidjan to cover costs and the purchase price at the Kati market. The required margin falls to 24 percent if export taxes are evaded. Allowing for liveweight shrinkage as the cattle are trekked south, retail meat prices in Abidjan would have to be 50 percent higher than in Bamako for legal exports to pay off. The estimate shrinks to 38 percent for illegal exports. The relevant price comparisons are between Malian prices and Ivorian prices three months later.

The available data indicate that legal cattle exports to Abidjan were of little or no direct profit in the second half of 1975 and in the first quarter of 1976, although the permission to import, obtained in return for exporting under Malian law, may still have been a sufficient incentive. Herd reconstitution in Mali sent domestic prices soaring while export prices in Abidjan were kept down by imports of frozen carcasses. The price split had returned to relatively remunerative levels by 1977, although substantially less than the very

igh margins in late 1974 and early 1975. Current developments in the world beef situation varrant an optimistic outlook for exports of Malian cattle on the hoof to Ivory Coast for the oreseeable future.

The outlook for fed cattle depends upon finding a satisfactory means of transportation o export markets. Trucking to any destination outside Mali is clearly unprofitable. nproved loading infrastructure and a quicker transit time for cattle trains are necessary to xport prime fed animals by railroad to Dakar, although the existence of a premium ifferential for high quality meat in that market justifies a closer look at the situation. It eems likely that this will be a partial outlet for some of the 9,000 to 10,000 head projected or finishing in 1985. However, Malian feeding programs will be in direct competition for a mited market with those in Senegal. A similar situation exists in Ivory Coast, where onsumption of high-quality beef was in the vicinity of 2,000 tons in 1976. It seems clear hat any growth in demand in this market will be met by relatively cheaper imports from eedlots in Upper Volta and in Ivory Coast. They have the advantage of being on the rail ine. Unless and until the Dakar outlet is developed, the only justification for feeding rograms in Mali will be to assure a supply of beef to the cities at the end of the dry season. he cost of feeding will have to be justified by the extra meat made available and by the igher price of selling at a time when most herds are away on transhumance. While ossibilities exist in this regard, embouche paysanne or small-scale private lots are a better roduction vehicle to exploit them than large project-run feedlots. The main market ompetitor for Malian fed cattle is, possibly, small ruminants, which have traditionally filled he dry season meat production gap in Mali. It may be that the latter are also cheaper, ound for pound, to produce and to transport.

The level of profitability of small ruminant exports depends to a great extent upon the eason in which the animals arrive on the market. Immediately prior to the Muslim holy day f Tabaski returns are so high that virtually any means of transport is acceptable. Australia nd New Zealand have been able to pursue a substantial trade in live sheep with the Middle ast, including Libya. During the Muslim holy season in 1978, which occured in November, ahel sheep cost as much as 30,000 FM at the Kati market and sold for up to 60,000 FM in bidjan. Even with transport and other costs of up to 10,000 FM per head for trucking, this eaves well over a two-thirds return on capital!

These high margins, which may apply during less than one month of the year, are most kely due to the absence of stocking facilities in terminal markets. The greatly increased isk for keeping the animals in a humid environment for a long period of time is also likely to e a factor. Exports at other times of the year are also highly profitable, although more ttention must be paid to transportation costs. During the rest of the year, prices in both ati and Abidjan are roughly half the peak levels. Sahel sheep sold for approximately 16,000 M in Kati and 28,000 FM in Abidjan during mid-1978. This price split, which is epresentative of the post-drought period since 1975, permits up to a 30 percent return on

capital if the animals are trekked. Clearly, the export opportunities offered by the smal ruminant trade should not be written off as a short-term phenomenon restricted to th Muslim holy season. Success at other times of the year, however, may be dependent upo trekking the animals part of the way.

The outlook for air shipments of chilled beef by SOMBEPEC is not good. The best cas that can be made is for export of rear quarters of fed cattle to Abidjan. Even so, the break even supply price (CIF) at the coast was approximately 1,200 FM/kg in early 1978. Thi price is dependent upon obtaining cheap air freight rates on a "space available" basis. Th structure of market prices in 1978 would not permit any return to capital. Furthermore Ivorian purchasers such as AGRIPAC have little interest in developing such an irregula source of supply.

Rough calculations show that SOMBEPEC would be able to supply chilled bee carcasses to Algiers at US $3.40 - $4.32 and to Tripoli at $3.30 -$4.11 per kilogram at 197 prices. The higher figure in each range would apply when using existing air equipmen without return cargo. This price should be compared with top quality boxed beef cuts flow to Europe from Argentina at $3.20/kg during the same period (see Ariza-Niño's report o Argentina in Volume IV). The rising costs of Argentine beef and aviation fuel should favo Malian meat exports over South American ones at some time in the next few years Nevertheless, the foreseeable level of activity to 1985 is negligible relative to total Malia livestock exports. Orders may be placed by clients who are willing to pick up the meat i their own military aircraft, not subject to the usual commercial cost criteria. While suc activity may offer sporadic gains to Mali, it is presumably not a suitable focus for dono agencies.

Mutton shipments by air were not profitable at 1978 levels. However, they ma represent the most viable form of meat (as opposed to livestock) exports in the future. Th break-even CIF price for Malian air shipments to Abidjan was roughly 1,400 FM/kg wholesal in 1978, in the off-season. This is an uncompetitive price relative to a prevailing reta value of 1,500 FM/kg. During the same period, SOMBEPEC could supply carcass mutton Algiers or Tripoli at US $3.00 - $4.00 per kilogram, depending on the availability of retur cargo. The cost level has almost certainly increased since then because of a rise in fu prices. However, per capita growth in income in the urban sector stimulated by o revenues, rising transport costs for chilled meat from relatively more distant locations, an increasing consumer preferences for mutton slaughtered by Muslim butchers are all likely t favor Malian mutton exports to North Africa in the future. While some of thes considerations also apply to beef exports, the higher value of mutton per kilogram help offset the air freight charges.

V. - Summary of Policy Conclusions

Livestock exports will continue to play a key role in the Malian economy in 1985. Projected exports for that year of 158,000 head of cattle and 500,000 small ruminants are worth approximately US $56 million at 1976 prices. This is equivalent to roughly half the value of exports of all commodities or one-tenth of GDP in 1976. Furthermore, good coastal demand prospects and low Malian herd productivity mean there is considerable scope for policy intervention to improve national income in this sector.

On the production side, planners need not fear depressed prices and lower income from productivity improvements. Demand for exports and adequate traditional export marketing channels ensure that extra production can easily be sent to the coast at profitable prices. There are five specific areas requiring investigation in order to promote greater offtake of cattle from range herds.

1. - Despite disenchantment with animal health programs in English-speaking circles, the high mortality of young stock remains perhaps the single greatest production problem of the livestock sector. The relatively limited resources of range improvement projects in the western Sahel and the Mopti area should be focused first and foremost on this question. Specific proposals for intervention should be solicited from multi-disciplinary teams including an economist, an anthropologist, and an animal scientist. Although the technology of calf salvage may already be known, interventions must be acceptable to the herdsmen and they must be able, potentially, to pay for them themselves. There should be scope for the last point: it can be shown that reduction of calf mortality from 30 to 20 percent would lead to increases in annual cattle production worth $10 million at 1978 prices.

2. - Projects should focus upon improving the calving rate of Sahelian herds. The estimated annual rate of 50 percent usually used for Malian zebu females of reproducing age is low on a world scale. Although this observation is hardly new, few resources have been channeled into herd improvement and breeding research. Basic scientific inquiry of this nature is expensive, foreign exchange intensive, and should be viewed as a long-term effort. As such, this form of endeavor is a prime candidate for foreign assistance programs. In the absence of short-run results in the realm of genetic improvement, it appears that much can be done to improve the calving rate by improving the veterinary and nutrition regimes of the breeding stock.

3. - Livestock development projects can play a key role in the encouragement of a national land-use policy. The proliferation of farms dependent upon irrigated rice production poses significant problems for the traditional herding system in the ODEM (Mopti) zone. While national policy may not be effective at resolving the problems arising from crop damage conflicts at the village level, there clearly is scope for resolving inconsistencies between livestock and crop development at the level of agricultural opérations. In particular, there is a need to preserve transhumance corridors running

through the various integrated rural development zones of the Niger Valley. Closing of suc corridors to obtain a relatively small extra amount of irrigated land around waterpoint effectively denies a much larger land area to livestock development.

4. - Much can be done to improve the efficiency of the use of existing pastures by th development of stock ponds of varying depths near currently under-used grasslands Attention must also be paid to the provision of adequate water along the routes used by th herds as they leave the area at the start of the dry season. A great deal of work is currentl in progress to identify these pastures.

5. - Since decisions involving herd management are usually taken by households o clans, but rarely by entire peoples, close attention should be paid to the various factor affecting herder sales motivation. What is clearly in the interest of the collectivity is no always in the interest of the individual decision unit. Stocking densities on communal land i an often-cited example. This is an absolutely essential point, since some authors feel tha large-scale improvements in herd productivity of the type advocated here will only lead t much larger herd sizes, and eventually to ecological disaster. Projects to improve her productivity must go hand-in-hand with efforts to increase the proportion of the herd take off each year. While it seems clear that higher producer prices (in terms of grain, fo example) will increase sales, the scope for administrative action to modify the prevailin price structure is limited. The main scope for raising prices independently of modification in export markets is to cut taxes, which may not be feasible, or to lower transport cost which may not be possible. Promising avenues for increasing the incentive to sell may lie i better rural consumer goods availability, alternative institutions for saving, or increase access to government services on a paying basis. In particular, projects should provide means for herdsmen to reinvest their extra cash from increased sales to improve the quality as opposed to the size, of their herds. Donor agencies would do well to initiate field studie at the level of the decision units in order to identify the correct avenues of approach.

There is a need for revision of the fattening component of the "stratification" strateg of cattle production. Donor agencies should not commit additional funds to feedlo operations. Lack of a domestic market for high-quality meat, transportation difficulties and effective competition from national producers in export market countries virtuall ensure that low export demand for feedlot beef will be more than met by existing capacity Cautious support should be given to embouche paysanne programs. However, care must b taken that administrative overhead is kept low and that these programs function to suppl the domestic urban market with beef at the end of the dry season, when supplies are low an prices high. New projects designed to involve crop farmers in livestock production shoul investigate the possibility of "growing out" cattle over a period of years rather tha intensive feeding programs. The limited supply of high-energy and high-protein feedstuf might better be used in "sedentarizing" portions of the village herds at the end of the dr season, when they would otherwise have to be left free to roam in search of scarce pastur

or to leave on transhumance in the river valleys). This could reduce losses, promote animal raction, and help ensure a supply of fit animals in the dry season for milk, export, and omestic beef production. However, sedentarization of this type without sufficient vailability of feed supplements and pasture, as has occurred around the rice farms in the nland delta, can lead to severe degradation of pasture. Therefore, projects should adopt a ong-term horizon when opting to use feed resources in this manner. Short transhumance atterns frequently exist around sedentary villages in the dry season for a good reason.

On the marketing side, the appropriate conclusion from the events in 1975 is that Malian livestock traders cannot count on institutional barriers or lack of experience to revent competition from non-Sahelian sources in coastal markets. It may not be possible to imply pass along increased costs for Sahelian exports to Ivorian or Liberian consumers. Therefore, a new cost consciousness -- always present in the thinking of private traders -- hould enter GOM policy-making and donor project design. The focus of interventions should e to cut marginal and average costs to individual traders in the traditional sector. Too ften, livestock projects only serve to increase these costs under the guise of "improved nfrastructure" without a corresponding increase in the revenue. A number of issues ertinent to this question deserve immediate attention:

1. - Donor agencies can play a significant role in helping to reduce the cost of trekking xport cattle within Mali. The principal problems facing herdsmen when marketing cattle on the hoof" are lack of waterpoints in the north and crop damage conflicts with farmers in he south. OMBEVI is actively seeking financing for the key Nara-Kati cattle trail. This roject and similar schemes identify the trail with specific markets. They include wells nanaged (for a fee) by village councils in northern areas. In this context, it should be mphasized that waterpoints should be "rented" to established groups who, in turn, can harge fees to strangers. Institutionalized routes have an extra advantage in that herdsmen re legally protected from crop damage suits within a fixed distance of the trail. Similar outes have worked well in Upper Volta. OMBEVI estimates the cost of equipping the Nara-Kati trail at 65 million FM; the project woud be socially profitable if it resulted in a eduction of liveweight loss (or an equivalent reduction of crop damages) of 1 percent. Other key trails signaled out by OMBEVI are Léré-Bamako, Nioro-Bamako, and Nioro-enegal.

2. - Donor policy should be strongly oriented to supporting and increasing the level of ompetition in Malian livestock markets as a general means of decreasing export costs. Thus, proposals to increase access to markets through better (not necessarily more costly) nfrastructure, such as an increase in the number of collection markets with water, should at east be considered. Projects to spread market information, such as radio broadcasts, may lso be promising if it is determined that market information is in fact restricted to larger raders. (This issue has not been resolved to date). On the other hand, proposals to organize" the export cattle trade should be viewed with suspicion. OMBEVI has called for a

halt to the "proliferation" of cattle traders and for limitation of individuals to specific aspects of trade (e.g., collecting in rural areas, transportation, wholesale marketing, or butchering). These actions would only be desirable if they served to break up monopoly positions of individuals. The available evidence does not indicate either that market concentration is a serious problem or that the existing degree of vertical integration is a serious impediment to efficiency. On the contrary, the proposals would restrict trade to those who could afford or were allocated a license, thereby increasing market concentration and costs. Much the same analysis can be made of attempts to enforce fixed prices for livestock and meat.

3. - Donor agencies investing substantial funds to promote livestock exports should take an active part in the encouragement of simplification of Malian export formalities. The current procedure includes eight different visits to government offices over a period of at least one week for each consignment. OMBEVI has been calling for the unification of these functions for at least three years without result.

To the extent that diversification of export outlets is desirable, Senegal is the best alternative to Ivory Coast for cattle and small ruminant exports. The latter destination is, nevertheless, likely to continue to account for three-quarters of Malian livestock exports in the foreseeable future. A study should be undertaken to ascertain the financing required to facilitate transport of Malian cattle from Kayes and Bamako to Dakar by rail. The rail spur to Koulikoro might eventually be used to export embouche cattle from the Banamba rural development area. The impact on Malian exports of the much-heralded Nigerian outlet is likely to be minimal. Because of greater proximity, Upper Volta and Niger possess a considerable advantage in supplying this market. Malian cattle from the Gao region may in fact be trekked across Niger and Upper Volta to Nigeria. However, the potential for project input into the improvement of this trade, at least from the Malian perspective, appears to be minimal. Algeria is becoming an important outlet for small ruminant exports from the Gao region. Further study is warranted of possible project interventions (centered around road transportation) in this trade.

Better knowledge about the small ruminant sector should be a clear priority for both the GOM and foreign assistance projects. Accounting for roughly half of the domestic meat supply in 1978, sheep and goats present real potential for year-round exports. Small ruminant shipments in 1976 are estimated to have represented approximately one-quarter of all livestock exports by value. Furthermore, sheep and goat exports to Senegal and Algeria are the best prospects on the horizon for diversifying the sources of foreign trade revenue. Because small ruminants are suitable for production in agricultural areas that are well penetrated by extension services and because they can be shipped by truck or rail, the small stock sector is potentially amenable to policy intervention. Nevertheless, little is known about even the basic offtake, mortality, and growth statistics pertinent to the national herd. All the evidence points to extremely high rates of lamb and kid mortality (around two-third

n the first year). This alone seems to indicate substantial room for improvement of roduction. Finally, a preference for beef in towns and rapid urbanization in Mali may ombine to increase the domestic demand for beef relative to mutton in the future. The esult may be to increase the competitiveness of mutton, relative to cattle, on the export narket.

Donor agencies should refrain from investing funds in meat export schemes. All ndications are that Mali will not be able to supply high-quality meat to coastal markets at ompetive prices. Both Senegal and Ivory Coast have made substantial efforts in recent ears toward self-sufficiency in high-quality meat production. To the extent that imports of ahelian meat are required, Upper Volta has a comparative advantage over Mali because of he rail line. The outlook for air shipments of meat to North Africa is also not good. The est bet is for shipments from Gao to Libya, and this is already adequately covered by the ibya-Mali Project at Gao. As in the case of trekked cattle, Niger and Upper Volta have a ubstantial comparative advantage over Mali in the shipment of meat by air to Nigeria, ecause of location. The viability of recent Sahelian shipments to Algeria and Nigeria ppears to depend upon the customer collecting the meat with military aircraft that are not equired to meet commercial cost-effectiveness criteria.

CHAPTER ONE

OBJECTIVES, ISSUES AND SOURCES

The Impetus for this study grew out of concern in policy-making circles over the ability of the Sahelian states to maintain, and possibly increase, their earnings from livestock and meat exports to important consumption centers on the Gulf of Guinea within the foreseeable future. The intrusion of South American beef into hitherto safe markets, such as Abidjan, in 1975 raised the spectre of decline in the crucial export sector of Mali, already hard hit by drought in the first half of the decade. There are two main issues in this context. First, can the Malian livestock and meat sector provide an increasing amount of exports in the post-drought era? Second, will export markets absorb this increased Malian production at price levels that guarantee an increasing source of foreign exchange for growth in the national economy in real terms?

Each of the two categories of issues, which essentially concern the supply and demand for Malian exports, can be broken down into several specific areas for investigation. The basic goal is to assess the outlook for different kinds of livestock and meat exports to 1985, in terms both of quantity and profitability. The information is presented as much as possible in a form useful to decision makers contemplating the allocation of funds to activities designed to maximize Malian income from this sector.

I. - Issues and Objectives

A. - Gauging Prospects for Sustained Increases in the Supply of Livestock and Meat Exports

The analysis of the future supply of livestock and meat exports depends principally upon three questions: production prospects following the drought, domestic meat consumption, and the price-cost structure for exports to coastal markets.

1) - Production Prospects Following the Drought

The first objective of the inquiry is to review the evolution of livestock production since 1967. This involves ascertaining the temporary and permanent (if any) effects of the drought on herd numbers, herd location, and production components such as offtake, mortality, and growth rates. The second task is to define the effective constraints on increased output of beef cattle, fattened steers, small ruminants, and red meat. As a

practical matter, swine and pork are not considered here, because of a complete lack of data. This is not considered a major omission in Mali, where people are, for the most part, of the Muslim faith.[1*] The third element of interest is the examination of the effectiveness of current policies to relax the constraints on increased output. Finally, an attempt will be made to project output of the major livestock categories to 1985 in the absence of price and income considerations.[2]

2) - Trends in Domestic Meat Consumption

The potential supply of livestock and meat exports depends not only upon production, but also upon use of part (perhaps three-quarters in recent years) of that output for domestic consumption. Although the animals typically exported tend to be healthier and larger than cattle in the domestic slaughter herd, it is clear that a unilateral surge in the domestic demand for meat will siphon off the more marginal export grade stock (and vice-versa). The available evidence concerning per capita consumption in urban and rural areas will be combined with information on trends in relative prices, real incomes, and demographic changes in order to project domestic demand for mutton and beef to 1985.

3) - The Price-Cost Structure for Malian Livestock and Meat Exports

In a market characterized by inelastic demand (i.e. not very responsive to price changes) and a lack of alternative sources of supply, sellers need not be concerned with costs. Added charges incurred during the marketing process can be passed on to consumers on a markup basis. However, the advent in 1975 of alternative sources of supply for beef in the form of South American frozen carcasses indicates that Sahelian traders must pay close attention to costs, since consumers now have the opportunity to shop elsewhere. This is particularly true of the limited market for relatively high grade beef produced from feedlot cattle. Coastal facilities for turning out fattened feeder animals have expanded greatly in recent years along with growth in the sugar industry which produces molasses as a by-product.

The study will therefore develop cost budgets for each of the major livestock and meat export items. The information can be used in conjunction with data on export market prices to gauge the relative profitability of different export strategies at the level of the individual trader. This serves three purposes. First, it can clarify the behavior of private traders who control virtually all of the Malian export business. Second, it provides a criterion of the feasibility of shipping to markets other than the usual ones on the Gulf of Guinea. Third, it identifies key points for project intervention, or absence of intervention, in promoting exports.

*Footnotes begin on page 419.

The composite picture of the likely supply of Malian exports, based on availability and costs, is only part of the question. The prospects for growth in foreign exchange receipts based upon livestock sector exports also depend upon the level of demand for Malian commodities in export markets.

B. - Gauging Prospects for Growth in Demand for Malian Livestock and Meat Exports

There are two main issues in the assessment of likely demand prospects for Malian exports of livestock and meat to 1985. First, increases in world supplies placed on the West African coast will tend to depress demand for Malian livestock and meat exports. Second urbanization, population growth, decreases (if any) in the supply of fish, and increases in real per capita incomes will tend to boost the overall demand for meat in coastal markets, at any given price level. Other things being equal, this will tend to increase sale prices and revenues for Malian livestock and meat exporters.

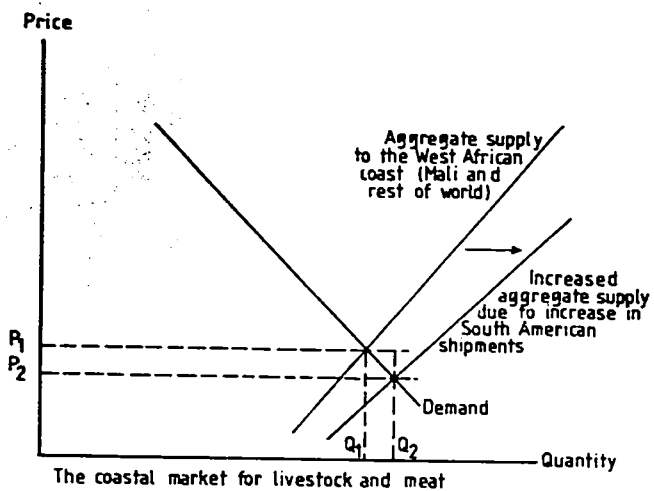
1) - The Effect of Competition from the World Meat Market

A competitive challenge to Sahelian cattle and beef exports occurs when non-Sahelian producers increase the amount of beef supplied to coastal markets in West Africa at any given price level. In graphic terms, the relationship between price and quantity offered, as represented by the aggregate supply schedule for beef placed in coastal markets, shifts to the right. At any given price level, sellers wish to dispose of more beef than before.[3] This phenomenon would occur if economic or domestic political conditions in Europe, say, cut imports of South American meat in that area, provoking a glut of beef to be disposed of elsewhere.

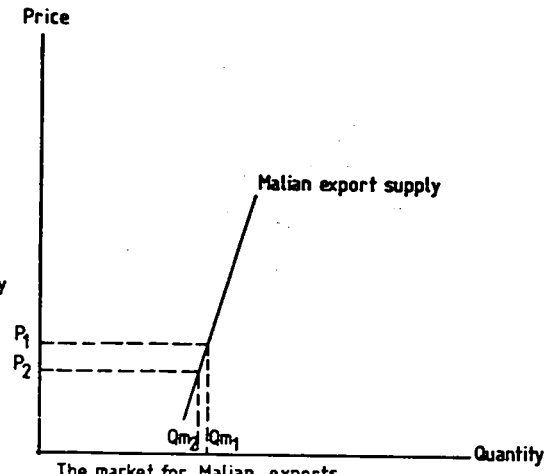
The effect of the increase in supply in West African coastal markets is to reduce the demand for imports of meat or cattle from Mali. This may be seen in Figure 1.1 in simplified form.[4] The increase in the world market supply of beef placed in West Africa shifts the aggregate supply curve to the right. Stocks are sold only when the prevailing price of meat falls from P_1 to P_2. In the sub-market for Malian exports, nothing has occurred to change the amount Malian traders are willing to sell at any given price level. The Malian supply curve remains constant, even though the aggregate supply curve has shifted. However, Malian traders slightly reduce the amount of livestock offered on the coastal market in response to the fall in market price (from Q_{m1} to Q_{m2} in Figure 1.1).[5] No single Malian trader is large enough to influence the prevailing market price significantly. New sales of non-Sahelian beef more than make up for the decline in Malian sales.[6] The increase in non-Sahelian supplies is associated with lower sales and prices of Malian exports. The aggregate revenue of Malian traders, as seen in Figure 1.1, falls appreciably.

FIGURE 1.1

How an increase in the world supply of meat placed on the West African Coast reduces demand for Malian exports



(a) An increase in supplies of meat placed on the West African coast (perhaps because of a glut elsewhere) shifts the aggregate supply curve to the right. Market price falls from P_1 to P_2.



(b) The price obtainable by Malian exporters also falls from P_1 to P_2. The fall in price provokes a reduction in Malian supply from Qm_1 to Qm_2. Aggregate revenue obtained by Malian traders falls from P_1 X Qm_1 to P_2 X Qm_2. The greater the elasticity of supply of Malian exports, the greater the reduction in sales of Malian commodities and the larger the fall in revenue.

2) - The Effect of Income and Population Growth on the Coast

On the whole, the demand for meat in coastal export markets will increase at any given price level in response to a change in one of the structural parameters underlying the demand relationship.[7] An increase in real per capita income is generally thought to stimulate meat sales. Urbanization might have a similar effect if city dwellers typically have better access to meat and a greater taste for it than inhabitants of rural areas. To the extent that the majority of animal protein in coastal areas is supplied by fish, an increase in fish prices will most likely have a substantial effect on the demand for meat, as consumers will tend to substitute the latter for the former. The key point is that demand increases stimulated by factors other than price decreases of the commodity in question have the effect of increasing demand at every price level; in other words, the demand schedule shifts to the right.

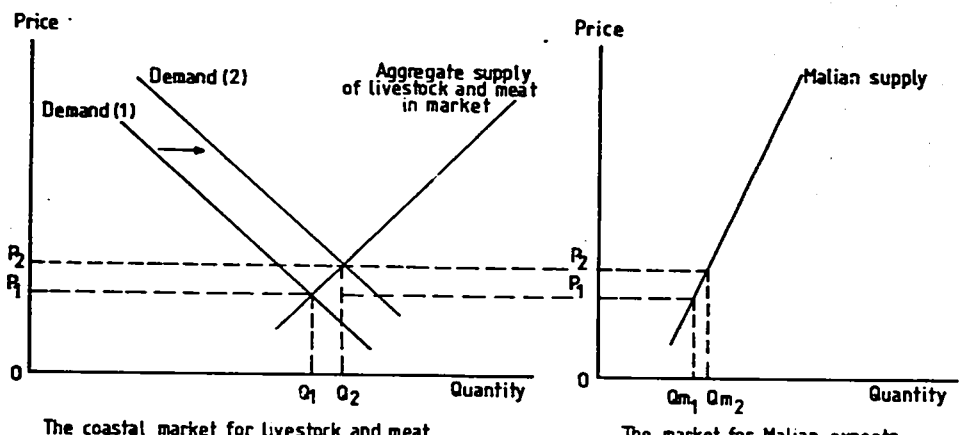
This effect is portrayed graphically in Figure 1.2. As a result of growth in demand, desired meat purchases at the old price level (P_1) exceed desired sales. The ensuing competition for existing supplies bids the prevailing price up to P_2, where aggregate supply and demand are just equilibrated. At the new market price, Malian traders increase sales from Q_{m1} to Q_{m2}. The aggregate revenue received by Malian exporters increases from $P_1 \times Q_{m1}$ to $P_2 \times Q_{m2}$.

Two interesting results follow from the nature of the supply schedule for Malian exports. First, the more price-responsive (elastic) the curve, the more Malian sales and revenues will increase. Second, if the supply of imports from South America in coastal areas is more elastic than the supply of imports from Mali, then the effect of the demand increase will be to increase imports from non-Sahelian areas by a greater absolute amount than imports from Mali.[8] To the extent that this trend continues, South American exporters will get a firmer foothold in the West African market. It can be shown that if initial South American participation is modest relative to that of Mali, demand increases under these conditions will rapidly increase the non-Sahelian market share.

The data do not exist at the present time to measure the historical price responsiveness of Malian livestock and meat exports in any satisfactory manner. However, the supply is judged to be elastic in the short run (within one exporting season) to the extent that traders can time their activity to take advantage of price trends, and inelastic in the medium-run (1-2 years), to the extent that livestock exports are ar important part of overall Malian commodity exports and represent a significant share of GDP. On the other hand, the world supply is likely to be relatively elastic in West African markets at all times to the extent that the latter account for a relatively small share of world trade in meat.

FIGURE 1.2

How growth in demand on the West African Coast increases Malian export revenue



(a) Increases in population size and real per capita incomes provoke an increase in demand for livestock and meat. Market price rises from P_1 to P_2.

(b) The price obtainable by Malian exporters rises from P_1 to P_2. Aggregate revenue increases from $P_1 \times Qm_1$ to $P_2 \times Qm_2$. It can be shown that the greater the elasticity of Malian supply, the greater the increase in aggregate revenue will be.

II. - The Record of Malian Livestock Sector Exports and Market Penetration by Non-Sahelian Suppliers

Much of the concern about the viability of Malian livestock and meat exports in coastal markets derives from the importance of the livestock sector to the national economy. The overall growth strategy adopted by Mali and the other landlocked Sahelian states emphasizes the maximization of foreign exchange revenue through exports in order to permit the import of capital goods. Therefore, penetration of coastal markets by non-Sahelian suppliers in 1975 was (and is) a major source of concern to Malian policy makers.

A. - The Place of Livestock and Meat in the Malian Economy

The contribution of the livestock sector to Malian production and exports was noticably less in recent years than before the drought of the early seventies. Nevertheless, Table 1.1 shows that livestock in 1978 still represented a key sector of the economy. Livestock and related products accounted for 20 percent of GDP in 1969, but only 15 percent in 1976. Similarly, livestock and meat amounted to an average of 26 percent of recorded exports in the six years prior to 1974 but only 17 percent in the three years thereafter. Assuming that actual exports were three times greater than declared shipments (which pay taxes), livestock are most likely Mali's major export item, even in the post-drought era (OMBEVI, No. 100, 1978, p. 7).

The importance attached to the livestock sector by the Malian authorities can be seen by its characterization in the 1974-78 Five Year Plan as: "traditionally the most important in the Malian economy" (DGPS, 1974, p. 146; author's translation). A 1976 position paper prepared for the planning agency by OMBEVI defines the Malian long-run strategy for livestock production in the Sahel (OMBEVI, No. 72, 1976). The principal tenet of this position is to maximize revenue from livestock exports in order to finance capital investment in the economy (ibid., confirmed by interviews in the fall of 1978).

B. - The Penetration of Coastal Markets by Non-Sahelian Suppliers

Mali has a substantial comparative advantage in livestock production over coastal areas because of the absence of tsetse fly infestation in most of the central and all of the northern areas of the country. This fact undoubtedly influenced colonial development strategy in the central corridor of West Africa. Livestock exports become a means of extracting value from otherwise "unproductive" territory (see Doutressoulle, 1947, pp. 72-73). Part and parcel of this development strategy is the idea that Sahelian livestock and meat exports will always be able to undersell competitors from other parts of the world on the West African coast, either because of proximity or because of tariff barriers. Furthermore, rapid growth in incomes on the coast are seen as indications that both sales and revenue of Sahel exports are likely to grow rapidly in the future.[9]

TABLE 1.1

THE PLACE OF LIVESTOCK AND MEAT IN THE MALIAN ECONOMY, 1968-1976
(in percent)

Year	Livestock & Meat Production as a % of GDP	Recorded exports of all commodities as a % of GDP	Recorded Livestock & Meat Exports as a % of recorded exports	Percentage of Tax Revenue from Livestock & Meat Exports
1968	-	-	23[a]	-
1969	20	7	39[a]	-
1970	18	13	27[a]	-
1971	18	12	27	-
1972	17	12	22	7
1973	15	13	20	5
1974	14	16	18	1
1975	16	9	13	4
1976	15	14	20[b]	5
1968-73 average	17.6	11.4	26.3	6.0[c]
1974-76 average	15.0	13.0	17.0	3.3
1968-76 average	16.6	12.0	23.2	5.0

SOURCE: IBRD working documents unless otherwise identified.

[a]Berg (1975).

[b]Preliminary.

[c]1972 and 1973 only. The livestock tax was lifted in 1973 and 1974 and reinstated in 1975.

By far the major portion of Malian livestock and meat exports in recent years has gone to Ivory Coast.[10] Therefore, the evolution of the Malian-produced share of the Ivorian beef supply serves to illustrate developments with respect to Sahelian producers in coastal export markets. Data on the composition of the Ivorian beef supply have recently become available through the work of John Staatz (1979, 1980).

Between 1967 and 1974, an average of 87 percent of the Ivorian beef supply came from Mali, Upper Volta, Mauritania, and Niger, as seen in Table 1.2. The vast majority of the shipments were in the form of live animals. A further 10 to 12 percent of beef sales came from the slaughter of animals produced within Ivory Coast. Between 1974 and 1975, the Sahelian share of the Ivorian beef market fell from 85 to 68 percent. The average Sahelian market share between 1975 and 1977 was 57 percent. Part of the fall in market share is attributable to increased Ivorian production. The main factor in the decrease of the proportion supplied by Mali appears to have been a severe shortfall in Malian supply at the end of 1974 and in the first half of 1975. The absence of Sahelian beef on the coastal market at this time encouraged the entry of shipments of frozen beef carcasses from Argentina, Uruguay, France, and Southern Africa (Staatz, 1980). This increase in non-Sahelian supplies (the analysis of which is similar to that in Figure 1.1) resulted primarily from the absence of Sahelian products. It was aided by the conjuncture of a high point in the beef cycle in Latin America and Europe, depressed world demand following the 1973-1974 recession, and concomitant political measures taken by the EEC to protect its producers.

Although the Sahelian share of the Ivorian market fell in 1975, the Malian share of Sahelian consignments rose, primarily as a result of export displacement from Ghana. Table 1.2 shows that the proportion of Sahelian livestock and meat exports to Ivory Coast originating in Mali rose from an average of 57 percent in the eight years prior to 1975 to an average of 65 percent in the three years thereafter.

Despite this gain vis-a-vis other Sahelian competitors, the degree of market penetration by non-Sahelian producers was so large that the Malian share of overall Ivorian beef supply fell substantially after the drought. Table 1.2 shows that Mali's share went from an average of 50 percent between 1967 and 1974 to 37 percent in the three years thereafter. It can be seen that Malian participation in 1977 was not much better than that in 1975; the 1976 market share for Mali was noticably worse. This leaves open the possibility that events in 1975 signal important structural changes in the outlook for Malian imports, changes that go beyond the short-term response to a temporary market glut in Europe in 1975.

III. - Sources and Data Collection

Despite the fact that the issues raised in the previous section have important political overtones for the countries involved, the focus of this study is essentially upon what changes

TABLE 1.2

THE MALIAN-PRODUCED SHARE OF THE IVORIAN BEEF SUPPLY, 1967-1976

Year	(a) Percentage of Ivorian Beef Supply Coming From Sahelian Sources	(b) Malian Share of Sahelian Cattle exports to Ivory Coast (in percent)	(c) Percentage of Ivorian Beef Supplied by Mali
1967	84.1	39	33
1968	85.5	41	35
1969	88.4	66	58
1970	89.7	72	65
1971	87.2	-	-
1972	88.0	65	57
1973	87.7	53	46
1974	85.1	64	54
1975	68.2	55	38
1976	46.8	68	32
1977	55.9	71	40
1967-1974 average (s.d.)	87 (2)	57 (13)	50 (12)
1975-1977 average (s.d.)	57 (11)	65 (9)	37 (4)
1967-1977 average (s.d.)	79 (15)	59 (11)	46 (12)

SOURCES: The averages are mean values of available data points; the figures in brackets are standard deviations of the mean. The estimates are computed from figures compiled by John Staatz (1980, Table 2.4). The last column is the product of the first two.

occurred during the drought and upon what is likely to happen to exports in the absence of new political initiatives. In an empirical investigation of this nature, the quality of the answers depends upon the availability of data generated by field research. Different approaches were used to obtain information about the supply and demand for Malian livestock exports.

A. - The Supply Side

The approach with respect to the supply of Malian exports to 1985 involved reliance upon the plethora of studies and raw data concerning the livestock sector generated by Malian and foreign sources in recent years. The objective was to read, sift, compare, evaluate, and synthesize the available published and unpublished analysis and data pertaining to the relevant livestock issues. Every effort was made to include all key publications from the period immediately preceding the drought until October 1978.[11]

B. - The Demand Side

The present study attempts to provide a parallel to similar work conducted in the central coastal countries of the Gulf of Guinea, reports of which are presented in this and accompanying volumes. The most important of these for the purposes of the present study is the painstaking work by John Staatz on cattle and beef marketing in Ivory Coast (1979, 1980).[12] To avoid duplication of effort, this study relies exclusively on the coastal studies for the analysis of likely demand patterns to 1985.

IV. - Outline of the Inquiry

More than half of the study is directed toward the assessment of trends in animal production. Given the view that the Malian supply of livestock exports from the open range is highly (but hardly exclusively) dependent upon production considerations largely independent of coastal markets, a considerable effort is made to review these elements in Chapters Two and Three. This part of the study assembles the relevant data on livestock production systems, zootechnical factors, government and donor livestock sector policies, herd numbers, and range production parameters. Chapter Four reviews the evidence on cattle fattening in feedlots and on small crop farms. The binding constraints to increased output of range-fed and fattened cattle is considered in Chapter Five; projects designed to increase production must surmount these barriers. The component parts are brought together in Chapter Six in an assessment from a purely technical perspective of the outlook for growth in herd size and output by 1985. In this vein, the aggregate output of livestock in the Malian economy is treated as if supply were perfectly inelastic. In other words, the

projections in Chapter Six of overall production through 1985 do not take producer responsiveness to price specifically into account. The basis for this simplification is the assumption that the overwhelming importance of livestock sales as a source of revenue for herdsmen tends to make the supply on the market relatively inelastic in the medium run at least. Presumably, herders need to pay taxes and buy grain each year, even if they can time sales within the year.

On the other hand, price and income effects are specifically considered in Chapter Seven, which reviews factors influencing the use of livestock output for domestic consumption. Chapter Eight then examines the historical record of livestock and meat exports from 1967 to 1977 in the light of price developments in export markets. The approach here, then, boils down to the view that a fixed amount of livestock is produced for both domestic slaughter and export each year, the actual end use being determined by relative prices in domestic and foreign markets.[13]

The profits to be had from different home slaughter and export strategies depend upon the cost structures for the various outlets and products as well as upon the price structures. Chapter Nine reviews the published evidence on livestock and meat production costs. Chapter Ten assesses the average costs of exporting livestock sector products under different commodity and transport strategies.

Chapter Eleven analyzes the outlook for Malian livestock and meat export strategies from both an aggregate and a micro viewpoint. The likely overall strength of the export market is assessed through a comparison of aggregate production trends, domestic consumption trends, and likely coastal demand patterns. The profitability of different kinds of export activity are then viewed through a comparison of established cost and likely price structures at the level of the individual trader. The macro approach elucidates overall trends and developments, and the micro approach helps explain the behavior of private traders. The micro approach also serves to identify the most fruitful orientations for increased export activity. The study concludes in Chapter Twelve with a detailed consideration of policy conclusions.

CHAPTER TWO

MALIAN LIVESTOCK PRODUCTION SYSTEMS, ANIMALS AND POLICY

Unlike the case for other areas in the Sahel, there already exists a voluminous literature for Mali on livestock production. Most of the major works are available only in French [Doutressoule, 1947; Lacrouts, Sarniguet and Tyč, 1965; Société d'Etudes pour le Développement Economique et Social (SEDES), 1975; Office Malien du Bétail et de la Viande (OMBEVI), No. 100, 1978; among others]. Noteworthy surveys in English include Stryker (1973b, 1973c) and International Livestock Centre for Africa (ILCA, Part A, 1978). This chapter presents the fundamentals of an introduction to the systems, animals, and policies of the Malian livestock sector. The distinctions drawn below between range and feeding production systems, and between northern and southern animals, are pertinent to the analysis of current production levels in the following chapters. The discussion of GOM and donor agency policy emphasis on intensive cattle feeding is relevant both to the interpretation of current events and to the assessment of further developments.

I. - Principal Modes of Livestock Production and the Environment

A. - Overview of Cattle Production Systems

The basic distinction chosen for the present purpose is between range grazing alone and systems emphasizing supplementary methods of feeding cattle.[1] The vast majority of Malian livestock are produced under the former regime, in a series of sub-systems that emphasize movement of the herd to a greater or lesser degree, depending primarily upon the rainfall in the area concerned. The herds farthest to the north are nomadic in the sense that herd movement over the range occurs during most of the year; the animals come south in the hot dry season. The single most important group of production sub-systems features a more limited seasonal transhumance, where part of the herding population grows crops (or lives near crop farmers) during the rainy season.

Generally, the farther south the location, the shorter is the annual transhumance around the base of operations. In the northern part of the southern farming areas, movement is often limited to a distance within forty miles of the primary living area. Animals belonging to sedentary farmers are taken by specialized herdsmen into river valleys for two to three months at the end of the dry season. The final group of range production sub-systems concern village herds in southern areas or in the areas of the inland delta

recently settled by rice farmers that are left free to wander near the inhabited area after the crop harvest and are rounded up at planting time the next year.

The main divisions of the national cattle herd into type of husbandry and breed categories are given in Table 2.1. The main economic regions are displayed in Figure 2.1. Since feedlot and organized farm-fattened output was, for the immediate purpose, negligible in the year of estimate (1977), the divisions valid for the national herd are synonymous with those within the category of range production systems. The most noteworthy point is the surprisingly large share of the national herd present most of the year in southern areas. Twenty-nine percent of the cattle were estimated to be in the Guinean Savannah in 1977, an increase of at least 50 percent over the proportion there in 1970 (see notes to Table 2.1).

Feeding systems have traditionally played a minor role in Malian livestock and meat production. This can be explained to a large extent by the limited size of the domestic market for higher-quality marbled meat, transport and institutional difficulties in getting fattened animals to areas where such a market exists, and the lack of affordable feed elements which do not have a higher value in some other use.

Nevertheless, one of the cornerstones of donor agency and government interventions in the livestock sector has been to encourage the production of fattened animals. This may be observed in the construction of feedlots and in the implementation of credit programs with the objective of assisting smallholder farmers to feed animals with cottonseed rations over three-month periods (embouche paysanne). Because of the high level of policy interest in the question, this report will examine the potentials for these activities in greater detail in Chapter Four.

B. - Major Determinants in the Size, Nature, and Location of Livestock Production

Environmental, zootechnical, and economic factors combine to determine the level of production and distribution of livestock throughout the country. The major environmental variables are access to sufficient water and forage at the end of the dry season, from March to May. Since these commodities are scarce outside the major river valleys or southern lowland areas at this time (particularly if sedentary herds are kept in the vicinity), they play a distinct role in limiting the overall size of the national herd and its location during different seasons. Very broadly speaking, the farther north one goes in the country, the more the animals need to be drought-resistant. On the zootechnical side, there appears to be a trade-off between resistance to drought and the average size of the breed concerned. On the other hand, the smaller breeds appear to be more tolerant to disease, particularly trypanosomiasis (SEDES, 1969, I, Chapter 2). This is of major concern in the fertile southern portions of the country which lie within the tsetse belt.[2] Even mixed breeds with some trypano-tolerance do better outside infested river valleys during the rainy season, when the fly population is at its maximum. Finally, conflicts in resource use between crops and

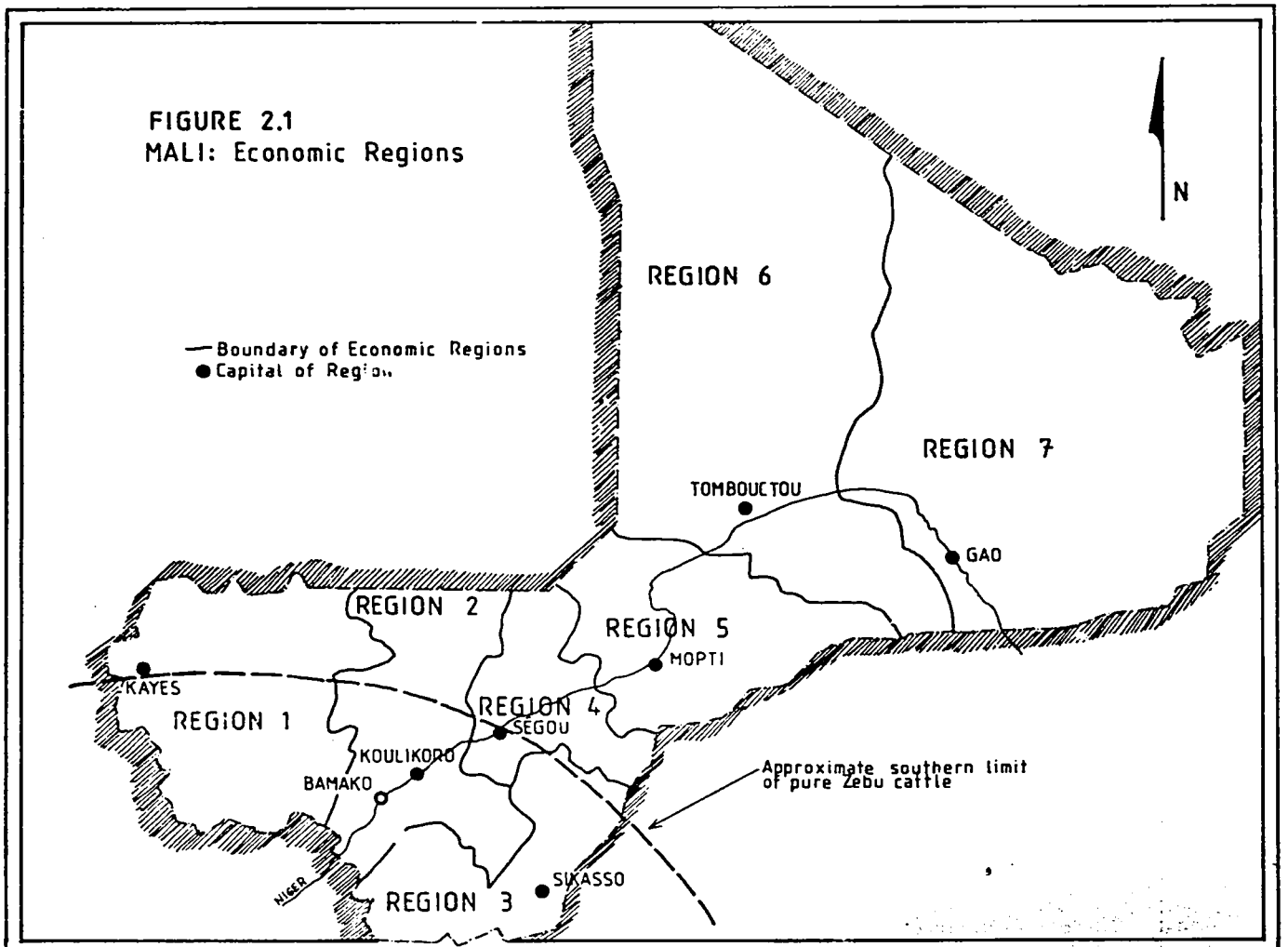


FIGURE 2.1
MALI: Economic Regions
Boundary of Economic Regions
Capital of Region
N
REGION 6
REGION 7
TOMBOUCTOU
GAO
REGION 2
REGION 5
MOPTI
KAYES
REGION 1
REGION 4
SEGOU
KOULIKORO
BAMAKO
Approximate southern limit of pure Zebu cattle
NIGER
REGION 3
SIKASSO

TABLE 2.1

ROUGH ESTIMATES OF THE PROPORTION OF CATTLE HERDS IN EACH BREED, TYPE OF HUSBANDRY, AND GEOGRAPHIC LOCATION, 1977

	Nomadic	Transhumant			Sedentary		
Breed or Species	7th and 6th	7th and 6th	5th	Northern Parts of 1st, 2nd & 4th Regions	Southern Parts of 1st, 4th & Middle of 2nd Regions	3rd and southern part of 2nd Region	Total by Breed
Zebu	9%	5%	35%	10%			59%
Méré (Primarily zebu)					12%		12%
Méré (Primarily taurine)						29%[a]	29%
Total by major zone	14% (Arid Sahel)		45% (Delta and Sahel)		12% (Sudan)	29% (Guinean Savannah)	100%
Total by type of husbandry	9%	50%			41%		100%

SOURCE: From figures in OMBEVI (No. 100, 1978, p. 19.) Also see: OMBEVI (No. 96, 1978, Table I-3) which estimates that 27% of the national herd are in southern areas. This may be contrasted with a SEDES (1975, I, p. 249) estimate for pre-drought herd numbers that more or less pure zebu animals account for over four-fifths of all cattle, implying that at least 80 percent of all cattle were outside the southern zone. The keeping of zebu cattle in southern areas appears to be a post-drought phenomenon.

[a]A small part of the 3rd region may have primarily zebu cattle.

livestock are the main economic (as opposed to physical or zoological) constraints to increased national livestock production. These concern the use of grazing land, access to lowlands during the dry season, and the opportunity cost of resources used to care for cattle in crop-producing areas.

II. - The Animals

A. Zebu Cattle in the Sahelian Environment

The environmental and zootechnical factors mentioned above have encouraged herdsmen who live most of the year in the northern portions of Mali to keep tall, thin, zebu cattle. The principal breeds are Moor, Tuareg, and Sudan Fulani. They are relatively drought-resistant in that they can survive in the dry season watering only every other day. On the other hand, they tend to do poorly in more humid areas during and just after the rainy season due to a low level of disease-resistance, particularly with respect to trypanosomiasis and streptothricosis. For the purposes discussed below, the average carcass weight of mature zebu steers is taken as 170 kg (Lacrouts et al., 1965, p. 38). The average animal (male and female) available for domestic slaughter is assumed to have a carcass weight of 125 kg with a dressing percentage of 48 percent [SEDES, 1969, I, p. 11 and Abattoir Frigorifique de Bamako (AFB), 1977]. Only the better specimens are exported to the coastal countries; export animals are assumed to have an average carcass weight of 150 kg, with a dressing percentage of 52 percent (SEDES, 1969, I, p. 11 and 1975, I, p. 287). The zebu in West Africa mature late, with the first calving at four years, and a relatively low calving rate of 50 to 60 percent (ibid.). Average mortality rates of 30 percent for calves and 6 percent for adults, and a typical herd structure characterized by a proportion of breeding females equal to 36 percent, imply that the rate of gross herd growth for zebu stock can be estimated at approximately 15 percent per annum.[3]

B. - Taurin Cattle in the Savannah

Environmental and zootechnical factors have also encouraged the spread of the shorter, more trypano-tolerant breeds in the southern and more humid areas of the country. The principal representatives of this type of cattle are the N'Dama, often cross-bred for size with zebu. Either pure or cross-bred, in Mali these animals are referred to as Méré.[4] The racial mixture has the advantage of combining the trypano-tolerance of the N'Dama with the strength, size, and drought-resistance of the zebu. Broadly speaking, the farther northeast one goes in the Sudan zone, the more the mixed-breeds resemble zebu; the farther southwest, the more the N'Dama characteristics become predominant. In the extreme southeast of Mali, relatively small but disease-resistant Baoulé cattle may be observed. For simplicity, these will be lumped together with the N'Dama in the taurin category in this study.

For the discussion below, the average carcass weight of a mature taurin steer is taken as 110 kg (SEDES, 1975, p. 251). However, prime export animals often have a carcass weight of 150 kg, with an average dressing percentage in excess of 50 percent (see SEDES, 1969, I, p. 12). The taurin races tend to mature earlier than the zebu in West Africa, with first calving at age three. Furthermore, a greater fecundity leads to a calving rate approaching 80 percent (ibid.). Taking Beinhauer's taurin herd census in the Bamako region (reported in Lacrouts, 1965, p. 30), the proportion of breeding females is estimated at approximately one half. In conjunction with a calf mortality rate of 40 percent (SEDES, 1975, p. 250), this yields an estimated annual gross rate of herd growth of approximately 16 percent.[5]

C. - Small Ruminants in the Sahel and the Savannah

Mali contains five major species of small ruminants, distinguished primarily by an increase in average size and liveweight when moving from south to north. Broadly speaking, the animals raised in the agricultural areas of the country (below the 14th parallel) are Fouta-Djalon sheep (Djalonké) and Guinean goats. They are both appreciated for their rusticity. The sheep have an average liveweight of 20 to 30 kg, while the goats are estimated at 18 to 20 kg (SEDES, 1975, I, pp. 246-47). Farther north, the Sahelian breeds of sheep and goats are considerably taller, heavier, and have increased resistance to drought. The former have an average liveweight of 30 to 45 kg, while the latter weigh 25 to 35 kg (ibid.). A relatively small number of Macina sheep are kept within the interior delta of the Niger almost exclusively for their wool yield (ibid.).

The average carcass weights of sheep and goats slaughtered domestically are both estimated at 14 kg, the higher dressing percentage for goats compensating for their relatively lower average liveweight. This estimate is consistent with data for 1977 from AFB (1977); however, it surpasses the 12.4 kg estimate used by SEDES (1975, I, p. 271), based on 1970 data. The Bamako abattoir data do show a steady increase in small ruminant average carcass weights since the 1974 drought (AFB, 1977, p. 15).

Similarly, the average carcass weight for export animals is estimated at the pre-drought level of 17 kg, following Staatz, (1978, p. 34) and SEDES (1969, I, p. 117). This exceeds the commonly used figure of 14 kg given in SEDES (1975, I, p. 287), which appears to be valid primarily for the drought years.

III. - Overview of Malian Livestock Production Policy

A. - The Livestock Production Strategy in the Five Year Plan

The overall national livestock and meat development strategy was initially set out in the 1974-78 Development Plan document [République du Mali, Direction Général du Plan et

de la Statistique (DGPS), 1974, p. 151]. This is modified by a more recent statement by OMBEVI (No. 72, 1976). The latter document in particular is excessively optimistic and fails to consider the many real constraints to reaching each of the targets or to recognize the conflicting nature of many of the objectives. A concise outside view of current livestock development policy has recently been put forth by ILCA (1978, part A, pp. 99-105).

There are four basic objectives of national livestock production policy:

-- To boost cattle exports as much as possible;

-- To export meat and finished animals rather than feedstuffs or young and thin stock.

-- To supply domestic protein needs with cull cattle, small ruminants, and poultry, rather than prime beef;

-- To increase income to herdsmen living in the north during the rainy season by promoting cattle breeding operations, while shipping young stock for finishing to feedlots and ranches in areas less subject to drought.[6]

The strategy used to promote these objectives since 1974 comprises five main points. First, the price of purchased feeds are highly subsidized by the state to encourage the fattening of animals within Mali. Second, administrative action is used to stem the export of young or thin animals and agricultural by-products suitable for feeding cattle. Third, Sahelian range production is encouraged by waterpoint construction in scarcely populated areas, and some pastures have been sown with imported seed. Fourth, an attempt is made to keep the domestic price of meat as low as possible by administrative fiat. From the point of view of Malian officials this has the double advantage of satisfying urban consumers with lower grade meat while encouraging exports of the grades capable of fetching a higher price abroad. Fifth, Mali has put pressure on the Ivory Coast through the CEAO to limit imports of non-Sahelian meat.

B. - Evolution of Production Policy and External Financing

The evolution of policy thinking since 1976 points to less emphasis on industrial feedlots, more on small-scale farm feeding activities within the context of rural development, a recognition of the limited prospects for meat export to the coastal countries, and a relatively greater emphasis upon range development in the north (from interviews with Malian officials). Furthermore, Mali has had greater success in obtaining external funding for rangeland improvement than for other production projects. Table 2.2 compares the percentage of the estimated cost of funding all the livestock development projects in the 1974-78 Plan represented by each one of the major categories of expenditures.

TABLE 2.2

LIVESTOCK PROJECT EXPENDITURE IN THE 1974-78
DEVELOPMENT PLAN BY TYPE OF INTERVENTION
(in percent)

Type of Project	Percentage of Proposed Total Expenditure (June 1977)	Percentage of Total External Financing Obtained (1978)	Ratio of Obtained to Proposed Financing for Each Category
Range Development	57	72	70
Feedlots	16	18	63
Small-scale Fattening Schemes within agricultural Operations	23	8	21
Other (e.g. hides)	4	2	25
TOTAL	100	100	

SOURCE: The expenditure figures underlying these calculations are taken from ILCA (1978, part A, p. 100).

Even though range development projects represented a little more than half the proposed expenditures in the Plan, they account for nearly three-quarters of the funding obtained. This may be ascribed both to a more recent Malian emphasis on these activities and to a greater reluctance of donors to become involved with industrial feeding operations. Only 21 percent of the proposed small-scale feeding operations were funded by 1978, while the comparable figure for range operations is 70 percent.

C. - Funded Livestock Development Projects

The major emphasis on range development projects is in the western Sahel area, contained between a line drawn from Kayes in the west to Niono in the east and the Mauritanian Frontier. This zone includes the Kayes-North, Dilly, and Nara-East projects, accounting for roughly 11.6 billion FM (ILCA, part A, p. 100; 420 FM = U.S. $1.00). Other range operations that had been funded by the end of 1978 were pasture improvement in the Mopti region and the improvement of forest reserves at Tienfala and Doukouloma, for an estimated 8.1 billion FM (ibid.).

Donor interest in feedlot creation centers around Libyan support for improvement of the Gao abattoir in the northeast and a CEAO proposal to fund lots in Mopti and Sikasso. At 5 billion FM, the Gao project accounts for 18 percent of the external funding acquired for livestock development under the Five Year Plan. The exact amount of money involved in the CEAO venture had not been settled at the end of 1978.

Livestock projects involving small-scale feeding or improved husbandry by smallholder agriculturists have received some attention from donors. Only 13 million FM has been budgeted in support of the embouche paysanne activities of ECIBEV by USAID. On the other hand, funding of 1.4 and 1 billion FM has been allocated for Operations N'Dama Yanfolila and Mali-Sud, respectively, by the Fonds Européen de Développement (FED) (ibid.). These projects are at their beginning stages. It was not possible at the end of 1978 to assess the likelihood that these interventions would succeed in promoting small-scale taurin cattle production by sedentary farmers in the south.

The potential for the funded livestock development projects --and for production policy in general -- to influence livestock output by 1985 will be examined in a later chapter, in the context of an analysis of the principal constraints to increased production in the medium run.

CHAPTER THREE

HERD NUMBERS AND RANGE PRODUCTION PARAMETERS, 1967-77

This chapter examines rough estimates of the size and distribution of the national livestock herd from 1967 to 1977 and interprets them according to the best available evidence. Given the lack of hard data at the national level, a detailed comparison is made of the findings of two major studies of herd structure and dynamics in the Mopti (5th) Region. This area, which contains one-third of the Malian cattle herd, was intensively studied in 1972 and 1977, allowing for the rough comparison of data for the same general area.[1] This chapter concludes with a summary of and commentary on estimates of aggregate livestock offtake and growth rates from different sources.

I. Methodological Perspectives

Any discussion of livestock and meat exports requires a position on overall herd size, growth, and offtake. Most estimates of actual exports begin with a calculation of the number of animals taken out of the national herd each year (the offtake). This is the product of an annual offtake rate and the overall herd size. This "disposable" stock of animals is either consumed by the stockraisers (a small number in the case of cattle), sold for domestic slaughter, or exported. Therefore, estimates of an aggregate offtake rate for cattle or small ruminants are crucial to later calculations of the supply of livestock and meat available for export.

Since herdsmen are unlikely to sell the same proportion of stock in each age and sex category, it follows that the aggregate offtake rate is a weighted average of separate offtake rates for each category. As such, the overall offtake is likely to change with changes in the composition of the average herd, which is in turn brought about in part by changes in the structure of producer prices. Furthermore, production patterns may change from one location to another, among ethnic groups, or under different forms of husbandry such as transhumance or sedentary stockraising.

The upshot of these considerations is to counsel prudence in interpreting aggregate offtake rates, particularly when they are used to predict future production. Obviously, the more disaggregated the data, the better the results of shifts in herd composition, mortality, and fertility may be taken into account and the greater the likelihood of an accurate prediction. On the other hand, the paucity of real data and methodological convenience have resulted in the widespread use of aggregate rates for production analysis.

An alternative method of expressing aggregate offtake rates is provided by the estimate of "meat production per herd member" or "per forage consumption unit." This is

simply the estimate of offtake converted into kilograms of meat, using an average carcas weight, and divided by the number of animals in the overall herd. This has both th advantage and disadvantage of allowing for changes in average carcass weights in th computation of overall output.

II. - Rough Estimates of National Herd Numbers and Distribution, 1967-77

A. - Sources of the Estimates

There are two basic methods of compiling statistics on the national herd. First, th Livestock Service (i.e. veterinary) agents in each secteur (corresponding to an administrativ arrondissement) estimate herd numbers from the number of vaccinations they give and the compile their best guess of herd sizes in their area. These are submitted via the regiona headquarters to the Central Directorate in Bamako, where the reports from the forty-thre sectors are compiled to get estimates for each of the six administrative Regions.[2] Th Central Directorate amends the figures according to its best judgment. The resultin numbers are then transmitted to OMBEVI, where they are coordinated with othe information,[3] including in-depth occasional studies in specific areas and the monthly report on marketing by OMBEVI's own staff.

The second basic method of estimating herd strength involves projecting herd size based on an assumed growth rate and data for a base year. Very often the figures ar published using this method without other explanation.

The raw sums from adding together the reports of veterinary sectors tend to giv inflated herd sizes. The figures that follow are derived by OMBEVI from a careful survey b the Central Directorate of the Livestock Service (CDLS) of herd strength in 1974, entitle "Enquête sur les Effets de la Sécheresse." This study was done under the auspices of th Institut d'Economie Rurale (IER, 1975c).

B. - Livestock Numbers by Region, 1967-77

Table 3.1 gives rough estimates of the size of the cattle herd in each Region, fron 1967 to 1977. The base year for these figures is 1974, and they incorporate the officia hypothesis of a 37 percent decline in the national herd between 1972 and 1974 as a result o the drought (IER, 1975c). Most of this decline occurred between 1973 and the end of 1974 The percentage growth or loss in herd numbers between 1973 and 1974, by Region, ar shown. Herds in the Northeast (Gao) Region declined by four-fifths, partly throug mortality and partly by migration towards the southern part of the inland delta. Thus, th overall herd in Mopti actually grew slightly, because in-migration more than compensate

for losses. Herds in the Ségou (4th) Region fell by over half their pre-drought numbers, due to high mortality among sedentary herds and migration to the south. The deficit in rainfall in the Ségou Region was particularly marked in some areas. By contrast, the number of animals in the relatively humid Sikasso area increased by over one-fifth, as a result of in-migration from the north.

The post-1974 figures in Table 3.1 are derived by the Central Directorate of the Livestock Service using a 4 percent net growth rate for zebu stock and 3 percent for taurin herds. OMBEVI, on the other hand, uses the same baseline figures for 1974 but a lower growth rate for zebu stock. Table 3.2 contrasts estimates for the 1976 national herd using the sum of Livestock Service sector reports, the corrected figures by the Central Directorate of the Livestock Service, and the OMBEVI estimates for both cattle and small ruminants. The OMBEVI estimates are the most attractive in that they embody a more conservative hypothesis about cattle in the Fifth Region, and are generally the product of a greater amount of information.

The Mopti (5th) Region, contains anywhere from 30 to 40 percent of the national cattle herd, with vast herds concentrated in the inland delta of the Niger during the dry season. For this reason, the Mopti area has received relatively greater attention from researchers working on the livestock sector. The creation in 1974 of a regional livestock development authority, Opération pour le Développement de l'Elevage à Mopti (ODEM), and the possibility of its extension past 1979 has sponsored a significant research contribution to knowledge of herd structure and dynamics of range herding of zebu cattle. The next section will present hard data on production for this Region, as virtually the only real evidence extant on the true magnitude of these figures in Mali. Although the results are location-specific in the sense that they primarily concern zebu cattle in a fairly unique ecological environment, the estimates are the best information to date on the biological constraints to Malian livestock production where there is access to bourgou (delta) grass during the dry season. Presumably the biological constraints would be even greater in Sahelian areas that do not have access to similar dry season pasture resources.

III. - Detailed Estimates of Herd Numbers and Production Parameters for the Mopti Region, 1972 and 1977

A. - Sources of the Estimates

The baseline data for 1972 are provided by Dr. J. Coulomb's detailed study of herd structure in the Mopti area (IEMVT, Etude du Troupeau, 1972). The cattle figures were derived from a sample of over 25,000 head in an eight-month field study from October 1971 to May 1972. While the Coulomb study remains one of the classics in the literature, the fact

TABLE 3.1

LIVESTOCK SERVICE ESTIMATES OF CATTLE HERD SIZES BY REGION, 1967-77
('000 head, based on the 1974 survey)

Region	1967	1968-69	1970	1971	1972	1973	% of change 1973-74	1974	1975	1976	1977
Kayes (1)	533	UNRELIABLE DATA	520	UNRELIABLE DATA	-	520	- 8%	481	499	517	537
Bamako (2)	645		530		-	530	-18%	432	446	470	480
Sikasso (3)	430		480		-	480	+21%	581	598	616	635
Ségou (4)	545		620		-	620	-55%	280	289	299	309
Mopti (5)	1,260		1,400		-	1,400	+ 6%	1,482	1,553	1,615	1,655
Gao (6 & 7)	1,800		1,800		-	1,800	-79%	384	399	415	432
Total for Mali	5,213		5,350		5,749	5,350	-32%	3,640	3,784	3,933	4,048

SOURCES: (a) 1967, 1970: OMBEVI, Statistiques, 1960-1970.
(b) 1972-1977: Direction, Service de l'Elevage (CDLS). Following the small drought in 1972, herd sizes in 1973 are assumed to be at their 1968 levels in each Region. A "normal growth" rate of 4 percent for zebu and 3 percent for taurine cattle was used by the Livestock Service in compiling these estimates. Note that these figures, based on an inquiry into the effects of the drought upon herd sizes in 1974, are considerably lower than those obtained by adding together the number of head reported by each Livestock Sector Office.

TABLE 3.2

COMPARATIVE ESTIMATES OF LIVESTOCK HERD SIZE BY REGION, 1976
('000 head)

Region	(a) All Cattle, Sum of Individual Estimates by Each Livestock Sector	(b) All Cattle, Estimate by Central Directorate of Livestock Service		(c) All Cattle, OMBEVI Estimate		(d) Small Ruminants, OMBEVI Estimate	
		No. of head	%	No. of Head	%	No. of Head	%
Kayes	623	517	13	507	13	779	7
Bamako	701	470	12	555	14	668	6
Sikasso	809	616	16	630	16	445	4
Ségou	488	299	8	433	11	779	7
Mopti	1,493	1,615	41	1,170	30	2,449	22
Gao	324	415	10	620	16	6,010	54
Total for Mali	4,438	3,933	100%	3,915	100%	11,130	100%

SOURCES: (a) ILCA (1978, part A, Appendix I).
(b) See Table 3.1 and note (c).
(c) OMBEVI, Statistiques, 1976. Both the Livestock Service estimates (column b) and those of OMBEVI are projections made from 1974 figures established by the Livestock Service in conjunction with OMBEVI and the IER in an attempt to estimate the effects of the drought. The divergence of the 1976 figures is due to the different methodologies used for projecting herd growth. As explained in the text, the OMBEVI figures are preferable.
(d) Ibid.

that it was made before the drought restricts its applicability today. Its current value lie largely in the fact that it shows the composition of the herd at its peak size before th drought.

In 1977, OMBEVI launched a major initiative to collect data on 30,000 cattle ar 20,000 small ruminants to update and complete information on the Mopti Region. This wa performed in collaboration with the IER as a benchmark inquiry for the feasibility study c the second phase of ODEM, currently being considered for financing by IBRD.[4] While th two studies are not strictly comparable, they do serve to give an idea of the evolution c herd structure over the drought and post-drought period in the major cattle producir region.

B. - Herd Numbers, Growth, and Offtake, 1972 and 1977

Table 3.3 presents a comparison of estimates of herd numbers, growth, and offtake b type of husbandry for 1972 and 1977.[5] The results indicate that cattle herds in the Mop Region had not yet regained their pre-drought levels by 1977. Indeed, they would need unt 1989 to do so if one assumes a net annual growth rate of 3 percent. At the annual grow rate of 3.3 percent calculated in the 1977 OMBEVI estimate, overall herd size would nc attain 1972 levels before 1988.

Small ruminant herds in 1977, however, appear to have surpassed those in 1972. Th result should be treated with caution, since the Coulomb study did not involve direc observation of sheep and goat flocks in 1972.

Examination of estimated annual growth rates for cattle in 1977 shows that sedentar stockraising outside the bourgou represents the fastest growing component of the cattle he in the 5th Region. These herds are usually owned by persons whose main occupation farming. The sedentary herds also had the lowest rate of offtake, indicating perhaps greater effort toward restocking, particularly with draft animals. It is also noteworthy tha the sedentary herds outside the fertile delta had the lowest gross rate of productivity (ne growth and offtake) at 11.5 percent.

The gross productivity of goat herds in 1977 was significantly greater than that fo sheep. Given approximately equal offtake rates for the two groups, this leads to a increasing proportion of goats in small ruminant herds. The average offtake of 15 percent significantly lower than the 31 percent assumed by Coulomb in 1972. The 1977 estimat however, is consistent with herder behavior in southeastern Upper Volta, as observed by th author (Delgado, 1978, 1979). Furthermore, field studies in central Ivory Coast indicate tha the previous SEDES estimates of a 25-30 percent offtake should be revised downward to 1 15 percent in the more humid Savannah because of high animal mortality.[6]

COMPARATIVE ESTIMATES OF LIVESTOCK NUMBERS, HERD GROWTH AND OFFTAKE RATES IN THE MOPTI REGION, 1972 AND 1977
(See Sources Below)

		Estimated No. of Head		Net Annual Herd Growth Rate (%)		Net Annual Offtake Rate (%)	
	Year:	(COULOMB) 1972	(OMBEVI) 1977	(COULOMB) 1972	(OMBEVI) 1977	(COULOMB) 1972	(OMBEVI) 1977
	Type of Herd						
CATTLE	Transhumant inside delta	855,000	742,000	4.0[a]	3.1	11.5[b]	10.2
	Transhumant outside delta	675,000	58,000	4.0	2.9	10.7[b]	9.5
	Sedentary outside delta		400,000	—	3.9	9.4	7.6
	Total Cattle herd	1,530,000	1,200,000	—	3.3[c]	10.4[c]	9.0[c]
SMALL RUMINANTS	Sheep outside delta	—	1,146,000	—	1.3	—	15.0
	Goats outside delta	—	1,354,000	—	2.4	—	15.3
	Total Sheep and goats	2,300,000	2,500,000	—	1.9	31	15.2

SOURCES: Data for 1977 are preliminary figures from a major new study by OMBEVI and IER of herd structure and dynamics in the Fifth Region, which was to be published in 1979. Data collection took place in 1977 as part of the feasibility study for the second phase of the Opération pour le Développement de l'Elevage à Mopti (ODEM). The sample included over 30,000 head of cattle and 20,000 small ruminants. Also see text in chapter Three, Section III-A.

Data for 1972 are taken from a study by J. Coulomb of the Institut d'Elevage et de Médicine Vétérinaire Tropicale (IEMVT, 1972) in the section outlined: "Etude du Troupeau." Coulomb observed herds totaling over 25,000 cattle. His data for small ruminants are considerably less reliable than other information presented, based as they are upon a prior study of only 658 animals by IER.

[a]"Real growth rates" concerning growth rate of reproducers. See IEMVT, Etude du Troupeau, 1972, pp. 147-48 for explanation.

[b]11.5% for Fulani herds, 10.7% for Tuareg herds.

[c]Weighted averages.

C. - Cattle Herd Structure, Mortality, and Offtake by Age and Sex, 1972 and 1977

Major age and sex categories in various types of cattle herds in the 1972 study and th 1977 study are shown in Table 3.4. The data show a trend toward a relatively greate proportion of cows in 1977. In particular, the proportion of the herd represented by matur females has risen for both transhumant and sedentary herds. The increase has been mos noticeable in the latter case, where an extra 15 to 20 percent of the herd now consists o older cows, or a three-quarters increase relative to the proportion found by Coulomb i 1972. This is consistent with (but not explained by) the relatively low offtake figures fo sedentary herds observed previously in Table 3.3. It appears that sedentary herds are beln restocked with breeding animals, at least in an aggregate sense.

Cattle mortality and offtake rates for 1977, disaggregated by age and sex are given i Table 3.5. Estimated calving rates for mature cows are also listed for three types o husbandry.

Examination of mortality rates shows lowest overall mortality for transhumant herd which have access to delta pastures in the dry season, as might be expected. Furthermore the mortality rate for immature females is much lower than that for comparable males in a three pastoral systems. This result is common in West Africa (see, for example, Perett 1976), and most likely is the result of more milk and better care given to newborn female by the pastoralists (especially by the women).

The calculated offtake rates are in line with a priori expectations: low offtake o immature females and culling of young males consistent with the rule of thumb of 1 percent of each age category up to age three.[7]

D. - Small Ruminant Herd Structure, Mortality, and Offtake by Age and Sex, 1977

Estimates of herd structure are given for 1972 and 1977 in Table 3.6. By his ow admission, Coulomb's figures for small ruminants should be treated with caution, since the are based on a relatively small sample of herders interviewed previously by IER. Therefore part of the variation in the 1972 and 1977 estimates may be explained by the greate reliability of the latter, which are based on a sample of 20,000 animals. In this contex there does not appear to be any striking difference in herd structures between 1972 an 1977. Roughly three-quarters of the sheep and two-thirds of the goats are femal suggesting higher rates of offtake for males, as expected.

TABLE 3.4

EVOLUTION OF THE STRUCTURE OF CATTLE HERDS
FOR THREE TYPES OF HUSBANDRY IN THE MOPTI REGION, 1972 AND 1977
(Expressed as percentages of the overall herd)

Sex	Age	Transhumant Herds Inside the Inland Delta		Transhumant Herds Outside the Inland Delta		Sedentary Herds Outside the Inland Delta	
		Coulomb 1972	OMBEVI 1977	Coulomb 1972	OMBEVI 1977	Coulomb 1972	OMBEVI 1977
Males	0-1	3.7	7.1	10.0	7.8	8.5	6.5
	1-2	8.2	5.5	6.1	5.5	6.7	5.0
	2-3	5.0	4.4	5.9	4.1	8.0	3.8
	3+	15.1	16.8	15.4	14.3	19.0	15.6
(Sub-total Males)		(38%)	(34%)	(37%)	(32%)	(42%)	(31%)
Females	0-1	11.1	9.4	10.1	9.0	8.8	8.6
	1-2	9.6	7.2	7.6	7.3	7.9	6.3
	2-3	6.0	6.7	8.7	6.4	9.4	5.7
	3-4	6.3	7.1	8.0	5.8	7.6	5.8
	4+	29.0	35.2	28.4	39.8	24.2	42.7
(Sub-total Females)		(62%)	(66%)	(63%)	(68%)	(58%)	(69%)
TOTAL		100%	100%	100%	100%	100%	100%

SOURCES: 1972: Study by Dr. J. Coulomb (IEMVT, Etude du Troupeau, 1972, pp. 133-36.)
1977: Preliminary figures from study by OMBEVI and IER (see "SOURCES" in Table 3.3).

TABLE 3.5

CATTLE FERTILITY, MORTALITY, AND OFFTAKE RATES
BY AGE AND SEX FOR THREE TYPES OF HUSBANDRY
IN THE MOPTI REGION, 1977
(Expressed as annual rates in percentage terms)[a]

Parameter	Sex	Age (Years)	Transhumant Herds, Inside the Inland Delta	Transhumant Herds, Outside the Inland Delta	Sedentary Herds, Dry Zone
Calving Rate	F	4+	59 %	59 %	49 %
Mortality Rate	M	0-1	22 %	30 %	36 %
		1-2	15	15	12
		2-3	6	10	7
		3+	2	2	2
	F	0-1	10 %	21 %	15 %
		1-2	8	12	12
		2-3	6	8	5
		3+	2	4[b]	2
Off-take Rates	M	1-2	12 %	12 %	6 %
		2-3	8	8	4
		3+	18	20	16
	F	1-2	4 %	3 %	3 %
		2-3	1	1	1
		3-4	1	1	1
		4+	12	10	8

SOURCE: Preliminary figures from a study by OMBEVI and IER (see "SOURCES" in Table 3.3).

[a]If one assumes that approximately 50 percent of newborn calves are females, then the large difference in mortality rates between male and female newborns is not entirely consistent (in a dynamic sense) with the relatively smaller difference between the percentages of the herd represented by males and females in the 1-to-2-year age group (Table 3.4). The OMBEVI figures in Tables 3.4 and 3.5 appear to have been arrived at independently from each other. Most likely mortality rates for males does not exceed that for females to the extent portrayed in Table 3.5. These are provisional figures.

[b]Two percent for cows four years and older.

TABLE 3.6

EVOLUTION OF SMALL RUMINANT HERD STRUCTURES
IN THE MOPTI REGION, 1972 AND 1977
(Expressed as percentages of the overall herd)

Sex	Age	Percentage of Sheep Herd		Percentage of Goat Herd	
		Coulomb 1972	OMBEVI 1977	Coulomb 1972	OMBEVI 1977
Male	0-1	12.9	10.8	n.a.	10.9
	1-2	7.7	7.8	n.a.	8.0
	2 +	4.3	11.6	n.a.	12.1
(Sub-total Male)		(25%)	(30%)		(31%)
Female	0-1	20.2	15.8	n.a.	15.7
	1-2	18.2	13.8	n.a.	13.6
	2 +	36.7	40.2	n.a.	39.7
(Sub-total Female)		(75%)	(70%)		(69%)
TOTAL[a]		100%	100%		100%

SOURCES: 1972: Study by J. Coulomb (IEMVT, Etude du Troupeau, p. 167).
1977: Preliminary figures from study by OMBEVI (see "SOURCES" in Table 3.3).

[a]Percentage totals may not be exact as a result of rounding.

Table 3.7 presents estimates of mortality and offtake by age and sex for 1977. Despite lambing and kidding rates in excess of unity (owing to multiple births), overall offtake is modest as a result of the extremely high mortality of immatures. The death rate for newborn males is nearly twice that of females -- 51 percent for sheep and 45 percent for goats. Clearly, diagnosing the source of this wastage and then reducing it should be a prime goal for livestock development policy.

TABLE 3.7

SMALL RUMINANT FERTILITY, MORTALITY, AND OFFTAKE RATES
BY AGE AND SEX IN THE MOPTI REGION, 1977
(Expressed as annual rates in percentage terms)

Parameter	Sex	Age	Sheep (dry zone)	Goats (dry zone)
Reproduction Rate	F	2+	111%[a]	106%[a]
Mortality Rate	M	0-1	51%	45%
		1-2	13	10
		2+	19	9
	F	0-1	28%	25%
		1-2	11	9
		2+	10	10
Off-take Rate	M	1-2	16%	16%
		2+	34	35
	F	1-2	1%	2%
		2+	16	15

SOURCE: Preliminary figures from study by OMBEVI and IER; see "SOURCES" in Table 3.3.

[a]Greater than unity because of multiple births.

IV. - Summary of Offtake and Growth Estimates for Malian Livestock

A. - Comparative Estimates from the Literature

Table 3.8 presents the key offtake and growth parameters assumed or calculated b each major study in the literature on Mali since 1970. The observed variation in the figure leads to very different estimates of the potential for annual meat production. For example ILCA (1978) set the annual production at 12 kg of meat per UBT (Unité Bovine Tropicale liveweight of 250 kg), while OMBEVI used the figure of 14.4 kg.[8] The OMBEVI estimate o 3,915,000 head in 1976 (Table 3.2) yields an estimated production of 46,980 to 56,376 metri tons of carcass beef (an 18 percent spread), depending upon the production paramete chosen.

TABLE 3.8

COMPARATIVE OFFTAKE AND GROWTH PARAMETER ESTIMATES FOR MALIAN LIVESTOCK

	Study		OMBEVI, No. 96 (1977)		ILCA, Part A (1978)	OMBEVI, No. 100 (1978)	OMBEVI, No. 100 (1978)	OMBEVI, No. 100 (1978)	SEDES, I, (1975)		COULOMB (IEMVT, 1972) Mopti Region Only	OMBEVI[f] (1979) Mopti Region Only
	Year of Estimate		1974		1976	1976	1974	1970	1970		1972	1977
	Cattle Type		Zebu	Méré	Combined			Combined	Zebu	Méré	Zebu	Zebu
CATTLE	Meat prod. per herd member[a]	Kg	13.8 kg		12 kg[b]	13.1 kg	13.7 kg	14.4 kg	13.1 kg	10.1 kg	—	—
	Net offtake rate	%	12	10	10.9	10.9	11.5	12	11.5	13	10.4[c]	9.0[c]
	Net herd growth rate	%	3	5	--	3.7	--	—	3	3.7	4.0[d]	3.3
	Gross productivity[e]	%	15	15	--	15.6	--	—	14.5	16.7	14.4	12.3
SMALL RUMINANTS	Meat prod. per herd member	Kg	4.1 kg		6.5 kg	3.6 kg	3.5 kg	3.9 kg	3.7 kg		—	—
	Net offtake rate	%	27		45	28	27	30	30		—	15.2
	Net herd growth rate	%	6		--	5.5	—	—	5.4		—	1.9
	Gross productivity[e]	%	33		--	33.5	—	—	35.4		31	17.1

[a]Based on carcass weight, excluding offals.

[b]12 kg/U.B.T. = 12 kg per animal if the average carcass weight = 120 kg and the dressing percentage is 48 percent. See first footnote to Chapter Three, Section IV-A in text.

[c]Weighted averages based on aggregation of herds in different locations.

[d]Coulomb's "real growth rate," which is an estimate of the growth of reproducers (IEMVT, 1972, Etude du Troupeau, pp. 147-48).

[e]After allowing for mortality, but before off-take.

[f]See "SOURCES" in Table 3.3.

The variation is even more noticeable for small ruminants. Meat production in 1976 was estimated at 6.5 kg per animal in the herd by ILCA (Part A, 1978) but at 3.6 kg by OMBEVI (No. 100, 1978). Even OMBEVI used (implicitly) two widely different assumptions about small ruminant production in 1974 (No. 96, 1977; No. 100, 1978). Perhaps the truth is that little real work has been done measuring the actual offtake of small ruminant herds subject to high mortality.[9] Furthermore, herdsmen probably consume a much larger proportion of small ruminant production than they do of cattle output. For those reasons, relatively more confidence can be placed in the estimates for cattle than for sheep and goats. Composite "high" and "low" estimates will be given for small ruminant offtake.

B. - High and Low Estimates of Annual Livestock Herd Growth and Offtake Rates

Table 3.9 gives high and low estimates of herd growth and offtake rates. The high estimates were compiled by selecting the highest rates for zebu and taurin cattle in Table 3.8. The all-breed rates were calculated by weighted averages, assuming that roughly 29 percent of the national herd is composed of animals with primarily taurin characteristics (see Table 2.1). Rates that were clearly inappropriate, such as the ILCA estimate (1978) of a 45 percent offtake for small ruminants, were excluded from consideration.

The low figures are based on the preliminary findings of OMBEVI-IER data collection in the Mopti Region; the aggregate results for cattle are generalized to all zebu. The figures for mere cattle are rather arbitarily estimated by reducing the high estimate by 18 percent, the amount by which the low estimate for zebus falls short of the high estimate. Although the conditions in Mopti are quite unlike those in many other areas in the country, the fact that the Mopti figures are virtually the only ones based on observation of traditional stockraising and the need for conservatism in supply projections dictate a preference for the lower estimates for the purposes of this study.

TABLE 3.9

HIGH AND LOW ESTIMATES FOR MALIAN LIVESTOCK OFFTAKE AND GROWTH RATES, 1977
(in percent per annum)

Cattle	High Estimate			Low Estimate		
	Zebu[a]	Méré[b]	Comb.[c]	Zebu[d]	Méré[e]	Comb.[f]
Net Offtake	12.0	13.0	12.3	9.0	8.2	8.8
Net Herd Growth	3.0	3.7	3.2	3.3	4.1	3.5
Gross Productivity	15.0	16.7	15.5	12.3	12.3	12.3
Small Ruminants			Comb.[g]			Comb.[h]
Net Offtake			30.0			15.2
Net Herd Growth			5.4			1.9
Gross Productivity			35.4			17.1

SOURCES: (also see Table 3.8)

(a) OMBEVI, No. 96, '977.
(b) SEDES, 1975, 1.
(c) Assuming that 29% of the national herd is composed of predominantly taurine cattle, and the rest predominantly of zebu (see Table 2.1).
(d) OMBEVI and IER (1979, see Table 3.3 and notes) preliminary estimates for the Mopti region only.
(e) Calculated by reducing the high estimated by 18 percent, the amount by which the low estimate for zebu falls short of the high estimate for zebu.
(f) See note (c).
(g) SEDES, 1975, 1.
(h) See note (d).

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CHAPTER FOUR

PRODUCTION OF FED ANIMALS, 1976-77

Two of the key objectives of the 1974-1978 Malian Five-Year Plan with respect to livestock production were to export animal products with the maximum value added and to satisfy domestic needs for meat during the dry season in urban areas (OMBEVI, No. 72, 1976). The thinking behind these objectives was to maximize the national value-added component of exports and at the same time to supply domestic needs at the end of the dry season, when transhumant herders are often far from urban centers and the overall meat supply is low. The initial strategy proposed to implement these goals consisted of the large-scale introduction of feeding programs. These were to consist of industrial feedlots, small-scale feedlots, and farmer cattle feeding (embouche paysanne) using culled plow oxen (DGPS, 1974, p. 151). Chapter Two showed that the policy interest in the encouragement of these operations is still relatively high, even though virtually all Malian livestock continue to be range grazed. This chapter shows that the high ambitions of the Five Year Plan have been almost entirely unrealized, with the exception of the development of a promising new model for embouche paysanne that does not involve plow oxen.

I. - Feedlots: Plan Projections, Actual Performance and Constraints

A. - Projections of the 1974-78 Five Year Plan and Actual Performance

Table 4.1 shows the very ambitious objectives of the Planning Commission (Commission Nationale de Planification de l'Economie Rurale) with respect to the output of fed cattle from Malian feedlots, primarily for export on the hoof or as meat. The objective for 1978 was to have nine feedlots, distributed around the country, feed 37,000 head on ninety-day rations containing various combinations of whole cottonseed, cottonseed cake, rice hulls and bran, peanut cake, and molasses. The precise mixture and forage component was to depend upon the location of the individual lot.

In fact, only three lots were in an operational state by 1978: Tienfala, Molodo, and Dougabougou. The latter two, run as commercial operations by the Office du Niger, were closed in 1976 after several years of unprofitable activity. Tienfala operated at only 5 percent capacity in the context of a USAID-sponsored project. In this case, private participants, primarily butchers, paid a fixed fee to feed cattle for ninety days. Overall Malian capacity utilization of feedlot resources in 1978 was less than 2.5 percent. These difficulties notwithstanding, the CEAO has recently decided to double overall Malian feedlot capacity by voting funds for new lots at Sikasso and Mopti, due to become operational in

TABLE 4.1

PLANNED FEEDLOT PRODUCTION 1974-78 AND ACTUAL PERFORMANCE, 1977-78
(hundreds of head annually)

Zone	Feedlot	Projected Annual Capacity in Five-Year Plan 1974	1975	1976	1977	1978	Actual Annual Capacity 1977-78	Actual Annual Production 1977-78
South	Sikasso	-	-	10	20	30	a	0
Bamako	Baguineda	-	5	10	15	20	-	-
	Tienfala	-	30	30	30	30	24	1.17
	Bamako	-	-	25	25	25	-	-
Office du Niger	Molodo	-	10	15	25	25	18	0
	Dougabougou	-	10	50	100	100	8	0
Middle Valley of the Niger	Ségou	-	50	50	50	50	-	-
Inland Delta of the Niger	Mopti	-	-	10	20	30	b	0
Northeast	Gao	-	-	20	40	60	-	-
TOTAL:		0	150	220	325	370	50[c]	1.17

SOURCES: CNPER (1974) Volume I (2); Experience, Inc. (1978); and data supplied by USAID livestock office, Bamako.

[a]Funding obtained from CEAO for 2,000 head annually but not built as of 1979.

[b]Funding obtained from CEAO for 3,200 head annually but not built as of 1979.

[c]Not counting 5,200-head annual capacity cited in notes (a) and (b).

1980. In light of those plans, it is instructive to examine briefly the principal constraints to increased use of feedlot capacity in Mali. The major problem consists of spreading a high capital and administrative overhead (fixed costs) over the net revenue from output.

B. - Spreading the Capital and Administrative Overhead

Feedlots, unlike small-scale farmer operations, need to provide enough return to amortize rather considerable capital investment in buildings, watering points, vehicles, machinery, and other overhead items. To these are added heavy cash costs of salaries and other management expenses. The average fixed costs per head are minimized for some scale of operations, presumably greater than the level of activity depicted in Table 4.1. The issue then is whether feedlot operations, after attaining some "critical mass," can meet depreciation expenses on plant and machinery as well as provide adequate returns to equity capital.

A careful and detailed analysis by Eriksen (1977), based on 1972 data, implies that success is unlikely. He examines the case for two hypothetical lots with annual capacity of 2600 head at Segou and Sikasso. The animals are assumed (rather generously) to gain an average of one kg a day in both cases, over a ninety-day feeding period (ibid., pp. 168-69). After a painstaking computation of the expected stream of costs and benefits to both operations over a thirty-year period, Eriksen uses standard discounted cash flow analysis to show that such activities would be "poor financial investments for the Government of Mali" (ibid., p. 216), whatever the assumptions about the discount rate or the opportunity cost of capital.

He goes on to conclude (ibid.):

> While the Segou feedlot operation as detailed would generate sufficient sales revenue from all sources to cover its annual cash operating expenses after project year 3, these revenues are insufficient to meet depreciation expenses on the physical plant and equipment and vehicles; to provide any financial reserve against unforeseen contingency expenses; and/or provide adequate returns to equity capital over the life of the project.
>
> With regard to the Sikasso feedlot operation, the financial analysis is even more pessimistic. This operation would not provide sufficient sales revenues in any project year to cover annual cash operating expenses. Furthermore, net losses from this operation would be greater in absolute and relative terms over the project life than those incurred by the Segou feedlot.

The main weakness of applying the Eriksen analysis directly to the current situation is the spectacular rise in real terms of feeder steer and retail beef prices since 1972. For example, Eriksen assumes that feeder steers can be purchased for 37,600 FM in Ségou in 1976 (ibid., p. 180), a price which substantially underrepresents the actual cost. Similarly, the output price of fed animals needs to be revised upwards. His work, however, serves to

make the point that the current financial viability of feedlots depends, to a great extent, on the relative evolution of output and input prices since the early 1970s. To the extent that beef prices have risen relative to most other commodities, feedlots may be in a better situation now than they were in 1972. However, substantial efforts need to be made to cut both fixed and variable costs before feedlots are likely to become a factor in national output. Tienfala, discussed below, provides an example.

C. - Costs and Returns to Cattle in Tienfala Feedlot, 1977-78

As the only operating industrial feedlot in Mali in 1977-78, and perhaps because of its convenient location near the capital, Tienfala has borne the brunt of criticism by visiting evaluators opposed to investment in feedlot operations in this context. Although the author is, in a sense, one of these, it should be emphasized at the outset that Tienfala is an experiment in an unfamiliar area, and that the personnel involved in the implementation of this project are most likely doing all that can be done under the circumstances.[1]

The Tienfala experience illustrates the three crucial elements in differentiating between profitable and unprofitable feedlots in Mali. First, a major part of the payoff to feeding is the compensating weight gain from feeding undernourished animals, which gain weight rapidly with relatively little feed.[2] This can also be thought of as the return to maintaining weight on healthy cattle throughout the dry season for a relatively small feed supplement. Second, the net return per animal in the feeding operation depends to a large degree upon spreading a substantial fixed overhead of physical plant costs and administrative services. Feedlots need to operate near capacity to be profitable. Third, capital-intensive installations cut seriously into profit margins. There is a consensus among analysts that the Tienfala experience indicates the need to incorporate local materials and simpler design into plant construction.

Table 4.2 documents these points in a rough manner. The benefits per animal are estimated as the average weight gain per animal (340 grams/day in 1978), added to the value of the carcass meat that would have been lost over the dry season had the animal been left on the open range. The value of the meat is computed using the seasonal high price prevalent at the end of the dry period in 1979. The costs per animal are distinguished according to whether they are borne by the owners of the cattle or by the project. As estimated in Table 4.2, owners in 1978 made a net profit per animal of 17,400 FM over what they could have made with the same animal by keeping it on the open range. However, there are additional recurring costs to the feedlot operation not covered by the fee paid by the owners.

The costs borne by the project are essentially fixed charges for debt service, depreciation, and administrative overhead. Table 4.2 shows data for Tienfala pertaining to the first two items. The third item is estimated from official projections for the Mopti feedlot, projections that are likely to be on the low side, since they form part of a funding

TABLE 4.2

COSTS AND RETURNS PER HEAD IN A TIENFALA-TYPE FEEDLOT

(a) Benefits to Owners	
Mean weight gain 90 days = 30.8 kg	
Expected value of gain at 1,000 FM/kg:	30,800 FM
Weight that would have been lost during the dry season outside the lot (20 kg). Maintenance benefit =	20,000 FM
Total benefit to owners:	50,800 FM
(b) Costs to Owners	
Delivery to Feedlot	5,000 FM
Feed, health, and credit costs	25,000 FM
Losses (3% of 80,000)	2,000 FM
(c) Average Margin to Owners	
(Excluding personal costs of accomplishing required formalities waiting for apyment or marketing outputs.)	17,400 FM
(d) Annual Fixed Costs Not Covered by Fee Charged to Owners	
Debt service on construction at concessional rates 6% p.a. of $376,859 x 420 FM =	9,496,847 FM
Depreciation of equipment 20% p.a. of $173,000 x 420 FM =	14,532,000 FM
Administrative costs (other than marketing) =	14,712,000 FM
Total Fixed Costs =	38,741,000 FM
(e) Annual Fixed Costs Per Animal	
On a 117 head basis (1978):	331,120 FM
On a 1,400 head basis (1979):	27,670 FM
On a 2,400 head basis (full capacity):	16,140 FM
(f) Gross margins excluding marketing costs:	
117 head basis:	312,720 FM
1,400 head basis:	9,270 FM
2,400 head basis:	2,260 FM

SOURCES: (a) Information on weight gain is from Experience, Inc. (1978) p. 72. The maintenance benefit is the weight that the animals would have lost over the same (dry season) period if they had been kept outside the lot; (b) The feed and health cost is from Experience, Inc. (1978) p. 72. The loss figures are conservative, in that 5 out of 122 animals were lost or sold out of quarantine in 1978; (c) = (a) - (b); (d) Debt service and depreciation cost are computed from Tienfala data in Appendix XIV of Experience, Inc. (1978). That document does not contain a clear breakdown of administrative overhead costs associated with the Tienfala lot; therefore projected costs calculated by OMBEVI for the new lot at Mopti are used ("Personnel, Bureau, Fonctionnement Siège", OMBEVI, No. 99, 1978, p. 106); (f) = (a) - (b) - (d).

proposal. These fixed costs range on a per animal basis from roughly 16,000 FM/head at full capacity to more than 300,000 FM/head based on the 1978 output of 117 animals.

Preliminary information from Mali indicates that 1979 output at Tienfala will reach 1,400 head, an enormous expansion over the 1978 figure. This is not surprising in view of the subsidized return available to the private participants. However, when the fixed costs are added in and no distinction is made between private and project money, the net loss per animal based on a 1,400 head output is in the vicinity of 9,000 FM, not including marketing costs. At current price and weight gain levels, the project only begins to pay when near full capacity, and this ignores marketing costs.[3]

The numerical example here is too rough to predict the "break-even" price and weight gain necessary for the lot to become truly profitable. The need to cut fixed costs is clear, however. Successful feeding experience in northern Ivory Coast in 1978 indicates that the break-even daily weight gain for that price structure is in the vicinity of 650 grams (Serres, 1978). Given the generally lower level of domestic Malian prices and the cost of exporting, the comparable figure at Tienfala is likely to be slightly higher.

D. - Cutting Variable Costs and Boosting Returns

In addition to spreading overhead, attention to four other elements of feedlot operations can boost profitability: the quality and supply of feeds at a given cost, the quality and supply of feeder cattle, the season in which feeding is accomplished, and the timing and distribution of output. These elements become increasingly binding constraints with the expansion of operations, even as average fixed costs diminish.

Besides research into efficient rations, output-oriented research at feedlots should consider the price and available supply of high-energy feedstuffs (e.g., cottonseed, molasses, etc.). The current supply price of these items, set by para-statal agro-industries, may in fact represent a subsidy relative to the opportunity cost of the commodities in other uses. Cottonseed provides an example: plans for a new cottonseed oil mill at Koutiala will eventually make this source of feed uneconomic. Subsidiary plans for a cottonseed cake processing facility (SEPOM) should help, but the cake will not be a perfect substitute for the whole seed from an energy (and therefore from an economic) standpoint.

The profitability of feeding also depends upon the ability of feeders to gain weight. In turn, this depends largely upon obtaining large-framed but thin animals amenable to rapid (compensating) gains over a ninety-day period. Maintenance of cattle at "normal" body weights from February to June is conceptually equivalent to feeding undernourished cattle from June onward; however, the former has the advantage in that the healthy stock is available for sale when prices are highest at the end of the dry season. Feeding during the rainy season is a dubious proposition since cattle do well on natural pastures at that time. The supply price of these cattle may rise sharply if feeding becomes a large-scale enterprise.

TABLE 4.3

PLAN TARGETS FOR FEEDING CULL PLOW OXEN IN 1978

Zone	Projected Number of Cull Plow Oxen	Projected Number of Fed Cattle from Small Farms	Production of Fed Cattle for Malian Consumption	Production of Unfed Cull Plow Oxen for Malian Consumption	Production of Fed Plow Oxen for Export
Mali South (Sikasso)	48,000	48,000	24,000	-0-	24,000
Center-West (Middle Valley, Bamako)	10,000	1,000	-0-	9,000	1,000
Upper Valley (Kita)	3,000	3,000	-0-	-0-	3,000
Office du Niger (Ségou)	7,300	7,300	5,300	-0-	2,000
Inland Delta and Seno Plains (Mopti)	8,000	-0-	-0-	8,000	-0-
Sahel (Kayes-Nara)	1,900	-0-	-0-	1,900	-0-
Lakes (Tombouctou)	1,000	-0-	-0-	1,000	-0-
North (Gao)	300	-0-	-0-	300	-0-
Projected Total for 1978, 1974-78 Plan	79,500	59,300	29,300	20,200	30,000

SOURCES: For Plan projections, see CNPER, 1974.

Much of the rationale for feeding consists in being able to supply heavy cattle at a time when range production is insufficient to meet domestic or export demand (Experience, Inc., 1978, p. 5). However, the limited absorptive capacity of the local market makes the staggering of output desirable in order to avoid flooding the market at any one time. Furthermore, the use of feedlots to obtain price premiums on a large scale requires an export outlet for the finished product.

The supply-side questions concerning availability of feedstuffs and feeders are also pertinent to the prospects for embouche paysanne, and will be discussed in the next chapter. The demand-side aspects of marketing will be dealt with more fully later; marketing is in itself a major question for consideration by Malian policy makers.

II. - Embouche Paysanne: Plan Projections, Actual Performance, and Constraints

A. - The Fed-Cull-Oxen Model and Projections of the Five Year Plan 1974-1978

As in the case of feedlots, unrealistic goals were set for small farm cattle feeding programs. The basic strategy was for a massive expansion in the use of animal traction, to be accompanied by a proportional expansion in the number of cull plow oxen available for ninety-day feeding operations on small farms, prior to export or domestic slaughter. The key points of the strategy were to replace the investment and administrative overhead of feedlots with small farmer labor furnished primarily during the relatively slack dry season, thus decreasing seasonal underemployment in rural areas and boosting the profitability of the animal traction enterprise. The least desirable of the cull oxen were to be sold unfed on the domestic market.

Table 4.3 contains the 1974 Plan projections of cull plow oxen by geographical zone in 1978 and a strategy for their distribution among final uses. In point of fact, virtually no cull plow oxen were fed on small farms within a project setting for any aspect of meat production in 1978. Indeed, the failure of this strategy can be explained in two ways.

First, the strategy neglects the smallholder's very real incentive to hold on to a trained and proven team as long as possible.[4] Besides the effort required to break in new oxen, older animals often prove to be stronger work animals and to be more disease-resistant.[5] Furthermore, a lack of banking institutions makes it more difficult for farmers than for city dwellers to translate last year's money profits into this year's capital investment.[6] The net effect of these considerations has been to discourage culling plow oxen earlier than age eleven (OMBEVI, No. 100, 1978, p. 13). However, this late culling age vitiates attempts to feed the animals intensively for meat production, since field studies have shown that zebu plow oxen tend not to put on meat under intensive feeding after age ten [MDR, Opération

Riz Ségou (ORS), 1978]. The conclusion of the trials was that feeding this category of animals would be unprofitable for the foreseeable future (ibid.).

Second, even if the culling-and-feeding option were viable for the older animals, the pool of cull oxen from which the best elements are to be drawn is much smaller than the 1974 projection. The planners estimated a total of 79,000 cull plow oxen, on the basis of a projected herd of 350,000 - 400,000 animals. Available data do indicate an astounding expansion in the use of animal traction in Mali, with one estimate of the plow oxen herd at 300,000 to 325,000 head for 1977 and an estimated annual rate of growth of the overall herd of 9 percent (OMBEVI, No. 100, 1978, p. 13). However, the Plan projections, which assume that plow animals begin working at age five, apparently ignore the dynamics of a growing herd of five-to eleven-year-old animals where the cull animals are all at the top of the age span, and each age class is characterized by 6 percent annual mortality.[7]

B. - A Downward Revision of the Plan Estimate of the Amount of Plow Oxen Available for Culling Each Year

Table 4.4 shows that the rate of addition to the overall plow herd (the number of new animals added to the five-year-old class divided by overall plow herd size) that is required to achieve a steady rate of growth of 9 percent in overall herd size (as hypothesized by OMBEVI, see above) is more than twice the culling rate (the offtake divided by the total herd size). Specifically, an overall plow herd of 330,000 animals, growing at 9 percent a year, requires more than 70,000 new additions in the five-year-old class and produces less than 29,000 cull oxen in the eleven-year-old class. This surprising result is attributable to the fact that new additions in the five-year-old class need to compensate for mortality in other age groups and for the culled oxen, in addition to providing the net growth in overall herd size.

These figures appear to suggest that an estimate of a plow oxen herd of 330,000 head in 1978 implies not only that 8 percent of Malian cattle are plow oxen, but also that one-fifth of the latter are young males in the vicinity of five years old. In fact, it seems unlikely that the overall herd of plow oxen could go on increasing at the rate of 9 percent per annum on a long-term basis. The most likely conclusion is that the herd was less than 330,000 head in 1978; and consequently, the cull figure of 29,000 head is very much on the upper limit of the order of magnitude.

Despite the failure of the plow oxen feeding model, a very interesting model of small-scale farm feeding of thin range steers was developed between 1975 and 1978 in the context of USAID's Mali Livestock I Project. This is now an autonomous Malian-run operation, under the aegis of the Etablissement de Crédit et d'Investissement dans le secteur Bétail-Viande (ECIBEV). It is perhaps the most viable strategy for feeding cattle in Mali and deserves further examination.

TABLE 4.4

SIMULATION OF GROWTH IN PLOW OXEN HERD AND CULLING PERCENTAGES, 1960-1978
(Reproduced to the Nearest 1,000 head)

Year	Overall Plow Herd	Replacement Rate (%)	5 year-olds	6 year-olds	7 year-olds	8 year-olds	9 year-olds	10 year-olds	11 year-olds	Culling rate (%)
1960	70	17.1	12	11	11	10	9	9	8	11.7
1961	76	23.9	18	11	11	10	9	9	8	10.8
1962	83	23.1	19	17	11	10	9	9	8	9.9
1963	91	22.3	20	18	16	10	9	9	8	9.1
1964	99	21.6	21	19	17	15	9	9	8	8.3
1965	108	21.0	23	20	18	16	14	9	8	7.7
1966	117	20.4	24	21	19	17	15	13	8	7.0
1967	128	19.8	25	22	20	18	16	14	13	9.8
1968	139	22.2	31	24	21	19	17	15	13	9.5
1969	152	22.0	33	29	22	20	18	16	14	9.2
1970	166	21.7	36	31	27	21	19	17	15	8.9
1971	181	21.4	39	34	29	26	18	18	16	8.6
1972	197	21.2	42	36	32	28	24	19	16	8.4
1973	215	21.0	45	39	34	30	26	23	17	8.2
1974	234	20.8	49	42	37	32	28	24	21	9.2
1975	255	21.7	55	46	40	35	30	26	23	9.0
1976	278	21.5	60	52	43	37	33	28	25	8.9
1977	303	21.5	65	56	49	40	35	31	27	8.8
1978	330	21.4	71	61	53	46	38	33	29	8.7
1967-1978 Annual compounded growth rate			9.5%						7.8%	

SOURCES: From a computer simulation assuming all culls are 11 year-olds, all replacements are 5 year-olds, 6 percent mortality in each age group, and an annual rate of growth of the overall herd of 9 percent. The initial herd in 1970 is arbitrarily set at 70,000 head, distributed between age categories in such a way that replacements are just sufficient to maintain overall herd size constant. Figures in the table have been rounded to nearest 1,000 head but the per-

C. - The ECIBEV Production Experience with Embouche Paysanne, 1975-78

The three years from 1975 to 1978 saw the development of a very interesting small-scale farm livestock feeding program under the auspices of ECIBEV. The ECIBEV model is well documented in Harms (1978) and OMBEVI (No. 81, 1976 and No. 89, 1977). These and extensive interviews with ECIBEV officials provide the basis for the following presentation.

The rationale for dry season embouche paysanne is to take advantage of low opportunity cost dry season labor in order to profit from seasonal increases in cattle prices. The basic model involves supplying small farmers with high-energy feedstuffs, extension, veterinary care, and credit for ninety-day feeding programs, for approximately two head of cattle per farm. Participants are chosen both from the participants in the Opération Arachide et Cultures Vivrières (OACV) and from a Region outside the Opération boundaries. In practice, the groups have performed equally well (Harms, 1978, p. 1). The farmer selection criteria are based on the credit record, if any, of the applicant; the area of peanuts and cowpeas cultivated; and the presence on the farm of plow oxen. The last criterion is designed to demonstrate both an ability to care for large stock and a capacity to cultivate a large area of legume hay and forage. The result of this selection process has been to ensure that only the most prosperous (and dynamic) farmers are enrolled in the program.[8]

The original model sought to involve farmers as much as possible by merely financing purchases of feeder steers. The participant drives his own bargain with a local seller; the ECIBEV field agent then inspects the animal and agrees to the price; finally, the organization lends the farmer the purchase price at the rate of 6 percent per annum for a duration of four months, up to a maximum of 55,000 FM per head. Purchase of feedstuffs and veterinary care for 18,800 FM can also be financed at this rate.

In practice, participants have had difficulty in locating sufficient mature, large-framed but thin cattle suitable for feeding. ECIBEV has therefore become involved in moving animals from markets in the Sahelian zone for feeding by participants in the Savannah zone. During the 1977-78 season, ECIBEV contracted with a merchant to supply feeder animals for 217 FM per kilogram liveweight, with risks borne by the middleman up to delivery. Marketing the fed animals has also become a constraint, since the finished product at the farm gate has not been attractive to local merchants, and the participating farmers are not equipped to travel. The internal marketing problems of fed cattle will be examined in a later chapter. The result of these difficulties, so far, has been to involve ECIBEV in export operations in conjunction with SOMBEPEC.[9] The training and maintenance of skilled extension agents has also become one of the serious hurdles to further expansion (personal communication from the Director-General of ECIBEV, Mr. Diallo).[10]

Despite the triple constraints of the supply of feeder cattle, the marketing of output, and the availability of trained extension agents, ECIBEV did well in the attainment of a steady growth in production from 1975 to 1978. The scale of current efforts is sufficiently small to have a negligible effect on the overall Malian output of beef. However, current

results leave hope for future expansion if the principal constraints can be overcome. Table 4.5 shows the evolution of output since the inception of the project. The estimates of the average net cash return per animal to the farmer, contained in the bottom line of the table, are encouraging. Given labor economies of scale in livestock management, it is to be expected that participants would want to feed several head at a time. On the other hand, farmer participation is most likely limited to the slack season from December to April, when the opportunity cost of family labor is below the 2,500-5,000 FM/month/head cash returns. This will quickly limit the number of head to be fattened by any one family, to the extent that greater activity would require more legume hays than are spun off by normal cropping activity. The cultivation of forage specifically for cattle feeding would incur a substantial opportunity cost in terms of rainy season labor.[11]

TABLE 4.5

EVOLUTION OF ECIBEV SMALL-SCALE CATTLE FEEDING

Item	1975-76	1976-77	1977-78	1978-79
Number of animals fed (head)	108	208	482	500[a]
Percentage of objective	48%	77.9%	90%	-
Number of farmers participating	48	109	225	-
Experience, Inc. calculations of the average return to the farmer's labor and management per head	17,805 FM	18,165 FM	10,368 FM	-

SOURCES: Harms (1978, Appendices III and IV) and Experience, Inc. (1978, Appendix XVI) for the per animal profitability in 1977-78.

[a]Preliminary, rough estimate.

D. - A Rough Evaluation of the Profitability of the ECIBEV Embouche Paysanne Project

As in the case of feedlots, the returns to individual participants in the ECIBEV embouche paysanne project are subsidized by donor agency funds. Table 4.6 serves to calculate the net average total costs and benefits per fed animal in the three years of the program.[12] The overhead items for personnel and operating expenses are fixed costs.[13] The figures used in the table are estimated minimums and may in fact understate the actual expenditures of ECIBEV on these items. As output increases the corresponding dilution of the fixed overhead greatly improves the average profit (loss) per animal.

TABLE 4.6

ESTIMATES OF AVERAGE SOCIAL PROFITABILITY PER HEAD FOR ECIBEV SMALL-SCALE FEEDING OPERATIONS (in Malian Francs)

Benefits	1975/76	1976/77	1977/78
Excess of average fed animal sale price at farm gate over average feeder animal purchase price[a]	34,873	41,695	43,500
Costs			
Feed, extension, and veterinary care[b]	14,100	14,100	14,100
Farm-produced forage (at opp. cost)[c]	4,410	4,410	4,410
Loss due to mortality spread on a per animal basis[d]	645	1,465	1,541
Cost of ECIBEV administrative personnel for Embouche Paysanne project on a per animal basis[e]	74,074	38,462	16,598
Allowance for other ECIBEV operating overhead (e.g., vehicles, offices, etc.)[f]	24,691	12,821	5,533
Opportunity cost of Credit Fund at 6% p.a. = 2% for 4 months[g]	1,266	1,465	1,510
Ditto, at 20% p.a. = 6.66% for 4 months[h]	4,214	4,880	5,030
Total Cost per Animal			
With 2% charge on credit[i]	119,186	72,723	43,692
With 6.66% charge on credit[j]	122,134	76,138	47,212
Net "Social" Profitability			
With 2% charge on credit[k]	- 84,313	- 31,028	- 192
With 6.66% charge on credit[l]	- 87,261	- 34,443	- 3,712
Ratio of Costs to Benefits			
With 2% charge on credit[m]	3.42	1.74	1.00
With 6.66% charge on credit[n]	3.50	1,83	1.09

Table 4.6 continued -

[a]1975-1977 from Harms (1978, Appendix IV). 1977/78 figure based on an estimated average sale price of 100,000 FM/head.

[b]Estimated as farmer cost minus the ECIBEV profit margin reported in Harms (1978, p. 17).

[c]Presumably, the opportunity cost of forage in small ruminant production: 90 kg. of legume hay at 25 FM/kg and 270 kg of grass hay at 8 FM/kg. (Harms, 1978, p. 17).

[d]Estimated as 1 percent per head average loan in 1975 and 2 percent thereafter. Average loss figures from Harms (1978, p. 31).

[e]Based on a staff with a project director (Master's level), a veterinarian, a supervisor (Bachelor's level), two livestock technicians (high school diploma plus 2 years) and four veterinary nurses (technical diploma). This closely resembles the core staff of the ECIBEV Embouche Paysanne unit in 1976/77, not counting trainees and the general administrative staff of ECIBEV (see Harms, 1978, p. 22). This works out very roughly to an estimated annual cost of 8 million FM in basic salaries. This figure is divided by the number of animals fed.

[f]Guesstimated as 50% of salaries during 4 months of the year and 25% for 8 months.

[g]Average loan from Harms (1978, p. 31), charged at 2% (ECIBEV rate).

[h]Ditto, at estimate of pure opportunity cost (in small ruminant production, for example) of 20% per annum on a 4-month basis.

[i]Equals (b + c + d + e + f + g).

[j]Equals (b + c + d + e + f + h).

[k]Equals (a - i).

[l]Equals (a - j).

[m]Equals (i/a).

[n]Equals (j/a).

The calculations in Table 4.6 include credit charged at the subsidized price of 6 percent per annum (the rate ECIBEV charges the farmer) and at the more conventional estimate of the opportunity cost of capital of 20 percent per annum.[14] It is noteworthy that the feeding project was just at the "break-even point" in terms of social profitability in the 1977/78 season, if the opportunity cost of capital is calculated at 6 percent per annum. A further expansion of output is likely to make the project socially profitable at the higher rate of discount of 20 percent in the near future. A strengthening of beef prices relative to other items will accelerate this tendency.

In sum, by spreading a low overhead over the feeder herd, embouche paysanne has been shown to be an activity capable of financing itself and expanding output. The major considerations for the future are to increase the supply of feeder steers and marketing outlets while keeping the overhead low. Perhaps the greatest problem for small-scale feeding in the future will be obtaining a supply of high-energy feedstuffs at commercial rates. The ration currently used by ECIBEV is economical largely because of the availability of under-used cottonseed. The supply of this resource in quantity in the future may be constrained by its allocation to higher value uses in vegetable oil production. This problem will be considered more fully in the next chapter.

CHAPTER FIVE

PRODUCTION CONSTRAINTS TO FURTHER EXPANSION OF CATTLE OUTPUT

In the absence of other constraints, the lack of pasture and water alone may serve to limit future herd growth in the northwest and south of the country. A maximum national carrying capacity of 8.5 million head, based solely upon pasture resources (i.e. temporarily ignoring tsetse and water, etc.) is further diminished by the competition for land from agricultural activities. This is particularly severe in the south; however, available evidence indicates substantial encroachment upon the traditional grazing lands of transhumant herds in the 4th and 5th Regions. In particular, the high return to land used for irrigated rice around surface watering points appears to be the principal constraint upon the expansion of range grazing in the major stock-raising area of the country. The production of fed beef cattle may be limited in the future by restricted supplies of feeder cattle or high-energy feedstuffs. The latter in particular have renumerative alternative uses as feed for milk herds and plow oxen in the dry season and as export commodities and industrial raw materials. However, the alternative use of farm resources to grow out small ruminants is more likely the greatest threat to the output of fed beef cattle.

I. - Production Constraints to Range Output

A. - Environmental Constraints: Water and Pasture

Water supply near usable pasture in the dry season is the basic environmental determinant of the viability and expansion of range livestock production. Rainfall is the basic determinant of the supply of water and pasture at the end of the wet season. It is also the major determinant of the presence of tsetse fly, ticks, and internal parasites. Therefore, rainfall and dry-season stocking rates are potential constraints to the expansion of range cattle production in any given area. The medium-run livestock production potential of Malian pastures from an environmental viewpoint will be estimated for both average and relatively poor rainfall through 1985.

1) - Evaluation of Stocking Potential According to Breman (1974)

In 1974, Breman estimated the potential of Malian pastures for different rainfall situations.[1] Since then, ILCA has surveyed the state of knowledge on the potential forage productivity of the Inland Delta and adjacent Sahel areas (1978, Part B, Annex 4). This document lists the species present, the orders of magnitude of the biomass produced

annually per unit area, and the total availability of dry matter per animal in the ILCA study area. However, the ILCA evaluation of the livestock subsector of the Malian economy contained in the same report uses the Breman estimates (ILCA, 1978, Part A, Table 34). OMBEVI in late 1977 called them "the best approximations to date" (No. 96, pp. 5-7). They are reproduced in Table 5.1.

TABLE 5.1

BREMAN'S ESTIMATES OF THE THEORETICAL CARRYING CAPACITY OF MALIAN RANGES (millions of UBT)

one	Theoretical Capacity Mean Rainfall	Rainfall -S.D.	Rainfall -2 S.D.	Actual Herd Numbers 1970	1974[a]
outh	3.9	3.3	2.7	0.4	0.6
orthwest	10.4	8.2	2.6	1.9	1.5
ortheast	2.8	1.8	0.7	3.7	2.5
TOTAL	17.1	13.3	6.0	6.0	4.6

SOURCE: H. Breman reported in OMBEVI (No. 96, 1977, p. 6).

NOTE: A "Unité Bovine Tropicale [UBT]" as used by Breman and OMBEVI is quivalent to a 250-kg animal (although theoretically this measure is based on erage requirements). "S.D." means standard deviation about the mean. If rain-ll is normally distributed across the years and if the sample estimates closely pproximate the true parameters, then there is less than a 2.5 percent chance that infall would be more than two standard deviations below the mean in a given year. wever, the situation approximately represents events in 1972-73.

[a]Overstates actual herd in 1974 (see Table 3.1).

The upshot of the Breman estimates is that pastures in the northeast were overstocked in 1970, even relative to their theoretical maximum capacity under normal rainfall. However, pastures in the south and northwest were vastly understocked in both 1970 and 1974, even under drought conditions (rainfall more than two standard deviations below the mean). This indicates a considerable latitude for herd expansion in the south and northwest, at least from a stocking rate point of view.[2] The next subsection reviews these estimates and contrasts them with less optimistic evidence.

2) - Breman's Estimates Revisited

Upon examination, Breman's estimates of theoretical carrying capacity seem to b much too high, even allowing for their "ideal" nature. Table 5.2 shows that the figures I Table 5.1 can be converted into an estimate of 2.2 hectares as the minimum required pastur to maintain one UBT per year in the northwest, with average rainfall. This is clearly a contrast with the more conventional estimate of 7-8 hectares per UBT for Savannah areas or 10-14 hectares per UBT for Sahelian zones.

Table 5.2 contrasts the Breman estimates with those by Dr. Boudet of the IEMVT chosen as representative of the Sahel by the FAO (1977, p. 205). Again, the former appea to be too low. Even the latter are optimistic, given the assumption that the entire surface i composed of rangeland suitable for pasture, as opposed, say, to lateritic crust. Bearing thi in mind, the last column of Table 5.2 gives a composite "optimistic" estimate of th mimimum amount of pasture required per animal in the three zones.

3) - Upper Bounds on Regional Carrying Capacity

The estimates of Table 5.2 are used in Table 5.3 to generate upper bounds for th number of animals that can be carried in each zone. The figures should be interpreted a absolute ceilings for a stable environment where the land has no other use than pasture. I practice, land use for crops, human habitation, or small ruminant herds will reduce th carrying capacity below these stocking rate upper bounds, based as they are solely upo water and pasture. Salubrity considerations for animals and herders such as tsetse, tic black fly, and mosquito infestation also play a role in the south and in some river valle farther north during the rainy season.

The implication of the estimates in Table 5.3 is that herds in the northeast in 197 were at the maximum level sustainable environmentally, while (theoretically) there remai substantial room for expansion in the northwest and southern areas of the country. Th upper-bound figure of 8.5 million head nationally relies upon a 2.4 million head expansion i both the south and the northwest. While these areas present the best hope for growth, the are the areas where factors other than the ability of pasture will be the limiting constrain to livestock production.

B. - Resource Conflicts as a Constraint on Output

1) - Resource Conflicts at the Farm Level

The main alternative to keeping cattle in the rural Malian context in the south ar west of the country is to grow crops. Agriculture limits the output potential for livesto

TABLE 5.2

BREMAN'S ESTIMATES OF CARRYING CAPACITY COMPARED WITH THOSE OF BOUDET (IEMVT)

Breman's Land Categories	Breman's Estimate of Maximum Stocking Rate (UBT/km^2)	Breman's Estimate of Minimum Pasture Per Animal (Ha/UBT)	Boudet's Land Categories	Boudet's Estimate of Minimum Pasture per Animal (Ha/UBT)	Mean Boudet Estimate with 30% Allowance for Low Rainfall	
					Land Category	Minimum Pasture per Animal (Ha/UBT + 30%)
South	43.2	2.3	—	—	South	3.0[a]
Northwest	45.5	2.2	Sahel rangeland with sand, clay, and alluvial deposits	3.2 - 5.8	Northwest	5.9
Northeast	8.3	12.1	Sub-desert Sahel, sandy clay and dunes	13.9 - 17.2	Northeast	20.2

SOURCES: The Breman estimates are obtained from Table 5.1 by dividing those figures by the relevant land areas, to get the stocking rates. The pasture per animal figures are the reciprocals of the latter, divided by 100. The Boudet estimates are intended for the Sahel as a whole. They are from FAO (1977, p. 205). The Breman and Boudet figures above apply to the case of average annual rainfall, while the "composite" estimates allow 30% extra pasture per UBT to cover the case of low (but not drought) rainfall.

[a]The Breman estimate for the South is used. It is consistent with evidence for Upper Volta and northern Ivory Coast.

TABLE 5.3

THEORETICAL ENVIRONMENTAL UPPER BOUNDS TO CATTLE HERDS IN MALI
(Average-to-Low Rainfall)

		(a) Area	(b) Minimum Pasture per Animal for an Environmentally Sustainable National Herd	(c) Optimistic Maximum Number of Animals for an Environmentally Sustainable National Herd	(d) 1976 Herds
	Unit:	km^2	Ha/UBT/year	UBT	UBT
ZONE	South	90,300	3.0	3,010,000	600,000
	Northwest	228,800	5.9	3,877,966	1,500,000
	Northeast	336,000	20.2	1,663,366	1,800,000
	TOTAL	655,100	—	≈ 8.5 million	3,900,000

SOURCES: (a) OMBEVI (No. 96, 1977, p. 6)

(b) Table 5.2.

(c) = ((a) ÷ (b)) x 100

(d) Rough estimates based on the distribution reported in Chapter Three, Table 3.2.

rom the perspective both of the individual farmer and of the community. At the farm evel, many individuals in Savannah areas of West Africa tend to find crop growing and the aising of small ruminants preferable to keeping large stock.[3] Delgado has shown that it also nore profitable to follow this route in at least one millet-growing area, provided that large tock can be entrusted to specialized herdsmen outside the village (1978). It is likely that his phenomenon is related to the density of human settlement and the wealth of the opulation: the more numerous and less wealthy the population, the less farmers will choose o keep range-fed cattle (other than plow oxen) on the farm in preference to sheep and oats.[4]

- Resource Conflicts Within the Village

At the level of the village as a whole, a higher population density tends to be ssociated with a greater incidence of crop damage by errant cattle. The frequently high ost of legal settlements in such cases serves to discourage herding near fields while crops e standing; it also increases the labor requirement for herd supervision in southern areas uring the rainy season relative to that in northern areas.[5] In lowland and riverine areas, w rice cultivation in particular often interferes with traditional cattle routes. The new routs are just coming out of the ground as the herds leave for drier pastures. For an dividual with control over lowland, cereal cultivation is far more profitable than oduction of crops for use solely as forage, except insofar as the forage crop may be ecessary to feed work oxen used in the production of cereals.[6] Produced forage on a non-gligible scale is likely to remain in the domain of by-products such as stalks and stems in e foreseeable future.

- Resource Conflicts at the Level of Rural Development Policy

State-run rural development projects in particular constrain the expansion of animal sbandry based on transhumance, as is the case for most cattle-raising outside the cotton lt of the country. By 1978, access to a substantial proportion of the lowland of the Niger alley involved crossing from southwest to northeast through the territory of Opération aute Vallée (OHV), Opération Riz Ségou (ORS), and the Office du Niger (ON): Opérations ils and Riz in Mopti also contribute to further colonization of former grazing routes. The eation of ODEM in Mopti has helped limit the impingement by official agencies on grazing rritory in the 5th Region. However, spontaneous colonization of fertile lands by crop rmers migrating from crowded lands in the 2nd and 4th Regions continues to be a major oblem (from interviews with top-level Malian officials). Land is often cleared, cultivated r a few years, and then abandoned. The bourgou grass apparently does not regenerate ontaneously.[7] Moreover, new expansion of rice cultivation is planned for the Lakes region

(Tombouctou) in the Opération Zone Lacustre. Livestock projects with irrigated cropp components are being discussed for the Gourma region, on the other side of the river, and t Menaka-Ansongho-Telataye triangle, farther to the east.

4) - An Example of the Displacement of Transhumant Cattle Herding by Agriculture

Detailed data from aerial surveys on changes in land use over time exist for the IL study area of some 60,000 km^2 in the 4th and 5th Regions (ILCA, 1978, Part C, Annex The study zone contains approximately 15 to 20 percent of the national cattle herd and o 10 percent of the small ruminants. It covers the heart of the traditional transhum livestock production area, on the Ségou-Macina-Mopti axis. Much of the area is also suita for irrigated rice cropping.

Table 5.4 illustrates the threefold growth in planned and spontaneous irriga cropping. The increase of over 500 percent in degraded rangelands between 1952 and 197 a poignant illustration of the problems of associating individual plots with herds kept communal land. Part of the increase is no doubt due to the fact that the 1975 aerial sur came immediately after the great drought. However, a good part of the increased eros appears to have come from the expansion of rainfed cropping and household flocks of sn ruminants around the irrigated perimeters (ibid.).

The final column in Table 5.4 is an illustration of the implications of th developments for land use and quality by 1985. It is intended for heuristic purposes o since it is unlikely that the rate of range degradation would continue unchecked at percent per annum, barring another great drought. It is not unrealistic, however, to assu that the present rates of population expansion and development do imply that over one-te of the study area will be under crops by 1985. This is serious for transhumant herds, si the fields will be clustered around the surface waterpoints. This effectively denies a par the range to itinerant livestock herds at key points of the year -- which is much larger t implied by the 10 percent figure.

It is interesting to note in this context that the use of the bourgou grass transhumant herds was (and still is to the extent possible) strictly controlled by traditional code of Cheik Amadou of Macina.[8] However it is the advent of substan sedentary herds owned for the most part by rice cultivators that is responsible for degradation of the pastures, both through over-grazing and by forcing the transhumant h south earlier than was previously customary. The latter effect stems from the uncontro use of water and pasture along the route to the south by sedentary herds; the result of has been that the routes become unusable sooner. The earlier arrival of the tran'hum herds on the bourgou leads to greater degradation.

TABLE 5.4

EVOLUTION OF LAND USE PATTERNS IN THE ILCA STUDY AREA, 1952-75

Land Use	1952 (km^2)	1975 (km^2)	% Change 1952-1975	Average Annual Compounded % Change 1952-75	Extrapolation for 1985 (km^2) (based on 1952-75 growth rates)
Number of Villages	760 villages	1,607 villages	+111%	3.3%	2,223 villages
Rainfed Cropping	1,408	2,557	+82%	2.6%	3,305
State-run Irrigated Cropping	278	650	+134%	3.8%	944
Delta Rice Cropping and Fallows	1,336	1,905	+43%	1.6%	2,233
Spontaneous Private Irrigated cropping	46	176	+283%	6.0%	315
Degraded Range	1,904	12,069	+534%	8.4%	27,037

SOURCE: Adapted from ILCA (1978, Part C, Annex 9). The percentage change from 1952 to 1975 is the total change relative to 1952. The annual rate is the compounded annual growth rate from 1952 to 1975.

C. - Herder Motivation to Sell as a Constraint on Output

Herder reluctance to sell off "unproductive" animals is one of the constraints to rang livestock production most frequently cited by Malian officials in the livestock field. Cattl In this category are mature males not required for breeding, mature sterile cows, and cu cows. Expatriate advisors frequently make the argument that the communal nature c pastures makes the marginal cost of keeping an extra animal low, thus removing the maj incentive for selling unproductive animals as soon as possible. The producer can affort t wait (even years) until the price is "right."

Very little is in fact known about the commercial strategies of traditional herdsmen i the Savannah and Sahel. Field level studies of herder behavior by John Van Dusen Lewis ar T.A. Wilson are innovations for the Macina area in this respect (ILCA, 1978, Parts B and C Lewis found that the Macinan Kobe are motivated to keep at least 200 head in their her without which they may lose their traditional grazing rights in the lowland (bourgou) pastu of the Inland Delta (personal communication). Furthermore, the herdsmen feel that certain proportion of older steers in the herd is necessary to keep the cows from becomir restless (ibid.). Delgado (1978) found that the Fulani herdsmen in southeastern Upper Vol had a preference for keeping older cattle in the herd in order to keep a significa proportion of animals in the herd that have proven their resistance to drought and disease.

Clearly, more research is required in this area in particular. A number of extern factors involving institutions and risk surely influence the herdsmen's view of desirab offtake strategy, not the least of which may be the lack of an alternative form of storir wealth. The problem is compounded by the fact that it is hard to beat livestock as a inflation-proof, productive, discreet, and relatively indivisible investment. The la characteristic is important in communal societies where relatives have a claim on one wealth (see Delgado, 1978).

Despite the incentive for holding on to cattle, it should be noted that only 15 perce of transhumant herds in the Delta consisted of males and steers over age three in both t Coulomb (1972) and IER-OMBEVI studies (1977, see Chapter Three, Table 3.3). This hard appears to be excessive.[9]

The working hypothesis adopted here in this regard is that the range of policy actio open to the GOM for modifying herder behavior in this respect is quite limited. The of cited remedy of "herder education" ignores the possibility that herders may already beha in their own best interest, at least in the medium run, even if this is not in the nation interest. Programs that merit further investigation might involve the introduction alternative productive stores of wealth available to herdsmen without having to do a gre deal of paperwork. On a purely theoretical plane, the translation of the social cost pasture utilization into a per animal charge payable by the herdsman would possib encourage the sales of animals which had stopped increasing in value. However, this is n certain and is most likely administratively infeasible, not to say socially undesirable.

appears that the medium term scope for state intervention to lift the constraints to range output of livestock lie more in the domain of range management (through herder associations) and improvement, rather than in attempting to alter herder behavior through direct controls. A proposal by Lewis (personal communication) that merits further study involves a combination of government issued "chits" tied to the current value of cattle and waterpoint improvements rented to herder associations. These associations could charge fees to newcomers to the ponds or wells.

II. - Production Constraints to the Output of Fed Cattle

A. - The Supply of Feeder Animals

The supply of suitable feeder cattle is a major constraint to the expansion of small-scale feeding operations (OMBEVI, No. 81, 1976; Harms, 1978). The animals most likely to show rapid weight gains are thin northern zebu mature males (from interviews with ECIBEV personnel). The original ECIBEV model in which the farmer was responsible for locating feeder cattle has proved inadequate (ibid.). ECIBEV has therefore become involved in the purchase of feeder steers in the north for resale to participating farmers in the Savannah areas. In this regard, the most important Malian cattle merchant was able to supply only 120 head over a ten-week period, with 10 to 15 percent of the animals not meeting minimum standards at an average purchase price of 217 FM/kg liveweight (Harms, 1978, pp. 5-6).[10]

Harms analyzes the 1975-77 embouche paysanne experience as follows (1978, pp. 3-4):

> The limiting factor was finding the necessary feeder cattle. Maximum involvement by the farmer was desired, so the program depended on local supply of cattle. This supply has been inadequate. It has been clear from the beginning that any sizable cattle feeding activity would require that feeder cattle come from the northern livestock zones. It is a desired outcome of the project. However, the problem of feeder cattle supplies should not be underestimated. The estimated figure for yearly offtake is 10-12 percent. This offtake is made up of old or sick animals, export quality steers and bulls, and butcher cattle for Bamako, Ségou and other population centers. This leaves a small percentage of yearly offtake available and suitable as feeder cattle. Additionally, feeder cattle must be supplied totally between Nov. 15 and March 15. Amassing 1000 head of feeder cattle may require drawing from a pool of 30,000-50,000 head in the Sahel.

In fact, the estimate of 1,000 animals available and suitable for feeding per 30,000 to 50,000 head in the Sahel is almost certainly overoptimistic. It implies that just under 70,000 feeder animals are potentially available each year.[11] If 71 percent (Chapter Two, Table 2.1) of the national herd of 3,915,000 (Chapter Three, Table 3.2) are outside the south, roughly 15 percent of these are bulls and steers over three years of age (Chapter Three, Table 3.4). If an average of 18 percent of these are taken off each year (Chapter Three, Table 3.5), then

less than a total of 56,000 bulls and steers over three years of age were taken off from tl Malian national herd outside the south in 1976. This includes (indeed -- consists primarily o prime animals capable of withstanding the trek to consumption centers in both Mali and tl coastal countries. Therefore, the number of large-framed thin animals in good health ar less than ten years old is likely to be much less than 56,000. Rather arbitrarily, the annu national offtake of animals suitable for ninety-day embouche paysanne feeding is set at maximum of 20,000 in 1976. Presumably this upper bound will expand at the same pace the overall rate of herd growth, leading to an estimate of 26,000 head for 1985.

However, this estimate includes the total supply from all parts of the country outsi the south, assuming that prices remain constant. Clearly, a large-scale demand for the animals will push the purchase price to the farmer up rapidly, cutting into the already sli average profit per animal in the feeding operation. For this reason, the ability of price ris to expand the supply of feeder animals is discounted. The same stimulus that might increa supply would also rapidly diminish the demand. Therefore, the "zoological" upper bound 26,000 animals in 1985 is considered to be an effective constraint to expanded feedi operations, quite apart from other production constraints.

B. - The Supply of High-Energy Feedstuffs

Mali must rely upon agricultural by-products not suitable for human consumption f its source of animal feeds, given its position as a landlocked country and the realtive pri ratio of imported feed grains to export meat or animals. The use of cowpeas on the vine practiced in some instances to supplement the diet of plow oxen in the dry season while th are working; however this is not comparable to the use of cowpeas (as opposed to the stem for fattening. Cottonseed, cottonseed cake, peanut cake, rice bran and polishings, molasse legume hays, and grass hay are the principal feed items available locally. Regional transpo difficulties and the lack of nearby suppliers appear to rule out the importation of ar appreciable amounts of any of these items; they therefore represent a potential limiti factor in the expansion of feeding, should this activity become economical.

Three possible rations for ninety-day feeding enterprises are shown in Table 5.5. Tl whole cottonseed ration is similar to the one used by ECIBEV in the embouche paysan program. The cottonseed cake ration is designed to replace the whole seed ration in tl event of the unavailability of the latter. The peanut cake ration is essentially similar ar has in fact been used by OACV on an experimental basis in conjunction with plow oxen.

The estimated supplies of Malian-produced feedstuffs for 1978 are contained in Tab 5.6. Projections of capacity are also given for 1985, although these are conjectural, to s the least. Based on ration requirements and feed availability, the maximum number of hi energy ninety-day rations potentially available are given in Table 5.7. These include ratio available to sustain plow oxen through the dry season as well as rations for fattening be cattle.

TABLE 5.5

COMPONENTS OF DIFFERENT NINETY-DAY FEEDING RATIONS USING MALIAN BY-PRODUCTS AND FORAGE

Type of Ration	High Energy Component	Protein Component	Additional Roughage Component
Cottonseed-based	← Cottonseed (315 kg) →		270 kg of grass hay
	135 kg of rice mill by-products	90 kg of legume hay	
Cottonseed cake-based	405 kg of rice mill by-products and/or molasses	81 kg of cotton-seed cake 162 kg. of legume hay	162 kg of grass hay
peanut cake-based	405 kg of rice mill by-products and/or molasses	81 kg of peanut cakes 162 kg of legume hay	162 kg of grass hay

SOURCE: The percentage composition of different rations is from figures supplied by the Livestock Development Office, USAID, Bamako. Also see Harms (1978, p. 10) and Morrison (1959, p. 1089).

TABLE 5.6

THE MALIAN SUPPLY OF DOMESTICALLY PRODUCED FEEDS
(in metric tons)

Items	1977-1978 Total Production	1977-1978 Amount available for use by Livestock	Projected 1985 Theoretical total production capacity	Projected 1985 Amount av able for by livest
Cottonseed[a]	59,767	27,000	174,000	-0-
Cottonseed Cake	-0-	-0-	24,000	24,000
Peanut Cake	14,000	14,000	23,100	23,100
Rice By-Products	4,814	4,814	8,294	8,294
Molasses[b]	4,800	3,060	8,900	6,750

SOURCES: From figures supplied by the Livestock Development office, USAID, Bamako, except that 1985 estimates are figures for 1981 projections, to take account of delays in project implementation. Figure for cottonseed output is from République du Mali, MDR, Compagnie Malienne pour le Développement des Textil (CMDT), 1978.

[a]Assumes that all cottonseed will be used in the future for the production of oil. In fact, it is not clear whether the lowest grade (Number Three) may stil be available to cattle or not. (W.H.M. Morris, in a personal communication, clain that it will be).

[b]Molasses available for use as feed is given in tons of dry matter, at the rate of 90 percent of liquid.

Feed usage has been overwhelmingly for plow oxen. One estimate for 1977/78 puts whole cottonseed usage for livestock at between 9,000 and 21,500 metric tons (figures from the Livestock Development Office, USAID, Bamako).[12] This represents 29,000 to 68,000 ninety-day rations. However, current plans for a new oil mill at Koutiala will increase Malian crushing capacity in excess of domestic supplies, leaving no whole cottonseed for livestock use in the near future.[13] Current plans are to replace the whole seed with cake and an increased diet of rice by-products and legume hays.

It is the supply of high energy items such as rice bran and polishings and molasses that promise to be the feed item in short supply in the future, although the current easy availability of cottonseed has tended to mask this. Officials of the Office du Niger claim that they cannot get takers to haul away their surplus molasses for free. The maximum numbers of rations potentially available is unlikely to exceed 37,000 in 1985, as cottonseed or peanut cake, rice by-products and molasses are substituted for cottonseed (Table 5.7). The lion's share of these items will certainly go to sustain plow oxen through the dry season in the more northernly areas of the Savannah, further narrowing the scope for beef

TABLE 5.7

THEORETICAL UPPER BOUNDS ON MALIAN CATTLE FEEDING USING LOCAL ENERGY PRODUCTS

Type of Ration		Maximum No. of Ration Components		Maximum No. of Energy Rations	
		1977/78	1985	1977/78	1985
cottonseed-based	cottonseed	86,000	0	36,000	0
	rice mill by-products[a]	36,000	61,000		
cottonseed bake-based	cottonseed cake	0	296,000 (?)	0	37,000
	rice mill by-products and molasses[a]	19,000	37,000		
peanut cake-based	peanut cake	173,000	285,000 (?)	19,000	37,000
	rice mill by-products and molasses[a]	19,000	37,000		
Maximum Number of Complete Rations Available:				36,000	37,000

SOURCES: Feedstuff availability is from Table 5.6. Feedstuff requirements for each type of ration are from Table 5.5.

[a]Assumes that entire amount of these products available for livestock goes to make up this type of ration.

production. If a more lucrative market for molasses opens up for the Office du Niger, it is likely that the total supply of high energy ninety-day rations will be down to about 20,000 in 1985, including those required for plow oxen.

Finally it should be noted that the current practice of the GOM is to subsidize the price of feeds sold internally and to discourage feed export (LDO, USAID, Bamako). Thus the cotton-based Development Operation (CMDT) was providing participating farmers with bulk shipments of whole cottonseed at 4 FM/kg. The internal "public price" was set at 14 FM/kg, still lower than the 17 FM/kg export price charged by SOMIEX (ibid.). Calculations of the social profitability of fattening beef cattle should consider the export price and not the subsidized price.

C. - The Opportunity Cost of Farm Resources

Discussion of the constraints to animal feeding in Mali tends to assume that grass and legume hays are available in great supply and are relatively costless. Harms estimates the cost of one kilogram dry matter (DM) of legume hay at 25 FM and cut grass at 8 FM/kg DM (1978, p. 17). However, these commodities have alternative uses to feeding beef cattle, assuming that the farmer has access to them. They are typically used in the West African Savannah for feeding sheep and goats during the dry season, when pasture is scarce. It seems likely that they have a higher value in this use than in contributing to embouche paysanne.

The cottonseed ration in Table 5.5 calls for 360 kg of dry matter forage hays. However, this amount of feed is enough to support twelve small ruminants through the dry season from February through May.[14] Dumas estimates meat productivity of small ruminants in the Savannah at six kg per head per year (Dumas, 1978). Since small ruminants require only low-opportunity-cost child labor and no produced forage at all outside the dry season, the extra forage from February to May effectively represents the cost of keeping the flock year-round, which is a requirement for producing Tabaski-grade animals in the right season. The returns to the 360 kg of feed are therefore on the order of 72 kg of mutton. This return far exceeds the return from using these hays as a component in embouche paysanne production of beef cattle.[15]

The prohibitive opportunity cost of farm resources used to produce fed beef cattle will most likely remain the main constraint on output of this item for the foreseeable future. However, precise predictions would also have to evaluate the availability of subsidized credit, such as in the ECIBEV scheme, and of scarce administrative ability to oversee these credit programs on a large scale.

CHAPTER SIX

THE OUTLOOK FOR GROWTH IN HERD SIZE AND OFFTAKE BY 1985

This chapter begins by reviewing the official Malian projections of head count for range cattle, feeding operations and small ruminants in the context of the assumptions made in order to arrive at these figures. The next section presents an assessment of the likely impact of development policy upon production and offtake of livestock in 1985. A pessimistic view is taken of the claims of range improvement projects with respect to altering herder offtake strategies in the medium run. Current policy in favor of feeding operations is judged to have little chance to achieve the very ambitious fattening goals in the official projections. Finally, the assessment of the probable impact of policy is combined with the analysis of the preceding three chapters in order to derive a revised set of output predictions for 1985. The revised estimate of the net offtake of range-fed cattle in 1985 is only slightly less than the official projection. However, the new prediction for cattle feeding is only one-sixth of the official estimate, and the revised projection for small ruminant offtake is also significantly lower than the official figures.

I. - Official Projections of Livestock Output to 1985

A. - OMBEVI Projections of the Growth of Range-Fed Cattle Herds to 1985

1) - The Parameters Used for Projection

The most up-to-date set of official projections of future developments in Malian livestock herd sizes are contained in OMBEVI (No. 96, 1977). The hypotheses on which the estimates are based are drawn from Appendix II to the OMBEVI document.

The 1974 cattle herd sizes are taken from the IER-OMBEVI-Elevage, "Inquiry on the Effects of the Drought" (1975), with 27 percent of the national herd of 3,640,000 designated as Savannah stock. The impact of livestock development policy upon herd offtake and growth are taken from the project planning documents for livestock projects in Kayes-North, Nara-East, and Mopti.[1] Cattle outside project zones are assumed to have a gross rate of herd productivity of 15 percent in both the north and the south. The net offtake rate for Sahelian cattle is 12 percent, and that of Savannah cattle is 10 percent.

2) - Official Projections of Cattle Herd Size and Offtake, 1974-1985

The OMBEVI projections are reproduced in Table 6.1. They estimate that by 1985 overall herd size will approach 1970 pre-drought levels. However, nearly one-third of the 1985 herd will be in the Sudanian Savannah rather than in the Sahel.

B. - OMBEVI Projections of the Growth of Fed Beef Cattle Output to 1985

The projections of the fed cattle output chosen for the official statement of the situation in the livestock sector (OMBEVI, No. 100, 1978) are also taken from earlier works (OMBEVI, No. 99, 1978 and No. 96, 1977). They are based on a projection of 6,000 head to be fattened in 1977, with amounts thereafter increased by the expansion of production at Tienfala, the addition of new capacity at Mopti and Sikasso, and the growth of embouche paysanne. Production is assumed to grow at 10 percent per annum thereafter. In a general sense, the more recent OMBEVI estimates implicitly take a very optimistic view of marketing problems, the supply of feeder steers, and the possibility of securing donor agency credit at low interest rates to sustain the operations through 1990 (see OMBEVI, No. 99, 1978). The earlier work also presents an alternative set of estimates "in case the expansion of feeding operations occurs more slowly than foreseen." (OMBEVI, No. 96, 1977, Appendix II). Both are given in Table 6.2.

C. - OMBEVI Projections of the Growth of Small Ruminant Herds, 1974-1985

The official Malian projections of the growth of small ruminant herds are based upon a "guesstimate" of 10,000,000 head in 1974 and a net gross herd productivity of 33 percent for the foreseeable future (OMBEVI, No. 96, 1977, Appendix II; No. 100, 1978, p. 90). The aggregate offtake rate is assumed to be 27 percent in 1974 and to increase by one percentage point every year thereafter as herds are reconstituted, stabilizing at 31 percent in 1982 (ibid.). The earlier paper admits that the 1974 estimate of herd size was calculated "without benefit of field surveys." It therefore presents a second set of estimates for the "low" case where the 1974 herd is evaluated at 9,000,000 head. Both are given in Table 6.3.

II. - The Impact of Development Policy Upon Livestock Output by 1985

A. - Range Use Projects for Cattle

1) - The Western Sahel

A substantial policy effort in favor of livestock development in the northwest grew out of the examination of stocking rates following the drought in 1974 (see Chapter Two, section

TABLE 6.1

OFFICIAL MALIAN PROJECTIONS OF CATTLE HERD SIZE AND OFFTAKE, 1974-1985
('000 head)

Year	Herd Numbers						Offtake					
	Sahelian Herds				Savannah Herds	Total Herd	Sahelian Herds				Savannah Herds	Total Herd
	Non-Project	Kayes-North	Nara-East	ODEM			Non-Project	Kayes-North	Nara-East	ODEM		
1974	← 2,640 →				1,000	3,640	← 317 →				100	417
1975	← 1,219 →			1,500	1,050	3,769	← 146 →			169	105	426
1976	← 1,256 →			1,556	1,103	3,915	← 151 →			165	110	426
1977	← 1,294 →			1,624	1,158	4,076	← 155 →			154	116	425
1978	1,153	160	20	1,714	1,216	4,263	138	17	2	156	122	435
1979	1,187	160	20	1,815	1,277	4,459	142	18	2	190	128	480
1980	1,223	160	20	1,897	1,341	4,641	147	19	3	227	134	530
1981	1,260	160	21	1,955	1,408	4,808	151	20	3	257	141	572
1982	1,298	161	21	1,991	1,478	4,949	156	20	3	275	148	602
1983	1,337	162	21	2,015	1,552	5,087	160	21	3	316	155	655
1984	1,377	164	22	2,001	1,630	5,194	165	21	3	312	163	664
1985	1,418	166	22	1,989	1,712	5,307	170	22	3	304	171	670

SOURCE: OMBEVI (No. 96, 1977, Appendix I, Table 3).

TABLE 6.2

OFFICIAL MALIAN PROJECTIONS OF FED CATTLE OUTPUT, 1976-1986
('000 head)

Year	Current (1978, 1977) Hypothesis	Alternative (1977) "low" Hypothesis[a]
1976	< 1	< 1.0
1977	6	3.0
1978	11	5.5
1979	18	9.0
1980	28	14.0
1981	33	16.5
1982	43	21.5
1983	47	23.5
1984	52	26.0
1985	57	29.0

SOURCES: OMBEVI (No. 100, 1978); OMBEVI (No. 96, 1977).

[a]Half the current estimate, but still optimistic.

TABLE 6.3

OFFICIAL MALIAN PROJECTIONS OF THE GROWTH OF SMALL RUMINANT HERDS AND OFFTAKE, 1975-85
('000 head)

Year	Current (1977, 1977) Hypothesis		Alternative (1977) "low" Hypothesis	
	Herd Size	Offtake	Herd Size	Offtake
1974	10,000	2,700	9,000	2,430
1975	10,600	2,968	9,540	2,671
1976	11,130	3,116	10,017	2,805
1977	11,687	3,389	10,518	2,945
1978	12,154	3,525	10,939	3,172
1979	12,640	3,792	11,376	3,299
1980	13.019	3,906	11,717	3,515
1981	13,410	4,023	12,069	3,621
1982	13,812	4,282	12,431	3,729
1983	14,088	4,367	12,680	3,931
1984	14,370	4,435	12,933	4,009
1985	14,658	4,544	13,192	4,090

SOURCES: OMBEVI (No. 96, 1977); OMBEVI (No. 100, 1978). (The complete "low" series of estimates is computed from the "alternative" data in OMBEVI, No. 96, 1977).

III and Chapter Five, Section I-A). These are collectively referred to as the Western Sahel Project, which in fact includes separate projects at Kayes-North, Nara-East, Dilly, and Kaarta (see République du Mali, Ministère du Plan, Projet de Développement de l'Elevage au Sahel Occidental, 1976). The Dilly project, involving range management and waterpoints, began to be implemented in 1976 with support from USAID. The Kaarta project is planned for 1981 and envisages an integrated approach with agriculture, under possible Canadian financing. Kayes-North and Nara-East are the two programs most likely to have an impact on aggregate livestock output. Implementation under Saudi financing was scheduled to begin by 1978.

The official estimate of the impact of the Western Sahel Livestock Development projects, as evidenced by Table 6.1 above, is to raise the gross rate of herd productivity (offtake plus net herd growth) to 16.5 percent after 1978, from an estimated 15 percent in the absence of policy intervention. Presumably this will come about as a result of decreased animal mortality, changes in herd composition (brought about by "herder education"), better marketing facilities, and some form of control over waterpoints. Offtake under project guidance is assumed to be 15 percent of the herd, leaving a rate of net herd growth in project areas of 1.5 percent

The available evidence, gleaned primarily from interviews with knowledgeable parties, indicates that it is over-optimistic to assume that these results will be achieved by 1985. Projects of this nature are likely to require long implementation periods before yielding noticeable benefits, for two main reasons. First, a sustained increase in the rate of gross herd productivity requires growth in the proportion of reproducing females in the herd. This takes a minimum of four years to achieve, since zebu in the Sahel generally do not calve before that age. The Kayes and Nara projects had not reached the field implementation stage by the end of 1978. Even if they are successful, it is unlikely that any noticeable impact on yearly output will occur before 1985. The second reason for not anticipating major benefits prior to this date is that both projects rely heavily upon major changes in herder behavior. These involve not only adopting new methods of husbandry but also require a substantial modification of offtake strategies. This appears to be a long-run proposition.

A further consideration is that available major field studies of range herding in Mali (as opposed to "herd analysis" based on estimated parameters) indicate the overall rate of gross herd productivity in non-project areas may be closer to 13 percent than 15 percent (see Chapter Three, Table 3.3 and Markgraf, 1975, p. 34). Therefore, gross herd productivity in the Western Sahel Project area is provisionally estimated at 15 percent for 1979 onward, which thereby provides a generous allowance for the medium-run impact of the projects.

2) - The Opération pour le Développement de l'Elevage à Mopti (ODEM)

ODEM began operations in the Mopti area in 1975, under IBRD financing. It is too early at this point to estimate the full impact of the ODEM Project. Moreover, the major

changes envisaged for Malian range production could not possibly show up after only a few seasons. Making a generous allowance for the beneficial aspects of the project, the gross rate of herd productivity of 13 percent observed in 1977 (see Chapter Three, Table 3.3) is assumed to grow to 15 percent in 1979. The latter is the figure hypothesized for ODEM cattle in the official projections from 1974 to 1990.

However, the OMBEVI estimate that the net rate of offtake will exceed the combined 1977 rates of net herd growth and offtake by 1985 appears to be wishful thinking. Table 6.4 shows the offtake and herd growth rates implied by the official (OMBEVI) herd and offtake predictions for ODEM in Table 6.1. The implication is that independent herdsmen on communal pastures will agree, within the space of seven years, to stop building up their individual herds in order to preserve the environment. It seems unlikely that such a revolution in herder behavior could be achieved before 1985. In the absence of other information, the ODEM projections will be accepted up to 1980 (while herds are reconstituted) but revised thereafter to reflect a net herd growth rate of 3 percent and an offtake rate of 12 percent, the most conventional estimate for the traditional systems of the Sahel.

B. - Beef Cattle Feeding Projects

1) - Project-sponsored Feedlots

The major policy impact on the output of fed beef cattle by 1985 will most likely result from the subsidization of feedlot operations at Tienfala, Mopti and Sikasso with foreign aid funds.[2] Output at Tienfala may be expanded as the result of a deliberate policy decision. Maximum annual capacity is 2,400 head. The planned lots at Mopti and Sikasso will become operational in 1980 and 1981, with joint capacity of 5,200 animals per year (OMBEVI, No. 99, 1978).

2) - ECIBEV-sponsored Embouche Paysanne

As demonstrated in Chapter Four, this may be the most promising avenue for GOM support of beef cattle feeding. A rapid expansion up to 1,000 head was planned for 1979. This level of activity will most likely be temporarily constrained by the limited infrastructure and administrative resources available to the project. Growth between 1980 and 1985 is estimated at the lesser rate of 10 percent per annum hypothesized by OMBEVI (No. 96, 1977, Appendix II, p. 2).

TABLE 6.4

ODEM OFFTAKE AND NET HERD GROWTH RATES IMPLIED BY
OFFICIAL PREDICTIONS OF HERD OUTPUT
('000 head)

Year	Official Prediction of Herd Size	Official Prediction of Herd Offtake	Net Herd Growth Over the Year	Net Off-take Rate
1978	1,714	156	5.9%	9.1%
1979	1,815	190	4.5%	10.5%
1980	1,897	227	3.0%	12.0%
1981	1,955	257	1.8%	13.2%
1982	1,991	275	1.2%	13.8%
1983	2,015	316	-0.7%	15.7%
1984	2,001	312	-0.6%	15.6%
1985	1,989	304	-0.3%	15.3%

SOURCE: Table 6.1.

3) - Other Beef Cattle Feeding Operations

The opportunity for private feedlots and embouche paysanne is judged to be primarily in supplying heavier cattle to the domestic market for the time being.[3] Successful operations will most likely require subsidized feedstuffs or proximity to a terminal livestock market with a demand for first-class beef. The heavy demand for feedstuffs for plow oxen in agricultural projects coupled with the disappearance of subsidized supplies of whole cottonseed will severely limit the scope for feeding outside a project framework. The current GOM policy of keeping urban meat prices low and undifferentiated by quality reinforces this finding. Further constraints on private sector feeding are the difficulty in obtaining credit outside a project and administrative problems in forage-cropping areas larger than five hectares near the capital (Lichte, 1978, p. 22-23). Non-project feeding is therefore projected to decline from (the guess) of a maximum of 1,000 head in 1978 to zero by 1983, when the new cottonseed mill becomes operational at Koutiala.

C. - Small Ruminant Production

Small ruminant production is clearly a very profitable livestock activity for the small farmer in the Savannah.[4] Although some investigative work has been done in this field for the Sahel (Dumas and Raymond, SEDES, 1974; Rombaut and Van Vlaenderen, République de Côte d'Ivoire, 1976; and Dumas et al., IEMVT, 1977), little has been done so far in Mali to design marketing and production projects for sheep and goats.[5] ODEM is beginning to show interest in health interventions targeted at small ruminant herds (from interviews). In the absence of further information, the conservative view leads one to assume that present GOM and donor policy will not have a great impact on the output of sheep and goats by 1985. More likely, changes in small ruminant output will occur as a result of price shifts, particularly in the export market (which will feed back on the domestic market). These are impossible to predict quantitatively with any degree of confidence, except that it is safe to say that the price will rise absolutely, if not necessarily in a relative sense.

III. - Revised Projections of Herd Growth and Offtake, 1978-1985

A. - Range-fed Cattle

1) - Assumptions

From the field studies mentioned earlier, non-project herds in the Mopti Region are assumed to have a gross rate of herd productivity of 13 percent and a net offtake of 10

percent (Chapter Three, Table 3.3). Cattle herds covered by the Western Sahel Project are assumed to have a 15 percent rate of gross productivity and a rate of offtake of 12 percent, beginning in 1979. Animals within the ODEM zone are assumed to be subject to the rates of Table 6.4, above, from 1978 to 1980, and to the 1980 rates thereafter (see Section II-A.2). A complete lack of new information precludes the revision of the SEDES (1975)-OMBEVI (1978) estimate of net herd growth of 5 percent and a 10 percent offtake rate for the taurin and mixed breed animals that predominate in the Savannah areas.

2) - The Revised Projections

The new predictions offered here are given in Table 6.5. They serve the purpose of providing impartial "conservative" estimates of national livestock production for use in constructing realistic projections of exports in 1985. The main differences between the new predictions and the more optimistic OMBEVI figures are an increase in the estimate of the overall herd size in 1985 by 5 percent and a decrease in the estimate of net offtake in the same year by 10 percent. This comes about through the use of a lower projected rate of offtake than that put forth by OMBEVI for the Kayes-North, Nara-East, and ODEM projects in years up to 1985. The lower projected net offtake will naturally affect projected availabilities for both domestic consumption and exports.

3) - A Note on Price and Income Considerations in Production Predictions

The economic analysis of agricultural phenomena often allows for a perfectly inelastic supply schedule in the short run. This would be the case for crops which are "already in the ground." Presumably, relative price changes will not affect the overall supply composition during the current season, even though they might for the next season. It is difficult to apply the same analysis to livestock in Mali, where herders can store animals several extra seasons at little marginal cost to themselves. In fact, Malian herdsmen are often in a better position to take advantage of price fluctuations than their US or European counterparts who must move their cattle through the marketing system at a specific maturity or else risk economic loss. The available evidence on herder price responsiveness is sketchy. Grayzel indicates substantial integration of herders into livestock market activity in Mali (1977). Delgado found similar results for southeastern Upper Volta (1978).[6] However, the exact nature of the influence of price changes on herder behavior in West Africa is one of the great unknowns, and a good deal of further field-level research in this area is needed. The proper estimation of the relationship between supply and relative prices requires micro-level data over a number of years; these, as yet, do not exist.[7]

Therefore, both the official predictions in Table 6.1 and the revised projections in Table 6.5 are computed using offtake rates which are implicitly assumed to be independent

TABLE 6.5

REVISED PROJECTIONS OF RANGE CATTLE HERD SIZE AND OFFTAKE, 1978-1985
('000 head)

Year	Herd Numbers						Offtake					
	Sahelian Herds				Savannah Herds	Total Herd	Sahelian Herds				Savannah Herds	Total Herd
	Non-Project	Kayes-North	Nara-East	ODEM			Non-Project	Kayes-North	Nara-East	ODEM		
1974	← 2,640 →				1,000	3,640	← 317 →				100	417
1976	← 1,256 →			1,556	1,103	3,915	← 126 →			165	110	401
1978	1,153	160	20	1,714	1,216	4,263	115	16	2	156	122	411
1979	1,187	165	21	1,815	1,277	4,465	119	20	2	190	128	459
1980	1,223	170	21	1,897	1,341	4,652	122	20	2	227	134	505
1981	1,260	175	22	1,954	1,408	4,819	126	21	3	234	141	525
1982	1,298	180	23	2,013	1,478	4,992	130	22	3	242	148	545
1983	1,337	185	23	2,073	1,552	5,170	134	22	3	249	155	563
1984	1,377	191	24	2,135	1,630	5,357	138	23	3	256	163	583
1985	1,418	197	24	2,199	1,712	5,550	142	24	3	264	171	604

SOURCE: See text.

of price or income considerations. The offtake figures in Table 6.1 and 6.5 could be represented as perfectly vertical supply curves, shifting to the right with increases in herd size or with changes in the offtake rate induced by policy action.

The only real justification for this methodology is the lack of alternatives when making quantitative estimates for the Malian livestock sector. It is equivalent to saying that the supply of cattle on the market is determined solely by herd size, which of course is not true. Therefore, it must be remembered that the projections given above are only valid if relative prices between cattle, small ruminants, grains, manufactures and services stay approximately the same. The effect of population shifts, income growth and meat price changes will be formally considered only in the case of demand, not supply.

B. - Fattened Cattle

Given the existence of idle feedlots and production subsidies for specific projects, separate projections can be made of the level of feeding and of the capacity that can be made operational at short notice should conditions warrant it. The estimate of the expected level of activity is confined to those projects that embody specific goals of GOM policy. Feeder cattle are drawn from the offtake of range-grazed animals at certain times within a given year; therefore they are not net additions to output on a per head basis, although they do increase the supply of meat. The assumptions underlying these projections are drawn from Section II-B, above. The predictions for fed cattle are given in Table 6.6. The overall output of fed cattle predicted for 1985 is one-third of the OMBEVI "low" estimate, or one-sixth of the "regular" projection.

C. - Small Ruminants

The revised projections for small ruminants start from the "regular" OMBEVI estimate of 10 million head nationally in 1974. However, the rate of gross productivity used by OMBEVI (32 percent) is scaled down in accordance with the discussion in Chapter Three, Section III-D. Gross herd productivity (offtake plus net growth) is assumed to be lower the higher the rainfall, because of the high animal mortality in these regions. Accordingly, gross productivity in the Sikasso area is estimated at 17 percent, with a 15 percent offtake rate.[8] Gross productivity in the very dry northeast (Gao-Tombouctou) region is estimated at 30 percent, with an offtake rate of 25 percent. The intermediate climate is assumed to have a gross productivity of 25 percent, with a 20 percent net offtake rate.

The revised predictions computed on this basis are given in Table 6.7. The main results of the revision are to increase the estimated size of the small ruminant herd in 1985 by 15 percent over the official estimate and to decrease the official estimate of animals taken off by 16 percent if the pessimistic view of net offtake is taken (the estimates being about the same otherwise). A further result is to underline the importance of the northeastern Sahel

TABLE 6.6

REVISED PROJECTIONS OF THE SUPPLY OF FED CATTLE
(number of head)

Year	Feedlots[a]		Embouche Paysanne[b]		Total[c] Output
	Expected Output	Total Capacity	Project-Related	Private	
1978	500	5,000	750	1,000	2,300
1979	1,000	5,000	1,000	1,000	3,000
1980	4,100	7,000	1,100	1,000	6,200
1981	7,600	10,200	1,210	1,000	9,800
1982	7,600	10,200	1,331	1,000	9,900
1983	7,600	10,200	1,464	0	9,100
1984	7,600	10,200	1,610	0	9,200
1985	7,600	10,200	1,772	0	9,400

[a]For expected output, see Section II-B. For total capacity, see Section II-B and Chapter Four, Table 4.1.

[b]Project-related refers to output produced in cooperation with ECIBEV. It is not clear how the creation of a "Mali-South" integrated development project will influence these figures prior to 1985.

[c]Rounded to nearest 100 head.

TABLE 6.7

REVISED PROJECTIONS OF THE GROWTH AND OFFTAKE OF SMALL RUMINANT HERDS, 1974-85
(in 1,000's of head)

Year	South		Middle		Northeast		Total		Extra offtake assuming uniform Gross productivity of 32%[a]	
	Herd	Offtake	Herd	Offtake	Herd	Offtake	Herd	Offtake	Extra	Total
1974	400	60	4,200	840	5,400	1,350	10,000	2,250	402	2712
1975	408	61	4,410	882	5,670	1,418	10,488	2,360	483	2843
1976	416	62	4,631	926	5,954	1,488	11,000	2,475	505	2981
1977	424	64	4,862	972	6,251	1,563	11,537	2,596	529	3125
1978	433	65	5,105	1,021	6,564	1,641	12,100	2,722	554	3276
1979	442	66	5,360	1,072	6,892	1,723	12,690	2,855	579	3434
1980	450	68	5,628	1,126	7,237	1,809	13,309	2,995	606	3601
1981	459	69	5,910	1,182	7,598	1,900	13,959	3,141	635	3776
1982	469	70	6,205	1,241	7,978	1,995	14,640	3,294	664	3958
1983	478	72	6,516	1,303	8,377	2,094	15,354	3,455	695	4150
1984	488	73	6,841	1,368	8,796	2,199	16,104	3,623	727	4351
1985	497	75	7,183	1,437	9,236	2,309	16,890	3,800	762	4562

SOURCE: See text.

[a]This is the rate assumed in most work by SEDES. The figures in this column are recalculated using the same estimator of net growth rates. The higher rate of gross productivity is therefore fully translated into higher offtake. This "extra" offtake occurs as a result of a more optimistic view of animal mortality. A reconciling viewpoint would be that this "extra" production is in the form of weak and dying animals consumed locally to avoid complete loss.

as a breeding ground for sheep and goats. The extreme south (Sikasso), on the other hand, is projected to contain only 3 percent of the national herd of small ruminants.

The lower estimates of the gross rate of herd productivity in different areas are substantially different from the uniform 32 percent rate often assumed by agencies such as SEDES. This is taken into account in the last column of Table 6.7, which contains the figures for the "extra" offtake implied by the higher (SEDES) estimate of gross herd productivity, assuming that the net rates of herd growth in different areas remain the same.[9]

D. - Summary of the Projections for Livestock Offtake to 1985

The summary of official and revised estimates of livestock net offtake through 1985 is given in Table 6.8. These figures represent the projected supply of produced animals potentially available for either domestic marketing or export. A certain proportion is also consumed outside the market system.

TABLE 6.8

SUMMARY OF OFFICIAL AND REVISED PROJECTIONS
OF LIVESTOCK OFFTAKE, 1978-1985
('000 head)

	ESTIMATE					
	Range-fed Cattle for final use[a]		Fattened Cattle		Small Ruminants	
Year	OMBEVI	Revised	OMBEVI	Revised	OMBEVI	Revised
1978	424	409	11	2.3	3,525	2,722
1979	462	456	18	3.0	3,792	2,855
1980	502	499	28	6.2	3,906	2,995
1981	539	515	33	9.8	4,023	3,141
1982	559	535	43	9.9	4,282	3,294
1983	608	554	47	9.1	4,367	3,455
1984	612	574	52	9.2	4,455	3,623
1985	613	595	57	9.4	4,544	3,800

SOURCES: OMBEVI estimates, Tables 6.1, 6.2, 6.3.
Revised estimates, Tables 6.5, 6.6, 6.7.

[a]The offtake destined for supplemental fattening in Mali is netted out.

CHAPTER SEVEN

DOMESTIC CONSUMPTION AND RETAIL PRICES OF RED MEAT TO 1977

Conceptually, the net annual offtake from national livestock herds is either consumed domestically or exported. A lack of adequate data makes the estimation of the relative share of each end use difficult. Recorded slaughters may understate actual domestic consumption by a factor of three. The data are useful, however, for gaining an idea of average carcass weights, the distribution of slaughters nationally, and the relative size of activity in different seasons and years.[1] Actual consumption, on the other hand, can be estimated using population projections and estimates of per capita consumption in rural urban areas, adjusted as well as possible for expected relative price and income effects over time.

The analysis of the available data on consumer meat prices indicates a large jump in the absolute and relative price of beef in early 1975, most likely attributable to the after-effects of the drought. Otherwise, the retail prices of beef and mutton are expected to grow at about the same rate in the future barring unforeseeable perturbations. While the available evidence indicates that meat prices in the post-drought period grew more rapidly than those of other commodities (particularly cereals), this appears to be a drought-related phenomenon that began to slacken in 1976. Fragmentary evidence and educated guesswork suggest an income elasticity of demand for red meat in excess of unity for the population as a whole. Combined with the assumption that red meat prices will grow at the general inflation rate, this implies that per capita meat consumption in the future will grow slightly faster than real income. Revised projections of aggregate domestic meat consumption in 1977 show less than a 3 percent increase for beef and more than an 8 percent increase for mutton over 1974 levels.

I. - Issues and Methodology in Estimating Domestic Consumption and Exports

A. - Conceptual Problems in Determining the Allocation of Offtake Between Domestic and Foreign Consumption

The concept of net offtake in the previous chapter implies a given number of animals ready for one of three uses. These are: slaughter for meat in Mali; entry into a feeding program for eventual domestic slaughter or export; or direct export. Intermediate sales from one herdsman to another for ré-élevage do not count as offtake from the national herd, although subsistence consumption of animal products is allowed for.[2] This implies that the net offtakes computed in the previous chapter are destined either for domestic consumption or for export, along with any imports or transits from Mauritania.

There is an obvious statistical problem in determining the relative proportions of net offtake exported and consumed domestically. Official figures for recorded slaughters and exports are clearly not adequate for the purpose at hand. This raises the dual problem of satisfactory estimation of past trends and valid projection for the future.

B. - Adequate Estimation of Past Trends

1) - Estimating "Actual" from Officially Recorded Data

Two methods are readily apparent for estimating "actual" as opposed to recorded slaughters and exports.

In the first method, the actual figures can be "guesstimated" using the officially recorded data and import levels from countries with more reliable statistical series, such as Ivory Coast. Once a relationship is established between "actual" and recorded data points for a given country and year, it is then applied to data points for other countries and years. For example, if "actual" exports to Ivory Coast in 1970 were twice officially recorded exports, then all "actual" exports are assumed to be twice the corresponding recorded figures. This is the approach, more or less, that was used by SEDES (1975, I, p. 279). However, it is not very satisfactory in that there is absolutely no reason to believe that the ratio between "actual" and recorded figures is constant between countries and over the years.[3]

2) - The Fixed Per Capita Consumption Approach

The second method for estimating "actual" figures is the one currently used by OMBEVI (as in papers No. 96, 1977, and No. 100, 1978). The procedure requires, as a minimum, estimates of net offtake, the average carcass weights of animals slaughtered domestically and exported, and the average domestic per capita consumption of red meat and meat by-products. This fixed annual consumption level, which may be adjusted for differences between rural and urban areas, is applied against the net tonnage of meat and offals represented by the annual offtake. The balance is available for export; by assumption it is actually exported.

There are three drawbacks to this procedure. First, the end results are very sensitive to errors in the estimate of per capita consumption in rural areas -- a quality which is not well known. Second, it does not provide any information on where the "exportable surplus" is actually sent. Third, it does not consider the effect of relative price and real income changes upon consumption. The first two objections can be dealt with through sensitivity analysis or supplementary information; however, the latter poses a thorny, but important, problem for predictions of future exports.

C. - Consumption, Export Projections and Price-Income Considerations

Failure to consider price and income factors in projecting both domestic and export demand raises two main difficulties. First, changes in the relative price of substitutes such as fish have an effect upon the projected consumption of beef. This could lead to a large error in projection if, say, fisheries were extensively developed in Mali or Ivory Coast by 1985. Similarly, changes in real income are likely to alter per capita demand patterns. Second, developments since 1975 have shown that it is not prudent to assume that Mali will, in fact, be able to export to Ivory Coast any amount of livestock that it can produce. Concern about production and transportation costs means paying attention to domestic prices, both as a cost element and as a factor in the allocation of offtake.

The lack of reliable data pertaining to several years necessitates caution in attempting to estimate demand elasticities for meat products consumed locally. Some rudimentary attempts have nevertheless been made in this regard, using cross-sectional or pooled data (OMBEVI, No. 68, 1976, p. 33; Beazer and Stryker, 1976, Annex A). However, the estimates apply only for Bamako and in any case are too rough for planning purposes.[4]

The approach used by OMBEVI refines somewhat the use of fixed figures for per capita meat consumption in the allocation of offtake between domestic use and exports. Allowance is made for different consumption behavior in urban and rural areas. In turn, this produces changes in aggregate consumption due to progressive urbanization (OMBEVI, No. 96, 1977).

The contribution of this study will be to review and revise the OMBEVI estimates of per capita consumption based on what little is known of consumer behavior with respect to price and income trends. The revised parameters will then be used with the new estimates of net offtake from the previous chapter to derive a revised set of figures for actual domestic consumption of red meat from 1974 to 1977. The methodology employed will be the basis of consumption -- and thus export -- projections to 1985.

II. - The Nature, Location and Size of Recorded Slaughters, 1967-1977

A. - Domestic Meat Production Institutions

The nature, function and location of livestock markets, abattoirs and retail meat outlets in Mali has been dealt with in detail by OMBEVI (No. 53, No. 54, No 57, 1975; No. 100, 1978). Marketing chains are also discussed (No. 100, 1978). The present report has nothing new to add in this respect. The essential distinctions for this report are among the domestic slaughter market outside Bamako, the Bamako terminal market, and collection and regrouping markets for export convoys.

The key point to be retained for the ensuing discussion of average carcass weights is that only the Bamako abattoir is currently equipped to weigh carcasses and to keep them in cold storage. Even so, slaughter is usually conducted the night before the meat is collected by wholesale butchers, to minimize shrinkage from cold storage (from interviews at Bamako abattoir). Carcass weights outside Bamako are "estimated" visually by Livestock Service personnel. Furthermore, perhaps more than half of the slaughters performed nationally in an average year are not recorded. These factors must be borne in mind when evaluating regional data concerning carcass weights; they also suggest using Bamako data alone to establish national norms for carcass weights of animals slaughtered domestically, even if Bamako is not necessarily representative of the country as a whole.[5] It is probably better than guesswork and at least underlines seasonal and year-to-year variations.[6]

B. - The Number of Recorded Slaughters by Region, 1967-1977

The number of recorded slaughters of cattle more than doubled as a result of the drought in the early seventies. Table 7.1 shows, however, that the high slaughter rate of 1974 had declined by one-third in 1977. Most of the growth in recorded slaughters between 1971 and 1973 occurred in Bamako. The increase in activity during the drought can be explained by three main factors.[7] First, herdsmen sought to sell cattle before they died of starvation. Second, more head of cattle had to be sold to obtain any given amount of grain, since the terms of trade between meat and grain had changed. Third, more cattle were demanded in urban markets since carcass weights at slaughter were considerably diminished (see section II-C below).

Recorded slaughters of small ruminants increased by nearly 50 percent from 1971 to 1973, for the same reasons as in the case of cattle. Table 7.2 shows that slaughters in the Bamako Region alone nearly tripled. Part of this may stem from refugees liquidating their animals in the capital city and part as a response to rises in the demand for purchased grain.

Increased slaughters of small ruminants tend to make up for the short-fall in beef production at the end of the dry season and during the rainy season (May to September). Figure 7.1 charts the monthly recorded slaughters of cattle and small ruminants in Mali from 1974 through 1977. The curve for small ruminants also shows small peaks representing slaughters for the Muslim feast of Tabaski. Those are most likely understated, nonetheless, since most of this activity is not recorded by the Livestock Service.

C. - Average Carcass Weights of Domestic and Export Cattle, 1972-1977

1) - The Bamako Evidence

The abattoir at Bamako has kept records of estimated monthly average carcass weights for cattle, sheep and goats since 1972. The figures for cattle are better than those

TABLE 7.1

RECORDED SLAUGHTERS OF CATTLE BY REGION, 1967-77
(Number of head)

Region	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977[a]
Kayes	8,211	9,956	14,275	14,267	12,926	DATA NOT AVAILABLE	13,887	12,403	10,230	10,935	13,198
Bamako	33,063	34,068	40,229	37,929	30,890		108,995	111,612	62,151	88,686	56,647
Sikasso	5,303	5,598	6,337	6,950	3,246		9,575	9,921	15,499	9,570	19,202
Ségou	3,927	3,918	5,325	5,857	8,934		10,442	13,986	10,418	7,183	6,569
Mopti	4,221	4,547	5,593	6,096	6,063		6,842	4,317	8,600	4,287	4,887
Gao	5,317	5,268	7,860	7,233	7,220		7,634	3,542	5,453	1,396	1,699
TOTAL	59,942	63,355	79,619	79,332	74,279		157,355	155,781	112,351	122,037	102,262

SOURCES: OMBEVI, Statistiques, various years.

[a]Preliminary figures from aggregating Livestock Service sector reports.

TABLE 7.2

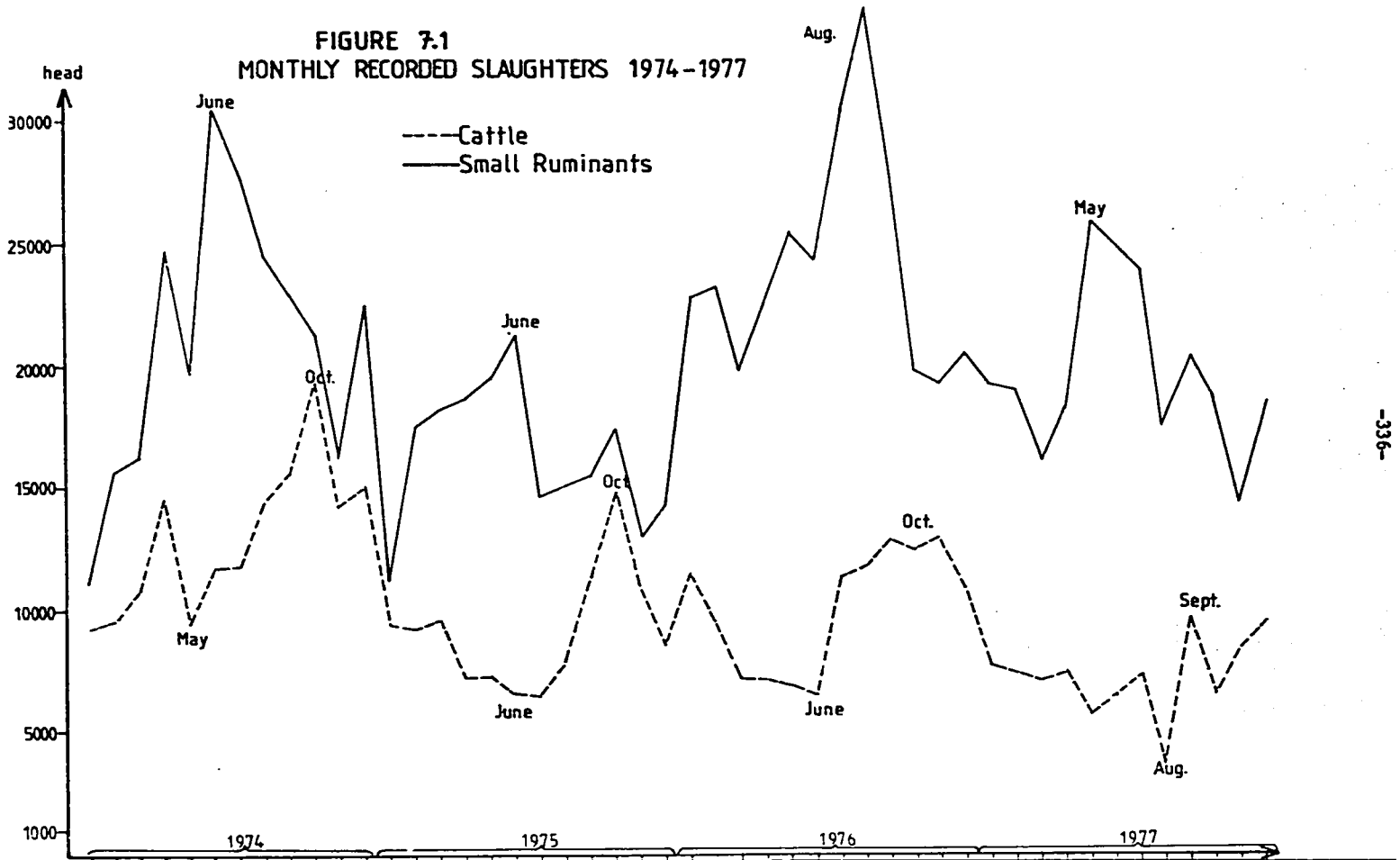
RECORDED SLAUGHTERS OF SMALL RUMINANTS BY REGION, 1967-77
(number of head)

Region	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977[a]
Kayes	1,752	5,749	6,997	6,877	8,886	DATA NOT AVAILABLE	9,253	7,499	7,844	7,918	10,218
Bamako	15,543	16,307	27,671	38,496	38,363		98,036	119,905	69,500	110,657	80,535
Sikasso	3,318	4,017	5,697	7,724	12,104		18,762	19,104	14,891	15,954	18,872
Ségou	14,541	9,837	17,095	35,304	49,573		52,947	53,734	41,715	77,632	44,211
Mopti	21,040	20,597	22,593	30,905	32,352		34,162	29,849	28,728	28,427	33,012
Gao	12,315	14,257	18,187	22,189	31,420		42,035	24,950	39,751	52,264	52,540
TOTAL	68,517	70,764	98,240	141,495	170,698		255,195	255,041	202,429	292,852	239,388

SOURCES: OMBEVI, Statistiques, various years.

[a]Preliminary figures from aggregating Livestock Service Sector reports.

FIGURE 7.1
MONTHLY RECORDED SLAUGHTERS 1974-1977



or small ruminants, since the latter are rarely weighed. Despite the shortcomings, they are he only estimates of carcass weights at slaughter in Mali based on actual weighings.

Carcass weights of cattle slaughtered in Mali tend to hit their yearly low during July. This is both because animals are thin at the end of the dry season and also because offtake t this time for the domestic slaughter herd consists largely of animals that herdsmen judge nable to survive to the end of the rainy season, when they would otherwise be heavier and n better health.[8] Table 7.3 shows that there is a 10 to 20 percent increase in average arcass weights between July and the seasonal peak in December.

TABLE 7.3

AVERAGE CARCASS WEIGHTS OF SLAUGHTERS AT THE BAMAKO ABATTOIR, 1972-77 (in kg)

ear	Cattle July	Cattle December	Cattle Yearly Average[a]	Sheep Yearly Average[b]	Goats Yearly Average[b]
972	124	119	127	12.5	12.5
973	110	124	117	12.5	12.5
974	104	124	116	11.5	12.0
975	119	124	122	13.0	13.0
976	121	133	127	13.5	14.0
977	114	135	126	14.0	14.5
975-1977 verage	-	-	125	13.5	14.0

SOURCES: OMBEVI, Statistiques, various issues; Abattoir Frigorifique de amako, 1977 annual report.

[a]Yearly averages refer to the mean of monthly averages. Weights are rounded o the nearest kilogram.

[b]Weights of sheep and goats are rounded to the nearest half-kilogram.

The severity of the great drought can also be seen in Table 7.3. The rains were so parse in 1972 that July slaughter cattle were on average heavier than those in December. lthough there was some recovery at the end of the 1973 rainy season, average carcass eights reached a low of 104 kg in July 1974. The 1975-to-1977 average is 125 kg per arcass, considered to be representative of low-to-average rainfall.

2) - Comparison of the Type of Livestock Slaughtered Domestically Compared to Those Exported

The conventional wisdom indicates that domestic slaughters include sterile cows anc heifers and animals too old to survive the trek to coastal markets, in addition to culls anc steers. Export cattle herds, on the other hand, tend to be mainly composed of steers ove five years of age. Therefore comparisons of domestic and export flows on a per head basi are misleading, because the average carcass weight of export animals is likely to be heavie than that of domestic slaughters.

The monthly and annual statistics published by the Bamako abattoir do not distinguis among domestic slaughters by age and sex. The annual figures published by OMBEVI and th Livestock Service do not give this information either, although they do contain numbers o recorded slaughters by Region. Only the monthly evaluations of the reports issued b OMBEVI market recorders (controleurs des foires et marchés) since December 1976 carr information on the composition of the slaughter herd in different areas. Results for thre months between December 1976 and October 1977 are given in Table 7.4.

Mature cows represent a smaller proportion of domestic slaughters at the end of th dry season (May) than they do at the beginning (October and December). This may b because herders cull their herds of dangerously weak animals (including steers and bulls before the end of the dry season, and cull cattle often go to the butchery in rural or regiona town markets.

By contrast, export cattle tend to be heavier (and presumably healthier) stock. Th average carcass weight of cattle slaughtered at Abidjan in 1970, 1971, 1975 and 197 (thereby excluding the drought years) was approximately 145 kg per carcass (Staatz, 1979, p 31). The averages include Ivorian as well as imported cattle. For the purposes of evaluatin Malian exports, prime zebu export steers are assumed to be capable of producing 170 kg o carcass meat at the time they cross the border. Delivered to Abidjan, the average expor animal is evaluated at 150 kg carcass weight. (See Chapter Two, Section II-A for a revie of the norms used by SEDES, which are similar.)

For the lack of other information, small ruminants slaughtered domestically ar assumed to have a carcass weight of 14 kg (Table 7.3), while those delivered to Abidjan ar evaluated at 17 kg. Staatz, (1979, p. 34) prefers this figure, which comes from SEDES, 1969

III. - Consumer Meat Prices, 1967-77

A. - The Available Evidence

OMBEVI began the detailed collection of retail meat prices in July 1974, at Kat market near Bamako.[9] Although figures exist prior to 1974 and for regional centers sinc

TABLE 7.4

ESTIMATES OF THE COMPOSITION OF THE SLAUGHTER HERD IN DIFFERENT REGIONS OF MALI, 1976-1977
(in percent unless otherwise indicated)

Abattoir	Month	Steers (including oxen)	Bulls	Cows	Immature Males	Heifers	No. of recorded Slaughters (in head)
Gao	Dec. 76	12	16	72	0	0	67
	May 77	64	6	30	0	0	86
	Oct. 77	31	9	60	0	0	65
Kayes	Dec. 76	67	14	13	6	1	542
	May 77	84	2	6	7	2	196
	Oct. 77	50	43	3	4	0	1,230
Sikasso	Dec. 76	20	8	71	0	1	247
	May 77	–	–	–	–	–	–
	Oct. 77	24	12	64	0	0	491
Mopti (Sévaré)	Dec. 76	22	4	67	5	1	379
	May 77	40	3	55	1	1	227
	Oct. 77	39	1	60	0	0	458
Ségou	Dec. 76	30	6	64	0	0	491
	May 77	–	–	–	–	–	–
	Oct. 77	23	18	49	6	4	495
Kati (Bamako area)	Dec. 76	21	38	41	0	0	258
	May 77	26	32	42	0	0	203
	Oct. 77	–	–	–	–	–	–

SOURCE: From data in OMBEVI, "Evaluation des Rapports Mensuels des Controleurs des Foires et Marchés," for the months given (lines accross sum to 100 plus or minus rounding error).

then, they are based solely upon the recall of agents of the Livestock Service and are no generally reliable. As a general principal, retail prices in Gao in the north are likely to b half those of Sikasso and Bamako (OMBEVI "market recorder" reports since December 1976)

B. - Beef Prices in Relation to Mutton, 1974-1978

The Bamako data, in Table 7.5, show that beef prices nearly doubled between the firs and third quarters of 1975. Mutton (including goat meat) prices underwent a more modes increase. The growth in retail beef prices during this period was most likely attributable t the simultaneous presence of several factors. First, the considerable destocking tha occurred in 1974 appears to have kept meat prices stable in export markets that year despit demand increases fueled by income growth and urbanization in Ivory Coast. Second, th Malian demand for meat at that time was modest due to declining consumer purchasin power attributable to high grain prices. Third, the poor rains in 1974 led during the ensuin dry season (January-June 1975) to a shortfall in the domestic Malian supply of meat on th hoof, through both decreased numbers from a smaller herd and lower carcass weight Fourth, urban demand for beef in Mali in early 1975 was recovering rapidly, particularly wit the influx of foreign aid funds and falling grain prices. Fifth, demand for Malian exports c the coast was at an all-time high in early 1975, since the supply of beef from other Saheli suppliers had also dried up. The GOM officially prohibited cattle exports for six month during early 1975 in order to ease domestic prices. Border disturbances with Upper Volta a this time helped to make this prohibition effective for transits through that country.

Other than the quantum leap in value for beef in 1975, retail prices for red meat hav been increasing at an average of roughly 10 percent per annum since the end of 1975. Tab 7.6 gives price indexes for beef and mutton from 1974 to the first half of 1978. Mutton h been increasing in price slightly faster than beef. By early 1978, the retail price of mutto bore the same relation to its 1974 price as did that of boneless beef. There is no sol evidence of differential retail price trends between mutton and beef, particularly after th short-term effects of the drought came to be a factor.

C. - Meat Prices in Relation to Other Commodities

This comparison is made difficult by the lack of a general consumer price index f Mali. Red meat prices appear to have increased considerably faster than either incomes the prices of other commodities from the end of 1974 through 1975. This was not tru however, prior to late 1974. Grain prices rose rapidly during 1974. Although not substitute for meat, food grains account for such a large share of family budgets in Mali th the sharp price rises severely reduced purchasing power. Meat was a luxury that ma consumers had to forego. The big decline in Malian red meat consumption per capi occurred in 1974 prior to the major meat price rises in 1975 and not as a result of them. Furthermore, the major meat price increases in 1975 undoubtedly served to further decrea Malian per capita consumption.

TABLE 7.5

CONSUMER MEAT PRICES IN SUBURBAN BAMAKO (KATI), 1974-78
(in FM/kg)

Year	1974				1975				1976				1977				1978	
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2
Beef with bone	285	300	330	305	350	505	640	635	545	590	605	590	635	665	-	645	650	710
Boneless beef	430	485	540	500	530	690	760	715	700	740	770	780	790	865	-	890	870	925
Mutton	415	440	525	520	545	660	455	650	665	680	730	755	750	760	-	860	810	890
Price ratio, beef with bone to Mutton	68%	68%	63%	59%	64%	77%	141%	98%	82%	87%	83%	78%	85%	88%	-	75%	80%	80%

SOURCES: (a) 1974-1976: Beef prices are from OMBEVI (No.82, 1977) monthly data. Where data from one month is missing, averages of the remaining months in the quarter are used.
(b) 1974-1976: Mutton prices are from OMBEVI, Statistiques.
(c) 1977: Prices are from the monthly "Evaluation des Rapports Mensuels des Controleurs des Foires et Marchés", OMBEVI.
(d) 1978: Prices are from unpublished data consulted at OMBEVI.

TABLE 7.6

CONSUMER MEAT PRICE INDEXES, 1974-1978
(1974 = 100)

Type of Meat	1974[a]	1975	1976	1977	1978[b]
Beef with bone	100	175	191	213	223
Boneless beef	100	138	153	174	184
Mutton	100	122	149	166	189

SOURCE: Computed from annual averages in Table 7.5

[a]Nominal red meat prices were fairly stable prior to 1974.
[b]January to June only.

There has been a very noticeable slowing of the relative price increase of meat ove grains since the beginning of 1976. Given a lack of other evidence, the operationa hypothesis adopted here is that meat prices in the post-drought era will stabilize to the poin where they increase at the same rate as other prices in the economy.

IV. - Estimates of Actual Domestic Consumption of Red Meat and Livestock Slaughters, 1974-1977

A. - Estimates of Per Capita Consumption of Red Meat and Close Substitutes in Bamako

1) - Fixed Average Estimates

OMBEVI projects urban consumption of animal products on the basis of a survey conducted among 791 households in Bamako, from December 1974 until September 1975 (written up in OMBEVI, No. 65, 1975, and No. 68, 1976). These figures offer a means to calculate overall meat and fish consumption in the capital during the survey period. Unfortunately, they do not allow for the substantial price increases that occurred over the sample interval. Therefore these data are offered as the only information available. They are reproduced in Table 7.7.

TABLE 7.7

AVERAGE PER CAPITA ANNUAL CONSUMPTION OF ANIMAL PROTEINS IN BAMAKO, 1975[a]

Item	Annual Estimate (kg)	Daily Estimate (gr)
eef	23.5	64
eef offals	5.9	16
tton	4.0	11
tton offals	0.6	2
ork	0.2	0+
oultry	4.2	12
ish	2.4	7
OTAL[b]	40.80	112

SOURCE: OMBEVI (No. 65, 1975), p. 9 and (No. 68, 1976), p. 47. The figures are veraged across all income.

[a]Meat prices doubled over the survey period. Nevertheless, these are the igures adopted by OMBEVI (No. 96, 1977; No. 100, 1978) for projections and in act are the only measures available.

[b]Totals ignore differences in protein values of different commodities.

2) - Problems with Using the Fixed Average Estimates for Projections of Future Consumption

A number of serious problems arise if these figures are employed to project consumption in the future. The two greatest defects of using the straight averages involve ignoring the effect of relative price and income changes. First, a change in the relative price of mutton and beef with bone is very likely to shift consumption in favor of the commodity that becomes relatively cheaper, since they are close substitutes. Furthermore, this form of price change could occur on the open market for a variety of reasons, independent of demand factors. Second, rising real incomes within the urban sector over time will increase expenditures (at constant prices) on animal products, as long as the expenditure-income elasticity of demand for these commodities is positive and greater than zero. This is usually assumed to be the case for meat.[11] It is therefore important to allow for changes in real incomes and relative prices when speculating about future meat consumption.

3) - Estimating the Effect of Income Growth on the Urban Demand for Meat

OMBEVI made an attempt to estimate the urban income elasticities for meat from the 1975 Bamako data (No. 68, 1976, p. 34). The calculated magnitudes, which increase over income groups, are probably incorrect. This most likely is a result of the inadequate estimation procedures made necessary by the limited data processing facilities in Bamako.[12] Economic theory and virtually every serious empirical study of consumption behavior in low income countries demonstrate that the consumption of meat, fowl and dairy products is highly sensitive to changes in real income, the more so the lower the income group.[13]

The income and expenditure distributions observed by the OMBEVI study are combined in Table 7.8 with some rule-of-thumb guesses at income elasticities for different sections of the urban population, to compute the percentage change in overall expenditures on red meat arising from a one percent change in real income. Table 7.8 shows that the overall urban income-expenditure elasticity for red meat can be estimated at 1.25, assuming that income changes are uniform across the population and that consumer behavior in Bamako is representative of urban areas in Mali. The figure implies that a one percent increase in urban per capita incomes will be translated into a 1.25 percent increase in expenditures on red meat, other things being equal.

4) - Estimating the Effect of Price Changes on the Urban Demand for Meat

Two varieties of price changes may affect the aggregate demand for meat products over time. These are general changes in the price level (inflation) and changes in relative prices (the price of beef going up faster than that of mutton).

The type of inflation which affects all prices equally will only affect consumer behavior if incomes fail to rise at the same rate.[14] For example, a rise in the general price level with money income constant is translated into a nearly equal fall in real purchasing power. The effect of such a rise in prices is treated as a fall in real income. The price of cereals is especially important in this context in that it is the principal "wages-good" of low income people in towns. Based on the income elasticity calculated in the previous subsection, the expected effect of a one percent increase in the general inflation rate not compensated for by higher incomes will be to decrease consumption of red meat by nearly 1.25 percent. Where incomes and prices rise at the same rate, no change is expected in the amount of meat consumed, other things being equal.

Besides the price of cereals, which is linked to real income, the price changes of greatest importance for predicting future trends are those which change the terms of trade between beef and its close substitutes: mutton (including goat meat), fish and poultry.

TABLE 7.8

COMPUTATION OF THE AGGREGATE INCOME-EXPENDITURE ELASTICITY FOR RED MEAT IN URBAN AREAS IN MALI

(a)	(b)	(c)	(d)	(e)
ncome category: verage monthly ash income per erson	Percentage of total income received by households in this income category	Percentage of total expenditures on red meat made by households in this income category	Assumed expenditure elasticity	Percentage change in total expenditures on red meat from a 1% rise in income for households in this income category
FM)	(%)	(%)	(units)	(%)
-4,000	41	37	2	.74
,000-8,000	36	38	1	.38
,000 +	23	25	0.5	.13

ercentage change in total urban expenditures on red meat associated with a 1 percent niform rise in real income..... 1.25

OURCES:
(a) Income distribution of households from OMBEVI (No. 68, 1976), p.25
(b) Ibid. It was not possible to estimate exactly the 40-40-20 distribution of income.
(c) Op. cit., p.84, using the distributions shown on p.25.
(d) Consistent with evidence for India in Mellor (1978) and with the conventional wisdom.
(e) = (c) x (d).

Pork is not a good substitute for beef or mutton in Mali for religious reasons. The data in OMBEVI (No. 68, 1976) indicate that beef is the preferred everyday animal protein in urban areas, with mutton second and fish a poor third. Chicken is a luxury good reserved for ceremonial occasions or for the affluent. A rise in the price of beef relative to mutton may be expected to have a sharp effect on the demand for mutton, and vice versa.[15]

B. - Per Capita Consumption Estimates for All of Mali, 1974-1977

1) - The Lack of Direct Evidence and the Methodology Employed

Very little real evidence exists concerning actual consumption of animal protein in rural areas. Establishing better estimates of these figures should be a number one priority for micro-level research programs in Mali. As we will see, virtually all estimates concerning exports, production, and consumption depend upon the magnitudes chosen.

Faced with this lack of data, OMBEVI personnel employ an interesting methodological twist. They take their best guess of imports and offtake of meat in 1974 and then net out their best guess of actual exports. The latter involves accepting Ivorian and Ghanaian customs data. The result is divided by the estimated population in 1974. The per capita domestic meat consumption figures thus obtained are then used to derive the surplus available for exports in future years. There may not be any better procedure until better micro-data become available.

The procedure adopted here is to take the OMBEVI estimates for per capita consumption of animal products in both urban and rural areas in 1974. However, a new set of assumptions is employed to take account of changes in per capita real incomes in urban and rural areas between 1974 and 1977. The latter are calculated at 1.8 percent per annum in urban areas and 0.12 percent per annum in rural areas.[16] These rates will be used in conjunction with the average urban income elasticity of 1.25 (Table 7.8) and an arbitrarily set rural income elasticity of 1.5.[17]

2) - The Official and Revised Per Capita Consumption Estimates, 1974-1977

The OMBEVI projections assume that per capita consumption of beef in urban areas will decline by one percent after 1975 as a result of GOM price policy, while that of mutton will increase by 3 percent per annum (No. 96, 1977, Appendix II). According to that account, consumption of beef in rural areas would stay fixed at 4.2 kg per person, while that of mutton is seen as increasing to 8 kg in 1977, and staying fixed thereafter (ibid.).[18]

The expected evolution of the figures for per capita consumption of beef and mutton is revised in Table 7.9. Assuming that all price changes are neutral, per capita consumption is then determined by the growth of real income and the reaction of consumers to that increase in purchasing power.[19] The assumptions about real income and income elasticities in the previous sub-section lead to the conclusion that urban per capita consumption of both beef and mutton will increase at a rate of 2.25 percent per annum for the foreseeable future. This projection does not seem unrealistic in the light of possible indirect consumption effects of the massive foreign aid inflows expected through 1985. The growth of aggregate income in the rural sector, however, is almost entirely offset by population growth, despite migration to the towns. Stagnant growth in rural per capita meat consumption seems to be an appropriate view, despite the assumption of a high income elasticity of demand.

C. - Revised Estimates of Aggregate Domestic Meat Consumption and Livestock Slaughters, 1974-1977

The projections made above of population, consumption and average carcass weights at domestic slaughter are combined in Table 7.10 to re-compute OMBEVI's estimates of actual aggregate meat consumption. The figures show that our estimate of total Malian beef consumption in 1977 is 7 percent below the OMBEVI projection, as is our figure for mutton.[20]

A comparison of revised estimates of actual slaughters with recorded slaughters in Table 7.11 shows that the latter seriously underestimate the true picture. The figures indicate that the slaughter figures for cattle should be increased by 100 to 200 percent, while those for small ruminants may need to be upgraded by a factor of ten. Although recorded slaughter figures for the city of Bamako may be an acceptable indication of beef production in the capital, the recorded figures clearly do not represent true events in the rest of the country. This is not altogether surprising, given the imposition of a tax on recorded slaughters. Most small ruminant slaughters in both urban and rural areas probably escape the attention of the Livestock Service. The moral is to be cautious when using recorded slaughter figures for any area outside of urban Bamako.

TABLE 7.9

OFFICIAL AND REVISED ESTIMATES OF PER CAPITA DOMESTIC CONSUMPTION OF RED MEAT, 1975-1977

Year	Population ('000)		Beef (including offals) (kg per capita)				Mutton (including goat meat and offals) (kg per capita)			
			OMBEVI Estimate		Revised Estimate		OMBEVI Estimate		Revised Estimate	
	Urban (a)	Rural (b)	Urban (c)	Rural (d)	Urban (e)	Rural (f)	Urban (g)	Rural (h)	Urban (i)	Rural (j)
1974	768	5,248	29.0	4.2	29.00	4.20	5.0	7.3	5.00	7.30
1975	808	5,352	29.0	4.2	26.10	3.78	5.0	7.6	5.11	7.31
1976	850	5,458	28.7	4.2	26.69	3.79	5.2	7.8	5.23	7.33
1977	894	5,566	28.4	4.2	27.29	3.79	5.3	8.0	5.35	7.34

SOURCES: (a), (b), (c), (d), (g), (h) are from OMBEVI (No. 96, 1977, Appendix II). The 1975-1977 figures are projections from 1974.

(e), (i) Start with the OMBEVI estimates of urban per capita consumption in 1974. Per capita beef consumption then falls by 10% in 1975, due to the extraordinary price rise. In 1976 and onwards, the 1.8 percent annual growth in real income combined with an income elasticity of demand for red meat of 1.25 leads to a 2.25% growth in expenditures on both beef and mutton. Assuming that suppliers will decrease exports sufficiently to meet increased demand without raising the price of meat relative to other commodities in the economy (i.e. assuming that the prices of beef and mutton rise at the same rate as all other prices in the economy), then the increase in desired expenditures is fully translated into an average annual rate of growth of consumption of 2.25 percent.

(b), (j) ditto, except that the low rate of growth of real per capita income in the rural sector, 0.12 percent (see text), combined with an income elasticity of 1.5, leads to an annual rate of

TABLE 7.10

REVISED AND OFFICIAL ESTIMATES OF AGGREGATE DOMESTIC MEAT CONSUMPTION, 1974-1977

(including offals, in metric tons)

	Revised Estimates						OMBEVI Estimates	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	
							National Totals	
Year	Urban beef Consumption	Rural beef Consumption	Total Domestic Beef Consumption	Urban mutton Consumption	Rural mutton Consumption	Total domestic Mutton Consumption	Beef	Mutton
1974	22,272	22,042	44,314	3,840	38,310	42,150	44,314	42.150
1975	21,089	20,231	41,320	4,129	39,123	43,252	45,910	44,715
1976	22,687	20,686	43,373	4,446	40,007	44,453	47,319	46,992
1977	24,397	21,095	45,492	4,783	40,854	45,637	48,767	49,266
1974-1977 Compounded Annual Growth Rate	2.3%	-1.1%	0.7%	5.6%	1.6%	3.7%	2.4%	4.0%

SOURCES: Calculated using the population and per capita consumption estimates of Table 7.9. The OMBEVI figures are from paper No. 96, 1977, Appendix I. The compounded annual growth rates are calculated from the consumption estimates.

TABLE 7.11

ESTIMATES OF ACTUAL AND RECORDED DOMESTIC SLAUGHTERS
OF LIVESTOCK COMPARED, 1974-1977
('000 head)

	Cattle			Small Ruminants		
Year	Recorded Slaughters	Revised estimate of Actual Slaughters	Percentage Increase of "Actual"[a] Over Recorded	Recorded Slaughters	Revised Estimate of Actual Slaughters	Percentage Increase of "Actual" Over Recorded
1974	156	284	82%	255	2,618	927%
1975	112	298	166%	202	2,686	1,230%
1976	122	312	156%	293	2,761	842%
1977	102	328	222%	239	2,835	1,086%

SOURCES: Slaughters are calculated by dividing the figures for estimated consumption of meat in Table 7.10 by the average weight per animal of carcass and edible offals. The latter are estimated at 156.25 kg for cattle (125 kg + 25%) and 16.1 kg for small ruminants (14 kg + 15%).

[a]"Actual" = recorded + unrecorded. The quotation marks are used to emphasize that the true magnitude of the unrecorded exports is not known.

CHAPTER EIGHT

EXPORTS OF LIVESTOCK AND RED MEAT, 1967-1977

Recorded exports are an unacceptable proxy for estimates of actual exports of livestock, although they can be used as a basis for arriving at the actual exports. They may account for as little as one-quarter of cattle exports and 40 percent of small ruminant exports. The latter fare slightly better than the former in recorded statistical series because of the relatively greater proportion of sheep and goats trucked to export markets. Imports are not recorded. The best guess indicates a net inflow of small ruminants in the western Sahel, but this is difficult to quantify.

The available data suggest that small ruminant exports in 1977 had surpassed pre-drought levels, but this is not the case for cattle. The best guesses for actual net exits of small ruminants and cattle in 1976 are 250,000 and 100,000 head, respectively.

From a pre-drought position as the major customer for Malian livestock, Ghana withdrew to the point that it virtually ceased to import Malian cattle in 1976. Four-fifths of cattle and nearly three-quarters of Malian exports of sheep and goats went to the Ivory Coast in that year, emphasizing Mali's growing dependence on that country as an outlet.

Recorded exports of red meat, in contrast to those for live animals, closely approximate actual activity. Sharply rising retail prices in Mali and the alternative of cheaper imports from the depressed world market combined to choke off meat exports in 1975. Red meat prices in Abidjan have not risen as quickly as those of smoked fish since 1976. That commodity accounts for a substantial part of protein in coastal diets. It would appear that the differential price rise is largely attributable to the downward pressure on red meat prices arising from imports of frozen carcasses from Latin America.

I. - Net Recorded Exports of Livestock and Meat by Destination, 1967-1977

A. - Recorded Exports of Cattle

1) - Overall Recorded Exports, 1967-1977

The absolute figures on recorded cattle exports are useful primarily for determining trends in exports over the years and the distribution of exports among destinations. Table 8.1 shows that recorded exits doubled between 1967 and 1971, peaked in 1972, and declined

TABLE 8.1

RECORDED CATTLE EXPORTS BY DESTINATION, 1967-1977
('000 head)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976[c]	1977
Ivory Coast	17.2	17.6	30.8	49.6	44.5	49.5	32.7	26.9	13.8	17.6	22.5
Ghana	23.1	18.7	43.9	30.0	32.2	16.2	11.3	6.3	-	0.3	0.3
Upper Volta[a]	1.3	-	0.4	-	2.1	2.4	-	-	-	-	-
Senegal	-	0.2	0.6	0.4	-	-	-	0.7	1.5	5.1	1.8
Niger[b]	0.7	-	0.1	0.4	7.8	4.7	-	0.1	-	0.1	0.8
Liberia	0.8	0.4	0.7	1.2	0.3	5.0	-	2.8	-	1.7	5.9
Undetermined	-	-	-	-	1.1	21.1	7.8	3.8	0.3	0.1	0.6
Total[d]	43.1	36.9	76.4	81.6	88.0	98.9	51.8	40.6	15.6	24.9	31.9

SOURCES: 1967-1969: OMBEVI, Statistiques ..., 1960-1970. The 1968 data for sheep and cattle are transposed in the OMBEVI publication, the result of a clerical error. (Personal communication from John Staatz.)

1970-1976: OMBEVI (No. 96, 1977, p. 14.)

1977: OMBEVI (No. 102, 1978.)

[a]In transit for Ghana and the Ivory Coast.

[b]In transit for Nigeria and Benin.

[c]Exports prohibited for six months.

[d]Actual totals may be slightly different, due to rounding error.

to pre-1967 levels by 1974. Overall recorded exports were only three-quarters of 1967 levels as of 1977. The 1977 figure represents one-third the level of activity during the peak export year of 1972.

2) - The Distribution of Exports Among Destinations

The major change in trading relationships during the last decade has been the spectacular decline in the share of exports going to Ghana. Table 8.2 shows that Ghana's relative share of cattle exports went from just over half in 1967 to a negligible amount in 1977. Since the void thus created has not been replaced in absolute terms, Ghana's decline as a trading partner has left Mali even more dependent on Ivory Coast as an export market. The absolute number of head officially imported by Ivory Coast in 1977 was only slightly above the comparable figures recorded for 1967.[1] However, Ivory Coast's relative share of Malian cattle exports went from 40 to just over 70 percent during the same period (Table 8.2). Senegal and Liberia have become relatively more important markets for Malian cattle in the post-drought period. Accounting for less than 1 percent of the market in 1967, their combined relative share of recorded cattle exports rose to just under 8 percent in 1977.

The decline in cattle exports to Ghana is interpreted primarily as a result of domestic economic and political disruptions in that country, rather than as export displacement by more competitive suppliers. Increased difficulties in transiting Upper Volta since the border disputes in 1975 and an easing of import formalities in the Ivory Coast may also disguise exports to Ghana as exports to Ivory Coast, some of which are re-exported to Ghana.

3) - The Origin of Recorded Exports

OMBEVI has synthesized and presented the available data for recorded exports from each Region for each month in 1977 (Paper No. 102, 1978). The authors of that paper make it clear that there is no guarantee that exports recorded from a given Region in fact originate there, since herders are free to accomplish the formalities wherever they wish. An examination of the OMBEVI data shows Bamako to be the major exporting region to Liberia, Sikasso to the Ivory Coast, and Kayes to Senegal. This is consistent with the hypothesis that formalities are accomplished in the border regions, rather than in the region of origin. The conclusion is that the reported origin of recorded exports is of little analytical interest in examining data from 1967 to 1977.

4) - Seasonal Fluctuations

The OMBEVI data for 1977 and previous years show that the maximum levels of recorded exports are attained from October to February, when animals are at their heaviest

TABLE 8.2

DISTRIBUTION OF RECORDED CATTLE EXPORTS BY DESTINATION, 1967-1977
(in percent of yearly totals)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Ivory Coast	40	48	40	61	51	50	63	66	88	71	71
Ghana	54	51	57	37	37	16	22	16	-	1	1
Upper Volta	3	-	1	-	2	2	-	-	-	-	-
Senegal	-	1	1	-	-	-	-	2	10	20	6
Niger	2	-	-	-	9	5	-	-	-	-	3
Liberia	2	1	1	1	-	5	-	7	-	7	18
Undetermined	-	-	-	-	1	21	15	9	2	-	2
Total[a]	100	100	100	100	100	100	100	100	100	100	100

SOURCE: Calculated from data in Table 8.1.

[a]Totals may differ from 100 as a result of rounding.

weights. Not surprisingly, the seasonal low is during May and June, at the end of the dry season, when animals are weakest. This is also the time when the producing herds are away on transhumance.

B. - Recorded Exports of Small Ruminants

1) - Overall Recorded Exports, 1967-1977

Declared exports of sheep and goats underwent a phenomenal expansion between 1967 and the peak year of 1971. Table 8.3 shows a fourfold expansion to nearly 127,000 head in 1971, falling to a post-drought low of 22,000 in 1975, and rebounding to 95,000 in 1977.[2] The 1977 total was nearly three times that of 1967.

2) - The Distribution of Exports Among Destinations

The major development in the small ruminant trade in the last decade has been the spectacular growth in recorded exports to Ivory Coast, which increased by a factor of six from 1967 to 1977. Part of the increase is doubtless due to better record keeping, since 64 percent of exports in 1967 were of "undetermined" destination, as compared with only 1 percent in 1977. However, Ivory Coast's portion of Mali's exports has most likely increased over the years, even if the change is not as great as that indicated in Table 8.4. Senegal and Algeria have also emerged as relatively important markets for Malian small ruminants in the post-drought period, with a combined market share of 33 percent in 1977.

3) - The Origin of Recorded Exports

The predominance of trucking as a means of transport for sheep and goat exports permits the use of the Region of declaration as our estimate of the Region of origin. Thus Sikasso accounts for only 4 percent of recorded exports of small ruminants in 1977, compared with the dubious figure of 21 percent for cattle. Interestingly, the OMBEVI data show that Ségou, a major agricultural Region, is the most important declared place of origin overall, and is specifically so in the case of exports to Liberia and Ivory Coast. This adds support to the view that the current complimentarities between Sudano-Sahelian livestock and agriculture relate more to small ruminants than to cattle.

4) - Seasonal Fluctuations

The seasonal fluctuations in the small ruminant trade are quite pronounced. The OMBEVI data for 1977 show a seasonal low of 3,400 head exported in June, compared to a

TABLE 8.3

RECORDED EXPORTS OF SMALL RUMINANTS BY DESTINATION, 1967-1977
('000 head)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Ivory Coast	7.7	2.0	42.5	82.9	86.7	81.2	DATA NOT AVAILABLE	70.2	18.2	59.7	56.2
Ghana	0.6	1.9	0.5	1.4	10.5	.4		-	-	0.1	-
Liberia	1.3	0.4	2.0	5.0	0.6	4.1		4.6	-	3.1	5.9
Upper Volta	0.1	-	-	0.7	2.1	0.4		-	-	-	-
Niger	2.1	-	0.3	0.9	2.1	2.0		-	-	0.2	0.8
Senegal	0.2	4.7	-	2.0	-	-		0.8	0.9	22.9	14.3
Algeria	a	a	a	-	-	-		5.2	-	14.3	17.2
Undetermined	21.2	8.1	11.7	13.5	24.9	9.0		5.0	3.2	1.1	0.6
Total[b]	33.2	17.2	56.9	107.4	126.9	97.1		85.8	22.3	101.4	95.1

SOURCES: See Table 8.1.

[a]The figures for Algeria are included in "undetermined" prior to 1970.

[b]Actual totals may be slightly different as a result of rounding.

TABLE 8.4

DISTRIBUTION OF RECORDED SMALL RUMINANT EXPORTS BY DESTINATION, 1967-1977
(in percent of yearly totals)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Ivory Coast	23	12	75	78	68	84	DATA NOT AVAILABLE	82	82	59	59
Ghana	2	11	1	1	8	-		-	-	-	-
Liberia	4	2	4	5	-	4		5	-	3	6
Upper Volta	-	-	-	1	2	-		-	-	-	-
Niger	6	-	1	1	2	2		-	-	-	1
Senegal	1	27	-	2	-	-		1	4	23	15
Algeria	a	a	a	-	-	-		6	-	14	18
Undetermined	64	47	21	13	20	9		6	14	1	1
Total[a]	100	100	100	100	100	100		100	100	100	100

SOURCES: Calculated from data in Table 8.3.

[a]See note (a) in Table 8.3

[b]Totals may differ from 100 as a result of rounding.

high of 23,000 head in November (Paper No. 102, 1978). The fluctuations will most likely vary year to year with the Muslim calendar, since consumer demand is heavily influenced by the dates of the feasts of Tabaski and the Muslim New Year.

C. - Recorded Exports of Red Meat

1) - The Role of SOMBEPEC

SOMBEPEC is the para-statal company that holds the nominal monopoly over red meat, hide and leather exports from Mali. SOMBEPEC would also like to control trade in fattened animals. There is in fact a certain inter-agency resentment over ECIBEV's forays into livestock marketing in Ivory Coast.

The SOMBEPEC monopoly over red meat exports is effective. Therefore, recorded exports of these items are a relatively accurate reflection of reality. The company is primarily equipped to deal with counterpart para-statal organizations in importing countries. This helps clear formalities and guarantees credit.

SOMBEPEC's performance as a marketing institution has been severely constrained in the past by two factors. First, the bureaucratic overhead must be spread over a relatively limited amount of activity. Second, the organization was obliged to supply meat at a loss to public service institutions such as the army and schools. (This latter obligation was lifted in the fall of 1978.) The company will nevertheless still have to surmount the difficulties of doing business in a highly competitive field while using bureaucratic procedures and administered prices.

2) - Recorded Exports of Red Meat, 1967-1977

With the exception of a shipment made to France in 1972 under special dispensation, Malian meat has been confined to African markets by prevailing health regulations. Ivory Coast and Ghana were regular, if modest, customers in the late sixties. Exports continued at predrought levels on an overall basis through 1973; Table 8.5 shows, however, that the traditional outlets on the southern coast began to dry up at that time. Low world prices for beef in 1975, coupled with soaring Malian domestic prices, put an end to the beef export trade in 1975.[3] Mutton exports by air have continued by trickles and dabs since then, although SOMBEPEC now prefers exporting sheep and goats as liveweight, by truck. Apart from an experimental shipment in 1976, little in the way of recorded exports of beef occurred until August 1978, when an experimental shipment of eighty-three chilled carcasses was made to Algeria by air. The North African market may offer better opportunities for meat as opposed to livestock exports in the future. These may be from Bamako or from a planned joint operation with Libya at Gao (OMBEVI, No. 59, 1975). However, a number of major organizational problems still need to be resolved.[4]

TABLE 8.5

RECORDED RED MEAT EXPORTS, 1967-1977
(metric tons)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Ivory Coast	259.5	274.0	188.4	295.4	-	0.5	0	0	0	0	0
Ghana	35.6	30.9	54.3	66.6	-	0	196.9	19.3	0	0	0
Liberia	0	0	4.3	0	-	21.8	36.6	18.3	0	0	0
Senegal	1.5	1.7	0	0	-	0	0	0	0	0	0
Libya	0	0	0	0	-	25.2	100.4	0	0	0	0
Congo	-	-	-	-	-	52.6	-	-	0	0	0
Undetermined	-	-	-	-	-	4.0	4.8	134.11	26.0	6.8	6.6
Total	296.6	306.6	247.0	362.0	313.5	104.1	338.7	171.71	26.0	6.8	0

SOURCES: Unpublished data from SOMBEPEC. Data since 1972 are cross-checked with OMBEVI, Statistiques. Figures are also cross-checked with the Service de l'Elevage, which does not keep totals by destination; hence the lack of information on destinations since 1974.

II. - Consumer Meat Prices in the Principal Export Markets, 1967-1977

The available evidence shows two- to five-fold increases in the nominal prices of animal proteins in the ten years since 1967. The largest rates of increase in nominal terms occur in Ghana. Part of this is due to rampant inflation and part to the decline in the supply of available beef because of administrative constraints.[5] When Ghanaian prices are evaluated at the "unofficial" exchange rate, 1977 retail prices of beef and mutton in Accra are predictably similar to those prevailing in Abidjan (although the cattle sent to Ghana may have been of lower quality.)

Table 8.6 portrays annual average red meat price increases of 9 percent in Abidjan, compared with 14 percent for "local smoked fish".[6] This has led to the surprising situation in recent years in which one kilogram of smoked fish costs more than the same weight of fresh beef with bone. It would seem that imported beef supplies from all sources have kept pace with demand more than locally produced fish stocks. Red meat prices in local currency have increased least rapidly in Liberia, with an average annual price growth rate of 6 percent between 1967 and 1977. Coupled with the recent weakening of the U.S. dollar against the French franc, this should act to divert Malian exports from Liberia to the Ivory Coast, other factors being equal.[7]

III. - Official and Revised Estimates of Actual Net Exports, 1970-1976

A. - Netting Out Livestock and Meat Imports

The extent of livestock imports into Mali is not known. Entries into Mali are frequent along the western border with Mauritania. However, the principal transhumance routes lie across the border, and it is difficult to distinguish seasonal movements from imports or transits destined for Ivory Coast. The splitting of ethnic groups and families by national boundaries also brings into question the nationality of herders who live part of the year in each country.

The policy adopted by OMBEVI in this regard is to consider that there are no net imports of cattle into Mali. All cattle arriving in Bamako and Kayes from the western Sahel are assumed to be of Malian nationality. Entries of livestock over other borders are considered by the Malians to be negligible. Livestock Service officials feel, however, that there is a net inflow of small ruminants into Mali from Mauritania. Some of these are destined for Malian consumption, but the majority are re-exported to Senegal. The feeling

INDICATIVE INDEXES OF RETAIL MEAT AND FISH PRICES IN COASTAL MARKETS[a]
(1967 = 100)

Year	Beef With Bone		Mutton		Red Meat	Smoked Fish
	Ivory Coast	Ghana	Ivory Coast	Ghana	Liberia[b]	Ivory Coast
1967	100	100	-	100	100	100
1971	113	109	-	127	106	135
1974	156	122	-	122	133	194
1975	191	142	-	148	168	205
1977	243	422	-	502	183	378[d]
1967-1977 average annual percentage change in local currency	9.3%	15.5%	-	15.8%	6.2%	14.2%
Average 1977 prices per kg in local currency (urban areas)	450 CFA	6.23 Cedis	675 CFA	9.50 Cedis	$2.66	519 CFA[d]
Approximate 1977 prices in FM/kg	900 FM	935 FM[c]	1,350 FM	1,425 FM[c]	1,250 FM	1,038 FM

SOURCES: Ivory Coast: Official Ivorian data supplied by John Staatz and the Bulletin Mensuel de Statistique. Ghana: Economic Planning Division of the Ministry of Agriculture, cited in Sullivan (1979). Liberia: Ministry of Planning and Economic Affairs, cited in Josserand (1979). Both are in vol. II of this study.

[a]Capital cities.

[b]Series for Liberia is for all "chilled and frozen meat" imported.

[c]Using the black market rate of 1 Cedi = 150 FM instead of the official rate of 1 Cedi = 409 FM.

[d]May - July 1977 data not available.

in official circles appears to be that cattle are mobile across borders, but that small ruminants are easier to identify with a specific locale. No exact data exist to quantify imports of sheep and goats. For the lack of better data, they are ignored.[8]

Unlike the other Sahelian countries, Mali effectively prohibits imports of luxury-grade chilled meat for urban elite and expatriate consumption by means of price policy. Therefore, imports of fresh, chilled or frozen meat are not a factor to be considered. In conclusion, it is not a great distortion of reality in Mali to ignore imports when computing net exports of livestock and meat. Rather, the lack of data on imports and the "projected" nature of these data on actual exports would make adjustment for imports seem an unnecessary effort.

B. - Estimates of Total Actual Livestock Exports, 1970-1977

OMBEVI has estimated actual livestock exports, apparently using a procedure similar to that outlined in Chapter Seven, Section I, above.[9] The figures for 1974 to 1976 are revised here to take account of the new (and hopefully better) estimates of net offtake generated in Chapter Six and the revised parameters for domestic consumption calculated in Chapter Seven. The methods used to generate both the official and revised figures suggest using extreme caution in interpreting the results. The data, such as they are, are contained in Table 8.7. They show actual cattle exports in 1976 to be in the region of 100,000 head, while the comparable figure for small ruminants would be 250,000.

C. - Actual 1976 Livestock Exports by Destination

In the absence of other information, the official estimates of the distribution of actual livestock exports by destination are used in Table 8.8 to indicate the new levels implied by the more conservative view of actual exports in Table 8.7, above. In sum, Ivory Coast is seen as accounting for four-fifths of actual cattle exports in 1976 and nearly three-quarters of small ruminant exports. Liberia was the next best customer for the latter. The questionable methodology for generating these figures -- excused only by the lack of alternatives -- cautions against too rigid an application of the results.

TABLE 8.7

OFFICIAL AND REVISED ESTIMATES OF ACTUAL EXPORTS OF LIVESTOCK, 1970-1976
('000 head)

	Source	1970	1971	1972	1973	1974	1975	1976
CATTLE	Official	190	200	220	150	122	114	111
	Revised	-	-	-	-	133	-	89
SMALL RUMINANTS	Official	270	320	200	200	155	200	265
	Revised	-[a]	-	-	-	94	157	220

SOURCES: Official Estimates: OMBEVI (No. 96, 1977) pp. 14-15. Revised Figures: (a) Cattle: Subtracting estimated domestic consumption (Table 7.10) from estimated production (Table 6.5). (b) Small Ruminants: Subtracting estimated domestic consumption (Table 7.10) from estimated production of live animals and possible extra subsistence consumption of weak animals not included in net off-take figures (See Table 6.7 and explanations).

[a] - signifies no revised estimate made.

TABLE 8.8

ESTIMATES OF ACTUAL 1976 LIVESTOCK EXPORTS BY DESTINATION
('000 head)

Destination	CATTLE			SMALL RUMINANTS		
	Official Estimates	Percent Distribution	Revised Figures	Official Estimates	Percent Distribution	Revised Figures
Ivory Coast	91	82.0%	73	185	70%	154
Ghana	5	4.5%	4	-	-	-
Liberia	5	4.5%	4	30	11%	24
Senegal	5	4.5%	4	25	9%	20
Nigeria (via Niger)	5	4.5%	4	10	4%	9
Algeria	-	-	-	15	6%	13
TOTAL	111	100.0%	89	265	100%	220

SOURCES: Official estimates are from OMBEVI (No. 96, 1977), which yield the calculated distribution. The latter is applied to the revised totals in Table 8.7 to get the revised estimates. The low precision of these figures makes them useful only for indicative purposes.

CHAPTER NINE

LIVESTOCK AND MEAT PRODUCTION COSTS, 1977-1978

The shrinking market shares for meat and livestock exports to coastal countries in recent years serve to focus attention upon the cost elements of Mallan products. This chapter deals with production costs up to the level of FOB prices in Bamako. The next chapter examines the tax and transport costs pertinent to the calculation of CIF charges on the coast. The costs of the basic commodities are estimated both through an average cost of production approach (prix de revient) and through examination of wholesale prices for livestock. The former are very sensitive to the opportunity cost of capital that is chosen while the latter are misleading in that they apply to all animals sold, rather than to a consistent grade of export steer.

The cost calculations show that the costs and returns to traditional livestock raising are consistent with a 20 percent annual charge on capital. The comparable figure for small ruminants is 25 percent, indicating a higher relative return to the latter when meat-production considerations alone are taken into account.[1] Conversely, a 20 percent per annum opportunity cost of capital implies that returns to traditional stockraising, particularly cattle, were not characterized by "excess" profits in 1978.

Calculation of minimum average (or "break-even") costs in traditional meat production show that traders and wholesalers have relatively low mark-ups, of the order of 3 percent each. The margins of retail butchers are of the order of 11 percent. This indicates relatively little latitude for government-induced cost and price cutting by "trust busting" of alleged monopolies in the domestic livestock and meat business. Average cost computations for SOMBEPEC, the para-statal meat export agency, indicate a FOB "break-even" export price for beef of 950 to 1000 FM/kg in 1978, a clearly uncompetitive position.

I. - Livestock Production Costs

A. - Traditional Livestock Herding

OMBEVI has recently attempted to put a cash value on the costs of production per head of livestock kept under traditional systems (Paper No. 100, 1978, pp. 22-23). This is noteworthy primarily because of a surprising result that emanates from a closer examination of the OMBEVI figures. They arrive at an end figure for cattle costs by assuming that new born calves are free, kept for seven years, and then sold. This means estimating costs of keeping as opposed to buying cattle. The costs of production are then the annual payments for taxes, charges for veterinary services, the imputed value of herding services and crop damage payments, all discounted by the risk of animal mortality in a given year. The annual

cash expenditure (including herding services) is then estimated at 5,300 FM per head of cattle and 660 FM per small ruminant (ibid.).

OMBEVI then assumes that the difference between the resulting figure for total costs per seven-year-old and the average sale price are the returns to capital. Table 9.1 reworks these figures assuming different opportunity costs of capital (returns to cash in other enterprises) to come up with production costs that include the opportunity cost of capital. The results are striking.

The assumption of a 20 percent opportunity cost of capital implies that the cash value of herding and other payments per head of cattle are approximately equal to the going market price. While it is not worth pushing this result too far, it further confirms that the 20 percent figure usually assumed by rural development planners is in the right "ball park". More importantly, there is substantial margin between the going price for small ruminants and the cash value of production, even assuming a 20 percent annual charge on immobilized capital. In fact, the internal rate of return to capital invested in small ruminants is in excess of 25 percent under these assumptions.

With regard to the maintenance of livestock for slaughter, owners who do not consume the milk do better in small ruminants than in cattle. This case is relevant to farmers who entrust cattle to herdsmen who keep the milk. It might possibly explain farmer's enthusiasm for small ruminants which look after themselves but yield little or no surplus milk in farming areas. However, this analysis does not hold for herdsmen who consume the milk of their own cattle and who may in fact regard sales for slaughter as a byproduct of milk production. Delgado (1979, Chapter Six) calculated an annual return to capital in excess of one-third in 1976 for funds invested in diary cows in Southeast Upper Volta. Returns would be substantially higher near a better market for dairy produce.

B. - Average Costs of Feeding

Average cost estimates for feeding depend to a high degree upon the extent of capacity utilization. Chapter Four stressed the necessity for spreading overhead. The current situation of under-utilization in Mali, as depicted in that chapter, is characterized by a marginal cost of feeding an extra animal that is substantially less than the current average total cost per fed steer.[2] This implies that expansion of operations up to the current level of capacity will lower average total costs. Expansion beyond the existing capacity will presumably raise average costs. Therefore the average cost per head with full utilization of current capacity is the minimum or "break even" average cost per head.

The Tienfala feedlot data (Table 4.2) and the projected per animal recurrent costs for the new CEAO feedlots at Mopti and Sikasso (OMBEVI, No. 99, 1978, p. 106) indicate that 35,000 FM/head is the "best case" estimate of average ninety-day feeding costs. This assumes full capacity utilization and no addition to current overhead. The ECIBEV embouche paysanne data (Table 4.6) show a higher figure but one that should diminish rapidly

TABLE 9.1

HYPOTHETICAL PRODUCTION COSTS FOR TRADITIONAL HERDING
GIVEN DIFFERENT OPPORTUNITY COSTS OF CAPITAL
(in FM/head)

Animal	Hypothetical Opportunity Cost of Capital in percent per annum				Actual Average Market Price 1978
	0%[a]	6%[b]	12%	20%	
Cattle (7-year-old steer of 140 kg carcass weight)	41,422	46,917	69,923	107,918	105,000
Small ruminant (5-year-old goat)	4,680	5,463	6,506	8,529	11,000

SOURCE: OMBEVI, No. 100, 1978.

[a]These are equivalent to the OMBEVI estimates. The OMBEVI estimates are calculated as:

$$\sum_{t=1}^{n} \frac{cost_t}{(1-m_t)^t} .$$

[b]The non-zero opportunity cost figures are calculated as:

$$\sum_{t=1}^{n} \frac{cost_t}{[(1-m_t)(1-r)]^t}$$

where m_t is the mortality rate at age t

r is the opportunity cost of capital

$cost_t$ is the cash cost in year t

n is the number of years the animal is kept.

as operations expand.

The next section examines the prices actually paid for livestock in Kati market, a major collection center for export herds.

II. - Wholesale Livestock Prices in Bamako

A. - A Cautionary Note

Livestock prices are prone to a high level of measurement error since a great deal of the variation within and between years is hidden by changes in the carcass weights of the animals and in the composition of the slaughter herd by age and sex. Price series based on liveweight are intended to surmount this problem; the current data for Mali do not do so. In practice, the liveweight price series kept by the Livestock Service and OMBEVI (with one exception) are based on enumerator estimates of "average" carcass weights.[3]

This section will compile the best available evidence on livestock costs in Kati market since 1974, on a per head basis. Although the data are not fully comparable between observations, they do serve to point out gross trends in exporters' costs and changes in the relative positions of small ruminants and cattle over time. Unfortunately, the data pertain principally to slaughter cattle rather than export animals. The latter may draw a 20 to 30 percent premium over the former in Kati market, even within the general category of "steers".[4]

B. - Relative Trends in Wholesale Prices for Cattle and Small Ruminants

Cattle prices doubled on a per head basis between mid-1974 and mid-1978, as illustrated in Table 9.2. Less than one-fifth of this rise is accounted for by heavier average carcass weights (Chapter Seven, Table 7.3). The average price of immature males appears to have increased slightly faster than that of older steers and bulls. This may be due to the spectacular growth of animal traction in Mali since that time. Contrary to the situation in 1972, the proportion of the slaughter herd accounted for by immature males in 1974 appears to be no greater than the percentage in more recent years (Chapter Seven, Table 7.4).

Small ruminant prices, on the other hand, show much greater variation among seasonal peaks (particularly Tabaski) than among the years since 1974. Prices that do not identify the species involved should be interpreted cautiously, since the difference in size between Sahelian and southern animals is large. The available data are contained in Table 9.3. However, this published data imply that the average values of sheep and goats probably have increased by less than 40 percent since 1974. The true price increase, intuitively, seems to be greater than this.[5] It is possible that the price observations are not for comparable items.

The next section considers the costs of meat production as well as expenditures on animals in wholesale markets.

TABLE 9.2

AVERAGE MARKET PRICES OF FULANI ZEBU CATTLE IN BAMAKO (KATI), 1974-1978
'000 FM/head

Year	1974				1975				1976				1977				1978	
Quarter	I	II	III	IV	I	II	III	IV	I	II	III	IV	I[b]	II[c]	III[d]	IV[e]	I[f]	II[g]
Steers (4 years +)	-	48	49	58	70	73	64	82	76	67	70	67	70	83	83	95	94	92
Bulls	-	—	41	56	69	67	62	75	--	--	—	—	65	74	79	74	—	82
Immature Males	-	19	26	31	37	28	28	39	34	26	26	33	35	30	35	46	41	51

SOURCES: OMBEVI Statistiques, 1974, 1975, 1976 and evaluations of reports by field agents thereafter. Quarterly figures are averages of monthly figures, unless otherwise indicated.

[a]Exports prohibited for six months in 1975

[b]Feb. only

[c]May-June only

[d]Sept. only, compare with 68,000 FM for steers in Nara market.

[e]Oct. only, compare with 67,000 FM for steers in Nara market.

[f]Feb. only

[g]May only

TABLE 9.3

AVERAGE SMALL RUMINANT PRICES IN BAMAKO (KATI), 1974-1978
('000 FM/head)

	Race	1974			1975				1976				1977				1978	
		II[a]	III	IV	I	II	III	IV	I	II	III	IV	I[b]	II[c]	III[d]	IV[e]	I[f]	II[g]
Adult male sheep	Sahel	—	13.7	16.8	—	—	—	—	—	—	—	—	—	—	—	21.2	13.0	13.6
	Southern	—	7.3	12.8	—	—	—	—	—	—	—	—	—	—	8.2	16.4	7.8	—
	Unspecified	10	11.6	14.2	12.7	10.0	11.7	19.1	11.7	10.6	10.6	14	9.8	10.8	—	—	—	—
Adult male goats	Sahel	—	6.5	7.2	—	—	—	—	—	—	—	—	—	—	13.1	10.2	11.2	—
	Southern	—	6.8	7.1	—	—	—	—	—	—	—	—	—	—	10.2	12.8	10.3	14.7
	Unspecified	8.8	6.7	7.1	9.9	9.6	11.4	14.1	10.3	11.4	8.7	9.2	9.1	12.6	—	—	—	—

SOURCES: OMBEVI Statistiques, 1974, 1975, 1976 and evaluations of field agent reports thereafter. Note that Tabaski fell in the November to December range between 1974 and 1977, explaining fourth quarter price jumps. The figures in this Table should be interpreted with extreme caution.

[a] April only
[b] Feb. only
[c] May only
[d] Sept. only
[e] Dec. only
[f] Feb. only
[g] July only

III. - Meat Production Costs

.. - The Traditional System

The main cost items of meat production in the traditional market are labor, loss of nimals and body weight during trekking, and various taxes.[6] The trek of more than 300 km rom Nara to Bamako may be associated with a significant loss of invested capital through hrinkage and attrition. Harms cites a 3.3 percent decline in herd size through mortality and disappearances" during a twelve-day trek at the end of the rainy season (1978, p. 6). The laughter taxes for cattle and small ruminants outside Bamako are 300 FM and 60 FM espectively, although the data in Chapter Seven shows that producers often avoid payment f these charges.

OMBEVI has recently put together estimates on the cost components of the domestic heat trade, beginning with the purchase of the animal in a northern market (Nara). The esults, shown in Table 9.4, indicate that the wholesale marketing costs of the traditional heat trade are relatively low. The combined net margins of the cattle broker and wholesale utcher are only 6 percent of the retail meat price. The net retail butcher's margin is 11 ercent. Over four-fifths of the production cost of meat at the Bamako abattoir gate is ccounted for by the purchase price of the animal in Nara.

This indicates that there is relatively little scope for cost cutting within the domestic attle and meat trade, as opposed to the long-distance trade to the coast. Wholesale cattle rices at Kati are in line with production costs, as far as can be judged. Therefore, policy ctions to increase the profitability of Malian exports should accept wholesale cattle prices s given. Attention should then be turned to cutting the costs specific to exporting. The ext section on the cost structure for the processing of exportable meat discusses a case in oint.

. - SOMBEPEC Meat Production Costs

SOMBEPEC has the monopoly on the export of meat; therefore its costs reflect the elevant cost structure for present purposes. The cost elements are set out in Table 9.5, sing the example of a steer costing 100,000 FM in Bamako, with a carcass weight of 140 kg fter slaughter.

This type of animal, purchased in Kati market in 1978, yielded carcass beef at a base ost (excluding any returns to the butcher) of 680 FM at the abattoir gate.[7] Table 9.5 shows hat various taxes and overheads boost this figure by more than 40 percent, yielding OMBEPEC's FOB export price.

The sensitivity of the latter to domestic cattle prices is demonstrated in Table 9.6. Using SOMBEPEC's mark-up pricing methods, a 100,000 FM steer with 140 kg of carcass meat nets out at 971 FM/kg (FOB). A wholesale price rise to 110,000 FM leads to a beef

TABLE 9.4

1977 MARGINS IN THE DOMESTIC CATTLE AND BEEF TRADE
(for a steer with 120 kg carcass weight in Bamako)

Item	Value added (FM)	Cost at each stage (FM)	Percentage Return to expenditures.	Percentage of final retail value
Purchase of the animal in Nara	70,200	70,200		75.1%
Marketing costs, Nara-Kati (herding, reimbursement for crop damages, losses, fees, and taxes)	2,225			2.4%
Cattle trader's margin	2,575		3.6%	2.8%
Sale price of animal in Kati		75,000		
Wholesale and slaughter costs (herding, slaughter fees, labor, taxes, and losses)	6,955			2.7%[a]
Sale of non-edible fifth quarter	-4,400			
Production expenses for 120 kg of carcass meat + 20.4 kg of offals		77,555		
Wholesaler's margin	3,325		4.3%	3.6%
Wholesale price at Abattoir gate		80,880		
Retailing costs (transport, spoilage, taxes)	2,100			2.2%
Retail butcher's margin	10,485		12.6%	11.2%
Retail price (including offals)	93,465[b]			100%

SOURCE: Adapted from OMBEVI (No. 100, 1978), Table 7.

[a]Offset by sales of fifth quarter items.

[b]Or 730 FM/kg, excluding offals evaluated at 300 FM/kg.

xport price of 1,064 FM/kg (FOB). Within the relevant price ranges, a 1 percent rise in holesale cattle prices increases SOMBEPEC's "break-even" FOB export price by nearly the ame proportion.

TABLE 9.5

AVERAGE EXPORT BEEF PRODUCTION COSTS FOR SOMBEPEC (1978)
(For a steer with 140 kg of carcass weight, expressed in FM)

Cost element	Per head	Per kg of red meat
Purchase price	100,000	714
Trek from Kati to abattoir:	200	
Slaughter tax	2,685	
Subtotal of sunk costs:	102,885	735
Carcasses rejected by veterinarian (2%)	2,058	
Subtotal (abattoir gate)	104,943	750
SOMBEPEC overhead (10%)[a]	10,494	
Packaging (wrapped at 15 FM/kg of carcass)	2,100	
Basis for license tax	117,537	840
License tax (0.15%)	176	
Basis for exit tax	117,713	841
Exit tax (5%)	5,886	
FOB cost Bamako	123,599	883
Desired profit margin (10%)	12,360	
FOB price Bamako airport	135,959 FM	971 FM

SOURCE: Prepared for the author by officials at SOMBEPEC (Oct. 1978).

[a]The disposal of approximately 35 kg of "fifth quarter" (offals, hide, etc.) per carcass, worth in excess of 10,000 FM, is a hidden overhead cost that could well be subtracted from the abattoir gate price and added to the overhead.

TABLE 9.6

RELATION BETWEEN CATTLE PRICES AND SOMBEPEC BEEF EXPORT PRICES, FOB BAMAKO (in FM)

Purchase price (Kati) 140 kg carcass weight animal	SOMBEPEC FOB cost per kg, Bamako airport	SOMBEPEC FOB price per kg Bamako airport
90,000	799	878
100,000	883	971
110,000	967	1,064
120,000	1,051	1,157
130,000	1,136	1,249

SOURCE: Prepared by the author, using the same methodology as in Table 9.5.

CHAPTER TEN

EXPORT COSTS FOR LIVESTOCK AND MEAT

The previous chapter showed that livestock and meat production in the traditional sector is not characterized by "excess profits" that jeopardize the competitiveness of Malian exports. Concern should therefore focus on export marketing rather than production costs. These include domestic and foreign taxes, non-official fees associated with trade, transportation costs, including the risk of losses, the opportunity cost of the owner's capital and time, and problems associated with securing payment and/or fraud.

Typically, export formalities are lengthy; the official fees for cattle represent over one-quarter of the marketing cost to the coast. Non-official fees along the way add to the burden, particularly in the case of trucked animals. Even taking into account the opportunity cost of tied-up capital, the cheapest method of exporting cattle to Abidjan is also the most time-consuming: trekking to Bouaké and rail transport thereafter. Surprisingly, transportation by truck is more often associated with mortality, forced sales, and shrinkage than is export on the hoof. Cattle shipments by road were prohibitively expensive in 1978 and are likely to remain so in the foreseeable future. On the other hand, truck transportation may be viable for small ruminants during certain peak periods of demand when the timing of sales is crucial.

Rail costs for small ruminant shipments to Dakar and Abidjan are modest, indicating a potential for trade development once there has been an improvement of infrastructure. Truck or air shipments of small ruminants to North Africa appear to be prohibitively expensive at this time. The cost of exporting meat by air is highly dependent upon the type of equipment used, the presence of return cargo and the price of aviation fuel. The need to guarantee regular shipments raises the cost of air freight above the minimum "space available" levels often cited in estimates of meat export costs.

I. - Modes for Exporting, Fees, and Taxes

A. - Modes of Exporting

1) - General Formalities

These are essentially two legal ways to export commodities from Mali. Traders or trading companies may use an export-import license, or they may apply for an exporter's permit. The second option is very seldom used, since all earnings in foreign exchange must be sold to the Central Bank. The first option permits the trader to import 75 percent of

the value of his exports in the form of commodities. Four-fifths of the licensed traders c trading companies operate out of Bamako (OMBEVI, No. 100, 1978, p. 35).

The most likely result of the linkage between imports and exports is an extr incentive for legal as opposed to unrecorded exports of cattle. The legal trader recoups substantial part of export costs through his license to import. On the other hand, he incur heavy fiscal costs, including income taxes. On balance, it appears that traders who woul otherwise have little interest in the legal cattle trade are in fact encouraged either t export cattle themselves or to rent their license to a livestock merchant.

2) - Modes of the Cattle Trade

Export lots of at least fifty head are often collected through purchases of smalle groups of animals in the main export markets such as Kati (Bamako), Niono, and Fatoum (Mopti). The most important export traders often have their own collection networks i rural areas, thus avoiding the central markets altogether (OMBEVI, No. 100, 1978, pp. 36 37).

Most cattle are trekked to Ferkéssédougou or Bouaké in Ivory Cast and thence shippe by rail, or sometime. truck, to Abidjan. OMBEVI estimates that 90 percent of 1976 cattl exports were trekked, 6 percent went over the border by truck, and 4 percent went by rail. In fact it seems that truck transportation of cattle within Mali is usually limited to fe animals. Weight losses in trekking defeat the purpose of the feeding programs. Th principal trekking routes run due south through Bamako and Bougouni to Ivory Coast an Liberia, southeast through Ségou and Koutiala to Ivory Coast (passing through Bobo-Dioulasso in Upper Volta or Sikasso in Mali), and east from Mopti to Kaya in Upper Volta and thence to Ghana, Togo, Benin and possibly Nigeria.[2] An unknown but measurably larg number of cattle are trekked east through the Gao region along the river, transiting Niger er route to Nigeria.

3) - Modes of the Small Ruminant Trade

The small ruminant trade makes relatively much greater use of truck and rail transport than the cattle trade. Shipments of at least 300 animals are often collected directly in rural areas and shipped from points on main roads. Truck and rail transport of small ruminants has the great advantage of rapid transit of animals at seasonal peak periods of demand. Over half of recorded exports in 1976 were trucked to Ivory Coast, while nearly one-quarter were sent by rail to Senegal (ibid., p. 41). Most recently, Algeria has become a promising market. Given that actual small ruminant exports are estimated to be 2.6 times as great as recorded exports (OMBEVI, No. 96, 1977, p. 15), this most likely implies that over half of actual small ruminant exports were trekked over the border in 1976.[3]

4) - Modes of the Meat Export Trade

The effective monopoly of SOMBEPEC over the meat export trade has been dealt with in the previous chapter. Shipments by refrigerated truck are judged infeasible because of a lack of equipment in good repair, the bad state of the roads which quickly cause damage to the trucks, long delays at customs posts, and the absence of return cargo. Recent experimental shipments to Nigeria and Algeria have gone by air.

B. - Malian Export Fees and Taxes

1) - Official Requirements and Costs

The official requirements and costs for obtaining an export permit for a herd of livestock are lengthy, exasperating and costly. The minimum time required to complete the procedures for one lot of cattle is one week, requiring visits to eight different offices. OMBEVI estimates the cost per animal to be 8,730 FM for cattle and 1,820 FM for small ruminants (Paper No. 100, 1978, p. 36). The costs are itemized in Table 10.1.

A movement to simplify the export procedures was started within OMBEVI in 1975 (Paper No. 58, 1975).

C. - Non-Official Fees and Foreign Taxes

1) - Non-Official Fees

"Non-official expediting fees" represent a quantifiable and expected export cost for cattle traders on both sides of the border. Although the costs are higher for private individuals, even in possession of the legal permits, they are also necessary expenses for the para-statal export agency SOMBEPEC. Mali's most important legal private trader had to pay 6,800 FM per head of trucked cattle between Bamako and Abidjan in early 1977 (OMBEVI, No. 89, 1977, p. 5). SOMBEPEC had to pay 3,600 FM per head over the same route (ibid.). ECIBEV had to pay 10,000 FM per head of cattle in early 1978 for trucked fed steers en route to Abidjan (from interviews). A standard allowance of 5,000 FM per head is in order for cattle trekked to Bouaké in Ivory Coast (OMBEVI, No. 100, 1978, p. 45).

Small ruminant traders are thought to be subject to the same order of illegal requests, allowing for the difference in the value of the commodities. Meat exports are sent by air and therefore escape the problem of having to negotiate road blocks. The few experimental meat shipments that have occurred are also subject to intense official scrutiny on both sides of the border, which helps explain the reported absence of non-official charges.

TABLE 10.1

OFFICIAL FEES REQUIRED FOR EXPORTING LIVESTOCK
(in FM)

Item	Per Herd of 50 Cattle	Per Herd of 300 Small Ruminants
Import-Export License, Pro-rated (or rental cost)	20,000	18,000
Purchase of Permit Documents	385	385
Bank Fees for Required Foreign Exchange transactions	1,330	1,330
Fee For the Internal Revenue Service (Patente des Contributions Directes)	30,000	15,000
OMBEVI Certification	5,000	15,000
Health Tax	15,000	48,000
Fiscal Stamps	15,000	13,500
Export Taxes	200,000	300,000
State Surtax (Contribution pour la Prestation des Services)	150,000	135,000
TOTAL	436,715	546,215
PER HEAD	8,730	1,820

SOURCE: OMBEVI (No. 100, 1978), p. 36.

2) - Foreign Taxes

Malian livestock and meat are treated as raw materials by the six member states of the CEAO (Communauté Economique de l'Afrique de l'Ouest)[4] and therefore are not subject to import duties within the CEAO zone. Some of the member countries nonetheless continue to tax imported livestock and meat at the frontier under the guise of "production taxes" not subject to the CEAO agreement.[5] Table 10.2 shows that tariff barriers are highly variable among members of the CEAO. Ghana and Liberia continue to levy import duties, being outside the economic community. Niger, Senegal, and Ghana have important tax barriers to entry of livestock and meat.

TABLE 10.2

FOREIGN IMPORT TAXES PAYABLE BY MALIAN CATTLE AND MEAT EXPORTERS, 1978
(in FM)

Country	Name of Tax	Basis of Assessment	Amount Per Steer Worth 120,000 FM at Border	Amount Per Small Ruminant Worth 20,000 FM at Border	Amount Per Kg of Carcass Beef worth 900 FM
Ivory Coast	None	-0-	-0-	-0-	-0-
Senegal[a]	Taxe Commerciale et Artisanale	15.93% of CIF value at border	19,100 FM	3,200 FM	143 FM
Niger[a]	Taxe à la Production	26% of CIF value at border	31,200 FM	5,200 FM	234 FM
Ghana	Import Duties	Per head for Livestock; 35% of CIF for Meat[b]	12,600 FM	Sheep: 4,350 FM Goats: 2,500 FM	315 FM
Liberia	"Consular Invoice Fee"	1.5% of CIF Value at Border	1,800 FM	300 FM	14 FM

SOURCES: Ivory Coast, Senegal, Niger, and Ghana (livestock): CEAO (1978).
Ghana (meat): Sullivan (1979) in vol. II of this study.
Liberia: Josserand (1979) in vol. II of this study.

[a]At the time of writing, the levy of "production taxes" at border posts in Senegal and Niger were being reconsidered by the governments concerned. Preliminary indications were that they would be scrapped.

[b]Temporarily reduced to 2.5 percent by the Meat Marketing Board in 1978.

II. - Transport and Other Costs of Exporting Cattle from Mali to Ivory Coast

A. - Time and Labor Requirements of Different Transport Options

1) - The Basic Transport Options

Herders may choose from three main transportation options in travelling from a Malian collection market to the coast. Each option emphasizes one of the following: trekking on foot, trucking or rail shipment. The basic tradeoffs are between time (including rotation of capital) on the one hand and cost of the means of transport on the other. There is a wide range of choice among these options. Specific values will be illustrated by the problem of exporting fifty head from an important northern collection market in Mali (Niono) to the main export market, Abidjan.

The herd can either be walked or trucked through Mali to railheads at Ferkéssedougou in Northern Ivory Coast or Bobo-Dioulasso in Upper Volta.[6] From Ferkéssédougou, cattle may either continue south on foot or be shipped by rail. Most Malian export herds are loaded in rail cars at Bouake (Staatz, 1979, Chapter Six). In any event, trekking is prohibited south of Yamoussoukro. To the extent that trucking is used at all north of Bouaké, it appears to be limited to fed cattle.

Thus three main scenarios represent the options available for a typical export consignment starting out from Niono. First, the animals can be walked the 860 km to Bouaké and shipped by rail the remaining 390 km south to Abidjan. Second, the cattle may be loaded in rail cars some 230 km north of Bouaké at Ferkéssédougou. Third, they may be trucked the entire 1,250 km from collection market to terminal market. These are the basic trekking, rail, and trucking strategies.

2) - Time and Labor Requirements

Fifty head require the labor of three drovers for trekking, but only two are required for shipment by truck or rail (Staatz, ibid.). The vehicles used for shipment typically contain twenty-five animals apiece. Herds being trekked average approximately sixteen km per day. The transit times required by each transport option are given in Table 10.3.

Naturally, the trekking alternative is the most labor intensive of the choices, requiring a total of 185 man-days of labor on the part of the drovers. The trucking operation, on the other hand, only requires sixteen days, including return transportation for the herdsmen. Trekking also has the disadvantage that capital is tied up in the herds a much longer time than in the rail and truck options. Including the time required to complete Malian export formalities and to make the return trip after sale of the animals, minimum turn-around time for invested funds under trekking is seventy-seven days. With trucks it is only twenty-one days.

TABLE 10.3

TIME AND LABOR REQUIREMENTS FOR EXPORTING FIFTY HEAD OF CATTLE FROM NIONO TO ABIDJAN UNDER DIFFERENT OPTIONS
(in man-days)

	Trek to Bouaké, then Rail to Abidjan	Trek to Ferkéssédougou, then Rail to Abidjan	Truck to Abidjan
Time Required For Malian Formalities After Purchase	7 owner-days	7 owner-days	7 owner-days
Time Required For Trekking	57 days x 3 drovers	45 days x 3 drovers	-0-
Time Required For Shipping	2 days x 2 drovers	2 days x 2 drovers	3 days x 2 drovers
Time Required for Marketing in Abidjan[a]	11 owner-days 5 days x 2 drovers	11 owner-days 5 days x 2 drovers	11 owner-days 5 days x 2 drovers
Number of Days Capital is Tied Up[b]	77 days	65 days	21 days
Number of Owner-Days Required	18 days	18 days	18 days
Number of Drover-Days Required	185 drover-days	149 drover-days	16 drover-days

SOURCES: Times taken from Staatz (1979, Chapter Six), based on interviews with owners and drovers. Where data is missing (such as from Niono to Koutiala), trekking times are calculated assuming that a herd covers 16 km per day.

[a]Includes unloading, marketing, roundtrip travel for owner, and return travel to Mali for drovers.

[b]The capital involved is greater for trucking.

B. - Average Per Animal Costs of Exporting under Different Options

1) - Transportation Costs for Truck, Rail, and Trekking

The major cost considerations in the choice of transportation methods are vehicle rental costs, loss of carcass weight through deaths, forced sales and shrinkage, and drover wages, in that order. The charges for truck rentals are dependent to a large extent upon the season Rates of up to 1 million FM per truck have been observed. ECIBEV paid 700,000 FM per truck of twenty-five animals to export steers from Niono to Abidjan in 1977 (OMBEVI, No. 89, 1977). Peak rates occur during the rice harvest in Mali and the cocoa and coffee harvests in Ivory Coast, between November and January (Staatz, op. cit.). Truckers dislike hauling cattle, make no special provisions for carrying animals, and tend to regard cattle as a back-haul cargo of the last resort (ibid.). Rail cars are often difficult to obtain, and a considerable amount of time can be spent waiting to load and unload the animals (ibid.). OMBEVI estimates that the cost per ton per km of shipping by truck is 74 FM, compared to 56 FM for rail and 25 FM on foot (Paper No. 100, 1978, p. 44).

Surprisingly, transportation by truck or rail is associated with higher mortality, more forced sales, and greater shrinkage than is trekking (ibid.). This is because the animals are not off-loaded at regular intervals for watering and feeding. Cattle may spend three days in confinement.[7] A joint ECIBEV-SOMBEPEC shipment of cattle in 1977 experienced 16 percent shrinkage in liveweight between Niono and Abidjan, although the animals regained 10 percent of liveweight after 48 hours in the pens at Abidjan (OMBEVI, No. 85, 1977). Staatz estimated a 9 percent loss of carcass weight for cattle sent by rail between Ouagadougou and Abidjan after allowing for reduced paunch weight (op. cit., pp. 242-243). He calculated that the total carcass weight loss for the ECIBEV animals shipped from Niono was 7 percent after forty-eight hours in Abidjan. Mortality for truck shipments in the Ivory Coast portion of the trip was estimated at 2 percent (ibid.).

By contrast, trekked animals may actually gain weight between Sikasso and Bouake during the rainy season.[8] OMBEVI reports only a 5 percent loss of liveweight for herds moving on foot in the dry season between Mopti and Bouake (Paper No. 100, 1978, p. 43). Furthermore, a survey of cattle merchants in Bouake conducted by Staatz in 1977 indicates that loss of animals through mortality during trekking is only half that during trucking over a comparable distance (Staatz, 1979, p. 239).

2) - Average Costs of Exporting from Niono to Abidjan under Three Transport Options

The transport option making the greatest use of trekking is the cheapest way to transport cattle from Mali to Abidjan, even allowing for the opportunity cost of tied-up capital. This is illustrated in Table 10.4 for fifty-head consignments leaving Niono for

Abidjan. Transport charges alone range from 10,200 FM to 33,300 FM per animal for trekked and trucked cattle, respectively. The latter alternative appears to be prohibitively expensive under current structures. The overall average cost per animal is therefore minimized by trekking to Bouaké and shipping thence by rail, yielding a total cost of 30,600 FM per head. Boarding the railroad earlier at Ferkéssédougou results in a relatively small saving of time and raises per animal costs 4 percent higher than the longer trekking option. On an overall basis, the trucking strategy is 75 percent more expensive than trekking to Bouaké.

The cost figures in Table 10.4 (following) charged the opportunity cost of tied-up capital at 20 percent per annum, pro-rated to reflect the number of days involved. Time savings from trucking simply do not justify the extra cost; trucking is still 70 percent more expensive than trekking the animals as far as Bouaké.[9]

III. - Costs of Exporting Small Ruminants and Meat to Ivory Coast, Senegal, and North Africa

A. - Costs of Exporting Small Ruminants to Ivory Coast and Senegal

Over one-half of the actual exports of small ruminants in 1976 were trekked over the border, based on recorded figures and an estimated actual flow of 220,000 head. Nevertheless, exports by rail to Dakar and Abidjan appear to be paying propositions, particularly in the periods preceding important Muslim feast days. Trucking is of seasonal interest for exports to Ivory Coast.

The available data on transport and other export costs for small ruminants are set out in Table 10.5. The figures are of use primarily in estimating an order of magnitude.[10] It costs roughly 7,000 to 8,000 FM per head to market sheep and goats from western Mali to Dakar, including 3,200 FM in import duties, provided that rail cars are available at Kayes. Small ruminants can be exported from Ségou to Abidjan for 5,000 to 6,000 FM, all expenses included, provided that rail cars are available at Ferkéssedougou. Trucking is more expensive at 9,000 FM per head but may be advantageous at seasonal peak periods because of rail bottlenecks and the need to meet delivery deadlines.

B. - Costs of Exporting Small Ruminants to North Africa

As shown in Table 10.5, trucking animals in regular consignments (as opposed to a few sheep carried as "extra" cargo) across the Sahara from Gao to Algeria is prohibitively expensive at 36,000 FM/head.[11] This high figure is largely due to uncertainties regarding the return cargo. Substantial Malian exports of small ruminants to Algeria are trekked over the border in the rainy season (personal communication from Dr. Moulaye Attaher, after a fact-finding trip to Gao).[13]

TABLE 10.4

COST OF EXPORTING FIFTY HEAD OF CATTLE FROM NIONO TO ABIDJAN IN 1977
(in FM)

	Trek to Bouaké, then Rail to Abidjan		Trek to Ferkéssédougou, then Rail to Abidjan		Rail to Abidjan	
	(FM)	% of Total	(FM)	% of Total	(FM)	% of Total
Official Malian Fees and Taxes[a]	437,000	30%	437,000	29%	437,000	17%
Transportation Costs						
Salary and expenses of drovers[b]	176,000	12%	110,000	8%	48,000	2%
Ivorian health certificate[c]	8,000	1%	8,000	1%	8,000	-
Indemnities for damaged fields[d]	2,000	-	1,000	-	-0-	-
Salt for animals[e]	1,000	-	1,000	-	-0-	-
Loss of animals[f]	100,000	7%	125,000	8%	150,000	6%
Forced sales of animals[g]	32,000	2%	60,000	4%	60,000	2%
Truck or rail transport charges[h]	191,000	13%	262,000	17%	1,400,000	56%
(Subtotal for transportation costs)	(510,000)	(35%)	(576,000)	(38%)	(1,666,000)	(66%)
Non-official Fees[i]	250,000	17%	250,000	17%	300,000	12%
Owner's Costs						
Round trip car fare to Abidjan[j]	26,000	2%	26,000	2%	26,000	1%
Housing and food in Abidjan, 7 days[k]	8,000	1%	8,000	1%	8,000	-
Opportunity cost of tied-up capital[l]	244,000	17%	206,000	14%	82,000	2%
(For interest payments to creditor pro-rated at 20% per annum)	(77 days)		(65 days)		(21 days)	

TABLE 10.4 (Continued)

	Trek to Bouaké, then Rail to Abidjan		Trek to Ferkéssédougou, then Rail to Abidjan		Rail to Abidjan	
	(FM)	% of Total	(FM)	% of Total	(FM)	% of Total
Total[m]	1,475,000	100%	1,503,000	100%	2,519,000	100%
Per Animal (less losses and forced sales)	30,600		31,800		53,600	

SOURCES:

[a]Table 10.1.

[b]Includes salary, food, and return trip, allowing for free tickets provided to drovers over rail distances. Three drovers are needed for trekking, but two are sufficient for shipping (Staatz, 1979, Chapter 6). Drover costs are computed as 176,000 FM (allowing 10,000 FM for rail labor costs) in trekking as far as Bouaké (OMBEVI, No. 100, 1978, p. 43), 119,000 FM in trekking as far as Ferkéssédougou and thence by rail (Staatz, 1979, p. 214), and 48,000 FM per man in trucking directly to Abidjan (ibid, p. 234).

[c]Staatz, pp. 234-235.

[d]Arbitrarily determined. Compare with 500 FM over a shorter distance (Staatz).

[e]Staatz.

[f,g]Taking the figures in Staatz and allowing for 1% loss and 1% forced sales on the trek between Niono and Koutiala. Total losses are computed at 100,000 FM per animal lost. Forced sales are assumed to occasion a loss of 40,000 FM per animal sold.

[h]Includes straw, extra help in unloading and miscellaneous rail transport expenses (see Staatz, Table 6.3). Two trucks are required for direct shipping, at 700,000 FM each between Niono and Abidjan.

[i]Section I.C.1 in text.

[j,k]Staatz.

[l]For trekked cattle, this equals ≈ 20% per annum charge for 5.8 million FM in credit to cover the purchase of the animals and payment of official and nonofficial fees, based on the number of days en route (Table 10.3). For cattle sent by truck, the cost of the vehicles is added in.

[m]Summation.

TABLE 10.5

ILLUSTRATIVE COMPARATIVE COSTS OF EXPORTING SMALL RUMINANTS TO IVORY COAST, SENEGAL, ALGERIA, AND LIBYA
(for shipments of 300 animals, in thousands of FM, net of import duties)

Destination:	Abidjan			Dakar	Algiers	Tripoli
Departing From:	Ségou	Ségou	Ségou	Kayes	Gao	Gao
Method of Transportation:	Truck to Abidjan	Trek to Ferké, (520 km); Rail thereafter (614 km)	Trek to Ferké, (520 km); Rail thereafter (614 km)	Rail (750 km)	Truck (dry season) (3,100 km)	Air (2,500 km)
Official Malian Fees and Taxes[a]	546	546	546	546	546	546
Approximations of Transportation Costs (vehicle rental, losses, labor, etc.)	1,600[b]	950[c]	550[b]	500[d]	9,300[e]	6,550[b]
Non-official Fees[f]	300	250	250	50	100	-
Charge on Tied-up Capital at 20% p.a.[h]	80 (3 weeks)	72 (3 weeks)	158 (7 weeks)	44 (2 weeks)	278 (5 weeks)	178 (4 weeks)
Owner's Marketing Expenses[i]	34	34	34	34	225	225
Total (to the nearest 50,000 FM)	2,550	1,850	1,550	1,150	10,450	7,500

Table 10.5 continued

Destination:	Abidjan			Dakar	Algiers	Tripoli
Departing From:	Ségou	Ségou	Ségou	Kayes	Gao	Gao
Per Animal (based on 291 animals at sale, to the nearest 1,000 FM)[j]	9	6	5	4	36	26

NOTE: The figures for costs of exporting to Algiers and Tripoli are based largely on guesswork, since air freight rates depend so much on the regularity of the route. The figures cited are valid primarily as estimates of the correct order of magnitude.

SOURCES:

[a]Table 10.1.

[b]From transportation costs over the same route for 50 head of cattle in Table 10.4, adjusted for departure from Ségou.

[c]Pro-rating truck transport charges on a kilometer basis, and adding the rail charge and associated expenses for 2 cars from Ferkéssédougou to Abidjan.

[d]The charge for two rail cars and associated expenses reported in OMBEVI (No. 100, 1978, p. 43).

[e]Assumes that one truck can carry 150 animals and that the charge per truck is 150 FM/km.

[f]Assumes that the 300 animals constitute a cargo of 10 tons transportable by one aircraft. The cost of air transport is estimated at 654 FM/kg. (OMBEVI, No. 59, 1975, Appendix IV). This figure also assumes that return cargo to Gao is not available.

[g]Figures for the Ivory Coast shipments are taken from the estimates for 50 head of cattle in Table 10.4. The Dakar and Algiers figures are guesses.

[h]The amount tied up is the purchase price of the animals in Mali of approximately 4.5 m FM plus costs for fees and transportation. The time periods for Ivory Coast are based on Table 10.4. The time periods for North Africa include the time required for repatriation of other funds (this is optimistic).

[i]These include a trip to the coast for the owner selling in Ivory Coast or Senegal, or a 5 percent commission on the FOB value of the animals for North Africa. The former does not include, therefore, a valuation on the owner's time.

[j]Based on a 3 percent observed mortality for truck transport to Ivory Coast (OMBEVI, No. 85, 1977, p. 8).

The feasibility of air consignments of live animals from Gao to Tripoli depends upon the type of equipment used, the coordination of flights to provide return cargo (perhaps all the way to Bamako), the evolution of aviation fuel prices, and the premium that consumers attach to live animals for ritual purposes. The best estimate for shipment by Air Mali at 1977 prices was a cost of 26,000 FM per head, in addition to the purchase price at Gao. This figure is likely to be considerably higher in the immediate future but might fall if the Libyo-Malian project at Gao obtains a DC 8, or if the Libyan government decides to subsidize the aviation fuel. In any event, consumers would have to be prepared to pay nearly twice as much for meat purchased from the live animal as opposed to meat on the carcass in order for live animal shipment by air to be justified from an economic standpoint. This is unlikely except, possibly, during religious holidays. In general the prospects appear doubtful.

C. - Costs of Exporting Meat to Ivory Coast, Senegal, and North Africa

Exports of red meat by refrigerated truck are ruled out by frequent malfunctions in existing rolling stock and the general state of the roads. The historical experience has been one of frequent spoilage. The comparative costs of shipping meat to different export markets in 1977-78 are given in Table 10.6. The average cost per kilogram of beef on the truck route to Abidjan was 350 to 400 FM. Air consignments suffer, as indicated in the previous section, from irregular routes, small volume and the absence of return cargo. The Abidjan run offers the best possibility for air shipments, precisely because of the existing pattern of traffic. Even so, 1978 data show an average total cost of 250-300 FM per kg for exports sent via this option. A further disadvantage is that the rates are on a "space available" basis, vitiating efforts to set up the type of regular shipping arrangements necessary in the perishable food business. Cost figures at 1977 rates for loads from Bamako to Algiers are estimated at 500 to 900 FM per kg,depending upon the existence of return cargo. Similar numbers for exports from Gao to Tripoli are 450 to 800 FM. These rates should be much higher in the future as a result of fuel price increases.

TABLE 10.6

COMPARATIVE COSTS OF EXPORTING MEAT TO
IVORY COAST, ALGERIA, AND LIBYA
(in FM/kg of carcass meat)

Destination:	Abidjan		Algiers		Tripoli	
Departure from:	Bamako	Bamako	Bamako		Gao	
Method of Transport:	Refrigerated Truck	Air (1,100 km)	Air (3,000 km)		Air (2,500 km)	
	Return Cargo	Return Cargo	No Return Cargo	100% Return Cargo	No Return Cargo	100% Return Cargo
Official Malian Fees[a]	43	43	43	43	43	43
Freight Charges	100[b]	135[c]	736[d]	368[d]	654[e]	327[e]
Health Inspection on Arrival[b]	20	20	20	20	20	20
Allowance for Spoilage[g]	218	56	87	68	82	66
Total, net of Import Duties[h]	381	254	886	499	798	456

SOURCES:

[a]From Table 9.5. Difference between FOB cost Bamako (883 FM) and basis for license tax (840 F) = 43 FM.

[b]Assuming that a 10-ton capacity truck is available for 1,000,000 FM.

[c]OMBEVI (No. 100, 1978, p. 48).

[d]Assumes same rate per kilometer as Abidjan run. This rate could be reduced by exporting on a space-available basis if UTA would make extra stops on the freight routes from Abidjan to Paris.

[e]1975 figure from OMBEVI (No. 59, 1975, Appendix IV), assuming use of existing equipment. This could be reduced through use of a more efficient DC8, or possibly through a combined flight from Bamako to Gao to Tripoli, returning to Bamako.

[f]Ivorian fee, extrapolated to other countries.

[g]Based on a FOB price of beef of 971 FM at Bamako (Table 9.5) plus freight charges and health inspection on arrival: 5 percent for air shipments, 20 percent for trucks (due to frequent breakdown).

[h]There are no import duties for Malian meat arriving in Ivory Coast. Presumably the duties for North Africa are absorbed by the parastatal importing agencies.

CHAPTER ELEVEN

THE OUTLOOK FOR MALIAN LIVESTOCK EXPORTS TO 1985

In the absence of political intervention within the CEAO, prospects for Malian livestock sector exports depend ultimately upon their competitiveness relative to alternative sources of supply in the coastal markets. An adequate conceptual framework for investigating the relative prices of Malian and competing exports in equilibrium requires data that are not available at this time. In the absence of a more satisfactory model of supply and demand in export markets, two "partial equilibrium" approaches give useful insights into the medium-run outlook for Malian foreign trade in livestock. First, projections of domestic consumption (Table 11.1) are netted out from projected domestic production. The remainder gives an idea of the Malian capacity to export in 1985. These figures may be compared to a similar projection of the demand for meat imports in the coastal countries. The latter indicate whether the Malians will be able to dispose of surplus livestock at acceptable prices. Second, a breakdown of Malian export costs based on the current price structure gives some idea of the latitude for compressing export prices, in addition to predicting exporter behavior. Considered together, the two approaches afford an educated guess of likely developments.

The first approach suggests that Mali will in fact have an "exportable surplus" in 1985 substantially lower than that projected by OMBEVI. On the other hand, demand for imports on the coast is likely to be high enough to rule out fears of lack of a market due to low import requirements. Furthermore, likely increases in world meat prices through the early 1980's would put Mali in a competitive position to take advantage of those demand increases.

The second approach shows that export gains are most likely for traditional exports of cattle and small ruminants. The post-drought evidence suggests that a 50 percent increase in beef prices between Bamako and Abidjan ensures a good return to trekked cattle consignments. Trucking of cattle is not presently profitable. The outlook for small ruminant exports is good on a year-round basis, with the big margins around the Muslim feast of Tabaski justifying even high cost methods of transportation (such as taxi-brousse) at that time. There appears to be little potential for meat exports on anything greater than an experimental scale through 1985.

TABLE 11.1

PROJECTIONS OF NATIONAL LIVESTOCK AND MEAT CONSUMPTION, 1978-1985

YEAR	RANGE CATTLE		SHEEP AND GOATS	
	NATIONAL CONSUMPTION IN METRIC TONS OF MEAT AND OFFALS	DOMESTIC SLAUGHTER (IN THOUSANDS OF HEAD)	NATIONAL CONSUMPTION IN METRIC TONS OF MEAT AND OFFALS	DOMESTIC SLAUGHTER (IN THOUSANDS OF HEAD)
1978	47,815	306	46,851	2,910
1979	50,278	322	48,097	2,987
1980	52,826	338	49,459	3,072
1981	55,611	356	50,797	3,155
1982	58,579	375	52,184	3,241
1983	61,682	395	53,669	3,333
1984	65,048	416	55,157	3,426
1985	68,632	439	56,691	3,521

SOURCES: The assumptions and methods of Tables 7.9 and 7.10 are used to project the consumption of meat and offals. These concern rates of population growth in the urban and rural sectors, the price and income responsiveness of Malian consumers, and trends in real per capita income. The figures for the consumption of meat and offals are translated into number of head slaughtered using the assumptions of Table 7.11.

I. - The Numbers Game: Projections of the Malian Market Share for Livestock and Meat on the Coast in 1985

A. - The "Exportable Surplus" of Livestock to 1985

1) - Trends in Domestic Consumption to 1985[1]

According to the assumptions of Chapter Seven, the national consumption of beef was only marginally greater than that of mutton in 1978. However, beef and beef by-products are projected to account for 55 percent of the domestic consumption of beef, sheep and goat meat, and edible offals by 1985. This is largely the result of the assumptions of increasing urbanization, the relatively greater rate of per capita income growth in towns as opposed to rural areas, and a pronounced urban preference for beef rather than mutton. It should be clear that these extrapolations assume that the prices of beef, mutton and other necessities for the low-income consumer grow at approximately the same average rate over the next half-dozen years. Actual price behavior will most likely depend upon the coastal demand for exports.

2) - The "Exportable Surplus"

The best estimate of the excess of projected production of cattle in 1985 over projected domestic slaughters is only 68 percent of the OMBEVI estimate. The figures in Table 11.2 show an "exportable surplus" of 156,000 head of range cattle, equivalent to 27,000 to 28,000 metric tons of beef and edible offals. For fed cattle the revised estimate is an upper bound which assumes that the entire 1985 production of 9,400 head is exported. While this is far more conservative than the official planning estimate of 37,000 head, in actuality it is likely that the feeding operations will add less than 1,000 tons to exports of beef on the hoof. With regard to small ruminants, the large differences in the estimates of the exportable surplus illustrate the impossibility of projecting behavior in this field with any degree of confidence. The fourfold difference between high and low figures results from different assumptions about animal mortality, all of which are plausible. The OMBEVI figure of one-half million head is middle-of-the-road.

There are three appropriate conclusions from the "exportable surplus" calculations. First, the official planning view overestimates Mali's capacity to export range cattle by as much as one-third. Second, existing projections of the possibilities of producing fed cattle for export are entirely unrealistic. Third, the information required to estimate the potential contribution of small ruminant exports to the Malian economy in any quantitative sense is totally lacking. The last point is particularly unfortunate, since it will be seen that this is precisely the livestock and meat commodity with great potential for export development.

B. - Import Requirements of the Ivorian Market in 1985

1) - The Overall Quantity Requirements for Beef

Figures compiled by John Staatz show that the total beef supply (including offals) in Ivory Coast increased by 86 percent between 1967 and 1977. Table 11.3 illustrates that domestic production doubled over the same period. However, the latter accounted for only 15 percent of the total supply in 1978. On the basis of income, price and population trends, Staatz projects that the Ivorian consumption of beef from foreign sources should increase from 25 to 45 percent between 1977 and 1985 (1980, Chapter Seven). This would mean imports of cattle and beef equivalent to at least 48,000 metric tons of meat and edible offals in 1985. This minimum figure is similar to OMBEVI's estimate of 38,000 tons of carcass beef (Paper No. 101, 1978).[2]

2) - Quantity Requirements for High Quality Beef

As a matter of policy, the governments of Upper Volta, Ivory Coast and Mali have promoted the production of high quality meat from the rear quarters of fed cattle. The

TABLE 11.2

PROJECTIONS OF THE "EXPORTABLE SURPLUS" OF MALIAN LIVESTOCK, 1978-1985
('000 head)

YEAR	RANGE CATTLE		FED CATTLE		SMALL RUMINANTS		
	OMBEVI	Revised	OMBEVI	Revised	OMBEVI	Revised- "HIGH ESTIMATE"	Revised- "LOW ESTIMATE"
1978	96	103	7	2.3	154	366	-188[a]
1979	125	134	12	3.0	338	447	-132
1980	160	161	19	6.2	359	529	-77
1981	190	159	21	9.8	381	621	-14
1982	202	160	28	9.9	549	717	53
1983	241	159	31	9.1	533	817	122
1984	236	158	34	9.2	515	925	197
1985	228	156	37	9.4	495	1,041	279

SOURCES: The OMBEVI projections are from Paper No. 96, 1977. They are reaffirmed in Paper No. 100, 1978. The revised figures for cattle are computed by subtracting the estimated domestic slaughter in Table 11.1 from the estimated offtake in Table 6.8. It is assumed that all fed cattle are exported. Similarly, the "high" and "low" estimates for small ruminants are computed using the figures for estimated offtake in Table 6.7. The "high" estimate corresponds to the case where gross herd productivity is a uniform 32 percent across the country. The "low" estimate assumes higher animal mortality in central and southern areas.

[a]A negative number suggests net imports from Mauritania.

TABLE 11.3

THE IVORIAN BEEF SUPPLY 1967 TO 1977 AND
PROJECTIONS OF REQUIREMENTS IN 1985
(in tons of meat and edible offals)

YEAR	Domestic Production	From Sahelian Countries	From South America	Other Imports[a]	Total Imports	Total Supply
1967	3,829	20,811	--	103	20,914	24,743
1969	4,157	32,517	--	102	32,619	36,776
1971	4,881	34,062	—	104	34,166	39,047
1973	5,430	39,848	—	138	39,986	45,416
1975	6,316	25,052	580	4,778	30,410	36,726
1977	7,647	25,709	11,861	753	38,323	45,969
1978	7,876	27,730	16,512	1,363	45,605	53,481
Projections for 1985	15,200	?	?	?	48,100-55,700	63,300-70,900

SOURCE: Staatz (1980), Tables 2.11 and 7.1.

[a]Principally from France and Southern Africa.

eventual markets for all these producers are the class 1 butchers in Bouake and Abidjan. Nevertheless, Staatz calculates that the total demand for beef on the class 1 market in Ivory Coast is unlikely to excede 3,000 tons in 1985. Table 11.4 shows that the share of this market supplied by imports is falling as a result of Ivorian domestic production at feedlots such as the complex at Ferkessedougou. Therefore, the potential market for the Sahelian nations is limited, even if they could entirely displace the exports from South America. The revised projection of fed cattle output for 1985 in Mali alone would produce roughly 900-1000 tons in rear quarters, which may equal the size of the entire Ivorian market for imports at that time. Mali, however, will have to share the market at least with Upper Volta. The feedlot complex at Banfora is likely to undersell the Malians because of proximity to the railroad. It produces roughly 250-300 tons of rear quarters annually. The conclusion is that even if transport problems are overcome, Mali will have to seek alternative markets for fed cattle in order to reap a premium for most of its higher quality meat production.

TABLE 11.4

THE IVORIAN MARKET FOR HIGH QUALITY IMPORTED BEEF, 1967-1977
(in metric tons of chilled and frozen beef)

YEAR	Sahelian Countries[a]	Europe[b]	South America	Southern Africa[c]	Total
1967	1,249	103	--	--	1,352
1977	181	112	474	528	1,295

SOURCE: Staatz (1980), Tables 2.7 and 2.9

[a]Mostly coming from Upper Volta by rail. See Staatz (1979), p. 41.

[b]Excludes consignments of low-quality beef sent by sea.

[c]Mozambique, Botswana, and South Africa

3) - Likely Ivorian Imports of Small Ruminants and Mutton

Data on Ivory Coast's requirements for small ruminant imports were not available at the time of writing. Nevertheless, the demand for live sheep and goats for ritual purposes seems assured. Furthermore, small ruminant and possibly mutton imports are likely to play a substantial role year-round in supplementing the red meat supply in Ivory Coast. Staatz estimates that imports will be 30 to 58 percent higher in 1985 than in 1977 (ibid.). Assuming

that actual exports from Mali in 1977 were about one-quarter million head and that Mali retains its market share, the Ivorian demand for Malian small ruminants in 1985 would be between 310,000 and 365,000 head.

C. - The Malian Share of the Ivorian Red Meat Supply in 1985

It appears unlikely that Mali will recoup its pre-1975 share of the Ivorian beef market by 1985. Mali had a mean share of 50 percent of the total Ivorian supply of beef and edible offals between 1967 and 1974 (see Chapter One, Table 1.1). This figure shrank to an average of 37 percent in the post-drought period from 1975 to 1977. Shipment of the entire "exportable surplus" of Malian cattle to Ivory Coast in 1985 would satisfy no more than 44 percent of the estimated requirements for beef and edible offals in that year. Furthermore, the Malian share in Ivory Coast's beef supply in 1985 would drop to 33 percent at most if Mali continues the post-drought pattern of sending roughly one-quarter of its cattle exports to other destinations.

The scarcity of credible data on either side of the border rules out attempts to repeat these calculations for small ruminants, or in fact for any exports going to other destinations. Even in the well-researched case of cattle destined for Ivory Coast, the comparison of "exportable surplus" to "import requirements" ignores cost elements, prices and the returns to Malian exporters. It is therefore of great importance from the standpoint of predicting exporter behavior to have some idea of the relative returns to different livestock and meat exports to different destinations. The next section addresses this issue, using data from the 1977/78 season.

II. - The Profitability of Various Livestock and Meat Export Strategies in 1978

A. - Returns to the Export of Range Cattle, 1975-1978

1) - Importance of the Central Corridor

In the post-drought era, virtually all Malian range cattle exports are thought to have gone to Senegal, Ivory Coast, Liberia (via Ivory Coast) and Nigeria (via Niger). The magnitude of the flow of cattle to Nigeria is unknown but probably minor in comparison with shipments bound for Ivory Coast. The latter country and Liberia accounted for nine-tenths of recorded cattle exports between 1975 and 1977 (see Chapter Eight, Table 8.2). The discussion will therefore be limited to the profitability of range cattle exports through the "central corridor" from Mali to Ivory Coast. Another reason for this restriction is that data of comparable quality for Senegal and Nigeria are not available.

2) - The Relationship Between the Profitability of Cattle Exports and Retail Meat Prices

Three separate calculations of the costs and returns to trekking cattle to the Ivory Coast show that it was a highly profitable activity at 1978 prices. Trucking, on the other hand, led to net losses. The data compiled by OMBEVI (Paper No. 100, 1978), Staatz (1979, Chapter Six) and the present work are adjusted so as to be fully comparable in Table 11.5. The purchase and sale prices and shrinkage rate assumed by OMBEVI are used for the present purposes in all three estimates. All agree that each legal consignment of cattle brings an 11 percent return to capital when there is a 50 percent increase between Bamako and Abidjan in the per kilogram liveweight price.

This rate of return yields annual profits at least equal to other opportunities in the informal sector if funds are rotated more than once a year. The consensus is that capital is rarely rotated more than twice a year (see Staatz, 1979, Chapter Six). This is explained only in part by the length of each rotation, which is just under three months. Seasonal aspects of the cattle trade most likely also play a part. It is difficult to get consignments together in the delta or northern regions of Mali before the end of the rainy season. Many herds are away on transhumance at this time. It is also a difficult period for trekking because of the danger of crop damage. Therefore shipments start in earnest around the end of October. This leaves time for only two rotations before the next rainy season. Furthermore, delays in repatriating funds can easily limit activity to one rotation, since cattle become scarce on the market as the dry season advances and Malian prices rise sharply.

Table 11.5 shows that the OMBEVI estimate of the returns to trucking range cattle to Abidjan is far too optimistic. Instead of the 5 percent net profit predicted by OMBEVI, a 10 percent loss is more likely. The official figures tend to underestimate the costs of renting vehicles. The revised figures for the present work are based upon rates actually paid by ECIBEV and reported by OMBEVI elsewhere (see sources in Table 11.5).[3]

3) - The Relationship Between the Profitability of Cattle Exports and Retail Meat Prices in Bamako and Abidjan, 1974-1978

The estimates in Table 11.5 imply that a 35 percent markup in per kilogram liveweight cattle prices is required to cover the costs of legally exporting range cattle from Kati to Abidjan. The margin shrinks to 24 percent if export taxes are evaded. The OMBEVI assumption of a 20 kg loss of liveweight over the trip, if the weight of saleable meat shrinks by the same amount, implies that retail meat prices would have to be roughly 50 percent higher in Abidjan than in Bamako in order for cattle exports to pay off (38 percent for illegal exports).[4] Given that the reduction in carcass weights is probably less than the predicted reduction in liveweights and that the majority of exports evade export duties, a retail price premium of 40 percent for beef in Abidjan over beef in Kati would most likely justify imports from Mali.

TABLE 11.5

THREE ESTIMATES OF THE RETURNS TO CAPITAL AND ENTREPRENEURSHIP IN THE CATTLE EXPORT TRADE TO IVORY COAST (1978)
(in FM per head, unless otherwise indicated)

Route	Trek to Bouaké, then Rail to Abidjan			Truck to Abidjan		
Source of Estimate:	OMBEVI (1978)	Staatz (1979)	Present Work[a]	OMBEVI (1978)	Staatz (1979)	Present Work[a]
Departure point	Kati (1150 km.)	Koutiala (930 km.)	Niono (1100 km.)	Kati (1150 km.)	Koutiala (930 km.)	Niono (1100 km.)
Purchase price (320 kg. at 250 FM/kg)	76,800	76,800	76,800	76,800	76,800	76,800
Official fees	8,800	8,800	8,800	8,800	8,800	8,800
Transportation costs (including losses, but not shrinkage)	9,836	12,000	10,200	15,404	32,200	33,320
Non-official fees	5,000	—	5,000	5,000	4,000	5,000
Miscellaneous costs, (excluding charge on capital)	1,050	3,400	700	1,150	3,400	700
Average cost, excluding cost of capital ("prix de revient")	101,486	101,000	101,500	107,154	125,200	124,620
Sale price (300 kg at 375 FM)	112,500	112,500	112,500	112,500	112,500	112,500
Gross margin	11,014	11,500	11,000	5,346	-12,700	-12,120
% returns to capital and entrepreneurship[b]	11%	11%	11%	5%	-10%	-10%

NOTES AND SOURCES: (a) The OMBEVI figures are from Paper No. 100 (1978), p. 45. The figures attributed to Staatz refer to the fees and costs in Staatz (1979), Table 6.9 and 11.6. These involve transit of steers from Koutiala to Abidjan via Ferkéssedougou. The estimates of the present work are based on Table 10.4, for cattle originating in Niono. The order of magnitude of error involved in all these figures precludes attempting to recalculate the transport costs from a common departure point. The calculations of returns are based on the purchase and sale prices specified in the OMBEVI example.

(b) This is the gross margin divided by the average cost at sale. It represents the return to a rotation of capital lasting 63-77 days for trekking and 18-44 days for trucking, as well as remuneration for some 18 to 44 days of the owner's time.

The official statistics on actual meat prices in the two capitals are compared on a quarterly basis since 1974 in Table 11.6. The ratio of the Abidjan price to the Kati price in any given quarter is surprisingly low. However, the split between the two values is larger when one compares the current Kati price to the Abidjan price three months later, which is the time it takes for trekked cattle to reach their destination.

TABLE 11.6

RATIOS OF QUARTERLY RETAIL BEEF PRICES IN BAMAKO (KATI) AND ABIDJAN, 1974-78
(official price series expressed in FM per kg of beef with bone)

Year	1974				1975				1976
Quarter	I	II	III	IV	I	II	III	IV	I
Abidjan	425	453	521	578	557	650	609	637	669
Kati	285	300	330	305	350	505	640	635	545
Ratio: Abidjan/Kati	1.49	1.51	1.58	1.90	1.59	1.29	.95	1.00	1.23
Abidjan 3 months later/Kati	1.59	1.74	1.75	1.83	1.86	1.21	1.00	1.05	1.18

Year	1976			1977				1978	
Quarter	II	III	IV	I	II	III	IV	I	II
Abidjan	627	695	768	808	--	--	892	963	--
Kati	590	605	590	635	665		645	650	710
Ratio: Abidjan/Kati	1.06	1.15	1.30	1.27	--	--	1.38	1.48	--
Abidjan 3 months later/Kati	1.18	1.27	1.37	--	--	--	1.49	--	--

SOURCES: The Malian prices are from various OMBEVI statistical publications. The Ivorian data are taken from the Bulletin Mensuel de Statistique, various issues. The Ivorian data may slightly understate the true price of meat due to insufficient attention to weight variations. The quarterly data are simple averages of the monthly figures.

Despite the roughness of the figures, three key points emerge from this analysis. First, the price differential during 1974 and the first quarter of 1975 was very high relative to experience since then. This lends support to the theory that the abrupt price rise observed in Bamako between mid-1974 and mid-1975 was essentially a realignment of domestic with foreign prices.[5] It is undeniable that Malian cattle production was down in 1975. This affected the Ivory Coast market as well as Mali's. Second, the massive imports of non-African meat into Abidjan in the second half of 1975 and early 1976 appear to have

lowered the price differential with Mali to the point that cattle exports at that time were not very profitable in themselves.[6] Consignments during this period may have been destined primarily for Bouake. Third, there appears to have been a gradual widening of the price differential since late 1975. The key 50 percent difference in meat values was back in evidence by the last quarter of 1977.

B. - Returns to the Export of Fed Cattle, 1975-1978

OMBEVI and ECIBEV have attempted to export fed cattle to Abidjan by truck at various times since 1976. The economic yield has been low, mostly because of the transportation problem encountered (see Chapter Ten, Section II and OMBEVI, No. 85, 1977). OMBEVI figures published in September 1978, reproduced in column one of Table 11.7, show a return of less than 1 percent to capital and entrepreneurship. Furthermore, these cost budgets contain no provision for insurance or risk other than expected animal mortality. The appropriate conclusion is that this strategy is not profitable for the time being. Further shipments involving less than 100 animals were sent in the rainy season of 1978; the level of activity thus far is negligible on a national scale.

Rail exports of fed cattle to Dakar from the Tienfala feedlot would be slightly more promising, in the absence of Senegalese taxes. Hypothetical figures based on the OMBEVI estimate of the cost of rail freight and the assumption that Dakar and Abidjan prices are the same lead to an estimated 5 percent return to capital and entrepreneurship, provided transit time is no more than two days and there are no Senegalese taxes. The trip can take up to five days, however, and entering shipments of fed steers must pay a taxe commerciale et artisanale amounting to 15.5 percent of value added (CEAO, 1978).[7] This fee is payable by Senegalese producers as well and is considered a production tax rather than an import duty. Nevertheless, it has the effect of cancelling the profitability of Malian fed cattle exports to Dakar at the assumed price levels.[8]

Despite these difficulties, the Dakar market seems to offer the best long-term prospects for the sale of Malian fed steers. The possibility of rail transport over most of the journey is an important plus. Rising world meat prices are also likely to favor high-quality beef produced in Africa. The principal constraints to the development of this outlet are likely to be the lack of livestock-oriented infrastructure at both ends of the rail line and the length of the train trip (from interviews).

C. - Returns to Small Ruminant Exports, 1975-1978

1) - Shipments to Ivory Coast

Exporting ruminants to Ivory Coast can be a profitable activity year-round. However, the level of returns and the means of transport chosen depend upon the season in which the animals arrive upon the market. Profits are so high immediately prior to the Muslim holy

TABLE 11.7

HYPOTHETICAL ACCOUNTS OF THE PROFITABILITY OF EXPORTING FED CATTLE
(in FM per head)

Option	To Abidjan by Truck[a]	To Dakar by rail
Departure point	Doukoulouma (near Ségou)	Tienfala (near Bamako)
Item		
Purchase price (360 kg liveweight @ 275 FM/kg in Ségou, @ 300 FM/kg in Bamako)	99,000	108,000
Official fees	8,800	8,800
Transportation costs (including losses but excluding shrinkage)	33,000	21,000[b]
Non-official fees	6,250	1,000
Miscellaneous costs (excluding cost of capital)	1,150	1,200
Foreign taxes	-0-	21,500[c]
Average total cost, excluding cost of capital	148,200	160,500
Sale: 340 kg liveweight at 440 FM/kg in Abidjan and Dakar	149,600	149,600
Net Margin with no allowance for risk	1,400	-10,900
Percentage return to capital and entrepreneurship	less than 1%	-7%

[a]figures from OMBEVI (No. 100, 1978), p. 46

[b]includes trip from Tienfala to Bamako, loading/unloading costs, and train transport at 54 FM/ton/km. (Ibid. p. 44).

[c]Senegalese "T.C.A." tax, 15.5% of average cost; this is also paid for Senegalese animals.

TABLE 11.8

COMPARISON OF QUARTERLY RETAIL MUTTON PRICES IN ABIDJAN AND BAMAKO (KATI) 1974-1978 (official price series expressed in FM/kg[a])

Year	1974				1975			1976	
Quarter	I	II	III	IV	I	II	III	IV	I
Abidjan	559	638	669	687	745	881	948	953	957
Kati	415	440	525	520	545	660	455	650	665
Ratio: Abidjan/Kati	1.35	1.45	1.27	1.32	1.37	1.33	2.08[b]	1.47	1.44

Year	1976			1977				1978	
Quarter	II	III	IV	I	II	III	IV	I	II
Abidjan	1,028	1,119	1,136	1,125	--	--	--	1,400	--
Kati	680	730	755	750	760	--	860	810	890
Ratio: Abidjan/Kati	1.51	1.53	1.50	1.50	--	--	--	1.73	--

SOURCES: Mali: OMBEVI, various statistical publications.
Ivory Coast: Bulletin Mensuel de Statistique (various)

[a]The first quarter 1978 figure is based on a reported average price of 700 CFA/kg in January. Otherwise, the quarterly figures are based on averages of monthly figures. This smoothes out the effect of seasonal peaks.

[b]The border was closed at this time, particularly affecting trucked exports.

season of Tabaski that virtually any means of transport is acceptable. Returns at other times of the year are also good but not so high as to justify trucking all the way.

Sahel sheep cost in the vicinity of 30,000 FM in Kati market in October 1978 and sold for up to 60,000 FM in Abidjan during the 1978 Muslim holy season, which occurred in November. (The Ivorian figure is from Goedicke, 1979). With transport and other costs of up to 10,000 FM per head for trucking, this leaves well over a 67 percent return on capital! The value of this estimate is the order of magnitude, since even the price level figures are tenuous, not to mention the estimate of per capita transport costs. The fact remains, however that a lot of money can be made by those with access to vehicles for transport at this time.

These high margins may prevail during less than one month each year. They can persist, most likely, because of the absence of "storage" lots in terminal markets and the lack of transport, both of which are determined by the possibility of year-round profits. The greatly increased risk of keeping the arrivals in a humid environment for a long period of time is also likely to be a factor.

During the rest of the year, prices in Kati are roughly half the peak level.[9] The author could not locate comparable figures for Abidjan. However, a comparison of the official price series for mutton indicate that the ratio of Abidjan to Kati quarterly prices is not noticeably greater in quarters that include peak periods. This may be taken as an indication that small ruminant prices in Abidjan also fall by roughly half outside peak periods.[10] The mutton price data in Table 11.8 show that roughly a 35 percent markup in prices prevailed during 1974 and early 1975. A 50 percent premium existed from the time the border was reopened in the second half of 1975 (having been closed to livestock exports for 6 months) until early 1977. One observation in early 1978 indicates that a 73 percent differential existed at that time. It would appear that price incentives for small ruminant exports have increased during the post-drought period.

Assuming that Sahel sheep could be purchased in mid-1978 for 16,000 FM in Mali, transported to Abidjan for 5,000-6,000 FM each (see Chapter Ten, Table 10.5) and sold for 28,000 FM, the returns to small ruminant exports in the off-season would be roughly 30 percent per consignment. This assumes that the animals are trekked over the border. The margin falls to 8 percent if they are trucked. The latter figure is a much lower order of magnitude than the former. Given the roughness of the figures and the risk involved, it is unlikely that it would pay to truck small ruminants in the off-season.

2) - Shipments to Senegal

An average of 19 percent of recorded exports of small ruminants was sent to Senegal in 1976 and 1977 (see Chapter Eight, Table 8.4). The cost analysis in Chapter Ten shows that rail exports to Dakar can be accomplished relatively cheaply at 4,000 FM per head, not

including the Senegalese TCA tax. At a cost of 16,000 FM per head in Kati market, liveweight prices for small ruminants would have to be only 25 percent higher in Dakar for exports to begin to pay off, absent the Senegalese tax.[11] Data on small ruminant prices in Dakar in 1977 and 1978 were not available to the author at the time of writing. However, it seems highly likely that this export activity is remunerative, particularly at seasonal peak periods. As in the case of fed cattle exports, the principal constraints are most likely the lack of livestock infrastructure at both ends of the rail line and the length of the train trip. This question clearly merits further research.

3) - Shipments to North Africa

Algeria accounted for an average of 16 percent of recorded exports of sheep and goats in 1976 and 1977. From customs statistics these shipments appear to have been trucked over the border, most likely during the religious season as return cargo. The cost calculations in the previous chapter indicate that trucking on any large scale other than as return cargo would be prohibitively expensive, as would air transport of live animals. However the burgeoning market in North Africa, the Muslim demand for live sheep for ritual purposes, the suitability of the Tombouctou-Gao region for small ruminant production, and the demonstrated potential of this market as an outlet for Malian exports all dictate a closer look at the possibilities for improved infrastructure. In particular, further research might examine the profitability of return truck cargo from Algeria after completion of an IBRD-financed improvement of the Gao-Mopti road.

D. - Returns to Meat Exports, 1975-1978

1) - Exports to Ivory Coast

The outlook for air shipments of chilled beef by SOMBEPEC is not good. The best case that can be made is for export of rear quarters of fed cattle. Even so, the calculations in Table 11.9 show that the break-even supply price (CIF) was approximately 1,200 FM/kg in early 1978. Furthermore, this cost level is a minimum, dependent upon air freight rates obtained on a "space available" basis.[12] The structure of market prices in 1978 at Abidjan would value the Malian product at roughly 1,000 FM/kg wholesale, delivered to the airport. It is therefore possible to state with a 20 percent margin for error that chilled beef exports to the Ivory Coast were not a paying proposition in 1978. Projected increases in air freight costs support the extension of this judgment into the foreseeable future. While small shipments can possibly be made on an irregular basis to take advantage of market fluctuations, it is not anticipated that beef exports to Abidjan will have any real impact on Malian export receipts by 1985.

TABLE 11.9

BREAK-EVEN PRICES (CIF) FOR SOMBEPEC MEAT EXPORTS TO ABIDJAN, 1978
(FM/kg of carcass meat)

(a)	Average production costs	840	1,000
(b)	Malian export taxes	43	43
(c)	SOMBEPEC 10% mark-up	88	104
	(FOB Bamako airport)	(971)	(1,147)
(d)	Air freight	135	135
(e)	Health inspection on arrival	20	20
(f)	5% Allowance for spoilage (or cost of insurance) and unloading	56	65
	Average Total Cost	1,182 FM	1,367 FM
(g)	Breakeven delivery price at Abidjan airport in CFA	591 CFA	684 CFA

NOTES AND SOURCES: (a), (b), (c) See Chapter Nine, Table 9.5, for SOMBEPEC beef production costs. The costs for mutton are based on a purchase price of 16,000 FM for a Sahel sheep with 17 kg of carcass meat.

(d) The 1977 rate reported in OMBEVI (No. 100, 1978), p. 48. This had reportedly increased to 155 FM/kg in mid-1978.

(e) Same source as (d).

(f) This may understate the actual losses due to spoilage; meat left unrefrigerated for even a few hours must be sold on the class 2 market.

(g) Compare with OMBEVI's very optimistic estimate of 422 CFA/kg for beef in 1977 (Ibid.).

Although much of the same analysis applies to chilled mutton shipments, Table 11.9 does offer more hope in this respect. The break-even CIF price for mutton delivered to Abidjan is only 16 percent above the price for beef. However, there is some evidence that mutton prices are typically 40 to 50 percent greater than beef prices in Ivorian retail outlets (see Tables 11.6 and 11.8, above). The implication is that if meat shipments were to become profitable, those of mutton would pay substantially more than those of choice beef. Put another way, it is more likely to be feasible to export mutton than beef.[13]

2) - Shipments to North Africa

The outlook for chilled beef shipments to North Africa is also not good. SOMBEPEC tried an experimental shipment of 83 carcasses to Algiers at concessional air freight rates in 1978.[14] The meat reportedly did not arrive in good enough condition to justify the class 1 premium prices necessary for such a venture. Table 11.10 shows that the lowest possible break-even price for supplying rear-quarter beef to Algiers in 1978 would be an average of US $3.40/kg, net of import duties. Without return cargo, the break-even level would be $4.32. These figures are based on 1975 air rates and assume (unrealistically) that a complete return cargo is available. They may be compared to the Argentine price during 1977 of roughly $3.20 kg for boxed choice cuts of chilled meat flown to Europe.

TABLE 11.10

BEST GUESS OF BREAK-EVEN PRICES (CIF) FOR MEAT EXPORTS TO NORTH AFRICA (1978)
(FM/kg of carcass meat)

	Destination: Item: Departure point:	Algiers Beef, choice rear-quarters Bamako	Tripoli Mutton whole carcasses Gao
(a)	Average production costs	840	600
(b)	Malian taxes	43	43
(c)	Agency mark-up (10%) (FOB Departure points)	88 (971)	64 (707)
(d)	Airfreight (lower figure assumes 100% return cargo)	368-736	327-654
(e)	Health inspection	20	20
(f)	5% Allowance for spoilage (or cost of insurance) and unloading (lower figure uses the lower air freight rate)	68-86	53-69
(g)	Average total cost	1,427-1,813	1,107-1,450
	Breakeven delivery price at airport of destination in U.S. $/kg ($1 = 420 FM)	$3.40-$4.32 depending on freight rate	$2.64-$3.45

SOURCES: (a) - (c) See Chapter Nine, Table 9.5 for beef. The mutton price assumes that Sahel sheep can be purchased in Gao for 10,000 FM.

(d) Based on ton/km freight rates in 1975 in OMBEVI (No. 59, 1975) - see Chapter Ten. The rates will have increased since then but use of larger craft would reduce the cost.

(e) - (g) See Table 11.9.

The rising cost of Argentine beef and of aviation fuel will tend to favor Malian production over the relatively more distant South American sources. However, the lack of regular air traffic and the uncertainties of Malian production are seen as ruling out any major activity in this direction by 1985.

On the other hand, mutton exports from Gao to Tripoli offer the best potential for Malian meat shipments. While the break-even supply prices of $2.64 to $3.45 per kilogram estimated in Table 11.10 tend to be over-optimistic, they are clearly more competitive than the prices for beef. Rising transport costs for meat shipped from distant locations such as Australia and (perhaps) increasing consumer preferences for meat slaughtered in Muslim countries will tend to favor Malian exports. It is sincerely hoped that the new Libyo-Malian project at Gao will consider mutton exports as an alternative to beef shipments.

CHAPTER TWELVE

POLICY CONCLUSIONS

Livestock exports will continue to play a key role in the Malian economy in 1985. Projected exports in that year of 160,000 head of cattle and 500,000 small ruminants are worth approximately US $56 million at 1976 prices. This is equivalent to roughly half the value of all exports or one-tenth of GDP in 1976. Furthermore, good coastal demand prospects and low Malian herd productivity permit considerable scope for policy intervention to improve national income in this sector. Nevertheless, careful attention must be paid to export costs. Funds allocated to production improvements should focus upon lowering costs of range cattle production. Except in particular circumstances, intensive feeding programs should be abandoned in favor of research on less costly "growing out" strategies in agricultural areas. Marketing improvements need to increase rather than decrease the level of competition in Malian livestock markets. In general, this implies simplification of procedures rather than installation of a higher degree of administrative control. It is imperative to improve our knowledge of the basic constraints to improved production and marketing in the small ruminant sector, given its relative importance to the economy and its bright prospects as a source of foreign exchange. Finally, the outlook for meat exports is sufficiently poor that related projects are judged a poor investment.

I. - Production Improvements

A. - Range Cattle Projects

1) - The Effect of Improved Productivity

Planners need not fear that depressed prices and lower income will result from productivity improvements in range cattle production, provided herdsmen are willing to sell the extra animals at the current price structure. This follows from the projected growth in demand for beef on the coast and from expected rises in the world price of beef placed in Abidjan.[1] Schematically, the argument runs as follows: the (inelastic) derived demand curve for range cattle is constantly shifting to the right as the primary demand curve for beef in coastal areas shifts in the same direction as a result of income and population growth. That is, coastal consumers as a group want more beef at any given price level. The rightward shifts of the demand curve for Malian cattle compensate for rightward shifts in the cattle

supply curve resulting from productivity improvements. The rightward shifts of the Malian cattle supply curve embody the assumption that the extra production due to decreased mortality, etc. will be sold rather than hoarded, provided that the same price level is maintained.[2]

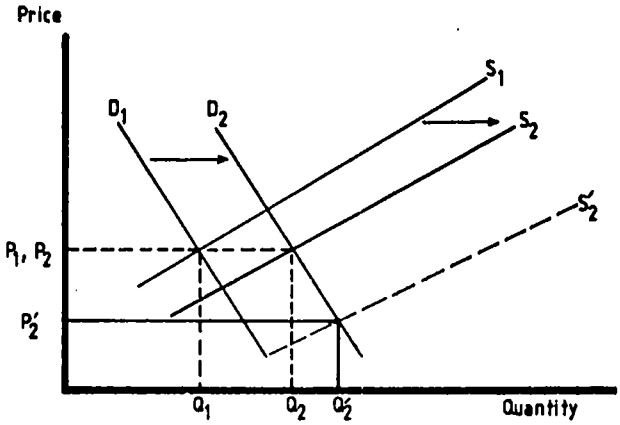
Figure 12.1 illustrates in a comparative static way that the behavior of export cattle prices and producer revenues over time will depend on the relative magnitudes of the shifts in demand (coastal income growth) and supply (sales of increased herd productivity). In practice, the increase in coastal demand is likely to be greater each year than the increase in cattle production at a given supply price. Income growth on the coast is virtually assured while productivity growth in Mali is likely to be slow and difficult. It seems almost certain that increases in Malian production will swell aggregate producer revenue. The analysis in Figure 12.1 also shows that it is likely that prices for export cattle will continue to increase despite productivity improvements.

There are four specific areas requiring investigation in order to promote greater potential for offtake of cattle from Malian range herds: health of young animals, improvements in fertility, land use for grazing, and a more efficient use of available pasture and water. Whether this potential is used to boost offtake or to swell the total herd to an unsustainable size depends upon herder sales motiviation, perhaps the most important area of concern for future project design.

2) - Animal Health

Despite disenchantment with animal health programs in English-speaking circles, the high mortality of young stock remains perhaps the single greatest production problem of the livestock sector. The relatively limited resources of range improvement projects in the western Sahel and the Mopti area should be focused first and foremost on this question. It is in these regions that increases can occur without overstocking. Specific proposals for intervention should be solicited from pluri-disciplinary teams including an economist, an anthropologist, and an animal scientist. To some extent the technology for calf salvage may already be known (personal communication from W.H.M. Morris). However, it must be deliverable in a form acceptable to the herdsman and feasible from an economic point of view. The latter calculation involves balancing the costs of intervention against the benefits of having larger herds. It can be shown that a reduction in calf mortality from 30 percent to 20 percent would increase gross herd productivity on a head-count basis by roughly 2 percent.[3] The economic importance of these considerations is illustrated by the fact that each percentage point change in gross herd productivity on a national basis leads to increases in annual cattle production worth roughly US $10 million at 1978 export prices.[4]

FIGURE 12.1
Comparative statics of the supply and demand for Malian export cattle over time



The derived demand for cattle exports (D_1) shifts to the right (D_2) because of income growth, population increases, and urbanization in the coastal countries. The export supply schedule of cattle (S_1) shifts to the right (S_2) as a result of herd growth and production projects. Export prices remain constant with the schedules as drawn and fall if the actual production increase is greater than $S_2 - S_1$. However, the shift would have to be greater than S_2 for producer revenue (P_1 X Q_1) to fall. This is very unlikely. Simila results with respect to producer revenues apply for all elasticities of the supply and demand curves. The case illustrated is a relatively pessimistic one with respect to price (inelastic demand and elastic supply).

3) - Improvement of Animal Fertility

Projects should focus upon improving the calving rate of Sahelian herds. The estimated annual rate of 50 percent usually used for Malian zebu females of reproducing age is low on a world scale. Although this observation is hardly new, few resources have been channeled to herd improvement and breeding research. It can be shown that an increase in the calving rate to 60 percent would increase gross herd productivity by approximately 3 percent, other factors remaining constant.[5] The fertility of taurine and zebu stock may be improved by reducing enviromental stress and disease leading to sterility and, possibly, by cross-breeding (see République du Sénégal, 1976; IEMVT, 1979). Specific proposals are in the domain of animal science. Fundamental scientific inquiry of this nature is expensive, foreign-exchange-intensive, and should be viewed as a long-term effort. As such, this form of endeavor is a prime candidate for foreign assistance programs. The basic facilities have been created at the Centre de Recherches Zootechniques de Sotuba, near Bamako, and at Niono. They require continued support.

4) - A National Land-use Policy

Livestock development projects can play a key role in the encouragement of a national land-use policy. The proliferation of farms dependent upon irrigated rice production poses significant problems for the traditional herding system in the ODEM (Mopti) zone. While national policy may not be effective at resolving the problems arising from crop damage conflicts at the village level, there clearly is scope for resolving inconsistencies between livestock and crop development at the level of agricultural "Operations." In particular, there is a need to preserve transhumance corridors running through the various integrated rural development zones of the Niger Valley. Closing of such corridors to obtain a relatively small amount of irrigated land around watering points effectively denies a much larger land area to livestock development. This larger land area may be sparsely inhabited and have a relatively low value for crop production at the present time.

5) - More Efficient Use of Available Pasture and Water

Following work on pasture identification by ILCA (1978), IEMVT (In progress) and the Dutch Projet Productivité Sahel,[6] it is now generally believed that large areas of unused rainy season pasture exist in parts of the Malian Sahel. These tracts often have the disadvantage that forage and water are lacking on the only possible routes out of the area at the onset of the dry season, even though there is enough of both in the grazing areas themselves. Sometimes this comes about because herds belonging to sedentary farmers have

degraded the pasture on the transhumance routes south (personal communication from J.V.D. Lewis). Sometimes the problem is that surface water is lacking in otherwise-good rainy season grazing areas. (This is apparently borne out by the Dutch study.)

An interesting proposal for providing surface water points in arid zones where grazing control depends upon water control has been advanced by Cluff.[7] The project authority creates water points by raising earth levees to catch run-off or by bulldozing stock ponds. The essential element is to have several ponds of varying depth. The sequence in which the ponds run dry as the dry season progresses is determined by the depth at which they are dug (or the height of the earth works). As a self-regulating mechanism, such ponds avoid the need for agonizing (and often politically infeasible) decisions to close down a well as pasture is degraded.

The difficulties inherent in the provision of new water points for cattle in the Sahel serve to emphasize the importance of "herder management" as opposed to range management, strictu sensu. Projects can, and should, monitor performance by close attention to ecological changes occurring in project areas. However, the quality of pastures should be a criterion for judgment of the sustainability of interventions, rather than the principal focus. To be successful, projects should be designed to consider the factors that are of concern to the herdsmen as individuals, rather than as a group. This is because herd management decisions are usually taken by households or villages, but only rarely by entire peoples. (The code of Cheik Ahmadu of Macina is the one exception of which the author is aware). What is considered in the interest of the collectivity is not necessarily in the interest of individual decision makers, stocking densities being the oft-cited example. Close attention should therefore be paid to herder sales motivation.

6) - Herder Sales Motivation and "Herder Management"

It has been argued by many that improvements in animal health during the sixties led to over-grazing, which, coupled with low rainfall, led to the disaster of 1974. The logic of this argument is that productivity increases from project interventions need to be compensated for by increased offtake from the herds concerned. Not only must the number of animals sold increase but so must the rate of offtake. The incentives or constraints, however, that are likely to achieve this increase in offtake are not known.

On the incentive side, it seems clear that higher prices will increase sales. Yet the exact relationship is not established. Furthermore, given that the traditional marketing system is relatively efficient faced with the intractible difficulties it must surmount (such as transport costs), the scope for price rises induced by policy action may be relatively minor. The herder response to more easily provided incentives is not known either. Promising candidates in this vein would be rural consumer goods markets, alternative

institutions for savings or increased government services for a fee. Most important, perhaps, would be the establishment of some means for herders to invest cash in the improvement of the quality of their herd, as opposed to herd size. Examples would be veterinary care on a pay-as-you-go basis (private veterinarians?), breeding stock or investment in improved milk production (with a technology yet to be specified).

The questions concerning incentives "that work" can best be answered following field studies over a protracted period of time at the level of the decision-making unit. The additional cost would be low in relation to the amounts invested in the Malian range cattle production projects (ODEM, Western Sahel) that depend for their pay-off upon herder response to interventions.

Constraints on herder behavior, such as edicts concerning grazing or penalties for range degradation, are on the other side of the coin from incentives to sell. In addition to posing potential political difficulties, they may not work. The ability of West African herdsmen to avoid direct administrative constraint is legendary. However, another class of "costs" offers a greater chance for success. These involve placing a positive marginal cost on maintaining animals beyond a certain point. One possibility would be for the GOM to rent newly-created water points to surrounding localities and to permit the lease holders to impose a fee on outsiders who wish to use them. (The author is indebted to J.V.D. Lewis for this suggestion). Presumably the fee would vary with the size of the herd watered. Another possibility might be a market or other tax on older males (greater than a certain size?) with rebates for the sale of healthy younger animals. While this specific proposal may turn out to be administratively infeasible, to the author's knowledge it has never been investigated adequately. It also illustrates the need for an approach that affects the individual herder's pocketbook through an "automatic" type of mechanism rather than through individually tailored settlements (as in the case of crop damage suits).

B. - Cattle Feeding and "Growing Out" Projects

1) - Small Potential for Feedlot Operations

There is a need for revision of the fattening component of the "stratification" strategy of cattle production. Donor agencies should not commit further funds to feedlot operations. Lack of a domestic market for high quality meat, transportation difficulties, and effective competition from national producers in small export markets ensure that demand for feedlot beef will virtually be met by the existing or planned capacity in the coastal countries.[8] This situation would most likely change only if the highly-subsidized West African sugar industry collapsed, wiping out the feedstuff resources used by the existing Ivorian and Voltaic feedlot complexes. To the extent that seasonal price variations and compensting weight gains make feeding profitable, small scale private lots or embouche paysanne can achieve the same result at lower cost than project-sponsored initiatives in large feedlots.

2) - Embouche Paysanne

The best argument for Malian feedlot operations is that they potentially serve to increase meat supplies in Bamako and other urban areas at the end of the dry season. However, this role can be accomplished equally well by small-scale farm programs which escape from the high overhead costs of feedlots. Embouche paysanne allows use of slack resources in the dry season and the liberation of these resources for other pursuits in the wet season. It has the same advantage as feedlots in that rapid (compensating) weight gains are observed in cattle fed during the dry season. The timing of output, as in the case of feedlots, also permits producers to take advantage of seasonal price rises.

The first lesson for projects designed to support embouche paysanne is that administrative costs should be kept as low as possible. Second, such programs will provide acceptable producer returns only in so far as the opportunity cost of farm-supplied resources is low. Therefore, any intensive household labor input to cut forage or to market animals must occur during the dry season. This is not the case in models which rely on using whole cowpeas or "dolico", produced in competition with other crops, for feeding beef cattle.

3) - The Optimal Use of Feed Supplies and Growing Out

There is an urgent need for a study to determine the economically optimal use of available feedstuff supplies. The mixed farming model used (with success) by CMDT and OACV in Mali is dependent upon "sedentarizing" at least part of the household herds that previously were left entirely free to forage for themselves after the crop harvest.[9] This is accomplished by providing sufficient feed supplements during April and May to enable plow oxen to remain in the village during this dry period. The returns to this practice may be considerably greater than when the same commodities are used for beef production. In the case of whole cottonseed, its value as a feedstuff may be greater, when all the ramifications are considered, than the returns from the use of the commodity in oil production.

One option that should be carefully studied, in this regard, is the potential for growing out Sahelian cattle in agricultural villages. The feedstuff and farm labor inputs would then be used for improved range production (by pasturing in a sedentary mode in southern areas with feed supplements during the dry season) rather than for intensive feeding using ninety-day rations. The sedentarization of the herds helps reduce animal losses and weight shrinkage during the dry season in addition to permitting the benefits of mixed farming on a year-round basis. However, sedentarization of this kind without benefit of sufficient feed supplements, as has occured around the rice farms in the Inland Delta, can lead to severe degradation of pastures. Projects should therefore adopt a long-term horizon when opting to use feed resources in this manner. There often is a good rationale for the short transhumance traditionally made at the end of the dry season by many herds belonging to sedentary villagers.

C. - Small Ruminant Production Projects

1) - The Need for Better Knowledge

Better knowledge about the small ruminant sector should be a clear priority both for the GOM and for donor projects. Accounting for roughly half of the domestic meat supply in 1978, sheep and goats present real potential for year-round exports. Small ruminant shipments in 1976 are estimated to have represented approximately one-quarter of all livestock exports by value. Furthermore, sheep and goat exports to Senegal and Algeria are one of the best prospects on the horizon for diversifying sources of foreign exchange. Because small ruminants are suitable for production in agricultural areas that are well penetrated by extension services and because they can be shipped by truck or rail, the small stock sector is potentially amenable to policy intervention. Nevertheless, little is known even about the basic offtake, mortality and growth characteristics of the national herd. Despite pioneering work by Dumas and Raymond (SEDES, 1974), Dumas et al. (IEMVT, 1977), and Rombaut and Van Vlaenderen (1976), the technological package that projects should offer farmers in order to improve production has yet to be identified. These studies do point to extremely high rates of lamb and kid mortality (around two-thirds in the first year). This alone seems to indicate substantial room for improvement in production.

2) - Mixed Farming Interventions Based on Small Ruminants

Discussions of mixed crop and livestock activities in West Africa are usually focused on cattle. Sheep and goats, however, are traditionally kept year-round by many farmers in the Savannah. They are efficient converters of crop residues into meat and their droppings can be used for fertilizer. Relative to cattle, they have the disadvantage of low or negligible surplus milk yield (in southern areas) and are obviously not suitable as a source of traction power.[10] Nevertheless, any adequate inquiry into the opportunity cost of using labor, feed and capital resources on small-holder farms should investigate small ruminant production relationships. It is interesting to speculate on the effect of making credit available to farmers at 8 percent per annum (the rate charged cattle feeders by ECIBEV) for use in growing out small ruminants. It is quite likely that red meat production for domestic consumption in the dry season and livestock export revenue can be significantly expanded by projects targeted at the sheep and goat herds of sedentary farmers.

D. - Meat Export Production Projects

Donor agencies should refrain from investing funds in meat export schemes. All indications are that Mali will not be able to supply high-quality meat to coastal markets at

competitive prices. Both Senegal (SODESP and Rufisque feedlots) and Ivory Coast (Ferkéssédougou feedlot) have made efforts in recent years towards self-sufficiency in high-quality meat production. Among Sahelian producers looking to the Ivorian market, Upper Volta has a comparative advantage over Mali because of the rail line. The outlook for air shipments of meat to North Africa is also not good. The best bet is for shipments from Gao to Libya, and this is already adequately covered by the Libyo-Malian Project at Gao. As in the case for trekked cattle, the location of Niger and Upper Volta give them a substantial advantage over Mali in the shipment of meat by air to Nigeria. Meat exports may be profitable for Mali if the clients use their own military aircraft to collect the consignments. To the extent that donor assistance is required in this domain, it presumably should come from the importing nations themselves.

II. - Marketing Improvements

On the marketing side, the appropriate conclusion from the events in 1975 is that Malian livestock traders cannot count on institutional barriers or lack of experience to prevent competition from non-Sahelian sources in coastal markets. It may not be possible simply to pass increased costs for Sahelian exports along to Ivorian or Liberian consumers. Therefore a new cost consciousness -- always present in the thinking of private traders -- should enter GOM policy making and donor project design. The focus of interventions should be to cut marginal and average costs of trading for individuals in the traditional sector. Too often, livestock projects only serve to increase these costs under the guise of "improved infrastructure" without a corresponding increase in income for the private trader. Four main issues pertinent to this question deserve immediate attention: reducing costs for trekking cattle within Mali, promoting competition in livestock markets, simplifying export procedures, and reducing the costs of exports by rail or, in the case of small ruminants, by truck.

A. - Reducing Trekking Costs for Cattle

Donor agencies can play a significant role in helping to reduce the cost of trekking export cattle within both Mali and Ivory Coast. One of the key conclusions of Chapter Eleven is that the competitiveness of cattle exports, and to a lesser extent of off-season small ruminant consignments, depends upon trekking the animals at least over the border. However, the principal problems facing herdsmen when marketing cattle "on the hoof" are lack of watering points in the north and crop damage conflicts with farmers in the south. OMBEVI is actively seeking financing for the key Nara-Kati cattle trail. This project and

imilar schemes identify the trail with concrete markers. They include wells managed (for a ee) by village councils in northern areas. Herdsmen are legally protected from crop damage uits within a fixed distance of the trail. Similar routes have worked well in Upper Volta Delgado, 1979). OMBEVI estimates the cost of equiping the Nara-Kati trail at 65 million M; it considers that the project would be socially profitable if it resulted in a reduction of veweight loss (or an equivalent reduction of crop damages) of only 1 percent. Other key rails singled out by OMBEVI are Léré-Bamako, Nioro-Bamako and Nioro-Senegal.

. - Supporting Competition in Malian Livestock Markets

Donor policy should be strongly directed to supporting and increasing the level of ompetition in Malian livestock markets as a general means of decreasing export costs. roposals for funding to "organize" the export cattle trade should be viewed with suspicion. MBEVI has called for a halt to the "proliferation" of cattle traders and for limiting articipation of individuals to specific aspects of the trade (e.g., collecting in rural areas, ransportation, wholesale marketing or butchering). These actions would be desirable only if hey served to break up monopoly positions of individuals. The available evidence does not ndicate either that market concentration is a serious problem or that the existing degree of ertical integration is a serious impediment to efficiency. On the contrary, such proposals vould restrict trade to those who could afford or were allocated a license, thereby ncreasing market concentration and costs. Much the same analysis can be made of ttempts to enforce fixed prices for meat.

Other proposals by OMBEVI deserve more attention in that they are designed to ncrease, rather than decrease, the smooth working of a competitive market. An example vould be radio broadcasts of livestock prices. In theory, such a practice would increase esponsiveness and lower the cost of obtaining market information. The practical benefits might be small within Mali. However, the idea of providing market information specific enough to help private traders operate competitively is unusual enough to merit special mention. This idea might be further adapted within the framework of the CEAO to include broadcasts from the coast beamed toward Mali.

C. - Simplification of Export Procedures

Donor agencies investing substantial funds to promote livestock exports should take an active part in the encouragement of simplification of Malian export formalities. The current procedure takes eight different visits to government offices over a period of at least one week for each consignment. OMBEVI has been calling for the unification of these functions since 1975 without result. Furthermore, any review of proposals for increasing the competitive position of Malian cattle in export markets should not lose sight of the fact that 30 percent of the average cost of exporting Malian cattle to Ivory Coast is represented by direct export taxes paid to the GOM.

D. - Reducing Costs for Export by Rail or Truck

Railroads represent the method of choice for the transportation of cattle over lo distances. A study should be undertaken to ascertain the financing required to facilita transport of Malian cattle by rail from Bamako and Kayes to Dakar. The spur to Kouliko might eventually be used to export farm fattened cattle from the Banamba rur development area. In a more general vein, improvements to the Abidjan-Bobo Dioulasso li will be of benefit to Malian cattle. These might include better cattle cars, resting a watering stops, careful scheduling of livestock trains and adequate unloading facilities (s Staatz, 1980).

Road transport of cattle does not offer good possibilities in the foreseeable futur The costs are simply too high and the scope for policy action to reduce them to acceptab levels is limited. The potential for small ruminant exports by road is better. Project desi teams should investigate the returns to investment in cattle trailers and the organization suitable return cargo shipments. This activity should be in conjunction or in competiti with the private trade but should not seek to exclude it. It is clear that private traders a interested in exporting small ruminants by truck. However, the levy of exorbitant "no official fees" along the route, unnecessarily long delays, and numerou checkpoints for poli and veterinary controls indicate that the immediate scope for cost cutting in this domain in the hands of the national authorities in the CEAO countries themselves, rather than those of donor agencies. A possible exception to this rule is the promising, but unknow Algerian market for Malian sheep and goats. Interest by IBRD in the improvement of t road from Mopti to Gao, good marketing prospects in North Africa, and the lack of availab data all indicate the desirability of a field study in the Gao area to identify suitable poll interventions to promote this trade.

FOOTNOTES TO CHAPTER ONE

[1]Fish, poultry and diary products are probably an Important source of protein but are not included within the terms of reference of the study.

[2]As in the case of a perfectly inelastic supply curve shifting sideways in accordance with various non-price considerations such as weather, herd size, and project-induced productivity increases.

[3]A supply schedule defines the relationship between the price of a good and the amount that producers are willing to sell, assuming a given cost structure.

[4]For heuristic convenience, Figures 1.1 makes no distinction between the primary consumer demand for beef and the derived demand for cattle. In practice, demand for cattle is likely to be less price-responsive (less elastic) at any given price level than demand for meat. This does not significantly influence the conclusions to be drawn from the analysis in Figures 1.1 and 1.2.

[5]As will become apparent later, the price elasticity of Malian exports is something of an open issue. The schedule illustrated in Figure 1.1 is inelastic in every region. The greater the elasticity of the supply curve, the more the Malian export supply will be reduced in response to a fall in the prevailing coastal market price.

[6]In Figure 1.1, the extra sales of non-Sahelian beef are equivalent to: $(Q_2 - Q_1) + (QM_1 - QM_2)$.

[7]A demand schedule defines the relationship between the price of a good and the quantity that would-be purchasers are prepared to buy. It requires the assumption of a number of "givens" about consumer tastes, ability to purchase, and the cost of substitutable items.

[8]In Figure 1.2, $(Q_2 - Q_1) > 2(QM_2 - QM_1)$.

[9]The argument is similar to the exposition in Figure 1.2 above. A recent exposition of this point of view is found in SEDES (1975).

[10]This point will be substantiated in Chapter Eight.

[11]The data and reports were gathered during a five-week trip through Mali in the fall of 1978, under sub-contracts with OMBEVI and IPGP (see the foreword for details). A glance at the bibliography gives an idea of the amount of information obtained. Naturally, raw data sources, opinions of field personnel, and certain unpublished official reports are not referenced in the bibliography (at the request of the authors in the case of the latter).

[12]Staatz did one and a half years of fieldwork in Ivory Coast as a colleague at the Center for Research on Economic Development of the University of Michigan. The major part of this fieldwork was financed by an earlier project.

[13]This is not to say that export-quality animals as a whole are comparable to the domestic slaughter herd, but rather that where one draws the line on the continuum depends on the relation of foreign to domestic prices. In actual fact, it is also likely that herders are more willing to hold export-grade animals an extra year if the price is too low. The domestic slaughter herd is composed largely of animals which might not make it another year on the open range.

FOOTNOTES TO CHAPTER TWO

[1]Naturally, many other classifications are possible. This method of analysis is usefu for the discussion of production projects later on.

[2]Strictly speaking, the tsetse belt moves with the rains, and the herds move with it Few animals remain in the far north during the dry season, just as most animals leave th river valleys (tsetse areas) during the wet season.

[3]The percentage of the herd represented by breeding females is taken from Coulomb' study in the Mopti Region, reported in SEDES (1975, I, p. 252). The calving rate is multiplie by the percentage of the herd composed of adult females, the product being discounted b the annual rate of calf mortality. The net rate of herd growth is then given by subtractin the rate of animal offtake. In fact, this estimate may be on the high side, as we shall see i Chapter Three.

[4]The mixed breed is sometimes referred to as Méré Woloso. (Personal communicatio from John V.D. Lewis.)

[5]These estimates, which are sensitive to the proportion of breeding females kept should be interpretated with care. The implicit figure in SEDES (1975) that is comparable i 16.7 percent. This was calculated by adding an offtake of 13 percent to net herd growth o 3.7 percent. In fact, fertility is probably lower than 80 percent. Chapter Three will sho that some authors consider 12.3 percent a more accurate estimate of productivity.

[6]Usually referred to as the "stratification strategy" by English-speaking writers.

FOOTNOTES TO CHAPTER THREE

[1]The comparison is rough. The methodology of data collection used by the two studie is different.

[2]Although now a separate Region, Tombouctou is counted with Gao since statistic from 1977 and earlier are aggregates.

[3]OMBEVI claims that it began compiling the reports because the Livestock Service wa so slow to do it.

[4]In the spirit of professional cooperation typical of this institution, OMBEVI agreed t share preliminary returns from this study for the limited purposes described. The figures i this section are tentative and in no way reflect a judgment by OMBEVI or IER as to thei veracity.

[5]It should be remembered that factors other than the time difference account fo differences in the estimates, since different methodologies were used.

[6]Personal communication of Dr. Rombaut (FAO) to John Staatz, August 1978; Staat relayed this to the author. See also, Rombaut and Van Vlaenderen, 1976. On the other hand the important work by Dumas et al. for Chad sticks to the hypothesis of a 35 percent rate o gross productivity with most of this accounted for (IEMVT, 1977).

[7]Note that SEDES (1975, I, p. 250) assumes that 10 percent of one-year-old males an 50 percent of each age group thereafter are sold, an assumption that clearly is no consistent with the present situation.

[8]Assuming an average carcass weight of 120 kg and a dressing percentage of 4 percent is tantamount to assuming that the average liveweight is equal to 250 kg, or on UBT. This makes the ILCA, SEDES, and OMBEVI estimates fully comparable.

[9]The work by Rombaut and Van Vlaenderen (1976) is a notable exception.

FOOTNOTES TO CHAPTER FOUR

[1]Tienfala contains two cement and steel lots: one for feeding and one for quarantine. Malian officials now believe that future feedlots should be constructed with cheaper local materials, such as palm trees.

[2]As in the case of thin large-framed animals which might put on a kilogram of liveweight for, say, 5 forage units, as opposed to a more normal rate of conversion (1 kg per 12 f.u.).

[3]In 1979, high-level staff had to travel by air to Senegal and Ivory Coast to market the cattle; these costs have not been taken into account.

[4]It seems that at least one counter-example is provided by the SODEVA project in Senegal (personal communication from Professor W.H.M. Morris). It is likely that the SODEVA case, however, is a special one. Farmers there can use credit destined for animal traction programs to fund embouche activities in the accessible Dakar market.

[5]This was a frequent explanation given to the author by Fulani herdsmen in Upper Volta apropos their preference for older (8+ years) animals.

[6]Sociological factors pertaining to the extended family play some role in encouraging a family head to conserve capital in relatively indivisible "cow units" rather than money, which can be claimed more easily by family members.

[7]It is arguable that mortality is higher than 6 percent at the beginning of the work career and lower in the middle. This does not change the basic point that one cannot divide the overall plow herd by five to estimate the number of culls.

[8]As evidenced by a straw poll of 30 participants in 1978 in the Koulikoro Region, which revealed that the "typical" farm in the program possessed an average of 4 plow oxen, 1-2 plows, and a cart (synthesized by the author from reports by field agents).

[9]Société Malienne du Bétail et d'Exploitation des Peaux et Cuirs, a para-statal trading company with a monopoly on the export of meat, hides, and skins.

[10]Extension agents need to be productively employed year-round; furthermore, a successful agent can often do better in his own venture than working for the state.

[11]John V.D. Lewis feels that this is already the situation in Mali, where ECIBEV participants have claimed that cowpea cultivation for forage cuts into the weeding labor available for millet (personal communication). Delgado found that the opportunity cost of using wet season labor for livestock feeding in Upper Volta is likely to be prohibitive, adding strength to this argument (1979).

[12]The analysis is not a rigorous social cost/benefit exercise in that this would require a more formal consideration of shadow prices, foreign exchange implications, and intangible benefits such as the lessons learned. However, it is adequate for the present purposes, especially in that the foreign exchange component is very low and the use of farm forage and credit resources is evaluated at their opportunity costs. The value of ECIBEV health and extension services is taken as the nominal cost to ECIBEV, including the salaries of the agents involved. In that the ECIBEV model of extension is not designed to be replaced by farmer autonomy, the cost of extension services is not amortized. Because ECIBEV extension agents are not involved in other income-producing activities (such as a second rotation) at other times of the year, the annual cost of their services is charged off against the value of the single feeding rotation. These assumptions may be a little extreme: to the extent that the model is profitable under these criteria, it will be even more so under lesser strictures.

[13]Expansion of output over 600 head a year would require adding an additional credit agent for every 100 head.

[14]The author found that farmers in southeastern Upper Volta could expect an annual return of that order for growing out immature stock in nearby Fulani herds (Delgado, 1979, Chapter 6).

FOOTNOTES TO CHAPTER FIVE

[1]The source of these estimates is OMBEVI (No. 96, 1977, p. 5-7), which quotes H Breman, "La Capacité de Charge Maximale des Pâturages Maliens," 1974, without othe reference.

[2]Other constraints such as tsetse fly infestation will be considered shortly.

[3]In Mali the keeping of small ruminants rather than cattle may be correlated wit instances of a low supply of family labor and wealth (personal communication from Joh V.D. Lewis).

[4]This is a well-established viewpoint. See Ruthenberg (1976) and ILCA (1978, "Stud of the Traditional Livestock Systems of the Sahel. . .," p. 19).

[5]The advent of market gardening to the Sahel tends to make the same analysi applicable to the dry season in some areas (see Delgado 1978, 1979).

[6]This point is well established for all foreseeable price ratios.

[7]We do not seem to be able to regenerate it as a policy action either. I am indebte for this and the preceding point to both W.H. M. Morris and John V.D. Lewis.

[8]I am indebted to Lewis for the analysis in this paragraph. He lived in the area an followed the Fulani on transhumance while working for ILCA.

[9]The ILCA team in Mali feels that the actual percentage is somewhat higher than th Coulomb and OMBEVI figures (personal communication from Lewis).

[10]This illustrates the requirements of any project-run stratification scheme for a regular source of supply at a price that can be agreed upon in advance. Private merchant have not been able to meet these requirements at the price offered by ECIBEV, which i 1978 was low relative to the market.

[11]For 1976: (3,915,000 animals x 71 percent in the Sahel and Inland Delta) ÷ 40,000.

[12]The 1977-78 Annual Report of CMDT, the cotton monopoly, states that 59,767 ton of cottonseed were available for sale for all uses in 1978. Without further precision the same report states that 5,000 tons were sold as cattle feed in the "model" Fana area.

[13]Assuming as before that Grade Three seed is not available.

[14]South African figures reported in Payne and Williamson (1959, p. 274) suggest that 30 kg DM forage is required per head for three months.

[15]It would be interesting to observe what would happen if ECIBEV credit was made available to smallholders for small ruminant purchases.

FOOTNOTES TO CHAPTER SIX

[1]OMBEVI (No. 96, 1977) does not make the exact source or magnitudes clear.

[2]Subsidies may be in the hidden form of credit made available at less than its opportunity cost.

[3]The difficulties involved in marketing fattened cattle outside the country, which principally involve transport costs and competition from other suppliers with transport advantages, will be dealt with more fully in Chapters Ten and Eleven.

[4]See Chapter Five, Section II-C. Skeptics are referred to the doctrine of revealed preference: the available evidence indicates that most farmers across the Sahel keep small ruminants.

[5]The difficulties in this domain should not be minimized: USAID and Chemonics, Inc. have not found it easy to put together a suitable design team in the small ruminant field under Mali Livestock II financing.

[6]This view is also vigorously supported by J.V.D. Lewis (personal communication.)

[7]This is changing with the data collection procedures of OMBEVI which have been functioning since December 1976. There should be sufficient data by the end of 1980 to begin to look at these questions using a statistical approach.

[8]There are the offtake and gross productivity rates estimated by the IER-OMBEVI Elevage study in Mopti in 1977 (Chapter Three, Section III-D). They slightly exceed the rates observed by Dr. Rombaut in northern Ivory Coast (personal communication from John Staatz).

[9]The "extra" component comes about through a lower estimate of animal mortality. The higher figures for animal mortality, however, are felt to be correct. Perhaps one way to resolve the difference in viewpoints is to take the "extra" component as offtake available only to the population in the region of production. The net offtake figures in Table 6.7, then, stem from the assumption that the "extra" animals are complete write-offs due to mortality, whereas the inclusion of the "extra" figures in rural consumption uses assumes that the emergency slaughter of weak and dying animals forms an important part of the rural meat supply. Therefore, the net offtake will be used in Chapter Eleven to estimate the supply of potentially marketable animals, while the "extra" component will be added on to these numbers to obtain the number of animals available for satisfying domestic slaughter needs in rural areas. Then the position that the "extra" offtake does not exist is simply equivalent to the view that meat consumption in rural areas of Mali is substantially less than the quantities assumed by OMBEVI and SEDES. (See Chapter Seven below.)

FOOTNOTES TO CHAPTER SEVEN

[1]It is the only data available for this. It should be remembered however, that there is no reason to expect that illegal slaughters, which account for a large proportion of all butchering, will follow exactly the same pattern as recorded slaughters. In fact, the average carcass weight of illegal slaughters is probably less than that of recorded slaughters because of a higher percentage of distress killings.

[2]Animals sold for ré-élevage in Mali become net offtake from the national herd in the year that they are slaughtered or exported, which may be several years after the initial sale. Entry into an intensive feeding program is counted as offtake because the animals will be sold for their end use within a few months.

[3]In fact, the results at the end of this chapter strongly support the view that the opposite is true. The relation between "actual" and recorded figures varies a great deal.

[4]The references cited ignore identification problems, which indicates that the estimators are biased. This may be the case, as the authors in question admit to pushing the data too hard.

[5]Certain individuals outside the abattoir at Bamako also question the accuracy of the scales there. This is denied by personnel at the abattoir. The author has no basis on which to judge.

[6]The author attempted to use Livestock Service data for carcass weights at slaughter outside Bamako and gave up. The parallel OMBEVI market information service does not publish this data for the same reason.

[7]The enforcement of a ban on slaughters outside the abattoir at this time may also be a contributing factor (personal communication from A. Niang and S. Diallo).

[8]This is not inconsisitent with large arrivals of Malian cattle in Abidjan during July an August. These are a different group of cattle, pastured on rich bourgou grass in the dr season. They leave the inland delta for the south in May and June, after the beginning of th rains.

[9]This is an involved procedure which includes the anonymous purchase, weighing, an analysis for composition of "piles" of meat that customarily retail for a designated price such as 100 FM. Meat prices customarily fluctuate by increasing or decreasing the overal weight of the piles and the proportion of bone and offals. This effectively cumvent official efforts at price control (OMBEVI, No. 74, 1975). The prices analyzed in this stud relate to red meat without offals and refer to purchases on the order of 500 FM.

[10]Personal communication from Professor W.H.M. Morris and Messrs. A. Niang and S Diallo of Purdue, who were observing the trade at the time.

[11]The expenditure-income elasticity of demand for meat is the percentage change i expenditures on meat divided by the percentage change in household incomes over the sam period. If it is positive and greater than zero, it implies that an increase in income i associated with increased spending on meat, other things being equal.

[12]The OMBEVI estimation procedure was to run a univariate linear regression o income on expenditures using a limited number of grouped observations. The elasticities a each designated level of income were then calculated by multiplying the regression slope b the ratio of average income to expenditure in each group. Presumably this was as much a could be handled on a hand calculator. The increase in estimates of elasticity over income groups could result from even a small bias in the regression coefficients; it can be shown that the estimator used was biased. The appropriate procedure would be to try an estimating equation of the form: $\log y = a + b/x + \log x$, on the data within each expenditure group (see Mellor, 1978).

[13]For example, Mellor finds that the expenditure elasticity for meat, eggs and fish in rural India is 2.34 in the lowest decile of the income distribution, declining to approximately unity in the highest decile (1978, p. 9). This implies that a one percent increase in the income of the poorest 10 percent of the population will be associated with over a 2 percent increase in their expenditure on these commodities.

[14]Discounting the effect of "money illusion" and assuming that new purchases by people whose incomes rise just offset decreases by people whose real incomes fall.

[15]This is a good reason for rejecting as biased the regression estimates of the own-price elasticity of demand for beef in Mali contained in Beazer and Stryker (1976, p. A-4). In fairness, it should be stated that the authors make no great claims for their estimate, which does not consider the effect of mutton prices on demand. In practice, the crossprice elasticity of demand for beef with respect to the price of mutton is likely to be quite high (in the vicinity of two?).

[16]Aggregate real GDP is assumed to grow at 7 percent in the urban sector and 2 percent in the rural sector (IBRD assumption for Mali, Jan. 1978). Population is assumed to grow at an annual rate of 5.2 percent in the urban sector and 2.4 percent overall (OMBEVI, No. 96, 1977). This leads to a 1.88 percent population growth rate in rural areas, given the population distribution in 1974. The average annual per capita growth in real income is then 1.8 percent in urban areas and 0.12 percent in rural zones.

[17]A greater rural consumption responsiveness to rural income changes would most likely result from lower imputed average incomes per capita than in urban areas, based on the theory that expenditure elasticities for meat are highest among the lower real income groups.

[18]No explanation is given of why rural consumers should behave this way.

[19]Neutral price change means that the prices of beef, mutton and other commodities are not changing in relation to each other, even if they are rising overall.

[20]It should be remembered that the revised figures are also projections. At the time of writing there were no real 1977 data to go on.

FOOTNOTES TO CHAPTER EIGHT

[1]According to the Malian recorded export data in Table 8.1.

[2]The six-month border closure in 1975 was particularly effective in diminishing declared small rum nant exports, most of which are shipped by truck.

[3]Some Malian observers feel that the creation of an institutional monopoly over the trade was also to blame.

[4]Problems with the handling of the meat prior to export apparently led to dissatisfaction in Algiers with the quality of the meat received in 1978, leaving the question of future shipments in doubt. One meat expert claims that no more than 15 minutes is permissible between cooling units when moving chilled carcasses in Mali. The prevailing institutions apparently have difficulty coping with this constraint.

[5]The bureaucratic "formalities" and requirements involved in exporting to Ghana have largely discouraged Sahelian sales to the country. This decline of imports has occurred despite the likelihood the the real (black market) exchange rate has increased less than the overall price index. The former is largely dependent upon supply and demand for cocoa in the world market.

[6]This category is from the Bulletin Mensuel de Statistique of Ivory Coast. Fresh fish is usually cheaper by weight than smoked fish, since the latter is made from the same commodity but contains 30 to 40 percent less water. The fish is often "trash fish" off-loaded by foreign trawlers seeking tuna and other more valuable species. Smoked fish accounts for roughly four-fifths of the fish consumed in Ivory Coast (personal communication from John Staatz).

[7]The weaker the dollar, the less the Malians get in terms of FM for a given amount of exports to Liberia.

[8]One official of the Livestock Service felt that 50,000 head per year might be a reasonable order of magnitude. Given the 1,000,000 head margin of error used by OMBEVI (No. 96, 1977) when estimating the small ruminant herd size for 1974, this amount would have only a small effect on national herd size and offtake.

[9]OMBEVI (No. 96, 1977) pp. 140-45. The methodology was not made explicit; however, the estimates for 1974 are consistent with the consumption data estimated for that year.

FOOTNOTES TO CHAPTER NINE

[1]Specifically excluding dairy and breeding activities.

[2]This is because average fixed costs fall as output is expanded up to the capacity of the fixed items.

[3]In fact, a vast amount of price data is kept in unpublished form for all of Mali. The exceptional series meriting detailed analysis is the one generated by OMBEVI for Kati market near Bamako after June 1974.

[4]There seems to be a grade premium, and export animals are generally heavier.

[5]Especially given the doubling of beef prices over the same period.

[6]In addition to slaughter taxes, there are trader taxes and market taxes which account for roughly 225 FM per head of cattle. It should be noted that in the rainy season cattle may actually gain weight on the trek south. Also, the loss in body weight may not be fully translated into loss of carcass weight because part of the loss is metabolized fifth quarter.

[7]This is the abattoir gate price of 750 FM given in Table 9.5 with offals worth 10,000 FM netted out. This excludes any costs associated with cutting and marketing and any returns to invested capital. Since transport costs are computed by weight, most meat exports by air consist of the higher value rear-quarters. Therefore these prices, which are based on the entire carcass, should be considered as minimums.

FOOTNOTES TO CHAPTER TEN

[1]Paper No. 100, pp. 38-40. These figures refer both to shipments to Senegal over the Bamako-Dakar line and to trekked shipments boarding the railroad at Bobo-Dioulasso in Upper Volta.

[2]OMBEVI (No. 100, 1978) reproduces a detailed map of trek routes prepared by SEDES. The SEDES map does not give any indication of the quantities involved and therefore is misleading with respect to the number of cattle going to Ghana from Mali, which is probably small. On the other hand, important routes through eastern Upper Volta for cattle en route to Togo, Benin and Nigeria are not shown.

[3]Another explanation would be fraud at border points. The author has no way of knowing what percentage of trucked small ruminants escape being recorded.

[4]Ivory Coast, Mali, Mauritania, Niger, Senegal and Upper Volta.

[5]In early 1979 these policies were being reconsidered under pressure from the CEAO.

[6]The popularity of the second option was diminished by the border war in 1975 and the decision by Voltaic authorities in 1976 to abolish the legal status of "transit" cattle. After that date, Malian animals in Upper Volta were considered to be Voltaic and required to pay Voltaic export taxes (personal communication from Larry Herman).

[7]It is against the law in the United States, where live animals are often shipped similar distances, to keep cattle on board for more than 24 hours at a time.

[8]This was determined in July 1977 in a joint weighing project by John Staatz and OMBEVI.

[9]This analysis considers the advantages of timeliness solely from the point of view of freeing tied-up capital. Another advantage of trucking is that exporters can respond more quickly to changes in the market situation on the coast. The relatively long turn-around between receipt of market information in Niono and sale of the cattle in Abidjan (a minimum of two weeks) implies that exporters are not in a position to take advantage of short-term fluctuations by trucking. Long-term fluctuations, on the other hand, are likely to be seasonal and hence predictable enough for exporting on the hoof.

[10]As the notes to that Table make clear, the accuracy of the estimates is less than for cattle exports, particularly with respect to North African shipments. This is due to the lack of published data.

[11]These figures are highly "tentative" and should be replaced by data from a field study as soon as possible.

[12]The true economics of exporting on the Gao-to-Algiers route has yet to be satisfactorily established.

FOOTNOTES TO CHAPTER ELEVEN

[1]The first step in estimating potential exports of livestock and meat from Mali in 1985 is to judge the productive potential of the national herds at that time. This was done in Chapter Six. The next step is to gauge the likely trend in domestic consumption of livestock and meat products on the basis of population, price, and income trends. The methodology and assumptions of Chapter Seven, Section IV, serve to accomplish this objective in Table 11.1.

[2]In that most Malian exports occur "on the hoof," 38,000 tons of carcass meat is equivalent to 47,500 tons of beef with edible offals.

[3]The rates depend quite a bit on the season and the presence of return cargo. This uncertainty and recent sharp rises in the cost of fuel are further arguments against relying upon truckers to ship Malian export cattle.

[4]This figure serves as an upper bound since the liveweight shrinkage will be less than the carcass shrinkage as a result of the metabolized fifth quarter. Offals are worth less than carcass meat.

[5]The official export embargo in the first and second quarters of 1975 helped moderate prices in Bamako. Presumably they did not fall back to the early 1974 levels because of continued illegal exports and rising domestic demand in urban areas as Malian grain prices fell.

[6]The export-import licensing arrangements continued, however, to provide a motive for legal exports. Illegal exports have smaller cost margins and thus remained profitable.

[7]Even though cattle trains may take five days, the animals are sometimes not off-loaded for watering en route. A trial shipment in early 1977 reportedly sustained a 45 percent loss following a train breakdown.

[8]The Senegalese Government is said to have agreed to drop the tax on livestock that are shipped to Senegalese projects (e.g. SODESP and SODEVA) for further transformation before being offered to the consumer.

[9]The price data on small ruminants is particularly poor since the variation in the size of the animal presented is large and the overall value per head is low relative to cattle.

[10]This is borne out in two observations reported for 1978 by Goedicke (1979).

[11]Including the TCA means that the margin would have to be at least 44 percent under these assumptions.

[12]The rate used in Table 11.9 is in fact the 1977 concessional rate, which considerably understates the cost in mid-1979.

[13]Assuming that Ivorian consumers accept meat slaughtered elsewhere. This is not thought to be a problem.

[14]Algerian military planes transported the shipment.

FOOTNOTES TO CHAPTER TWELVE

[1]One major reason for suspecting this rise in world beef prices through 1985 is the growth in demand for beef in tropical Latin America. The projected deficit in this area is large enough to make this important exporting region of manufacturing beef a net importer by 1990 (see Valdés and Nores, 1978). Imports by Brazil would be a market of first choice for Uruguay and Argentina, the principal non-Sahelian suppliers to the West African market.

[2]If herdsmen still sell the same amount as before at any given price level, then the productivity increases will not affect the supply curve. The conclusions from the analysis in Figure 12.1 will then hold even more strongly. However, eventually the range will be ever-grazed and disaster for everyone will occur. This problem will be considered more fully later in this chapter.

[3]Define: $h = b - (M + N)$

Where: h = annual gross productivity rate of the herd (= offtake + net growth)

b = crude birth rate = live births/herd size

M = deaths of calves/herd size

N = deaths of other cattle/herd size

then substitute: $M = bm$

where: m = calf mortality rate

we get: $h = b - bm - N$

Clearly: $\frac{\partial h}{\partial m} = -b$ = approximately .2 to .25.

Therefore a 10 percent decrease in the calf mortality rate leads to roughly a 2 percent increase in the number of live cattle available each year for offtake or addition to the herd.

[4]The amount would be more if prices increase, as the analysis in the preceding section indicates is likely to be the case. On the cautionary side, a complete economic analysis of the costs of increasing the number of calves would have to consider repercussions, if any, on milk sales and on the average weight of members of each age/sex category in the herd, because of increased pressure on the available pastures.

[5]"Calving rate" is used here to designate the number of live births in a year, divided by the number of females of reproducing age in the herd. If the latter represents one-third of the herd, then a 10 percent increase in the calving rate is equivalent to a 3.33 percent increase in the crude birth rate. If the mortality rate is constant, this eventually leads to a similar increase in the percentage of the herd available each year for offtake or net addition to the herd.

[6]Despite considerable effort, the author was not able to locate an exact reference for the Dutch work. According to W.H.M. Morris of Purdue, the Dutch findings will be published shortly in a paper by C.T. De Witt and F.W.T. De Vries, department of Theoretical Ecology, Wageningen Agricultural University, the Netherlands.

[7]See Cluff, C.B., "Report of the Expert Consultant on Hydrology," UNDP/Mex 74/003, Mexico City, 1976.

[8]Deficits in Ivory Coast requiring imports from Sahelian countries would most likely be met from imports originating in Upper Volta's Banfora feedlot complex.

[9]They are not rounded up until the next planting season. In some areas of Mali, as in most of the Mossi plateau of Upper Volta, the household herds are combined into joint herds under Fulani care and taken into the river valleys from March to June.

[10]Some breeds of goats have the potential to produce a considerable amount of surplus milk when well-fed, but the breeds kept in the Malian Savannah are primarily meat animals. Their milk yield under indigenous conditions may be as low as two ounces a day for a short lactation period. In any event, goat milk is rarely consumed in that area.

ABBREVIATIONS AND ACRONYMS

AFB	Abattoir Frigorifique de Bamako
AGRIPAC	Para-statal agricultural marketing firm in the Ivory Coast which merged with DISTRIPAC in 1979 to become PAC
CEAO	Communauté Economique de l'Afrique de l'Ouest (members: Ivory Coast, Mali, Mauritania, Niger, Senegal and Upper Volta)
CIF	cost, insurance and freight
CILSS	Comité Inter-états de Lutte contre la Sécheresse au Sahel
CMDT	Compagnie Malienne pour le Développement des Textiles
CNPER	Commission Nationale de Planification de l'Economie Rurale
DGPS	Direction Générale du Plan et de la Statistique
ECIBEV	Etablissement de Crédit et d'Investissement dans le secteur Bétail-Viande
EEC	European Economic Community
FAO	Food and Agriculture Organization of the United Nations
FED	Fonds Européen de Développement (EEC)
FM	franc malien (in this report 420 FM = US$ 1.00)
FOB	free on board
GDP	gross domestic product
GOM	Government of Mali
IBRD	International Bank for Reconstruction and Development (World Bank)
IER	Institut d'Economie Rurale
IEMVT	Institut d'Elevage et de Médecine Vétérinaire des Pays Tropicaux (France)
ILCA	International Livestock Centre for Africa
IPGP	Institut de Productivité et de Gestion Prévisionnelle
LDO	Livestock Development Office, USAID, Bamako
MDR	Ministère du Développement Rural
OACV	Opération Arachide et Cultures Vivrières

ODEM	Opération pour le Développement de l'Elevage à Mopti
OHV	Opération Haute Vallée
OMBEVI	Office Malien du Bétail et de la Viande
ON	Office du Niger
ORS	Opération Riz Ségou
PNUD	Programme des Nations-Unies pour le Développement (see UNDP)
SEDES	Société d'Etudes pour le Développement Economique et Social (France)
SEPOM	Société d'Exploitation des Produits Oléagineux du Mali
SOMBEPEC	Société Malienne du Bétail et d'Exploitation des Peaux et Cuirs
SOMIEX	Société Malienne d'Importation et d'Exportation
SSG	Service de la Statistique Générale, de la Comptabilité Nationale et de la Mécanographie
UBT	unité bovine tropicale = liveweight of 250 kg
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USDA	United States Department of Agriculture

BIBLIOGRAPHIC NOTE

Some of the abbreviations above have been used in the text to identify reference works in the bibliography. IEMVT, 1977, for example, refers to the study by R. Dumas found under Institut d'Elevage et de Médecine Vétérinaire des Pays Tropicaux. In a few instances where one source has published more than one work in the same year and there is need to distinguish among them, the letters (a), (b), etc. have been used. The various OMBEVI reports are mentioned by number in both text and bibliography. Finally, there are some references in the text whose place in the bibliographic listin is not readily apparent. These include:

DGPS	See République du Mali, Présidence du Gouvernement.
IER	See République du Mali, Ministère de la Production, for 1974-1975 references.
	See République du Mali, Ministère du Développement Rural, for 1977 references.
FAO	See United Nations Food and Agriculture Organization.

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