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VOLUME I

Synthesis Upper Volta

Edgar J. Ariza-Niño
Larry Herman
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Charles Steedman



Prepared by the CENTER FOR RESEARCH
ON ECONOMIC DEVELOPMENT,
the UNIVERSITY OF MICHIGAN

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**prepared by
Center for Research on Economic Development
The University of Michigan
for
Regional Economic Development Services Office, West Africa
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LIVESTOCK AND MEAT MARKETING
IN WEST AFRICA
VOLUME I

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PREFACE

The marketing of livestock and meat in West Africa is a major element of the trade system linking inland and coastal states. This trade was severely disrupted by the Sahel drought of 1968-74. In the wake of the drought, Sahelian governments incorporated ambitious livestock projects into their overall recovery programs. In 1975, however, large quantities of frozen beef and mutton from overseas appeared simultaneously in several countries of the west coast of Africa. This meat was coming from major meat exporting nations, notably South America and Europe. This radical shift in sources of supply altered the structure of the West African market for meat and livestock, in ways whose consequences for the future of the livestock sector in the region were little understood at the time.

This study was designed to trace the evolution of the changes prior to 1977, to evaluate how the new situation affects livestock development in both Sahelian and coastal countries, and to project likely trends through 1985. The study was commissioned by the Regional Economic Development Services Office for West Africa (REDSO/WA) of the United States Agency for International Development (USAID).

The five volumes in this series cover the "central corridor" segment of the West African livestock trade -- comprised of two Sahelian countries (Mali and Upper Volta) and five coastal nations (Liberia, Ivory Coast, Ghana, Togo, and Benin). The Upper Volta report appears in this volume along with the synthesis report. Individual reports on four coastal countries are contained in volume II: Liberia, Ghana, Togo, and Benin. Reports on the two principal trading partners, Mali and Ivory Coast, are found separately in volume III. Two additional volumes cover developments outside West Africa. Volume IV reports on three major non-African countries that play an important role in the world meat trade: Argentina, Australia, and New Zealand. Volume V includes reports on three other suppliers -- Uruguay, Denmark and France -- plus a report on market opportunities in the Near East and North Africa for meat from Sahelian countries. An overview of recent changes in the world meat economy and their implications for West Africa is also included in volume V. French translations of all volumes will appear later this year.

Research on the marketing of livestock and meat in West Africa is part of the long-standing involvement by the Center for Research on Economic Development (CRED) of the University of Michigan on the economic development problems of the region. These reports have benefited, in particular, from the considerable volume of data and personal experience obtained in the course of field surveys carried out under the previous project on livestock production and marketing in the Entente states of West Africa directed by our colleague, K.H. Shapiro. Moreover, CRED researchers are currently involved in three other surveys related with the West African livestock economy: a farm management survey to determine constraints to the stratification of cattle production in southern Niger, a survey of the livestock and meat industry in Nigeria, and a consumer survey of meat consumption patterns in Abidjan, Ivory Coast.

In addition to researchers at CRED, two Institutes have graciously contributed their work to the successful completion of this project: the International Trade Center In Geneva assumed responsibility for the reports on Denmark, France, and potential new markets in North Africa; the Agricultural Business Research Institute of the University of New South Wales In Armidale, Australia, contributed the studies for Australia and New Zealand. We are greatly indebted to Messrs. A.H. Rotival and S. Skuncke of ITC, and to Messrs. J.L.P. Griffith and P.A. Rickards of ABRI for their support and cooperation.

Numerous individuals and institutions in several countries have taken part in the course of this project. In each volume, we have tried to mention those most closely involved in the respective studies. Special recognition is made to several Voltaic organizations and individuals who contributed time, data, documentation, and administrative support during the field survey by Larry Herman, in the preface to the Upper Volta report (in this volume).

An early version of the synthesis report was the subject of a thorough review at a meeting of livestock project officers organized by REDSO/WA in July 1979 in Abidjan. We are particularly indebted to Messrs. G. Evans, J. Kelly, T. Mukherjee, and D. Butchart for their pointed critiques at the time. We have subsequently benefited from lengthy discussions with many persons, including the authors of the country reports themselves. Detailed comments and recommendations from W.H.M. Morris (Purdue University), J. Simpson (University of Florida), J.D. Stryker (Tufts University), J.V.D. Lewis (USAID), H. Helman (American ORT Federation), S. Skuncke (International Trade Center), and E.L. Littman (FAO/ECE) have greatly helped to sharpen the conclusions and recommendations of the synthesis report. All remaining misjudgements are ours alone.

Finally, we would like to affirm our appreciation of many of our co-workers at CRED: Elliot Berg and Robin Barlow, former and current CRED directors, respectively, gave their continual encouragement and support throughout the project. Ken Shapiro was a constant source of experience and advice. Beth Fredrickson ably coordinated the project's numerous activities and carefully edited the reports. The demanding administrative duties were shouldered by Sherry Cogswell and Jane McCormick. Jane also designed the cover, prepared graphics, and added numerous small touches with her usual flair. Jayne Owen patiently and skillfully directed the secretarial staff in typing multiple versions of these reports, and together with Tony Nuismer, worked in the preparation of this volume.

Ann Arbor, Michigan
June 1980

Edgar J. Ariza-Niño
Charles Steedman

Inquiries about additional copies of this and other volumes of Livestock and Meat Marketing in West Africa should be addressed to:

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The five volumes are entitled:

- I. Synthesis and Upper Volta
- II. Benin, Ghana, Liberia, Togo
- III. Ivory Coast and Mali
- IV. Argentina, Australia, New Zealand
- V. The World Meat Economy; Other Supplier and Consumer Countries

PART I

SYNTHESIS REPORT

**Edgar J. Ariza-Niño
Charles Steedman**

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INTRODUCTION

Two major but independent events in the early 1970s brought about a major reorganization of the livestock and meat trade in West Africa. The traditional flow of cattle from the Sahelian toward the coastal countries was severely disrupted in the aftermath of the 1968-74 Sahel drought. At the same time the international meat trade underwent a drastic restructuring; meat flows from South America to the European Community virtually ceased, while new channels were opened toward markets elsewhere, notably in the Middle East and in Africa. One hopes that the drought was a temporary natural phenomenon, but the new structure of the world meat economy shows signs of permanence. Sahelian livestock producers will henceforth have to compete with international meat exporters for a share of the West African market.

This series of reports attempts to show the effects of the new situation on two Sahelian and five coastal countries of West Africa: Mali and Upper Volta in the Sahel, and Liberia, Ivory Coast, Ghana, Togo and Benin on the coast.

By 1980 livestock production has practically recovered to pre-drought levels. Demand for livestock products, however, has continued to expand, driven largely by rapid urban growth in coastal as well as Sahelian countries. The largest deficit has occurred in bovine meat and offals; this has been partly offset by increased consumption of fish, small ruminant meats, and poultry.

The outlook through 1985 is for slow growth in cattle production, rapid growth of demand for beef, increasing meat deficits for the region, and higher prices. A further drift of consumption away from beef toward poultry and sheep and goat meat is to be expected. Small ruminants present a better prospect than cattle for improvements in productivity.

Throughout the 1970s the traditional marketing system for livestock and meat in West Africa demonstrated a remarkable ability to adjust to changing conditions. It should continue to do so in the future. Given the shortcomings in physical and institutional infrastructure, the system operates competitively and efficiently. Little evidence of monopoly power or collusion among traders or butchers has been found. High marketing costs and rates of return on capital in the cattle trade reflect the high transport costs and taxes involved, and the risks and uncertainties encountered. Calls for reorganization of the livestock and meat trade appear unnecessary.

Demand for beef and mutton is growing rapidly in North Africa and the Middle East. It is unlikely, however, that Sahelian meats can compete against those from South America, Oceania, and Europe in supplying these new markets. Sahelian exporters are hampered by inadequate transport, refrigeration and communications, and by strict sanitary and processing import requirements. Nevertheless, trucking live small ruminants to markets in Algeria offers hopeful prospects.

I. SUMMARY OF HIGHLIGHTS

The paragraphs below give a capsule summary of the main points of the Central Corridor Livestock and Meat Marketing Study. Section II discusses some topics in more detail and addresses important issues. The third and final section is devoted to policy recommendations.

A. The Coastal Market

1. Demand for animal protein was increasing during the late 1960s in the five coastal countries under study. Increased population, greater urbanization, and higher per capita incomes were the main causes. The latter was particularly the case in Ivory Coast, where real per capita income rose markedly until 1970, at which point it leveled off.

2. Prior to the early 1970s, almost all imported red meat consumed in the coastal countries arrived in the form of live animals from the Sahel. Togo, for example, obtained 99 percent of its imported red meat in 1969 from live animal imports. Ivory Coast satisfied over 80 percent of its demand for beef with imported cattle through 1973. Liberia was the exception, importing more meat than animals in the 1960's.

3. The limited imports of red meat that occurred prior to 1975 were predominantly higher priced cuts destined for the "class I" market patronized by high-income consumers and expatriates. Prior to 1975, the largest amount of beef that Ivory Coast had imported in one year was 1,520 metric tons. Benin had not imported more than 50 tons, Togo 350 tons, or Ghana (prior to 1973) 680 tons. Sahelian countries provided roughly 90 percent of Ivory Coast's imported beef; Europe supplied the remainder.

4. The rapid and extreme changes that occurred in these markets in the mid-1970's were the result of an unusual coincidence of factors. The causes of these changes were the conjuncture of the Sahelian drought aftermath, a cyclical glut of beef on the world market, and protectionist policies in the developed countries. The Sahelian drought caused an extreme fluctuation in the supply of live animals to the coastal markets. As the drought became prolonged, herds moved south and forced sales occurred. Cattle owners even sold females and young stock to get money to buy foodgrains. Sales reached a peak in 1973, then declined as the Sahelian countries took steps to reconstitute their herds. By 1975, Mali, Mauritania, and Niger had gone as far as closing their borders for a few months. The brief outbreak of hostilities between Mali and Upper Volta in December 1974, further reduced the flow of livestock to the coast. The coastal countries, particularly Ivory Coast, began to look for alternative sources of supply.

5. Events elsewhere provided them. The world's traditional beef exporting countries were faced with greatly increased stocks of meat and fewer markets. The world beef economy, which displays a strong cyclical pattern, had rapidly turned from a situation of beef shortage and herd expansion to one of beef surplus and herd reduction. Declines in

world grain and fishmeal supplies had made cattle feed much more expensive, and beef demand had moderated as consumers' purchasing power declined in the recession following the 1973 oil crisis. By 1973, the beef cycles in all four major producing areas (Argentina, Australia, the U.S., and the EEC) had come into alignment and led to a massive oversupply problem. Import restrictions in the EEC, Japan, and the U.S. made matters worse. The EEC was becoming self-sufficient within its borders. While the Community's four major beef importing countries took only 29 percent of their beef imports from other EEC countries in 1965, they were getting 85 percent from their partners in 1976. In addition, there had been an explosive increase in Australian production, exports increasing from 275,000 metric tons in 1961 to one million in 1978. Argentina's exports went from 396,000 tons to 625,000 in the same period. By 1975, the need to find new markets was keenly felt.

6. Ivory Coast took the lead in importing meat from non-West African suppliers. In April-May 1975, there was an abrupt drop in imports of Sahelian cattle. To overcome this shortage, large quantities of frozen meat imports were brought in by sea, starting in September 1975. Until then less than five percent of Ivory Coast's beef imports had arrived in that manner. The new imports also included large quantities of lower grade front quarters, which were sold on the general (class 2) rather than the class 1 market. Eighty percent of this meat was sold in Abidjan. Chilled and frozen beef imports rose from 1,240 tons in 1974 to 6,090 in 1975 and to 16,610 in 1976. South America, which had shipped no meat to Ivory Coast prior to 1974, provided 77 percent of its 1975 beef imports and 93 percent of the 1976 total. France also shipped a large amount of surplus frozen beef from EEC intervention stocks.

7. In Ghana, the situation evolved in a somewhat different and more complex manner. Government intervention in cattle and meat marketing added a new element. The government's first move was the Alien Compliance Act of 1969, under which Ghanaian cattle dealers were to assume positions in the livestock trade that had previously been occupied by non-nationals. Alien cattle traders were obliged to sell their animals at border quarantine stations. The Ghanaian Government then began to set prices and created a Cattle Development (later Meat Marketing) Board in 1972 in an effort to correct what were seen as abuses by middlemen. The low purchase price for cattle offered by the Board and lengthy delays in currency conversion caused cattle merchants to seek other coastal markets, primarily Ivory Coast. To alleviate the resulting meat shortages in the south, the Board imported beef by air from Mali and Senegal in 1973, and the government also raised the price for live animals. Distress sales of cattle during the Sahel drought temporarily renewed the flow of live animals into Ghana, but an outbreak of hoof and mouth disease in December 1973, a closing of the quarantine stations, and a subsequent saturation of market channels led to a breakdown of the government-controlled system. Cattle imports dropped sharply from over 51,000 head in 1974 to 10,500 in 1975 and to less than 4,500 in 1976. The Board turned to meat imports instead: 4,500 tons of beef and 1,140 tons of mutton, lamb and goat meat in 1975. Beef imports rose to over 7,600 tons in 1977 -- despite import licensing restrictions and limited foreign exchange availability. At the present time, Ghana has virtually disappeared as a market for Sahelian cattle, though a small seasonal trade in small ruminants continues.

8. Liberia, Togo and Benin did not respond to changes in the world meat economy in quite the same fashion. Imports of live animals reached peaks in 1973, although Togo had a slightly higher peak two years later. The change in Benin was dramatic: imports rose from less than 6,000 head of cattle to 17,500 in 1973, dropping off sharply thereafter. Since then Benin's meat imports have been insignificant as a result of government restrictions, which now apply to imports of both meat and livestock. Togo has been more open. Meat imports increased to between 350 and 450 tons in the 1974-76 period, covering about one-quarter of the supply. Imported meat in Togo now goes to the general as well as the class I market, the unit price for imported meat being well below what it was prior to 1971.

9. Liberia responded to the Sahelian distress sales and lower prices by importing more cattle and less meat in 1973 and 1974. Then, cattle imports dropped sharply in 1975. Two years later, live animals and imported meat each accounted for about one-half of consumption or 4,000 tons.

10. In brief, it was disruption in the supply of livestock from the Sahel, and the availability of frozen and chilled beef at low prices which permitted large-scale importations of the latter, particularly in Ivory Coast and Ghana, starting in 1975. Since then, relative prices have become less favorable to imported beef. Having fallen as low as \$600 in 1975, the price per ton of frozen beef, delivered and stored in Abidjan, rose to \$1,045 in August 1978. In the same month an equivalent mix of front and rear quarters of beef from Sahelian animals slaughtered in Abidjan was still 80 percent higher, \$1,895. Since then, the trend has been toward narrowing the gap. Any further moves to loosen European and other developed country restrictions on beef imports could bid up world prices substantially. The considerable advantage enjoyed by non-West-African imports in 1975 is unlikely to be repeated in the near future.

11. Although this study focused on the central corridor states, it should be emphasized that events in Nigeria and in the eastern corridor in general, had a significant impact in the pattern of livestock trade flows in the central corridor. Nigeria's cattle herd of 12 million head overshadows the combined herds of Mali and Upper Volta. The Sahel drought affected northern Nigeria where most Nigerian cattle are concentrated and had severe consequences for the cattle herds of both Niger and Chad -- the two main exporters of livestock to Nigeria. Demand for beef in the Nigerian market grew rapidly in the oil boom after 1973. Beef prices in urban areas, Lagos especially, skyrocketed. Beef was flown from as far away as Brazil and Yugoslavia, but frozen meat could not be brought in by sea because of congestion in the port of Lagos. Only in 1977, did Nigeria begin receiving frozen beef cargo from Argentina and Brazil. These developments were bound to have an impact. Nigeria became a magnet for cattle from eastern Mali and Upper Volta. Some of the traditional flow of cattle southwest toward Ivory Coast, turned eastward toward Niger and Nigeria. Even breeding stock was included, attracted by the high prices offered in Niger's herd reconstitution program.

B. Competing Sources of Protein in Coastal Countries

12. An element often overlooked is the role of fish products in supplying animal protein. Fish is far more important than meat in Ivory Coast, accounting for about half of total animal protein consumption, with beef supplying only one-fifth. Per capita fish consumption in Togo is only one-half what it is in Ivory Coast (11.5 kg against 22 kg annually), yet still higher than per capita meat intake. Benin imports enough fish to maintain consumption per capita near 10 kg while attempting to increase the domestic catch. Demand for fish in southern Ghana is extremely high. Per capita consumption nationally is even higher than in Ivory Coast. Fish is a less expensive source of animal protein throughout the coastal countries, although in Togo, the price gap has narrowed considerably.

13. Imports of frozen fish into all the coastal countries, except Liberia, have been significant. In Ivory Coast, inexpensive imports of iced and later frozen fish from non-West African suppliers (mainly East European) who fish in African waters have largely displaced dried fish imports from Mali. The traditional fish marketing system adapted surprisingly well to frozen products and new suppliers.

14. Poultry and pork are other sources of animal protein that need to be taken into account. Though it is possible to increase production rapidly, to date, Ivory Coast has not been able to produce and market these meats at a cost that makes them competitive with imported beef. The role of Muslims in the meat marketing chain also poses a constraint to the expansion of pork sales. Poultry and pork production have been expanding rapidly in Ghana. Prices for pork and dressed poultry have been less than those for red meat products and have led consumers to substitute them for red meat in Ghana and Liberia.

15. The meat of wild animals, known as bushmeat, contributes an important but undetermined portion of animal protein intake in both coastal and Sahelian countries. It is particularly important in rural communities in forest areas. All animal species are consumed in West Africa; rodent meat is especially common. This study did not attempt to gauge the magnitude of bushmeat consumption in the coastal countries, but it is a competing source of animal protein that, like the others mentioned above, should not be forgotten.

C. Livestock Production and Consumption in Mali and Upper Volta

16. Looking to the Sahelian countries in the study, one finds indications of the severity of the drought on livestock. The 1972 rains were so sparse in Mali, that slaughter cattle were on average heavier in July than in December. There was some recovery at the end of the 1973 rainy season, but average carcass weights at Bamako reached a low of 104 kg in July 1974, 21 kg below the 1975-77 average.

17. Since the drought years, herds have recovered remarkably well. With the exception of the Malian cattle herd, which in 1978 was still but four-fifths of its 1970 size, the cattle and small ruminant herds now exceed their pre-drought levels. By 1978, Malian cattle numbered about 4.25 million head. In Upper Volta the cattle herd had recovered by

1975, and contained about 2.8 million head in 1979. The best guess for small ruminants is 12 million head in Mali and 4.8 million in Upper Volta.

18. Distribution of the national herds over available rangeland is once again an important consideration. Previous estimates of theoretical carrying capacity of Malian rangeland have been used to generate upper bounds for the number of animals that can be carried in different zones. The minimum annual pasture for an environmentally sustainable national cattle herd in Mali was found to vary from 3 hectares per Tropical Livestock Unit (TLU) in the south to 20 in the northeast. In 1976, while the portions of the national herd in the south and northwest were far below the upper bound, the portion in the northeast had already reached it.

19. Most studies of livestock production appear to be over-optimistic with regard to herd growth rates. For Mali, they estimate the net annual growth rate for cattle between 3.2 and 3.5 percent. Field studies indicate that the true parameter may be as low as 2 percent. In Upper Volta, the growth rate is estimated to be 1.8 percent in the north and about 2.4 percent in the rest of the country.

20. It is unlikely that current livestock sector projects, which favor range development, will succeed in significantly altering herder behavior with respect to offtake. Livestock production on the open range is further constrained by limited availability of new pasture and sources of water, and by conflicts with crop production. Substantial encroachment of farm fields on traditional transhumance routes in Mali's interior delta, for example, is evidence of continuing pressure on the range. In lowland and riverine areas, new rice cultivation often interferes with traditional cattle routes. Similarly, in Upper Volta, expansion of agriculture in the north and east is causing conflict on traditional rangeland.

21. These and other considerations lead to an estimate of range cattle offtake in 1985 of 600,000 head in Mali, rather than the official projection of 670,000 head. In Upper Volta, in the same year, an offtake of 310,000 head is projected. National production in Mali in 1985 would thus be roughly 97,000 metric tons of carcass beef and edible offals, including animals exported on the hoof, an increase of 50 percent over 1976. Upper Volta's national production in 1985 would be some 31,000 tons of beef and 7,700 tons of offals, up 22 percent over 1976.

22. Feedlots have so far had a negligible impact on production. Calculations based on 1977-78 prices and average daily weight gains at Tienfala in Mali show that the feedlot would be economically unprofitable, even if it operated at full capacity. Mali's small-scale farm animal feeding programs using plow oxen have not worked in practice. Farmers have resisted culling the animals young enough for suitable weight gains. The ECIBEV farm fattening (embouche paysanne) program in Mali is more promising and could be economically profitable past a threshold of 1,000 head per year.

23. In any case, expansion of cattle feeding schemes is constrained by the lack of suitable feeder steers, of high-energy feeds, and of outlets for fed animals. Moreover, the domestic market does not place a premium on fattened animals. The premium does exist in

the coastal markets, but cattle would lose much of the added weight being trekked. Given these and other problems, beef and offals from fed cattle can be expected to account for less than 3 percent of output in 1985. In Mali, 10,000 head of fattened cattle per year is an optimistic upper limit.

24. Sheep and goats have tended to be neglected in comparison with cattle, yet they accounted for half of Mali's red meat supply and a quarter of its livestock exports in 1976. Small ruminant production is clearly a very profitable livestock activity for the small farmer in the Sahel. So far, little has been done in Mali to design production and marketing projects for sheep and goats. The dry northeastern part of the country (6th and 7th Regions) is a good breeding ground; gross herd productivity there (offtake plus net growth) is thought to be 30 percent a year, compared to 17 percent in the more humid Sikasso Region. Conservatively, aggregate production of sheep and goat meat and edible offals in Mali, by 1985, will be 62,000 tons, a 50 percent increase over 1976, and in Upper Volta, 21,000 tons, a 40 percent increase over 1976.

25. There were quantum changes in domestic meat prices during 1974 and 1975 as a result of the drought. Nonetheless, the big decline in Malian meat consumption occurred in 1974 -- prior to the rise in prices, not as a result of it. Future increases are not expected to exceed the rate of domestic inflation. Relative meat prices in the future are likely to depend to a great extent upon demand in export markets. Coastal consumption of Sahelian meat will, in turn, depend on economic trends in the coastal countries as well as on prices prevailing in the world meat and fish markets.

26. Trekking cattle to the coast from the Sahel is a profitable activity once again. A consignment of 50 head trekked from Mali to Ivory Coast, after complying with legal formalities, can bring a 10 to 11 percent return on capital at 1978 prices. By contrast, in late 1975 and early 1976, cattle exports were of little or no profit because domestic prices had soared in Mali, while frozen carcass imports were keeping prices down in the Ivory Coast.

27. The level of profitability of small ruminant exports depends to a great extent on the season in which the animals arrive on the market. Exports prior to the Moslem holy season, are extremely profitable. They are also profitable at other times of the year if care is taken to hold down transportation costs. In mid-1978, small ruminants exports from Mali to Abidjan could bring up to a 30 percent return on capital, provided the animals were trekked over the border.

28. The current, traditionally-organized cattle and beef marketing system is rather efficient -- given the institutional and infrastructural framework within which it operates. Marketing of cattle between the Sahelian and coastal states is costly, but the costs are attributable mainly to high transportation costs and export taxes, not monopoly profits of traders and butchers. The relatively high rates of return on capital for cattle merchants are generally warranted by the risk and uncertainty encountered. 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.

D. The Overseas Supplier Countries

29. ARGENTINA: the pre-eminence of Argentina in the world meat economy deteriorated over the past three decades, being replaced by Australia as the major meat exporter. During the crisis of the world meat trade in the mid 1970's, Argentina saw its beef exports collapse to a mere 79,000 tons in 1975, an 80 percent drop from 385,000 tons in 1972. This drop can be largely attributed to the closing of the European Community market, which cut its beef imports from 281,000 tons in 1972 to 27,000 tons in 1975. Argentina found alternative outlets for its major export product in Southern and Eastern Europe and in Africa both north and south of the Sahara. Africa's share of Argentine beef exports grew from virtually nothing in 1974 to 37,000 tons in just the first half of 1978, (25 percent of the world total). All together, the five coastal countries covered in this study received 7,671 tons of beef and offals, equivalent to 21 percent of the African total in the first semester of 1978. Ivory Coast, alone, received 3,124 tons. The largest African importers were Nigeria (8,495 tons), Egypt (6,474 tons), and Tunisia (5,597 tons). Over 60 percent of the beef exported to West Africa consists of manufacturing-quality beef from culled cows and older bulls. The proportion of manufacturing-beef is particularly high for Nigeria and Liberia. FOB prices for Africa are lower than for other regions, and in early 1978 ranged from \$660 per ton of manufacturing-beef quarters, to \$1,500 per ton of deboned beef cuts. European intermediaries play a key role in coordinating meat shipments from South America to the West coast of Africa. Attempts to establish direct links with importers have not so far succeeded. Beef production and prices follow a cycle of six to eight years. Throughout 1977/79, the beef sector was going through a severe stock liquidation phase: slaughter of cows and heifers was above 40 percent, and production was reaching record levels. The outlook is, therefore, a progressive decline in production lasting until 1982/83, while prices rise in real terms in the same period and decline thereafter. Beef exports to Africa are particularly susceptible to the fluctuations of the beef cycle.

30. AUSTRALIA: this country is the largest single supplier of beef, veal, and mutton to world markets. In 1977, it accounted for 27 percent of international trade in red meats. Beef and veal go principally to the United States. The largest markets for Australian lamb have been the United Kingdom until 1974, and the Middle East after 1974. Japan is the major market for mutton. With no regular shipping service from Australia, West African countries are considered markets of last resort by most Australian meat exporters. This attitude is not likely to change. Australian lamb and mutton production is expected to remain at low levels until 1984/85, while beef production is projected to decline from very high levels reached in 1977/78 before gradually increasing once again after 1981/82. In the short term, a reduction in red meat exports is projected, with markets considered readily available. By 1985, it is likely that beef available for export will exceed demand from traditional markets, but Australian exporters are not expected to look to West African markets to dispose of the surplus.

31. DENMARK AND FRANCE: peak exports of fresh/chilled and frozen meat from France to Ivory Coast occurred in 1975, though the amount recorded by France (6,000 tons) is considerably more than that recorded by Ivory Coast (3,900 tons). This export burst was short-lived, however. Only canned meat and other meat preparations have sustained a level of continuity and volume as exports to West Africa. On the part of French and other European exporters, there is in fact little interest in these markets, except for Ivory Coast. Liberia has been Denmark's major customer, but quantities of fresh/frozen meat have never exceeded 250 tons in one year. The accession of Greece and Spain to the EEC is expected to open up opportunities for both Denmark and France -- at the expense of South American exporters who have shipped significant quantities of meat to these countries in the past.

32. NEW ZEALAND: this country accounted for 47 percent of world trade in lamb and mutton in 1977. About 300,000 tons of lamb and 100,000 tons of mutton are available for export each year. Production of both is expected to increase up to 1985. The Middle East is likely to become an increasingly important market at the expense of the United Kingdom. While New Zealand's exports of red meat will expand up to 1985, it is not expected to have difficulty finding buyers. West African countries should remain marginal markets, a last resort.

33. URUGUAY: in the early seventies, European countries were Uruguay's most important customers for meat exports. In 1973, Spain took 32,000 tons, and the nine EEC countries took 37,000 tons out of the 98,000 tons total beef exports. Since that year, however, there has been a major reorientation in the destination of Uruguay's meat exports. Brazil has emerged as the main export outlet; in the first nine months of 1978, it took 51 percent of Uruguay's total. Brazil, in turn, has found it advantageous to ship its own meat to Nigeria, which received 11,000 tons in 1977. A tentative explanation of this triangular trade is that zebu-related breeds that are raised on tropical or semi-tropical pastures in Brazil may be more suited to the African market than Uruguay's European breeds. Nonetheless, Uruguay has found other new markets in Africa. Africa's share rose from one percent in 1973, taken by Egypt and Tunisia, to 24 percent in 1977, spread among twelve countries. Egypt is the principal client by a wide margin, followed since 1975, by Ghana, which has predominantly imported manufacturing-quality beef from Uruguay for direct consumption. Meanwhile, the EEC share of Uruguay's total meat exports fell from 45 percent in 1972 to only 18 percent in 1978.

E. Projections for 1985

34. In the world meat economy, there should be a short-run beef shortage in the next three years or so, followed by greater supplies and lower prices after 1983. If the beef cycles in the major producing areas remain synchronized, the shortage may be very severe and the surplus very large. The Sahelian countries may have a relatively good competitive position for a few years and then be severely challenged once again. Sahelian livestock exporters should expect keener competition in the future. As trade channels are opened up

and improved, it will be easier for non-African suppliers to compete. The lesson to be learned from the developments of the late seventies, is that the Sahel must pay careful attention to export costs.

35. Domestic demand for beef in Mali and Upper Volta will compete increasingly with export demand. In Mali, assuming a per capita growth of income of 1.8 percent annually and an income elasticity of 1.25 in urban areas, per capita consumption of meat in Malian towns would grow by 2 to 2.5 percent per annum to 1985, compared to less than 0.25 percent in rural areas. The consequence of Mali's recent political and economic troubles, however, may be to reduce the growth of incomes and hence consumption.

36. More than half the aggregate beef consumption in Mali occurs in towns, which have less than 15 percent of the population, while nine tenths of domestically consumed mutton is eaten in rural areas. Extrapolation indicates that by 1985 aggregate beef consumption in Mali may increase by more than 50 percent to 69,000 tons, whereas mutton consumption would grow by less than 25 percent to 57,000 tons. It is not clear what effect this might have on the relative prices of beef and mutton, since prices for steers are likely to be determined in the export market.

37. In Upper Volta, beef consumption may not rise so sharply. Based on certain assumptions about internal migration, income elasticity of demand, income growth and different consumption patterns, Voltaic beef consumption is expected to increase at a 3.5-4.0 percent annual rate or about 32-37 percent in the 1977-1985 period. Per capita consumption would rise 0.7-1.0 percent per annum. Urban areas will account for 38-39 percent of total beef consumption in 1985, up from 30 percent in 1977. The rural share of total small ruminant meat consumption is expected to decline slightly from 94 to 91 percent between 1977 and 1985. Total domestic small ruminant consumption would be 23 percent higher in the latter year.

38. The best guess on how much beef and edible offals will be available for export after domestic demand has been satisfied in 1985 is 28,000 tons for Mali, and 3,000 tons for Upper Volta. Projections for small ruminants, depending as they do on average mortality rates, which are unknown, remain pure guesswork. OMBEVI's estimate of 7,000 to 8,000 tons for Mali is plausible. For Upper Volta, the amount could reach 4,500 tons, but caution is advised in using these estimates.

39. For beef in 1985, comparison of Ivory Coast's likely demand with predicted availabilities in Mali and Upper Volta shows that the Sahel will have a market for its surplus. The real question, of course, is not whether Sahelian livestock will sell but at what price. For the next three or four years at least, Sahelian traders should get reasonable returns on their exports. As far as the size of the market is concerned, Ivorian beef import requirements in 1985 should be between 48,000 and 56,000 tons. The maximum surplus available from Mali and Upper Volta should be in the neighborhood of 31,500 tons in that year. A somewhat larger surplus could become available if prices rose considerably in coastal markets and thus drew animals away from domestic consumption in the interior countries. Ivory Coast alone could theoretically take the entire export production of Mali

and Upper Volta. In what proportions Ivory Coast meets its import requirements through livestock imports from the Sahelian states or through frozen meat imports from overseas, will depend on the evolution of the world meat economy as well as on the supply and demand situation in the Sahel. Furthermore, from the perspective of the Sahelian countries, Ivory Coast is not even the major coastal market for livestock exports. Nigeria remains the largest and most rapidly growing market in the region. Barring unlikely developments, these two countries should take as much livestock as the Sahel can provide at least until 1990.

40. The other coastal countries covered in this study will play a much less important role in sustaining demand for Sahelian livestock. Benin, in fact, restricts livestock imports. A reasonable estimate of Togo's annual meat deficit by 1990 is only 3,500 tons; nor can Liberia be expected to become a significant market.

41. Ghana's picture is more uncertain. The country's economic and political difficulties have been important factors in its behavior. With regard to the future, higher world prices, and devaluations of the Ghanaian cedi are expected to reduce demand for red meat. Foreign exchange restrictions continue to make it difficult to import. By 1985, the deficit between domestic production and consumption could be as little as 12,700 tons or as much as 33,600 tons. While Ghana does represent a potential consumer of importance for Sahelian livestock, a number of political and economic changes would have to occur before live animal imports could reach the magnitudes registered prior to 1975. They are unlikely to do so in the next few years. In any case, the Sahelian countries need not count on the re-emergence of a significant market for livestock in Ghana.

42. The outlook for air shipments of chilled beef from Mali is not good. Mutton shipments by air were not profitable at 1978 levels, but may represent the most viable form of meat (as opposed to livestock) exports in the future.

F. Potential New Markets for Sahelian Exports

43. ALGERIA: consumer preference is for fresh lamb and mutton, the bulk of which comes from the local flock. Comparatively little is imported at the present time, nor are the European breeds well suited to Algerian tastes. About 1,000 tons of beef are imported per month, and the taste for beef is increasing. Algeria is willing to buy from most supplying countries in large or small quantities, depending on the most competitive offers. France is the major supplier of live animals and fresh/chilled beef. Since 1975, government control of imports of livestock and meat has greatly facilitated procedures for exporters to Algeria. Initial contact should be made with the Office National des Aliments du Bétail. There is some potential for use of the trans-Saharan highway by Sahelian exporters, but in the short term, the costs and risks pose serious obstacles to the initiation of any regular large-scale trade.

44. EGYPT: there has been a dramatic rise in Egypt's imports of beef, from less than 2,000 tons in 1968 to over 33,000 in 1977. Market potential is great and can only increase, but exporting countries need to be able to comply with Egypt's requirements on animal

health, quality, quantity, packaging, delivery, and credit terms. There will be stiff competition from Australia and South America which have assured, specialized delivery service. Lack of established trade channels will have to be overcome, and it is thought essential for new suppliers to become known to Egyptian importers. Somalia, Sudan, and Australia have supplied live sheep to Egypt in the past, but self-sufficiency in mutton production is considered possible by 1985.

45. KUWAIT: This country has become the center for entrepot trade and a major force in livestock and meat commerce in the Persian Gulf. It will be very difficult to dislodge Australia from its present position as the major supplier, benefiting from strong promotion of its products. As is true in all of the potential new markets, the main concern for Sahelian countries wishing to export will be to deliver on time, to specification, and at competitive prices.

46. LIBYA: the market for fresh/chilled/frozen meat is not large in comparison with other North African and Middle Eastern markets, but demand is expected to increase and will not be met by domestic production. In 1979, Libya placed an order with Australia for 650,000 live sheep and lambs.

47. SAUDI ARABIA: the preference is for lean young sheep and goats, either produced locally or from Africa. FAO projections show a gap between domestic production and demand in 1985 of over 150,000 tons of meat, about one-third of which would be lamb and mutton. Australia has the major share of the beef trade and promotes its products by providing extensive price lists and instructions in Arabic on the best methods of cooking and serving Australian meat. With a population of 8 million plus large number of pilgrims and expatriates, Saudi Arabia provides an attractive market for competitive exporters able to guarantee quality and delivery.

II. - OVERVIEW OF KEY ISSUES

A. Pastoralists Economic Behavior

The response of African herders to price changes is a subject of controversy in the literature. The issue is not whether Sahelian pastoralists increase their herds in response to favorable prices, but, whether they are willing to sell additional output. Their willingness to increase herd size has been amply demonstrated during the past three decades. Favorable weather, improved health programs, and greater water availability made possible such long term expansion. Growing demand and rising prices have also contributed to increased cattle numbers. Efforts to increase the cattle population are all the more intense in the post-drought period. On the other hand, increased competition from agriculture has displaced livestock production from some areas previously used for grazing. Although pastoralists themselves profess reluctance to sell animals, the evidence accumulated in this study indicates that they do in fact dispose of their marketable animals in a manner consistent with sound economic behavior.

The absence of young females from the cattle market is a reflection of the low productivity of Sahelian herds. High calf mortality and low fertility rates dictate that all females be retained in the herd for breeding. The desire to increase milk production is an additional motive to keep females. Old cows are sold routinely for local slaughter.

The Sahelian cattle that enter the market are predominantly adult males, four to seven years old; that age compares unfavorably with one and a half years in the United States and two in Argentina, but the difference is mainly a consequence of the slower growth of Sahelian cattle. During the dry season of each year, cattle lose weight and the onset of maturity is retarded. Slaughter weight is reached at a later age. Even so, young males are sometimes sold in large numbers; over 60 percent of the males sold in the Sahelian zone of Upper Volta in 1976-77, were four years old or younger. Growing-out programs in Senegal and Niger have had no difficulty procuring immature males when an adequate price premium was offered. Widespread cattle ownership by non-herding groups further weakens the presumption of non-commercial orientation in cattle production.

Live cattle prices in the Sahelian markets do not favor the sale of young stock. Prices per head continue to increase rapidly with age until adult weight is reached. Once a male survives the first year, it pays the herder to keep it until adulthood. Were stratification policies to succeed, the price of young animals would have to increase to induce Sahelian herders to sell more young stock for growing out in areas farther south. Thus far, however, the profitability of fattening and growing out cattle in higher rainfall areas has not been conclusively shown, despite prevailing low prices of input stock.

Proximity to livestock does not necessarily imply a high level of meat consumption among Sahelian pastoralists. Cattle, in particular, are rarely consumed by the cattle-raising groups themselves; milk production is far more important to the diet of the herding population. When the population is widely dispersed, only on special occasions do enough

people assemble to justify sacrificing even an old cow. The type of animal routinely slaughtered in Sahelian regions is distinct from that of animals shipped to the coast. The rigors of the trip impose the selection of larger and stronger animals for export. Since most marketing costs for exporting cattle are fixed per head, this further induces the export of high-value animals, those with heavier weights and in better condition. Culled cows and males that are sick, injured or in poor condition remain for local slaughter.

The rural Sahelian population derives its meat consumption mainly from small ruminants. Their small size is advantageous for slaughter in small villages and by large family units. A large portion of small ruminant production is consumed within the owning household; only a small share is marketed and the market is rather localized.

B. The Structure of the Livestock Trade

The livestock and meat marketing system in West Africa is far from being a traditional one that has remained unchanged through the years. It is evident from the country reports in this study that the trade has adapted well to the disturbances of the past few years. The system has shown a remarkable capacity to respond to radically changing conditions in production, consumption, and prices.

The flow of livestock from the rangelands of the Sahel to the coastal cities of the Gulf of Guinea poses considerable logistical and organizational difficulties. Over the years, a sophisticated and complex system of market relationships has evolved. No one individual or institution can effectively handle more than a small segment of the trade. As a result, the system has developed a well-defined set of functions, performed by specialized groups.

This specialization is often interpreted by observers as evidence of a redundancy of intermediaries. The presence of numerous agents is seen as a burden to the system, contributing to greater-than-necessary price differentials. An alternative view is that the presence of many individuals at each level insures competitive conditions. If the market is competitive, price differentials reflect and are commensurate with the marketing costs and risks incurred.

The traditional livestock trade has developed its own self-policing procedures. At every stage of the market chain, safeguards have been instituted to insure that transactions are binding and animals are legitimately transferred. The function of the dillalji (broker) is to monitor transactions and to keep a close watch over the solvency of market operators. The transaction fee paid to him is, to some extent, payment for assuring the integrity of the other party. The landlord hosting the cattle merchant, acts also as his agent and guarantor. The financial difficulties of a butcher or a merchant soon become common knowledge.

Despite the absence of physical infrastructure in livestock markets, there exists well defined categories of markets in both surplus and deficit regions. From bush transactions to terminal coastal markets, cattle pass through collection and redistribution markets. Livestock are assembled in widely-dispersed producing areas and moved into progressively larger herds or groups. Price differentials between small markets and the larger markets of

a surplus country reflect location advantages with respect to coastal markets. Seasonal price fluctuations reflect changing demand and supply conditions throughout the year. Day-to-day variations reflect the number of animals present at a market.

On the receiving end, there are large terminal markets and redistribution markets for imported and domestic cattle. In smaller countries, these may be fused into one market in the capital city, but in larger countries, they are separate markets. Such is the case, for example, of Bouaké in Ivory Coast and Kumasi in Ghana. These centers become the reference markets for smaller satellite consumption points.

There are no overt restrictions to entering the livestock and meat trade. Nonetheless, the trade is predominantly in the hands of men with northern and Moslem backgrounds. Substantial capital is required to engage in long-distance cattle trade, but this is not an insurmountable barrier. A bigger impediment is the need to develop a network of contacts in the different markets, and to establish a reputation for solvency and prompt payment of obligations.

Cases of market power being concentrated in a single entity are found in areas subject to government intervention. Most are of recent occurrence. In coastal countries, meat imports are usually in the hands of one or two institutions. One parastatal company -- AGRIPAC -- has exclusive rights to import frozen beef in Ivory Coast. In Ghana, the Meat Marketing Board and the state-owned conglomerate GIHOC have a monopoly on imports of frozen meat and live animals from the Sahel. SODERA has total control over meat imports into Benin. Similarly, in Sahelian countries state agencies created for the purpose of promoting the orderly marketing of livestock products have exclusive rights to certain activities. Meat export is technically the sole prerogative of SOMBEPEC in Mali, and in Upper Volta, ONERA exerts a commanding voice over meat export contracts.

C. Market Information: Prices and Weights

CRED researchers have found it relatively easy to obtain price information for livestock transactions, once they become acquainted with butchers and traders. With few exceptions, prices reported by buyers and sellers of the same animal show substantial concordance. The main difficulty in obtaining market information arises over the weight of live animals. Efforts to operate weighing scales in livestock markets have a consistent history of failure. Butchers are quite agreeable to have animals weighed before they buy. It is generally the sellers who refuse to weigh. There are several legitimate reasons for their reluctance.

There is a high risk of injury to the animal in the weighing process. The trader is understandably unwilling to assume such a risk before closing the transaction. Moreover, weighing requires several people and a well-trained agent to calibrate and operate the scale. The cost becomes substantial when one animal is done at a time; neither buyer nor seller would pay for it. The only parties interested in the operation are usually government agents and researchers.

Through long years of experience, traders and butchers have developed a keen eye for judging weights. In addition, factors such as age, sex, health, condition, and breed are also essential in estimating the value of a given animal. Recording of these additional factors would be necessary to analyze weight-price relationships properly. To be useful, weight and price data should be processed promptly and the results made available to traders right away.

Many of the problems of live weighing are avoided by taking carcass weights in abattoirs. It avoids multiple weighing of live animals at different markets. Unfortunately, carcass weights are not collected with any regularity. Scales and other basic equipment are seldom in working condition. Carcass weighing on a regular and sampling basis would constitute one of the most cost-effective ways of gathering meat market information.

Information about prices and other market conditions spreads rapidly throughout the marketing network. Travel by returning merchants and drovers (convoyeurs) provides a continuous source of information to the large Sahelian cattle markets. Transmission of information by word of mouth is, of course, well established. There is no substitute for it as a link between smaller livestock markets in the Sahelian region. The Livestock Office of the CEAO has considered the installation of a network of radio transmitters to speed the spread of marketing information and make it more accessible. The technical difficulties of operating such a system will be considerable. Collection of precise and meaningful information is hampered by the heterogeneity of animals involved and by a lack of quality and other standards for livestock and meat.

Although most of the attention is on the weighing and pricing of live animals, other pieces of market information are equally useful to traders and butchers, while also being simpler to collect: (a) The number of animals presented at the major markets or the number of head slaughtered at major abattoirs provide ready indicators of supply conditions, and merely require counting; (b) the retail price of meat with or without bone at the popular markets would provide a barometer of price fluctuations, and it would involve just a few sample purchases.

D. Market Differentiation

Beef consumption in West Africa is concentrated in urban centers and the capital cities. The urban population is increasing much faster than the rural population. Moreover, income per capita also tends to rise more quickly in the towns than in the countryside. As a result, domestic beef consumption is likely to become more concentrated in the urban sector. Domestic demand for beef and other livestock products in the Sahel will grow almost as fast as the urban population; in fact, it is likely to exceed that of the Sahelian cattle herd. The domestic Sahelian market will compete increasingly with the coastal market for existing supplies of livestock. Relative prices and marketing costs will determine the final distribution of Sahelian cattle.

The urban market for red meat should be studied in at least two major segments: the elite (class 1) market catering to the expatriate and higher income communities, and the general (class 2) market. Although the former accounts for only a small volume of total red meat consumption, it often attracts the greater share of attention. In this market, major new developments appear. One must guard, however, against the assumption that these developments can be easily transferred to the general market.

Beef from zebu cattle raised on the open range is lean and often tough, since it comes from older animals. Beef is generally used fresh in the preparation of sauces and stews, where it is thoroughly cooked and tenderized. Table beef for the class 1 market has for many years been either imported or obtained from specially fattened animals. The class 1 markets in the coastal cities provided, until recently, a favorable market for good quality beef exports from the Sahel, but these shipments have now virtually ceased. Competition from South America and southern African is part of the explanation. The deterioration of refrigerated transport by rail from Ouagadougou has also increased the risk and cost of shipping meat to Abidjan. Perhaps more importantly, new feedlots in Ivory Coast now provide a local source of good quality beef. Only high value rear quarters are still profitable for export from Ouagadougou. The problem of disposing of the remaining front and fifth quarters in the local market severely constrains meat exports from the Sahel to the coast.

Class 1 market beef prices are much higher than those of the general market. The latter prices are nominally regulated, while the former are not. Retailing in the class 1 market is done through licensed butcher shops and supermarkets. The traditional method of selling class 2 beef is in small piles (tas) made up of miscellaneous pieces, but sale by cut and weighing are gradually being adopted, at least in the main markets of capital cities.

Though small quantities of chilled and frozen beef have been imported previously just for the class 1 market, the massive imports of frozen carcasses from South America that started in 1975, competed directly with fresh beef in the class 2 market. Initial consumer resistance to frozen beef has been partly overcome, but it still sells for less (thawed) than fresh beef.

E. Cattle Production in Coastal Countries

The Sahel drought spurred coastal governments to seek the development of their own cattle sector. Promotion of livestock production takes several forms: large scale ranches, feedlots, animal traction in agriculture, breeding centers, and artificial insemination programs. Coastal governments have also tried to shift the pattern of protein consumption away from beef toward types of livestock more easily produced in coastal regions such as swine and poultry.

A type of cattle-raising scheme commonly favored by governments is large scale ranches, either for breeding stock or meat production. Ghana places great emphasis on them in its livestock development program. As many of those ranches are of recent inception, there is, at this time, little basis on which to evaluate their performance, but there are

reasons to be skeptical. It has proved difficult to obtain sufficient local breeding females to stock these ranches. A trial in Ghana with an exotic breed brought from Australia was an unqualified failure. European breeds succumb to disease and parasites. Once promising crosses of Jersey with N'Dama in Ivory Coast, have now been discounted. A government ranch in Ghana is contemplating bringing Nelore helpers from Brazil. All this indicates much enthusiasm, but expectations about output should be modest.

In the best of cases, the output from the ranches now being established in coastal zones is not likely to exert a significant impact on the domestic supply of beef before 1985. The main reason is the considerable lag between the time when operations begin and when slaughter animals become available.

Domestic cattle production in the coastal states is not likely to stagnate, however. It is expected that production will respond to the high prices sustained over the last five years with a higher rate of increase. Moreover, the migration of herds from Sahelian countries into the northern regions of the coastal countries has given rise to an artificial boost in domestic production. Some of these refugee herds have settled permanently in their new territory. Ivory Coast has instituted programs to encourage the settlement of Fulani herders in its northern districts.

Programs designed to encourage coastal farmers to incorporate livestock, particularly cattle, into their farming activities, have had mixed success. Programs to promote the use of ox-plowing in cash crop production have been very successful in Benin. The small size of N'Dama cattle and the West African shorthorn, however, limits their usefulness as beasts of burden elsewhere in the humid zone. Regardless of how feasible or widespread animal traction may be in the coastal areas, it will have little impact on meat supplies before 1985. The marginal weight gained by bullocks during the additional years of life is generally negated by the higher mortality of work animals in trypano zones.

Less auspicious are the prospects for integration of livestock production and agriculture without recourse to traction. The Ivorian government agency, SODEPRA, is actively promoting the improved management of village herds in northern Ivory Coast. Little enthusiasm for livestock raising has been detected among the presumed beneficiaries. Farmers are more likely to entrust their newly acquired cattle to Fulani herders.

Large intensive feedlot operations have recently been installed near the sugarcane mills in Banfora (Upper Volta) and Ferkéssédougou (Ivory Coast). Cottonseed and rice mill by-products are provided to supplement and balance molasses from the sugar mills. Substantial rates of gain, as much as 600 grams per day, have been achieved by adult males. Over a period of four to six months, animals gain fifty to 100 kilograms per head. In addition, the quality of the meat is greatly improved by the rapid accumulation of fat. The feedlots are located with easy access to both the rail line and road transport. Nevertheless, it remains to be established whether the value gained, covers the very high cost of establishing and running these operations in the trypano zone.

So far, placing fattened animals in the class 1 market has presented no major difficulties. Nevertheless, the ambitious expansion plans for the future raise serious

questions about the capacity of the Ivorian class I beef market to absorb the output. Whether it would be commercially justifiable to fatten cattle for the general market remains in doubt. Lower prices in the general market make fattening less profitable.

The impact of feedlot output on beef supply in Ivory Coast will be significant in the class I market but not in overall supply. Even at a rate as high as 1000 fattened steers per month, the total weight gain will only amount to about 1200 metric tons of beef per year, or the equivalent of 7 percent of 1978 meat imports. Nonetheless, this is about 60 percent of class I supply. Feedlot-fattened cattle will probably compete with high value beef cuts brought by air from South America, and will also preclude the renewal of class I meat shipments from Ouagadougou to Abidjan.

F. Prospects for Meat Imports from Overseas

The outlook for the future is basically, a gradual reversal of the trend observed in the mid-1970s. A return to more normal rainfall patterns, along with programs designed to rebuild livestock herds, will result in a gradual expansion of Sahelian supplies from 1979 onwards. By contrast, beef prices outside Africa are on an upward trend: in 1979, the beef cycle in the United States was going through a period of high prices and low supply. New markets in the Middle East, North Africa, Southern and Eastern Europe, and sub-Saharan Africa have been incorporated into the world meat economy. Argentina, the principal supplier of frozen beef to Africa, has recently undergone a period of rapid destocking as a result of the country's economic difficulties. This will markedly reduce its exports over the next few years. All these factors point to a gradual rise in the international price of beef, at least until 1983. The net result of both trends -- increasing Sahelian livestock supplies and increasing world beef prices -- foretells a dampening of frozen meat imports in the coastal markets. The prospects for Sahelian livestock are more favorable now than in the recent past. The real issue for Sahelian producers is not so much whether they will be able to sell their export animals, as how lucrative prevailing prices will make it.

Major marketing difficulties were encountered at all stages in the introduction of frozen meat into West Africa. Cold storage capacity was a major constraint; a network of refrigerated distribution points did not exist; maritime transport connections had to be established; financial arrangements had to be developed. Consumer acceptance of frozen beef is now much greater. The West African market has been successfully opened for frozen beef. Both importers and exporters perceive this market as rapidly expanding in the future. The world beef price still remains below that prevailing in the coastal markets, though the gap is diminishing. Frozen beef imports should therefore continue, but will grow at a slower pace than in the past few years.

III. POLICY RECOMMENDATIONS

A. SAHELIAN COUNTRIES

I. Production Policies

A fundamental conclusion of this study is that Sahelian livestock planners should not worry about slack in demand for meat products in the coastal countries of West Africa. Previous fears, that competition from overseas meats might displace Sahelian livestock producers from their traditional markets, have proved unjustified.

Growth of meat supplies from increased herd size, higher offtake, and improved yields per animal, is expected to lag behind growth in demand for animal protein. Over the next two or three years, prospects are for increasing meat deficits in the coastal states and higher international prices for beef. Beyond 1983, however, world beef prices may begin to decline in keeping with their cyclical character.

Benefits from increasing livestock production in the Sahel, are not likely to be significantly reduced by lower prices. Policies aimed at increasing livestock production in the Sahel, are therefore to be encouraged. The current low level of productivity of Sahelian livestock herds indicates that there is considerable scope for interventions to improve national income from this sector.

Animal Health and Nutrition

Animal nutrition and health interventions are most likely to have the greatest impact on livestock productivity. Without significant improvements in fertility and calf survival rates, rapid growth in livestock production in the Sahelian region is not possible. At current estimates of values for these parameters, cattle herd growth is limited to 2-3 percent annually, even when all females are retained for breeding until an advanced age.

High mortality among young stock is perhaps the most serious constraint to increased productivity in the livestock sector. Livestock development projects in the Sahel should give priority consideration to this issue. Specific proposals for intervention to reduce calf mortality should be solicited from competent animal scientists. The economic importance of raising calf survival rates is readily illustrated; a reduction of calf mortality from 35 to 25 percent, for example, could result in an increase of gross offtake of 2 percentage points, equivalent to an increase of roughly 15 percent in livestock production.

Nutritional deficiencies are important a cause of calf mortality as are parasitic infestation and disease. Competition for milk between calf and the herding family pose a difficult dilemma. Efforts to increase milk yields of cows are essential to a calf survival program. Veterinary inputs specifically oriented at the prevention of disease and treatment of parasites among young stock, are decisive ingredients at that critical stage. As both

milking cows and calves often remain close to the family compound, efforts in this direction may differ in approach from those followed by traditional veterinary programs. New programs should focus on women among the target groups, since they are usually charged with milking, and keep daily contact with the calves.

Improvements in calving rates of Sahelian cattle could yield substantial benefits. The estimated annual rate of 50 percent (used for Malian zebu females of reproductive age) is low by world standards. An increase in the calving rate from 50 to 60 percent would raise the gross offtake rate by over three percentage points, equivalent to an increase in gross cattle production of over 20 percent.

Once again, nutritional factors are perhaps more responsible for low fertility than disease or low innate genetic potential. Programs aimed at reducing nutritional stress on cows would be especially effective, perhaps more so than additional veterinary care or genetic improvement programs. Feed supplements for lactating cows could help improve fertility, calf survival, and milk output simultaneously. In an adequate nutritional environment, Sahelian cattle breeds have demonstrated satisfactory growth and fertility characteristics; crossbreeding may also improve reproductive performance.

Genetic improvement programs are not recommended at this point. For genetic selection to be meaningful, large numbers of animals are needed, along with teams of highly trained animal scientists. The benefits are slow in coming, while the commitments are large and long-term. Environmental and nutritional constraints limit determination of the genetic potential of current generations; they also impede the identification of superior individuals. Animals selected under favorable experimental conditions, are not likely to perform as well when placed outside. The alternatives: health, nutrition, and herd management interventions have more immediate and evident results.

Rangeland Resources

Livestock development projects currently underway in the Sahel emphasize the ecological protection of rangeland, judicious range management, and improvement of water resources. Concrete evidence of the benefits is not abundant, and is subject to debate among experts. The rapid recovery of grasses and other vegetation following a few years of good rains, has led many to doubt the assumed fragility of the Sahelian ecosystem and emphasize instead, its resilience. To the extent that Sahelian grasses are annual and depend on seed for propagation, each year's vegetative cycle is less dependent than perennials on previous ones. Hence, the longer term benefits of good range practices are diminished. Given the fundamental nature of this issue, it would be advisable to set monitoring procedures to detect the differential impact of alternative range management programs.

The expansion of farming into former range areas poses problems for the traditional herding system. Such is the case for irrigated rice production in the ODEM (Mopti) zone in Mali. There is a need to preserve transhumance corridors running through the various integrated rural development zones of the Niger Valley. Closing of these corridors to obtain

a small area of irrigated land effectively denies a much larger land area to livestock. Clearly, there is scope for resolving this type of inconsistency between livestock and crop development objectives.

Some observers question whether health and nutrition improvements could lead to excessive pressure on rangeland resources. In some parts of the Sahel, there is little or no scope for larger herds; in others, there is ample rangeland. In the long run, there would be excessive pressure even on the latter -- unless offtake increases to match greater herd numbers. Are pastoralists reluctant to sell the additional animals, as is often claimed? Observations by CRED researchers and others do not substantiate any such reluctance. On balance, improved animal health and nutrition are valuable in themselves. They are not apt to lead rapidly and inexorably to overgrazing. In fact, higher reproductive efficiency may reduce grazing pressure, since fewer breeding cows would be required for the same level of output.

Herder Participation

Range management projects have proved extremely difficult to implement. An important consideration should be how to promote participation by livestock owners. Traditional Fulani herders tend to be skeptical of programs aimed at them and their cattle. Many Fulani were reported to have left the West Volta Livestock Project zone, in fear of forced participation. Herdsmen's aptitude for evading direct administrative constraints on their behavior is well known.

Programs aimed at promoting the sedentarization of herdsmen should be critically examined. Their voluntary participation is indispensable; groups and localities involved must be carefully identified. At any rate, the practice of seasonal transhumance remains an integral part of the Sahelian herding system, essential for adjusting to seasonal variation in availability of feed between ecological zones.

Better information regarding herders' response to positive incentives such as higher prices, availability of consumer goods, alternatives for savings, and government services is also essential. Intensive field studies in this domain should look at animal sales, as well as the key role of milk production and sales in the household economy of herding families.

Herdsmen have appreciated the benefits of vaccinations and veterinary care in their operations, as demonstrated in their willingness to pay for veterinary supplies. The possibility of levying fees to help finance government-provided health inputs and services should be considered, whenever it has not already been tried.

Stratification

There is a need for reviewing the cattle production "stratification" policy as it is being implemented in Sahelian countries. This policy has two components: (1) promoting the use of young male cattle by savannah farmers in animal traction, growing out and farm fattening programs; and (2) constructing feedlots that make use of agro-industrial by-products.

a. Farm Fattening (Embouche Paysanne)

The most promising component of the stratification program is farm fattening and growing out, since these activities are already taking place spontaneously on a seasonal basis in zones near feed sources and with access to large urban centers in the Sahel. Areas of possible intervention include extension work, organizing marketing of feed supplements, and short term credit to purchase animals and feed.

Farm fattening requires only minimal infrastructure provided by the farmers themselves. Moreover, since it takes place during the dry season, it uses labor and resources with very low opportunity cost. Care must be exercised, however, in keeping administrative costs to a minimum. Farm fattening during the crop season is not likely to be advantageous to farmers -- despite the possible occurrence of compensatory gain; labor inputs will be better used in crop production, and the price advantage of selling at the end of the dry season is lost.

The availability and utilization of feedstuffs at the farm level are only vaguely understood at present. There is a great need to define the best use of available feedstuffs under diverse conditions. For example, when should cottonseed be used in farm fattening, in feeding work oxen or milking cows, as an ingredient in feedlot rations or for the production of oil? When is production of a forage crop recommended? More knowledge about the profitability of current pilot projects and the constraints they are encountering, is required.

b. Feedlots

Caution is recommended before committing further funds to feedlot operations in Sahelian countries. These projects are largely dependent upon the domestic and export markets for high grade beef. Apart from the capital cities, domestic demand for marbled meat is very limited, with little likelihood of rapid growth through the mid-eighties. This limited market could be easily satisfied by small farm fattening programs.

In export markets for quality beef, feedlots face transportation difficulties, high operating costs, and heavy competition from coastal feedlot operations and imported beef. With the possible exception of Banfora, the prospects for profitable feedlot fattening of beef cattle for export from Mali or Upper Volta are negligible, under current price and transport conditions. Despite the rail link to the Abidjan market, the commercial viability of the Banfora feedlot complex remains to be seen. Its profitability is very conditional on continued subsidization of the sugar industry, which provides molasses for feed as a low cost by-product. Although ONERA slaughtered Banfora steers for export by air to Nigeria in 1979, the net balance of that contract remains unclear, and no further shipments are likely.

Malian representatives justify the considerable deficits incurred by the Tienfala feedlot as necessary to insure a steady supply of beef for Bamako during the dry season. Rather than fattening, the purpose there is holding and feeding to avoid weight loss during the dry season. Farm fattening may accomplish the same objective at a lower cost and with a greater stimulus to farm incomes.

Small Ruminants

Better knowledge about the small ruminant sector should be a priority -- both for the Sahelian governments and for foreign assistance projects. Sheep and goats accounted for roughly half of the Malian domestic meat supply in 1978. Nevertheless, little is known about offtake, mortality, and other herd parameters of small ruminants. All evidence points to extremely high rates of lamb and kid mortality. This alone seems to indicate substantial room for improvement of production. Because small ruminants are found in agricultural areas that are well penetrated by extension services, the small stock sector is particularly amenable to policy intervention. In view of the wide distribution of small ruminants among both herding and farming populations, herd productivity improvements would have important equity considerations. Red meat consumption in the dry season and export revenue could be significantly expanded by projects targeted at the sheep and goat herds of sedentary farmers.

Small ruminants offer more promising prospects for export to the countries of North Africa than bovines. The higher values of mutton, the common religious heritage, the preference for live animals, the remoteness of overseas competitors, the rapidly increasing incomes of the oil producing countries, and the development of trans-Saharan routes are factors that point favorably towards a potential outlet for Sahelian small ruminants in North Africa.

2. Marketing Policies

Interventions in the livestock and meat marketing system must be based on more concrete objectives than the usual "rationalization" of trade, which is too often a catchword for making marketing practices conform to some preconceived modern model. Market interventions should take into account the proven capability of the marketing network to move cattle long distances relatively efficiently, and to adjust promptly to changing market conditions. Policies should be aimed at working with the current structure, not replacing it.

Livestock Market Infrastructure

Infrastructure projects should be better justified in the future than they have been in the past. Their location has often been ill-chosen and their design, inadequate. Their contribution to more efficient marketing is not readily evident. Scales, for example, are of no use in livestock markets to anyone other than researchers, nor are they likely to be in the future. On the other hand, collection of statistics and market taxes are legitimate government concerns, and to that end, new market enclosures and trained agents should ultimately function well.

Marketing participants already seem to have good access to market information through traditional sources. Large investments of funds, equipment, and trained personnel

to operate a separate radio network linking livestock markets do not appear justified at this time. Nonetheless, the prompt dissemination of prices and volumes in terminal markets through more conventional channels, would help improve marketing efficiency.

Regulation of Market Agents

Contrary to prevalent government policies, the restrictive regulation of traders, butchers and intermediaries will have damaging effects on market efficiency. Instead, policy should be aimed at encouraging competitive marketing as a means of lowering marketing costs. Proposals to "organize" the cattle trade, to halt the "proliferation" of cattle traders, and to limit the activities of market agents in some arbitrary fashion should be discouraged. The available evidence does not indicate that market concentration is a serious impediment to efficiency. Some proposals would restrict trade to those who manage to obtain a license, thereby increasing market concentration and costs. Fraud and illicit arrangements would likely ensue, neither of which benefit the government or trade.

Price Fixing

The same analysis can be made of attempts to enforce fixed prices for livestock and meat. The arguments against such action are overwhelming. The likelihood that any price fixing arrangement would work for meat, under Sahelian conditions, is slim. As prices reflect variations in supply, their fixing would tend to accentuate seasonal variations in availability of meat, thus leading to greater scarcity in critical periods. A black market for meat would be the likely outcome. In the absence of demonstrated monopoly power or widely fluctuating prices, such action should not be contemplated.

State Participation

Government cooperation with the private livestock and meat sector could serve to open new markets and to facilitate trade. The private sector has shown itself capable of adjusting to changing market conditions, as exemplified by the redirecting of cattle flows towards Nigeria when conditions warranted. Government agencies could be instrumental in negotiating trade agreements with importing countries. The recent contract between Upper Volta's ONERA, and the Nigerian Livestock and Meat Authority is a case in point. National governments might also be useful in attempts to reopen the Ghanaian market.

Trekking Trails

Trekking is an efficient and inexpensive method of moving cattle. There remains, however, room for improvement. The main problems are lack of water points in northern areas, and occasional conflicts with farmers over crop damages. The main usefulness of marked trails lies in lessening conflicts with agriculturalists and in facilitating monitoring of market activity. Providing water points on the route is essential to induce drovers to follow

the trail. However, expectations of lower weight losses from establishing trails may prove overly optimistic, since the assumption of large weight loss under current trekking patterns has not been substantiated. Moreover, following a single, frequently-used trail may divert herds from longer but more favorable routes. Financing of the Nara-Kati and other cattle trails in Mali as suggested by OMBEVI should be examined in this light.

Providing grazing reserves (parcs de restauration) near major livestock markets, such as Loubila near Ouagadougou, helps stabilize the flow of cattle and alleviates problems with surrounding farmers. However, the proposed range of usage fees are thought unjustified by the traders and may lead to their boycotting it.

Rail Transport

Railroads are the preferred transportation of cattle over long distances. Improved rail transport presents real possibilities for cost reduction. The most serious problems result from seasonal constraints on rail car availability, excessive duration of trips, and failure of refrigerated equipment. With the cost of mortality, forced sales and shrinkage between Ouagadougou and Abidjan running at more than 12 percent, there are considerable benefits to be gained from reducing travel time and improving conditions in the cattle cars. Increased rotation of rail cars could relieve their shortage during the peak season. Rental rates could be adjusted to reflect seasonal demand and to encourage their off-season use. Fixed rates result in under-the-table deals and long waits at the railhead during the peak season.

The possible use of the Bamako-Dakar railroad line for the export of cattle fattened in the Banamba rural development area would be worth investigating.

Mechanical breakdowns in refrigeration equipment were partly responsible for the falloff in meat exports from Upper Volta in the late sixties and early seventies, but the eventual demise can be better attributed to non-Sahelian competition in the Ivorian class 1 market. Whether the improvements in refrigerated rail transport projected in the creation of SATRAF (Société Africaine de Transport Frigorifique) will enable Upper Volta to regain a share of that market remains to be seen.

Trucking in the Sahel

Truck transport of cattle within the Sahelian states does not offer good possibilities in the immediate future. Present costs are simply too high, although that disadvantage will diminish as roads are paved and trucking costs decrease. The rapid adoption of long-distance trucking of cattle in Nigeria indicates that such a shift might occur where the road system is being improved. On the other hand, rising fuel prices makes the outlook for trucking less favorable. Trucking is already viable, however, for small ruminants during the periods of peak demand. The use of trucks in the little known Algerian market for Malian sheep and goats (from the Gao area) merits careful consideration.

Meat Exports

Meat export schemes should play a minor role in overall Sahelian market policy. The comparative advantage of Sahelian producers lies in live animal exports. Non-African suppliers cannot compete with the Sahel in the provision of fresh meat for the general coastal market.

All indications are that Mali will not be able to supply high grade meat to coastal markets at competitive prices. Both Senegal and Ivory Coast are making progress towards self-sufficiency in high quality meats. To the limited extent that Sahelian meat exports are possible, Upper Volta would have a comparative advantage over Mali because of the rail line and closer proximity to Nigeria.

Two important considerations militate against a profitable outlook for Sahelian meat exports: first, the difficulties of operating a reliable refrigerated transport and storage system at a commercially justifiable cost; second, the problem of making an adequate return on the valuable fifth quarter. The higher coastal prices are relative to Sahelian prices, the more it pays to ship live animals to capture the value of the fifth quarter.

The outlook for meat exports by air from the Sahel to North Africa is not encouraging. The only bright prospect is for flights from Gao to Libya under the Libyo-Malian project.

B. COASTAL COUNTRIES

Trade Promotion

Promotion of livestock trade between Sahelian and coastal countries will serve the interests of both. Conversely, policies that obstruct the movement of livestock toward the coastal markets are inimical to the interests of both Sahelian producers and coastal consumers.

Despite the existence of inter-governmental accords among Sahelian and coastal states aimed at promoting mutual cooperation in the field of livestock commerce, there is little sense of West African solidarity in this regard. Meat imports from overseas into Ivory Coast and Ghana effectively discourage Sahelian meat exports; Voltaic bans on transit cattle block Malian exports to Ghana, Togo, and Ivory Coast; Mali banned for a time its own exports to Ivory Coast. Barring non-nationals from engaging in trade has become a tempting policy among countries of the region. Though the aim is to favor national traders, the result has been a diversion of livestock elsewhere or the promotion of smuggling and subterfuge.

Much could be gained by implementing some clauses of the Entente and ECOWAS protocols, designed to facilitate the flow of cattle among states of the region. Cooperation in the collection and prompt sharing of market statistical information should be a first step.

The interests of Sahelian livestock exporters are intimately linked to the economic well-being of the coastal states. Increasing prosperity of the coastal population will redound in increased demand and higher prices for Sahelian livestock products. Similar results would come from growth in urban employment and expansion of the foreign trade sector.

Railroad Improvements

Improvement of the transport infrastructure would help reduce the current high costs and losses incurred in moving cattle. The railroad system merits special attention, since it is the most advantageous means of moving cattle long distances. More cattle cars would save on time spent waiting to load cattle. Loading and unloading ramps would decrease injuries. Ventilation in the box cars would lower heat stress. Watering stops could lessen forced sales and mortality. Special scheduling of trains could shorten the trip.

The projected improvement of the road between northern Ivory Coast and Ouagadougou would release some rail capacity for livestock transport. A similar effect would ensue from the road works now underway between Cotonou and Parakou.

Trucking

Trucking has already established a definite place in the transport system for livestock in coastal countries. For example, for moving cattle in forest zones, and for small ruminants, the speed and flexibility offered by trucking justifies its higher cost. In the northern regions of the coastal countries, where trekking is still possible, the latter is preferred over trucking on the basis of cost. This cost advantage will diminish as the road network expands and improves. Complaints by farmers along trekking routes of crop damages and spread of disease may induce the Ivorian government to mandate trucking throughout the country. Livestock authorities might devise instead, compensation schemes for those farmers affected by passing herds. The increase in transport cost brought about by mandatory trucking would be eventually felt by coastal consumers. Furthermore, during the harvest season, when competition for the movement of crops is keenest, trucking of cattle could become uneconomical. Trucking also suffers from the occasional arbitrariness encountered at road control checkpoints.

Holding Grounds

Lack of grazing areas near the terminal markets for keeping cattle before sale and slaughter, is a major complaint heard from cattle traders and butchers. Wide price variations could be dampened if it were possible to keep animals for several days. The reduction of risk and weight loss by providing those facilities would be well justified. The matter is particularly urgent in Abidjan. The holding grounds on the outskirts of Monrovia will soon be lost to urbanization. Sahelian cattle, however, do not always adapt well to coastal grass varieties. Grazing reserves would, thus, mainly benefit taurin cattle.

Market Infrastructure

Improvements in the physical infrastructure of livestock markets are among the more conspicuous and attractive forms of public investment in livestock trade. Unfortunately, their usefulness is often less than anticipated. The splendid concrete structure lying unused

next to the open air livestock market in Abidjan is a case in point. Similarly vacant structures are found in Sahelian markets. Weight scales are never used in livestock transactions. Attempts by market authorities to force traders and butchers to use these facilities would only compound the initial mistake.

Abattoirs

In many coastal capitals there exists adequate slaughtering facilities. Glaring exceptions are found in Accra and Abidjan, the latter being the most important terminal market in the central corridor. Sanitary conditions are deplorable. A new abattoir in Abidjan is necessary from both the standpoints of public health and of personnel safety. Given the location disadvantages of the present abattoir, it would also be advisable to study its relocation. A site should be sought that is more convenient for unloading cattle coming by rail, and for grazing and watering animals. Holding areas are also non-existent at the Accra abattoir.

The design of abattoirs, particularly those for smaller communities, requires careful consideration of the peculiarities of West African conditions. Too often in the past, mechanized systems have been introduced with few adaptations to the local environment. Labor intensive procedures should be considered whenever warranted. Systems designed to run on electrical or mechanical power are prone to breakdown and abandonment. Simple, manual techniques are preferable.

There are legitimate reasons for public supervision of the activities of people engaged in the meat trade. Unfortunately, over recent years in both Sahelian and coastal communities, market authorities have sought instead to limit or reduce the number of people in the trade and to organize them along artificially-drawn functional lines. These measures have stifled competition and impeded the mobility of individuals within the trade. A black market for the few licenses or stall permits develops whenever limitations of that sort are introduced; they should be avoided.

Price Fixing

The same argument applies to the prevalent practice of setting prices for meats at the retail level. These price policies are usually ineffective and seldom enforced. When obeyed, price ceilings temporarily favor urban consumers at the expense of domestic and Sahelian livestock producers. With a commodity as mobile as cattle, traders have no difficulty rerouting supplies elsewhere. The net result is an artificial scarcity of meat in the official market and the creation of a parallel black market at higher prices. The experience of Ghana, in this regard, is illustrative.

Market Information

An unfortunate secondary consequence of officially regulated meat retail prices is that it hinders the collection of real market price data. Price series become a mere record of

official prices. It is unlikely that the use of livestock scales will become widespread in the markets of the region. Weight measurements could more easily and reliably be obtained at the abattoirs, and carcass weights would be more meaningful than live weights. Even more desirable for analysing the dynamics of livestock supply, would be the regular collection of basic data on number of head slaughtered differentiated by breed, sex, and age.

State Involvement

The private meat and livestock trade does an efficient job of supplying fresh beef to coastal consumers. Attempts by the state to take over the trade have brought disastrous results in Ghana. Efforts elsewhere are not to be encouraged. To the extent that the traditional private marketing system has been found to operate in a competitive fashion, the common presumption of excessive marketing margins going to intermediaries does not seem justified. Returns to the capital employed in the livestock trade, though large in nominal terms, are not excessive -- given the high transport costs, risks, and uncertainties faced in both physical and price areas, and the low rate of capital turnover that is possible. Butchers are commonly afflicted by chronic indebtedness, caught between fluctuating livestock prices on the one hand, and rigid official meat retail prices on the other.

Government participation should aim at providing an open and stable institutional framework within which the private trade can efficiently operate. In formulating new policies, officials need to consider the often grave disruptions caused by sudden changes in government regulations, and allow provisions for gradual adjustments by the private sector whenever major policy shifts are involved.

Frozen Beef Imports

State enterprises have complete control over the importation of frozen beef from overseas. This control has allowed them to influence the price of meat and to derive substantial profits from their meat activities, even though frozen beef sells cheaper than fresh. Ironically, the lack of competition in the frozen meat import business may have redounded to the benefit of Sahelian livestock exporters. Had imports of frozen beef been unrestricted, the prices of fresh and frozen beef would probably have been lower.

Cattle Development

Cattle development programs are among the more important forms of government intervention in livestock production. These programs often take the form of large government-owned ranches for either production or multiplication purposes. The prospects for success are not good. Their impact on meat supplies before 1985 will be minimal. The natural ecology of the coastal regions is not hospitable to cattle raising. Diseases and parasites are the major obstacles. Before proceeding with major cattle production schemes, much remains to be done in controlling the major health problems affecting cattle. The number of trypano-tolerant taurine cattle in coastal countries will remain small.

Feedlots

Fattening adult cattle in feedlots using agro-industrial by-products, may give Ivory Coast the capacity to supply its elite market with good quality beef. The expansion now underway could satisfy much of the limited market that exists for fattened animals. It is doubtful that fattening will be commercially justified for animals sold in the general market. Similar facilities are not present in the other coastal countries.

Small Species

A more promising area of livestock production lies in small ruminants. There is more room for improvement in the health and management of small ruminant herds than in that of cattle, which have received more government attention and resources. Furthermore, there appears to be a strong demand for small ruminant meat, especially mutton, in Ivory Coast and other coastal areas. It is important, however, that programs to increase small ruminant production be accompanied by a careful evaluation of the potential market for mutton and goat meat.

Perhaps, the most rapid alternative for increasing production of meats resides with poultry and pork. Expansion of those species in large scale commercial units has been successfully accomplished in Liberia, although under subsidized or protected conditions.

PART II

**LIVESTOCK AND MEAT PRODUCTION, MARKETING, AND EXPORTS
IN UPPER VOLTA**

**Larry Herman
Marty Makinen**

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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:

| | <u>CFA A per U.S.\$</u> |
|---------|-------------------------|
| 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

SURVEY OF LIVESTOCK PRODUCTION

I. - Livestock Production Systems

Voltaic livestock production takes place on communally held pasture, with insignificant forage planting, and requires few cash outlays. Animals are fed almost exclusively on natural pasture and stubble from fields; only lactating cows receive feed supplements during the dry season. The general scarcity of water motivates seasonal transhumance of 20-100 km. Herds are usually composed of thirty to eighty head, small enough to minimize risks of disease and problems of herd control. Livestock are valued mainly for their milk production and their exchange value in grain. The value of meat for own consumption is of secondary importance.^{1*}

Most Voltaic livestock owners are pastoralists of the Fulani, Tuareg, and Bellah groups. The Fulani are the most important; they compose only 10 percent of the population but they own 70 percent of Voltaic cattle. Only one-fourth of the Fulani live in the Sahel; in the south they herd both their own cattle and those entrusted to them by farmers, merchants, and civil servants. Thus, they control almost all of the Voltaic herd.

The Voltaic Sahel is no longer principally populated by nomadic herders living almost exclusively off their animals. A variety of factors have caused much of the traditionally pastoral population to become increasingly dependent on semi-sedentary agriculture. There is now considerable competition for land between agricultural and pastoral uses.

A. - Transhumance

Most Voltaic herders take their cattle on seasonal transhumance for the following major reasons: to search for pasture during the dry season and to search for water holes in the rainy season; to protect crops during the growing season; to bring cattle to market when grain supplies are low; and to find salt licks.²

1) - Northern Transhumance

Northern herders move to short-term pasture in the rainy season (July-September), return south during the cool season (October-February), and keep herds near permanent water sources during the dry season (March-June), where they graze on stubble and available

*Footnotes begin on page 200.

grasses. Only a few young men from each household (Relsman, 1974, p. 48) take the adult male cattle and a few lactating cows (to supply milk) on transhumance. The rest of the herd remains in the household's permanent village.

2) - Southern Transhumance

In the south not all herds are taken on transhumance. In this more settled agricultural area, livestock are kept near the fields until the rainy season so that their manure may be used as fertilizer. Once crops are planted, they must be protected from free-grazing cattle; consequently, southern livestock owners take one of three actions: 1) they keep their livestock in corrals near the village or enclose their fields with thorn bushes; 2) they move their camps away from their fields, but stay close enough to be able to work them; or 3) they send their young men away on transhumance with the cattle after planting. When cattle are sent away they are returned after the harvest to graze on field stubble. The two major symbiotic advantages of the integration of agriculture and stockraising in the south are fertility benefits to fields from manure (Delgado, 1977) and benefits from livestock feeding on agricultural by-products such as field stubble.

B. - Herd Structure

Herd structure varies between northern and southern pastoralists (Figure 1.1). Because the environment is more harsh in the north, herds there tend to be older than those in the south. Older animals are more resistant to both drought and disease. Another reason for the older age of the northern herd is that pure pastoralists are more likely to be outside the monetized economy than the farmer-herders of the south. Thus, they are more likely to hold assets in the form of livestock.

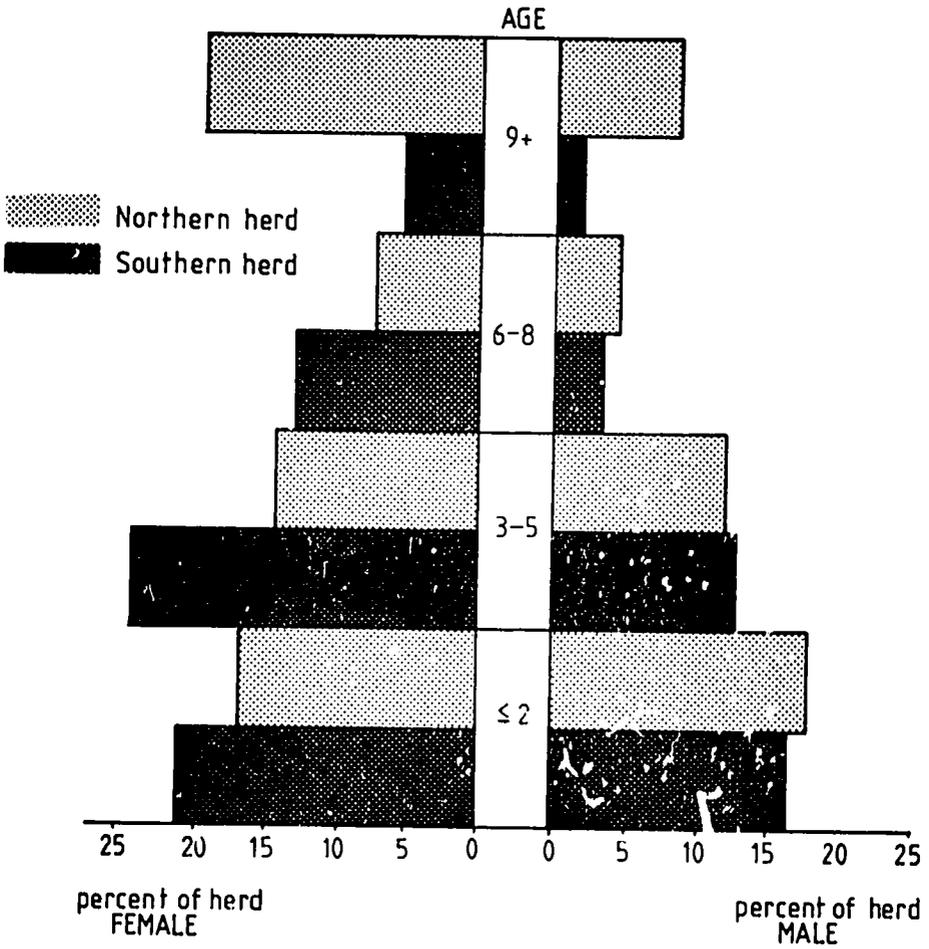
Because of their reproductive capacity and milk production, females are held through their reproductive years (nine years), whereas males are often sold or slaughtered once they reach adult size (four years). Hence there are more female than male animals in the herds.

C. - Livestock Sales

Herders do not like to sell their livestock; for security against drought and disease it is important to have a large and varied stock of animals. However, to meet cash needs, livestock are sold; they are also used as gifts and for ceremonial slaughter. They are rarely slaughtered for consumption by the herder's household; meat is not an important part of pastoralists' diets.

FIGURE 1.1

AGE AND SEX COMPOSITION OF NORTHERN AND SOUTHERN
VOLTAIC HERDS, 1970



SOURCE: SCET International, 1972.

Livestock sales decisions are usually motivated by immediate cash needs, most often for grain purchases. Revenue from livestock sales is also used for religious holidays and ceremonies, for pilgrimages, to pay taxes, to purchase clothing and jewelry, and to purchase household goods. Small ruminants are sold to meet smaller financial obligations; cattle are marketed to raise cash for major expenditures. Annual revenue from a cattle herd of fifty head is 60-100,000 CFA F* (SCET International, 1972, p. 6; Robinet, 1973, p. 3).

D. - Non-traditional Stockraising

The 30 percent of Voltaic cattle not owned by the Fulani are largely owned by farmers, merchants, and civil servants. However, a large portion of this group of animals are entrusted to the Fulani for raising. This results in separation of ownership and management, to some degree.³ In most cases, though, the absentee owner retains control over major decisions such as marketing.

Such relationships are not what is envisioned by policy makers advocating the increased integration of agriculture and stockraising. Integration is seen to be the most likely strategy to improve livestock production because of the potential for growth in the agricultural south and doubts about Sahelian livestock production in the near future (SEDES, 1975a; SCET International, 1972; IBRD, 1975a). This attitude is the basis for the long-run strategy of "stratification." The objective of stratification is to divide the country into zones of production. The Sahelian zone would be devoted to breeding -- supplying young male cattle out of traditional extensive stockraising systems. These yearlings would be moved south through the marketing system to farmers and businesses for growing out, fattening, and finishing. They would also be used in animal traction programs and would be ultimately finished before final shipment for slaughter. This would be carried out by encouraging the organization of feedlots, animal traction, short- and long-term fattening by peasants, village livestock projects, better management of existing pasture land, forage farming, and the increased use of agro-industrial by-products for livestock feed (Sous-Commission de la Production Animale, 1976).

Stratification bears little relation to the livestock production system in Upper Volta today. Even the limited part of production not in the hands of traditional pastoralists is far from the hoped-for ideal. While mixed farming has several important benefits for those who adopt it, it also has many disadvantages, one of the most important of which is the additional labor required to care for livestock.

Currently, non-Fulani ownership of cattle usually takes one of four forms: 1) farming integrated with stock breeding; 2) fattening by peasants; 3) animal traction; and 4) Fulani entrustment. Under the first system, the peasant behaves to some degree like the traditional herders in both farming and breeding. This form of management is relatively rare because few farmers can make the investment of roughly one-half million CFA F for a twenty-five head herd; unless pasture is readily available, maintenance costs for such a herd are high, and such herds require considerable amounts of labor, a requirement that conflicts with peasant agricultural labor needs.

*See Note on Exchange Rates and Terminology, page 46.

Peasant small-scale fattening is a more popular alternative. Farmers invest in one or several head, usually young males, which are kept near the household compound and graze on the stubble from fields. Their diet is often supplemented with purchased agricultural or agro-industrial by-products. While the first is widely available, its quantity is relatively limited. Forage cultivation is constrained by four factors: 1) it conflicts with other agricultural labor requirements; 2) forage crops present a significant risk of fire; 3) there is no tradition of forage cultivation in Upper Volta; and 4) there are limited opportunities to market cattle. Still, many peasants and some city dwellers find both short-term (less than one year) and long-term fattening reasonably profitable investments.

Animal traction in agriculture is limited in Upper Volta. It is estimated that there were less than 10,000 draft oxen in Upper Volta in 1973 (Robinet, 1973, p. 11). While the number has undoubtedly increased in recent years, traction in agricultural production has still not caught on. Most animal traction consists of the use of donkeys to pull small carts to transport firewood to cities and to carry agricultural produce to market.

The entrustment system of livestock raising by nontraditional livestock owners is probably used most often. It can involve both short- and long-term stockraising. Cattle are turned over to Fulani herdsmen who keep the animals with their personal stock in return for certain implicit and explicit payments. The herders gain milk rights for the animals they tend, they benefit from the improved fertility of their fields, which receive most of the manure, and in some cases, especially where the herd is predominantly male, herdsmen receive grain, cash, cola nuts, or other considerations for their services. The owner, for his part, is not constrained by the labor requirements of keeping cattle. He may receive some milk from the herder, may receive manure benefits, and, most importantly, retains control over all new calves and receives the revenue from the sale of cattle. This system is described in detail in Delgado (1979).

Whatever the system, the nontraditional livestock owner is usually more favorably inclined to "modernization" and more responsive to economic incentives than his pastoral counterpart (SCET International, 1972, p. 10). The interest of the former in livestock is almost exclusively economic. Because the owner usually meets his subsistence needs from other sources, he is not as averse to risk as the pastoralist who counts on his herd for subsistence. The owner's interest in maximizing income from the sale of livestock coincides with the public interest of increasing meat production. Nontraditional owners are those most likely to respond favorably to government interventions in the livestock sector. It is for these reasons that the government views the promotion of nontraditional stockraising as one of the keys to improving the livestock sector.

II. - Herd Growth, Offtake, Composition and Geographic Distribution: 1967-1977

Upper Volta's 1972 cattle population was estimated to be 2.5 million, with 2.4 million goats and 1.6 million sheep (SCET International, 1972, pp. 34, 52). In the northern and central parts of the country zebu cattle predominate; in the south smaller taurin and mixed zebu-taurin cattle, resistant to trypanosomiasis, are found. Two-thirds of Voltaic cattle are zebus. Average annual cattle production⁴ is 14 percent of the national herd; it is divided between offtake (12 percent) and herd growth (2 percent) (SCET International, 1972, p. 12). Male cattle make up 32 percent of the herd and comprise 60 percent of marketed offtake. Reproducing females make up 41 percent of the herd.

Estimates of the fertility rate range from 35 percent (SCET International) to 50 percent (Peretti, 1976). Thus, cows calve every two to three years, beginning at age four to six (SEDES, 1974 and Peretti, 1976). Cows are culled at age nine in the south and at thirteen in the north; therefore, the average Voltaic cow bears about three calves in her lifetime. Calf mortality is high; only 50 percent of those born reach maturity (IBRD, 1975a, p. 3). Peretti estimated mortality before maturity for Sahelian cattle to be 42 to 50 percent. Mortality rates are lower than average for females because they are given better care. A premium is placed on reproductive capacity.

Cattle mature slowly under natural pasture grazing; steers take four to eight years to reach marketable liveweight of 300-350 kg. However, offtake of males occurs at a relatively young age in the north; half the males may be sold before they are five years old (Peretti, 1976).

Table 1.1 and Map 1.1 show the geographic distribution of Voltaic livestock. More than one-fifth of the Voltaic herd is in the Sahelian region. The pasture requirement per Tropical Livestock Unit⁵ for the Sahel, Yatenga, and Kaya ORDs⁶ is 13 ha (IBRD, 1975a, p. 6). As shown, in 1969 there were only 7.4-6.3 ha per UBT. The requirement in the southern regions is 7-8 ha per UBT, whereas it was 9.1-17.9 ha per UBT in 1969. Therefore, prospects for increased animal production appear better in the traditionally agricultural south. In addition, improved range management, including the planting of forage grasses, is thought to have potential to lower the pasture requirement in the southern regions to almost 4 ha per UBT.

III. - Effect of the Drought

It is difficult to assess precisely the impact of the unfavorable climatic conditions of 1968-1974 on the Voltaic livestock herd because of the difficulty of gathering accurate herd census data. It is estimated that only 16 percent of the herd is taxed, so that herders are

TABLE 1.1
LIVESTOCK DISTRIBUTION BY ORD, 1969

| ORD | Area ^a | Population ^b | Cattle ^c | Percent of All Cattle | Density ^d | Cattle per Capita | Small Ruminants ^c | Percent of all Small Ruminants | Density ^d | Ha per UBT ^e |
|-------------------|-------------------|-------------------------|---------------------|-----------------------|----------------------|-------------------|------------------------------|--------------------------------|----------------------|-------------------------|
| Sahelian Zone | | | | | | | | | | |
| Sahel | 37 | 258 | 560 | 22.4 | 15.2 | 2.2 | 900 | 22.5 | 24.5 | 6.3 |
| Total | 37 | 258 | 560 | 22.4 | 15.2 | 2.2 | 900 | 22.5 | 24.5 | 6.3 |
| Sudanian Zone | | | | | | | | | | |
| Yatenga | 12 | 540 | 152 | 6.1 | 12.4 | 0.3 | 300 | 7.5 | 24.4 | 7.4 |
| Kaya | 22 | 604 | 287 | 11.5 | 13.3 | 0.5 | 650 | 16.3 | 30.1 | 6.6 |
| Ouagadougou | 24 | 859 | 232 | 9.3 | 9.6 | 0.3 | 300 | 7.5 | 12.4 | 10.5 |
| Fada N'Gourma | 50 | 275 | 283 | 11.3 | 5.7 | 1.0 | 350 | 8.8 | 17.0 | 17.9 |
| Koupéla | 9 | 279 | 105 | 4.2 | 11.6 | 0.4 | 100 | 2.5 | 11.1 | 9.1 |
| Koudougou | 26 | 751 | 180 | 7.2 | 6.8 | 0.2 | 250 | 6.3 | 9.5 | 14.5 |
| Volta Noire | 37 | 604 | 320 | 12.8 | 8.6 | 0.5 | 400 | 10.0 | 10.7 | 11.8 |
| Total | 180 | 3,912 | 1,559 | 62.4 | 8.7 | 0.4 | 2,350 | 58.9 | 13.0 | 11.3 |
| Guinean Zone | | | | | | | | | | |
| Bobo-Dioulasso | 21 | 330 | 159 | 6.4 | 7.7 | 0.5 | 350 | 8.8 | 17.0 | 11.4 |
| Gaoua-Diébougou | 17 | 380 | 127 | 5.1 | 7.3 | 0.3 | 200 | 5.0 | 11.5 | 13.3 |
| Banfora | 18 | 218 | 95 | 3.8 | 5.2 | 0.4 | 200 | 5.0 | 10.9 | 17.4 |
| Total | 56 | 928 | 381 | 15.3 | 6.8 | 0.4 | 750 | 18.8 | 13.4 | 13.4 |
| Total Upper Volta | 273 | 5,098 | 2,500 | 100.1 | 9.1 | 0.5 | 4,000 | 100.2 | 14.6 | 10.5 |

SOURCE: SCET International, 1972.

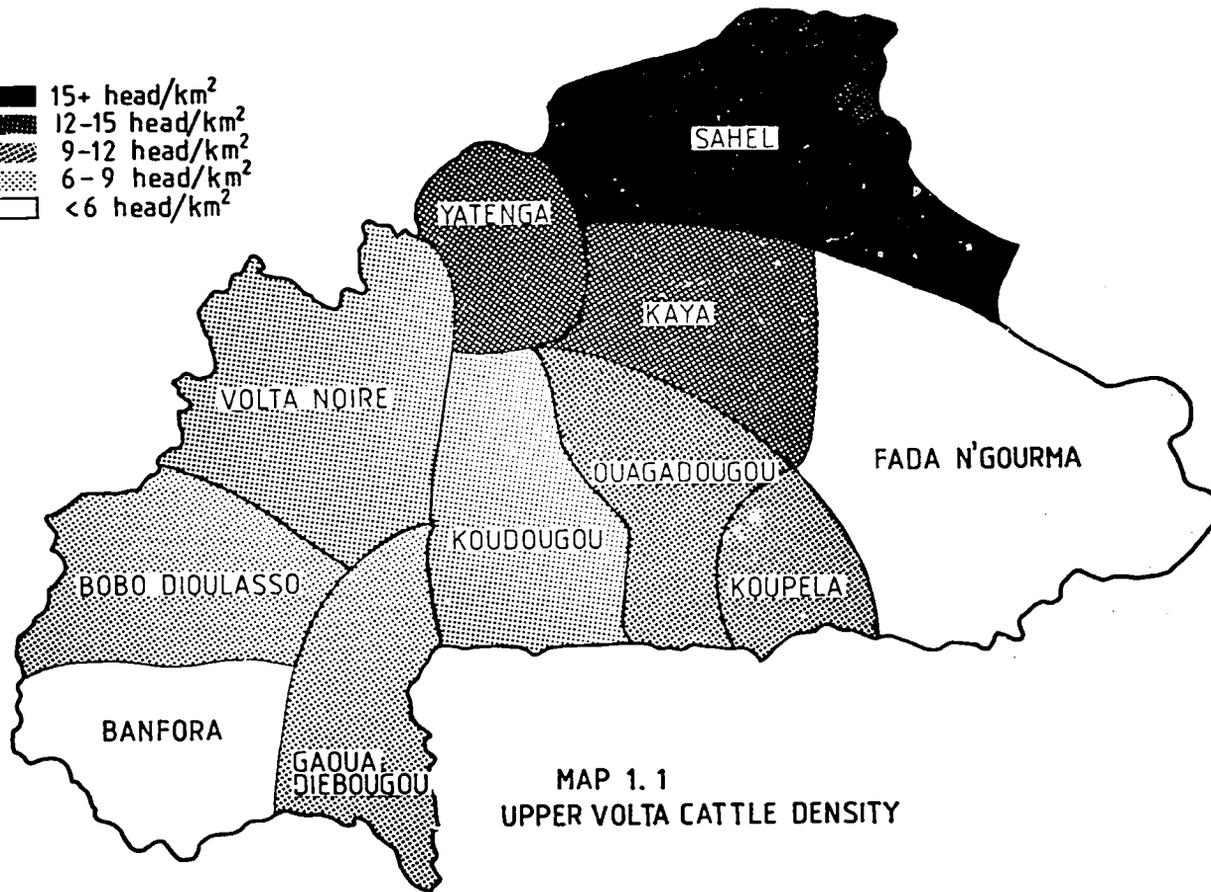
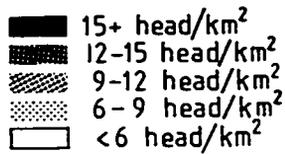
^aThousands of km².

^bIn thousands.

^cIn thousands of head.

^dNumber of head per km².

^eComputed on the basis of: cattle = .8 UBT per head; small ruminants = .15 UBT per head.



MAP 1.1
UPPER VOLTA CATTLE DENSITY

reluctant to participate in censuses that might result in more effective taxation. The figures presented in Table 1.1 were estimated by the Voltaic Livestock Service from vaccination records.

A. - Effect on Cattle

Peretti sampled the Sahel ORD and found a lower cattle population for 1969 (500,000 head) than that reported by the Livestock Service. Given his base figures, Peretti calculated drought losses for the Sahel ORD as 27 percent, with some sub-areas losing as much as 62 percent of their cattle. The losses in the Sahel ORD were due to both mortality and emigration, as some herders took their cattle southward in search of better pasture, while others sold cattle to southerners.

Table 1.2 shows the evolution of the Voltaic cattle herd from 1952 to 1975. The national herd growth rate was about 2-4 percent prior to the drought. Historically, the herd has increased rapidly to the carrying capacity of the range during periods of favorable precipitation and has been pruned during drought. Favorable conditions throughout the 1950s and up to 1969 led to the relatively high annual growth rates shown. The initial response to the drought was increased offtake to salvage some value from the animals least likely to survive. Thereafter offtake was reduced and is expected to remain low until herds are reconstituted. From 1969 to 1975 the total Voltaic herd grew, albeit at a rate much lower than in previous periods.

TABLE 1.2
VOLTAIC CATTLE HERD, 1952-1975

| Year | Zebu and Crossbreeds ^a | Taurins | Total Cattle | Annual Rate of Growth (Percent) |
|-------------------|-----------------------------------|---------|--------------|---------------------------------|
| 1952 | n.a. | n.a. | 1,300,000 | -- |
| 1960 | n.a. | n.a. | 1,800,000 | 2.75 |
| 1966 | 1,540,000 | 800,000 | 2,340,000 | 4.47 |
| 1967 | 1,570,000 | 825,000 | 2,395,000 | 2.35 |
| 1968 | 1,600,000 | 848,000 | 2,448,000 | 2.21 |
| 1969 | 1,630,000 | 870,000 | 2,500,000 | 2.12 |
| 1975 ^b | 1,654,000 | 884,000 | 2,540,000 | 0.26 |

SOURCE: SCET International, 1972 and SEDES, 1970 and 1975b.

^aZebu-aurin crossbreeds.

^bFrom SEDES, 1975a.

Table 1.3 shows that absolute losses of cattle because of the drought were felt only in the Sahellian region, where the cattle population fell by 36 percent over the 1969-1975 period. At the same time the herd in the central and southern regions grew. This was based on growth rates found in previous periods and does not account for any permanent immigration into these regions by cattle from the Sahel. Any permanent drought-induced southern migration of the Voltaic herd could be looked on as a favorable development, as cattle would have moved from zones with high densities to zones with lower densities.

TABLE 1.3
EFFECT OF THE DROUGHT ON THE VOLTAIC CATTLE HERD

| Region | 1969 | 1975 | Percent Change | Annual Percent Change |
|----------------------|-----------|-----------|----------------|-----------------------|
| Sahel | | | | |
| Number ² | 600,000 | 408,000 | -36 | -6.6 |
| Head/km ² | 15 | 10 | | |
| Center | | | | |
| Number ² | 1,270,000 | 1,402,000 | +10.4 | +1.7 |
| Head/km ² | 10.8 | 11.9 | | |
| South | | | | |
| Number ² | 630,000 | 730,000 | +15.9 | +2.5 |
| Head/km ² | 5.4 | 6.3 | | |
| Total | | | | |
| Number ² | 2,500,000 | 2,540,000 | +1.6 | +0.3 |
| Head/km ² | 9.1 | 9.3 | | |

SOURCE: SEDES, 1975 a, p. 10.

In addition to the absolute loss of cattle in the Sahel, the age structure of the northern herd was affected by the drought. Peretti (1976, p. 66) claims that during the drought there was a reduction in cow fertility and an increase in calf mortality that reduced the proportion of young females in the herd. According to Peretti, all other conditions the same, this reduction in young females will cause the number of reproducing cows in the Sahel to fall in the 1980s and remain below current levels through the 1990s. Even if calf mortality could be reduced to 25 percent and cow fertility increased to 60 percent, Peretti's calculations show that the Sahelian herd could grow only at 0.5 percent annually in the next twenty years (Peretti, 1976, pp. 69-86).

However, surveys of the age structure of Sahelian herds seem to belle Peretti's conclusions. Table 1.4 shows the results of three age-structure surveys, one done in 1970 as the drought's effects were beginning to be felt, another in 1974 as the drought was ending, and the third, Peretti's, done in 1976 just after the drought. The surveys show that the proportion of young females (under five years old) in the herd has risen from 26 percent in 1970 to 32 to 35 percent after the drought. The biggest other change in the age structure is the decline in the oldest age group (although this is obscured somewhat by the use of the nine-years-and-up category in the 1970 survey). It seems likely that herders sold off their older, less-productive cattle first during the drought, leaving them with smaller, younger herds afterward. One result of this would probably be a decrease in the average age of marketed cattle. The younger age structure of post-drought herds would cast doubt on Peretti's claim of a constraint on potential herd growth.

However, Tyč (SEDES, 1975a, p. 11) argues that the shift in the geographic distribution of the Voltaic herd, as a result of the drought, reduces its meat-producing potential. Tyč argues that less meat is marketed by sedentary than by pastoral cattle owners. In addition, the composition of the post-drought Voltaic herd shifted toward the smaller taurin and taurin-zebu crossbreeds, away from zebu cattle. This shift also reduced the meat-producing potential of Upper Volta, despite the larger absolute number of cattle in the national herd.

B. - Effect on Small Ruminants

In 1969 there were approximately 1.6 million sheep and 2.4 million goats in the Upper Volta. This herd was growing 2-5 percent annually. They were distributed geographically as follows: 25 percent in the Sahel, 50 percent in the central region, and 25 percent in the south. The drought is estimated to have cost the Sahelian region 20 percent of its small ruminants. There is some evidence that because of offtake in excess of herd growth, the small ruminant herd was in decline in the four to five years up to 1974 in the Sahel, Yatenga, and Kaya ORDs (SEDES, 1975a, p. 12). Because of this excess offtake and the drought losses, the Voltaic small ruminant herd is estimated to be no more than the four million head present in 1969 (SEDES, 1975a, p. 12). Table 1.5 gives a rough picture of what happened to the Voltaic small ruminant herd from 1969 to 1974.

TABLE 1.4

AGE STRUCTURE OF SAHELIAN CATTLE HERDS

| | 1970 ^a | | | 1974 ^b | | | 1976 ^c | | |
|-------------|-----------------------------|-------------------------------|----------------------------|-----------------------------|-------------------------------|----------------------------|-----------------------------|-------------------------------|----------------------------|
| | Male Percent of Total | Female Percent of Total | All Percent of Total | Male Percent of Total | Female Percent of Total | All Percent of Total | Male Percent of Total | Female Percent of Total | All Percent of Total |
| Less than 2 | 12 | 12 | 24 | 8 | 9 | 17 | 13 | 14 | 27 |
| 2 | 5 | 5 | 11 | 5 | 8 | 13 | 5 | 6 | 11 |
| 3 | 4 | 4 | 8 | 5 | 9 | 14 | 5 | 6 | 11 |
| 4 | 3 | 5 | 8 | 3 | 9 | 12 | 4 | 6 | 10 |
| 5 | 4 | 6 | 11 | 2 | 7 | 9 | 2 | 7 | 9 |
| 6-9 | 4 ^d | 8 ^d | 12 ^d | 3 | 24 | 27 | 3 | 21 | 24 |
| 10 and up | 7 ^e | 20 ^e | 27 ^e | * | 7 | 7 | - | 7 | 7 |
| Total | 39 | 60 | 101 | 26 | 73 | 99 | 32 | 67 | 99 |

SOURCES: a) SCET International, 1972.

b) Garcia, Revue Trimestrielle d'Information Technique et Economique, Nos. 8 and 9, 1974, pp. 4-13.

c) Peretti, Projet Mise en Place de l'ORD du Sahel, 1976, p. 59.

d) Ages 6-8 only.

e) Age 9 and up.

TABLE 1.5
EFFECT OF THE DROUGHT ON THE VOLTAIC SMALL RUMINANT HERD

| Region | 1969 | 1974 ^a | Percent Change | Annual Percent Change |
|----------------------|-----------|-------------------|----------------|-----------------------|
| Sahel | | | | |
| Number | 1,000,000 | 800,000 | -25.0 | -4.6 |
| Head/km ² | 25.0 | 20.0 | | |
| Center | | | | |
| Number | 2,000,000 | 2,130,000 | +6.5 | +1.3 |
| Head/km ² | 16.9 | 18.1 | | |
| South | | | | |
| Number | 1,000,000 | 1,070,000 | +7.0 | +1.4 |
| Head/km ² | 8.6 | 9.2 | | |
| Total | | | | |
| Number | 4,000,000 | 4,000,000 | 0.0 | 0.0 |
| Head/km ² | 14.6 | 14.6 | | |

^aThe figures for 1974 are upper-limit estimates of the actual herd size.

CHAPTER TWO

CHANGING EMPHASIS ON PRODUCTION: THE STRATIFICATION POLICY

I. - Government Policy Objectives

This section outlines the general objectives of Upper Volta's livestock production policy. The orientation of government policy is described in Programme de Production Animale pour le 3e Plan 1977-1981 (Sous-Commission de la Production Animale, 1976). More detailed information regarding policy implementation was obtained from discussions with officials, project documents and observation of projects.

As noted in Chapter One, Voltaic livestock production policy is primarily based upon the strategy of stratification, which envisages a high degree of regional specialization in livestock production, integration of traditional and modern production systems, and a revitalization of livestock sector output -- mainly meat but also milk and agricultural applications. Under the plan, each region is given a set of livestock production objectives which take advantage of the region's natural and human resources. The Sahel is called the zone naisseur or breeding region. There, the traditional stockraising systems of the Fulani, Tuareg, and others are to be augmented by government breeding ranches. Programs will be aimed at 1) maintaining the environmental equilibrium of the region and 2) promoting healthy cow herds for both milk and animal production. The other two regions (center and south, which encompass the Sudanian zone) are collectively referred to as the regions of fattening and traction (embouche et culture attelée). This two-pronged effort to increase and encourage all forms of fed animal production and draft animal uses involves a variety of public, private, industrial, integrated farming, and even communal projects. What emerges from the strategy is a general pattern of traditional stockraising and milk production in the north and modern or agriculturally integrated fattening in the center and south.

Despite the fact that the Sahelian region only accounts for about one-quarter of the Voltaic cattle herd and was the region most devastated by the drought, authorities hope to establish the region as the primary cattle reproducing area in the country. Although the specific programs to accomplish this goal were not clearly outlined by the government, they will involve some measure of land management, animal health extension, government breeding ranches, and a marketing policy to promote early offtake of males. The general statements of policy also acknowledge the importance of milk production to the traditional stockraisers of the region and suggest support of unspecified programs to improve milk production.

Government policy directed toward the remainder of the country is somewhat more substantive than that for the north. It includes the establishment of feedlots, animal

traction programs followed by finishing of the culled oxen, growing-out centers for young cattle, and other forms of fed animal production. Concurrent with these actions are efforts to promote forage cultivation and use of agro-industrial by-products as fodder in feedlots and by small scale peasant cattle-fattening schemes. As in the north, the national veterinary service is committed to an intensification of animal health services provided to producers, especially for those who participate in the new programs.

In 1978 there was very little evidence of implementation of the stratification program in the Sahelian region. Some of the Azawak stock remaining at the Markoye ranch were apparently being used on a loan basis to upgrade the indigenous breeding stock of the region. However, no intensive efforts at genetic selection, range management, herd management, or supplemental feeding were as yet underway.

In the south there were several projects at various stages of implementation. The majority of these farthest along were in the southwestern region. The most ambitious is the World Bank's *Projet Elevage de l'Ouest Volta* (PEOV). The major production thrust of the project is a series of cooperative model ranches.¹ In 1978 only one was operating, on a partial basis. The ranches are based on a Kenyan model and support three cattle-raising operations. The first type of herd belongs to local Fulani who participate in the program. They are allowed to use the restricted grazing land and receive technical and supplemental veterinary assistance. A second herd type is made up of cattle owned by participating sedentary farmers and entrusted to ranch personnel. The formal arrangement is supposed to encourage more investment by local farmers and townspeople by structuring an accessible entrustment system. The third herd is supposed to be a model herd. It is hoped that other cattle raisers will attempt to utilize improved stockraising techniques once their success is demonstrated and with technical and economic assistance provided by PEOV.

While the original plans called for three to five ranches by early 1980, each with 3,000 head of cattle and about 15,000 hectares, the one ranch operating in 1978 had fewer than 1,000 head, according to the project director. One of the major difficulties has been the recruitment of Fulani participants.

In addition to PEOV, the southwestern region also boasts several feedlot projects in operation. These are briefly described in section III-A.

II. - Supply of Young Cattle: Sales Patterns of Pastoralists

A. - The Sample

The information for this section comes from a sample of Voltaic herders (Herman, 1979, p. 371) from three regions of the country (Kaya, Djibo, and Pouytenga) selected to represent a cross section of livestock-raising patterns. Kaya is a mostly sedentary, mostly Fulani (73 percent of the 74 herds sampled) region. Djibo, in the Sahel, is completely

pastoral, and all 134 sample members were Fulani. Pouytenga is the site of a major cattle market. The livestock entrustment system of cattle raising is used there, and its sample of 82 households is 67 percent Mossi.

B. - Composition of Marketed Cattle

The stratification policy of the Voltaic government has a goal of making the Sahel a breeding zone, where herders would sell male cattle at young ages so that they could be fattened in southern regions. From the sample data presented in Table 2.1, this stratification appears to happen already. In Sahelian Djibo, 61.2 percent of all cattle sold were males under the age of four years. Since, under an extensive stockraising system, zebu cattle do not reach adult size until they are six years old, there is strong evidence that young males are sold when they still have significant growth potential.

TABLE 2.1
SEX AND AGE STRUCTURE OF CATTLE SOLD BY SAMPLE MEMBERS
(Percent of Animals Sold in Each Region)

| Age | Djibo ^a | | Kaya ^b | | Pouytenga ^c | |
|-------|--------------------|--------------|-------------------|-------------|------------------------|--------------|
| | Males | Females | Males | Females | Males | Females |
| < 2 | 46.3% | 6.7% | 7.7% | 2.7% | 0.1% | --- |
| 3-4 | 14.9% | 0.6% | 11.7% | 3.7% | 1.2% | 0.1% |
| 5-6 | 8.9% | --- | 26.7% | 2.7% | 26.5% | 5.5% |
| 6-8 | 3.5% | 0.3% | 29.0% | 2.7% | 36.1% | 17.5% |
| 9+ | <u>1.0%</u> | <u>17.8%</u> | <u>7.0%</u> | <u>6.3%</u> | <u>2.5%</u> | <u>10.4%</u> |
| TOTAL | 74.6% | 25.4% | 82.0% | 18.0% | 66.5% | 33.5% |

SOURCE: Herman, 1979, p. 372.

^aTotal of 315 cattle sold over 9 months.

^bTotal of 300 cattle sold over 7 months.

^cTotal of 805 cattle sold over 8 months.

By contrast with the Djibo sample, the average age of cattle sold in the other two regions sampled is between five and eight years. Few cattle were sold at less than two years of age, whereas almost half of the males sold in Djibo were two years old or less. This is another indication that de facto stratification already occurs.

Another indication of the greater importance attached to breeding in the north is the large proportion of females over the age of nine sold by the Djibo sample. Less than 35 percent of females sold in the non-Sahelian regions were over nine years old, but 70 percent of Djibo females sold were over nine. The Djibo percentage might have been even higher if it were not for the Nigerien herd reconstitution program during the sample period.

Using the data on geographic and age distribution of cattle in Chapter One and the sample commerce data in this section, estimates of the supply of young cattle suitable for fattening can be generated. In the north, young males less than five years old account for 61.2 percent of sold cattle. With annual commercialized offtake of 8 percent (Sous-Commission de la Production Animale, 1976) and a cattle population of 400-500,000 head, the Sahel region can be expected to produce between 19,500 and 24,500 head of young male cattle. Similar calculations for the center and southern regions yield estimates of 23,600-25,500 head for those regions collectively. This suggests a total of less than 50,000 young males available each year for all purposes. In most cases only three and four-year-olds are suitable for short-term industrial fattening, thus reducing the supply by over half. In addition, competing demands for draft animal uses, small farmer growing-out and fattening operations and even butcher demand must be taken into account. Thus it is not unreasonable to suggest that even with the apparent tendency of northern traditional herders to sell cattle at young ages, no more than 10-15,000 head of cattle could potentially be tapped as feeder cattle for the stratification program.²

III. - Potential for Intensive Animal Feeding

A. - Availability of Feed Inputs

The success of the fed animal production component of the stratification program is dependent upon a sufficiency of fodder as well as of livestock. In addition to the natural forage available to range-fed cattle, the government hopes to make use of a variety of agricultural and agro-industrial by-products which can be used as feed in both modern industrial feedlots and small-scale peasant operations. Although production and distribution of these supplemental animal feeds takes place to a limited degree in central Upper Volta, the best prospects for their intensive use remain in the southwest. There, six major types of cattle feed are currently being offered in reasonable quantities with every suggestion of increased production in the future. These sources are: brewery by-products, cotton and peanut cake from oil production, rice by-products, cottonseed, bran from milling operations, and sugar by-products, especially molasses. Statistics on the availability and costs of these feed inputs are very inexact. Nonetheless, a 1977 report by a German technician provided some basic information (ONERA, 1977).

The two breweries in Upper Volta produce four by-products of potential usefulness as a source of animal feed: damp sediment or lees (*drêche humide*), brewer's yeast, concentrated protein cake, and malt bran. Of those, the first two have the greatest potential in terms of contributing to the supply of animal feeds. Estimates of availability are given in Table 2.2. Damp sediment must be dried for feed use. At present there are no plans to construct an industrial drying facility, thus requiring small-scale sun drying by the users. Damp sediment yields dry material at a 4:1 ratio. The material is currently provided for a service charge of 500 CFA F for 2 tons of the damp sediment. One of the breweries estimates a price of 500 to 750 CFA F per ton will be required in the future. If the breweries undertake the drying process the price will likely be 10-15 CFA F per kilogram. Unlike sediment, yeast is only useful as feed in dry form. Though the figures in Table 2.2 give dry matter equivalent, the breweries do not have drying capabilities. The estimated price once drying is possible is 50 CFA F per kilogram.

TABLE 2.2
VOLTAIC SUPPLY OF FEED INPUTS
(In Metric Tons)

| Type | 1977 | 1980 | 1985 |
|-------------------------------|--------|--------|---------|
| Brewery By-products | | | |
| Sediment (damp) | 4,300 | 6,500 | 9,600 |
| Yeast (dry matter) | 20 | 25 | 41 |
| Oil By-products | | | |
| Cottonseed cake | 9,000 | 11,000 | 14,000 |
| Peanut cake | 1,050 | n.a. | n.a. |
| Rice By-products | 1,464 | 1,948 | 3,138 |
| Cottonseed | 56,000 | 80,000 | 138,000 |
| available as feed | 4,000 | 2,900 | n.a. |
| Wheat Bran^a | 1,800 | 2,396 | 2,858 |
| Molasses | 9,000 | 16,000 | n.a. |

SOURCE: ONERA, 1977.

^aIncludes all bran from industrial milling operations.

Cottonseed cake and peanut cake are by-products of oil production; rice by-products include bran and polishings. Only 30 percent of the peanut cake and 5 percent of the cottonseed cake have historically been consumed domestically. Through 1978 all domestic demand was from public institutions. The remainder has been exported to Ivory Coast at world market prices. Estimates are based on a conservative estimate of a 10 percent growth in production. Currently, these by-products are being utilized domestically by private stockraisers and feedlots at an average price of 7 CFA F per kilogram. Little of the cottonseed produced by textile operations is directly available as feed since all but the lowest quality is crushed for oil. As cotton production methods improve, a reduction in production of the low quality seed is anticipated, so that little will be available by 1985.

Bran from the Banfora mill is mostly exported because of slack domestic demand. Some increase in domestic use has resulted from the establishment of the feedlots in the area. Cubed bran was sold in 1977 at 12 CFA F per kilogram. The demand for molasses also increased as a result of feedlot use. Sold at a price of 5 CFA F per kilogram, the bulk of the sugar refinery's (SOSUHV) output was used until recently to wet roads or on fields as fertilizer. An unspecified amount is used by SOSUHV's own feedlot operation (see section III-B).

Using the rough estimates in Table 2.2 and daily ration information, it is possible to estimate the potential for cattle feeding with domestically produced agro-industrial by-products. These results appear in Table 2.3. They suggest that barring export of the energy components of feed (molasses, bran, and rice by-products), feed potential could rise to over 25,000 head in 1985. However, it is essential to recognize that the constraints to feed inputs are found in high-energy components. Thus, the maximum number of cattle potentially fed is very sensitive to the molasses production estimate. These figures do not consider brewing by-products. It should also be noted that they do not allow for any high energy feed use in alternative livestock feeding.

B. - Feedlot Infrastructure

Both the Voltaic government (through ONERA) and the CEAO are committed to expanding industrial cattle feeding operations in Upper Volta. The cattle and feed input potential for supplying these programs were discussed in the previous section. Distribution of the output (cattle or meat) is examined in Chapters Seven and Eight. This section looks at the existing cattle feedlot infrastructure.

There are currently four feedlots in various stages of operation in Upper Volta. All are located in the Banfora (southwestern) region close to most of the feed input sources. The largest and most developed, SODEXPAD, is operated by the semi-public sugar producing company, SOSUHV. It is located adjacent to the sugar refinery outside Banfora. The state-operated, German-financed Banfora Feedlot is somewhat smaller, but has equally ambitious plans. The other two feedlots are much smaller. One is run by the ORD and is organized to

TABLE 2.3
 FED ANIMAL POTENTIAL USING DOMESTIC FEED INPUTS^a
 (Number of 90-day Rations)

| Feed Type | 1977 | 1980 | 1985 |
|--|--------|--------|---------------------|
| Bran/Cottonseed ^b | 5,000 | 6,655 | 0 |
| Cottonseed Cake ^c } Peanut Cake ^c } | 11,626 | 19,942 | 25,708 ^d |
| Maximum combined ^e | 13,876 | 22,937 | 25,708 |

SOURCES: M. Gaullier of SODEXPAD related the information on Bran/Cottonseed ration; the cake ration was supplied by the Feedlot de Banfora and ONERA; information on feed availabilities from Table 2.2.

^aAll calculations assume adequate availability of legume hay, grass hay, or other forage where necessary. Assumes 90-day fattening.

^bAs used in the SODEXPAD operation: daily ration of cubed bran (4 kilograms), molasses (5.5 kilograms) and cottonseed (1.5 kilograms).

^cDaily ration of cottonseed or peanut cake (1 kilogram), molasses or rice by-products (10 kilograms), plus some additional protein supplement (brewery by-products). In both cases the molasses/rice component is the constraining input.

^dAssumes 20,000 ton molasses output.

^eLess than sum of others because of the molasses/rice constraint.

finish draft animals culled from a local animal traction program. There is also a small private ranch run by the Banfora flour mill; the ranch takes advantage of plentiful milling by-products. Each of the latter two feedlots has limited capacity (less than 100 head) and no major expansion plans (personal communication, Bary Sitta, Assistant Director, ONERA, September 1978).

The SODEXPAD feedlot is currently being operated with French technical assistance. The structure has an annual capacity of 5000 finished head at a rate of 400 head per month on a continuous basis (using ninety-day cycles). During most of 1978 the feedlot was operating significantly below capacity with a stock of 700 feeders, a monthly turnover of 150 head, and a four- to six-month fattening cycle. In addition, the operation maintained a 300-head stockraising herd receiving a maintenance ration.

Most of the cattle purchased for the feeding operation are bought by a contract buyer who tours northern markets. While there are no strict standards imposed by SODEXPAD, it prefers two- to four-year-old males. No cull cattle, cows, or draft animals are ever purchased. Cattle are not bought by weight, but the average purchase price for the 1400 head bought during the first year of operation was between 140 and 150 CFA F per kilogram liveweight. This compares with a fixed resale price of 180 CFA F per kilogram liveweight.³ Fattened cattle are resold to private buyers. Two merchants were regularly accounting for all purchases in 1978. The cattle are used for local slaughter (in Bobo-Dioulasso, where the meat is sold in European style butcher shops) and for live export to Abidjan, where as quality beef they receive an implicit premium over other Voltaic exports. Much to the dismay of government officials, SODEXPAD had refused to deal with ONERA on credit. Cattle are sold to the private merchants on schedule on a cash basis.

The program employed by SODEXPAD has typically yielded 650 grams of weight gain per day. Wet season gains are less than dry season gains, likely due to the higher base weights during the wet season. The ration, given in a simple mix, consists of wheat bran, molasses, and whole cottonseed. Additionally, cattle are given unlimited quantities of grass hay, and graze for several hours each day. Average resale weight is reported to be 330 kilograms liveweight with a dressing fraction of 52 percent. The average gross margin for cattle in the four-month cycle was about 22,860 CFA F (or over 28,000 CFA F at the 1979 price of 200 CFA F per kilogram liveweight). No cost information was available for SODEXPAD.

The Feedlot de Banfora, financed and technically assisted by West Germany, is operated under the auspices of ONERA, which has first claim on all output. This caused significant problems during the early months of operation. Occupying 500 hectares, with a physical capacity of 600 head (1800 head annually with a four-month rotation), the feedlot was opened in December 1977. First year production goals were 600 head with monthly rotations of fifty head. However, as of September 1978, no cattle had been commercialized. The reason was that ONERA had not yet completed contract negotiations to supply the Nigerian market -- an expected outlet for Feedlot de Banfora production.

The Feedlot could not provide average or expected weight gain information. However, thirty-one of the original cohort showed an average gain of 109 kilograms over eight months (450 grams per day). During the first four months the group averaged over 650 grams per day. The ration is similar to that used by SODEXPAD, though it is supplemented by rice hay and expectations are to make use of other rice by-products. The feeders are grazed two hours each day, and the Feedlot is experimenting with various fodder grasses which are being cultivated on Feedlot property.

The Feedlot did not provide any cost or purchase price information. The entry weights of cattle averaged just under 200 kilograms liveweight, somewhat lower than those in SODEXPAD. Though no cattle were commercialized prior to September 1978, the anticipated resale price was 200 CFA F per kilogram.

Under the best of conditions, current fed animal capacity of the four feedlots is 7000 head annually. It is unlikely that that figure is realistic. A more appropriate estimate of capacity is probably 4000 head. Assuming that the Feedlot de Banfora resolves its difficulties, 1978 production was about 2600 head. Table 2.4 gives the total and incremental quantities of beef produced by current operations and a projection for 1985 which assumes an expansion of capacity to double the present level. Note that these optimistic estimates assume short-turn intensive fattening of relatively young males with a low failure rate. Inclusion of cull animals as inputs to fattening operations would reduce production. In all cases the most optimistic capacity figures fall within the upper limits of feeder cattle and feed input estimates generated in the previous two sections. However, all these estimates (summarized in Table 2.5) are unreasonably rosy projections. The cattle and feedstuff figures do not account for other sources of demand, notably other stratification-type applications: draft animal demand, embouche paysanne, growing-out operations, collective ranches, etc.

C. - Peasant Participation: Traction, Growing Out, and Embouche Paysanne

The second thrust of the southern cattle production strategy in the context of stratification entails the expansion of participation in livestock activities by nontraditional stockraisers. The objective seeks to increase the integration of livestock and agricultural activities. A 1975 SEDES report recommended (SEDES, 1975a, p. 14):

The development of livestock production must be essentially accomplished by a better integration of stockraising and agriculture. Livestock production must take increasing advantage of agricultural products and by-products. (author's translation).

This type of integration is foreseen in three principal small farm activities: 1) animal traction followed by short-term finishing of the culled oxen; 2) growing out of immature cattle using collective ranches, Fulani entrustment, crop residue, and pastureland, and 3) small scale peasant fattening of thin stock using surplus off-season farm labor, forage cultivation, and purchased feed input. In the government's view peasants will enthusiastically support such programs when given the proper technical and economic incentives.

There is evidence to suggest the correctness of the government's premise of willing and economically rational small scale investors awaiting profitable opportunities. It is estimated that around Ouagadougou, Kaya, and Pouytenga there are several thousand peasants and townspeople who have been engaged for years in fattening activities of the type envisioned by the government (SEDES, 1975a, p. 18). Using a combination of locally available agricultural and agro-industrial by-products, young cattle are fed over long periods of time and resold in major markets where premium prices are paid for their high quality. It is equally likely that such spontaneous embouche paysanne occurs around Bobo-Dioulasso as well. However, there is currently no organization of the participants in these activities. The purchase of feeder stock, feed inputs, and health-related goods and services as well as the resale of the fattened cattle is usually done on an individual basis. The government's view is that a better organized market for feeder and finished cattle, feed inputs, and improved animal health extension will stimulate significant increases in small-scale feeding activities.

Animal traction continues to be relatively underutilized in Upper Volta. No data were available in 1978 on the total number of draft oxen in use. The number of plow oxen is likely to be only several thousand. Though some progress is being made in introducing draft oxen technology by a Dutch project in Kaya, the AVV in Koupela, and the ORD in Banfora, the draft animal herd does not appear to be an important source of cull stock for fed animal production in the near or midterm.

One additional note about peasant participation in feeding, growing out, and traction activities is necessary. A very important conclusion of an earlier work (Delgado, 1978, pp. 300-301) on the subject of agriculture-livestock integration was that the labor conflict between crops and livestock often makes it preferable for farmers to entrust livestock rather than keep them on the farm. While these findings do not preclude successful integration of the two activities, they do suggest that the proper incentives involve improvements in agricultural production methods as well as the obvious livestock-oriented interventions.

TABLE 2.4
FEEDLOT CAPACITY AND PRODUCTION ESTIMATES, 1978-1985

| | Head | Total Output ^a | Net Output ^b | Gross Margin ^c |
|-------------------------|--------|---------------------------|-------------------------|---------------------------|
| Stated Capacity | 7,000 | 1,201 | 409 | 179.2 |
| Adjusted Capacity | 4,000 | 686 | 234 | 102.4 |
| 1978 Utilization | 2,600 | 446 | 152 | 66.6 |
| <u>1985 Projections</u> | | | | |
| Stated Capacity | 14,000 | 2,402 | 818 | -- |
| Adjusted Capacity | 8,000 | 1,372 | 468 | -- |
| At 1978 Rate | 5,200 | 892 | 304 | -- |

SOURCE: See text.

^aTonnage of beef commercialized from feedlot operations: 330 kilograms live-weight average and 52 percent dressing ratio.

^bTonnage of beef added by feeding operations: 650 grams per day at 75 percent carcass gain.

^cCFA F net value estimated at 50 CFA F premium and weight gain as above: 25,600 CFA F per head. In millions of CFA F. Not estimated for 1985 projections.

TABLE 2.5
SUMMARY OF FEEDER CATTLE, FEED INPUTS AND FEEDLOT CAPACITY PROJECTIONS

| | 1978 | 1980 | 1985 |
|----------------------------|-----------|-----------|-----------|
| Feeder Cattle ^a | 10-15,000 | 10-15,000 | 12-18,300 |
| Feed Inputs ^b | 13,876 | 22,937 | 25,708 |
| Feedlot Capacity | | | |
| Maximum | 7,000 | -- | 14,000 |
| Adjusted | 4,000 | -- | 8,000 |
| At 1978 Rate | 2,600 | -- | 5,200 |

SOURCE: See text and Tables 2.3 and 2.4.

^a3-4 year old males.

^bNinety-day rations; for 120-day rations reduce by one-third.

CHAPTER THREE

PRODUCTION PROJECTIONS: HERD GROWTH AND OFFTAKE THROUGH 1985

I. - Cattle Herd Growth and Offtake

A. - Herd Productivity

Herd productivity is the annual number of surviving calves divided by total herd size. This output may go either to growth (increasing herd size) or to offtake (meat production). The productivity of the Voltaic herd was estimated as 12 percent for zebus and zebu-taurin crossbreeds and 13 percent for taurins in pre-drought 1966 (SEDES, 1969, p. 68). Productivity in 1972 was estimated to be 14 percent (SCET International, 1972, p. 12).

The rate of productivity depends mainly on the proportion of females of reproductive age present in the herd. Peretti (1976) argued that the proportion of young females (less than reproductive age) present in the Sahelian herd had been reduced by the drought, thereby restricting future herd productivity. His own herd census data seemed to refute this claim, however (see Chapter One).

Voltaic zebu cows first calve at four years of age (SEDES, 1974). They continue to produce offspring until 9 to 12 years of age. Fertility is 35 (SCET International, 1972) to 50 (Peretti, 1976) percent, so each cow can be expected to produce 1.75-4.0 calves during her lifetime. Calf mortality is high; IBRD (1975a, p. 3) estimates that only 50 percent reach maturity and Peretti (1976, p. 76) says that 42 to 60 percent of Sahelian calves reach maturity. Peretti also suggests that, under the best possible conditions, fertility could be as high as 60 percent and calf mortality as low as 25 percent.

It may be assumed that, as an upper limit, the proportion of the herd made up of reproductive cows are those females aged four years and up. From herd census data presented earlier (Table 1.4), the following proportions result:

TABLE 3.1
REPRODUCTIVE FEMALES IN THE VOLTAIC HERD

| Region | | Percent |
|------------------|------|---------|
| Center and South | 1970 | 34.5 |
| Sahel | 1970 | 37.5 |
| Sahel | 1974 | 47 |
| Sahel | 1976 | 41 |

SOURCES: See Table 1.4.

These proportions are combined with a variety of possible mortality and fertility rates in Table 3.2 to show the implied rates of herd productivity. The most pessimistic assumptions, 58 percent mortality and 35 percent fertility, produce productivity rates of 5 to 7 percent. The most optimistic assumptions put the productivity rates at 15 to 21 percent. The mortality and fertility rates which fit best with the productivity rates cited earlier (12, 13, and 14 percent) are 40 to 50 percent mortality and 50 to 60 percent fertility. These rates produce productivity rates of 8.6 to 16.9 percent. In the projections that follow, herd productivity of 12 percent will be used as the most likely rate, 10 percent as a low estimate, and 14 percent as a high estimate.

TABLE 3.2
HERD MORTALITY, FERTILITY AND PRODUCTIVITY
(In Percent)

| Mortality Rate | Fertility Rate | Herd Productivity | | | | |
|-------------------|-------------------|-------------------|--|-------|------|------|
| | | Center and South | | Sahel | | |
| | | 1970 | | 1970 | 1974 | 1976 |
| 58 | 35 | 5.1 | | 5.5 | 6.9 | 6.0 |
| 58 | 50 | 7.2 | | 7.9 | 9.9 | 8.6 |
| 50 | 50 | 8.6 | | 9.4 | 11.8 | 10.3 |
| 50 | 50 | 10.4 | | 11.3 | 14.1 | 12.3 |
| 40 | 60 | 10.4 | | 11.3 | 14.1 | 12.3 |
| 40 | 50 | 12.4 | | 13.5 | 16.9 | 14.8 |
| 25 | 60 | 15.5 | | 16.9 | 21.2 | 18.5 |

B. - Herd Growth

The three types of cattle present in the Voltaic herd, zebus, taurins, and zebu-taurin crossbreeds, have different rates of growth. Fredet (reported in SEDES, 1975a, p. 10) estimated the annual average growth rates as 2 percent for zebus and crossbreeds and 3 percent for taurins. The Sahelian herd is almost entirely zebus and crossbreeds, while the herd from the center and south was about 40 percent taurins in 1975. Table 3.3 shows the projected growth of the Voltaic cattle herd through 1985. Note that the Sahelian herd is expected to reach 497,000 head by 1985, still only 89 percent of its 1969 level (see Table 1.1).

TABLE 3.3
VOLTAIC CATTLE-HERD GROWTH^a, 1975-1985
(In Thousands of Head)

| Year | Sahel | Center and South | | Total |
|------|-------|----------------------|---------|-------|
| | | Zebu and Crossbreeds | Taurins | |
| 1975 | 408 | 1,285 | 847 | 2,540 |
| 1976 | 416 | 1,311 | 872 | 2,599 |
| 1977 | 424 | 1,337 | 899 | 2,660 |
| 1978 | 433 | 1,364 | 926 | 2,723 |
| 1979 | 442 | 1,391 | 953 | 2,786 |
| 1980 | 450 | 1,419 | 982 | 2,851 |
| 1981 | 459 | 1,447 | 1,011 | 2,917 |
| 1982 | 469 | 1,476 | 1,042 | 2,987 |
| 1983 | 478 | 1,506 | 1,073 | 3,057 |
| 1984 | 488 | 1,536 | 1,105 | 3,129 |
| 1985 | 497 | 1,566 | 1,138 | 3,201 |

^aAnnual growth rates used: 2 percent for zebu and zebu-taurin crossbreeds, and 3 percent for taurins.

The center and south herd is expected to increase to 1,566,000 zebus and crossbreeds and 1,138,000 taurins by 1985, a 39.4 percent increase over the 1969 total number of head. Cattle density would rise to 11.5 from 8.2 per km² in 1969.

C. - Beef Production

Given the 2 percent growth rate for the zebu and crossbreed herds and the 3 percent growth rate for taurins, offtake must be 8-12 percent for zebus and crossbreeds and 7-11 percent for taurins. The average carcass weight of taurins is 77 kg; the average carcass weight of zebus and crossbreeds is 112 kg (calculated from SEDES, 1969, p. 12). Table 3.4 projects beef production through 1985 assuming 12 percent herd productivity and the average carcass weights given above. Beef production through 1985 using the high and low estimates of herd productivity is shown in Table 3.5.

TABLE 3.4
VOLTAIC BEEF PRODUCTION,^a 1975-1985

| Year | Offtake (thousands of head) | | | Meat Production ^b (in tons) | | |
|------|-----------------------------|----------------------|---------|--|------------------|--------|
| | Sahel | Center and South | | Sahel | Center and South | Total |
| | | Zebu and Crossbreeds | Taurins | | | |
| 1975 | 40.8 | 128.5 | 76.2 | 4,570 | 20,259 | 24,829 |
| 1976 | 41.6 | 131.1 | 78.5 | 4,661 | 20,728 | 25,389 |
| 1977 | 42.4 | 133.7 | 80.8 | 4,754 | 21,196 | 25,950 |
| 1978 | 43.3 | 136.4 | 83.3 | 4,848 | 21,687 | 26,536 |
| 1979 | 44.2 | 139.1 | 85.8 | 4,946 | 22,189 | 27,135 |
| 1980 | 45.0 | 141.9 | 88.3 | 5,045 | 22,702 | 27,747 |
| 1981 | 45.9 | 144.7 | 91.0 | 5,146 | 23,228 | 28,374 |
| 1982 | 46.9 | 147.6 | 93.7 | 5,249 | 23,766 | 29,015 |
| 1983 | 47.8 | 150.6 | 96.5 | 5,354 | 24,316 | 29,670 |
| 1984 | 48.8 | 153.6 | 99.4 | 5,461 | 24,879 | 30,340 |
| 1985 | 49.7 | 156.6 | 102.4 | 5,566 | 25,425 | 30,991 |

^a Assumes a 10 percent offtake rate for zebu and crossbreeds and 9 percent for taurins.

^b Average carcass weights of 112 kg for zebu and crossbreeds and 77 kg for taurins.

TABLE 3.5
ESTIMATED VOLTAIC BEEF PRODUCTION AT VARIOUS HERD
PRODUCTIVITY RATES, 1975-1985
(In Tons)

| Year | Rate of Herd Productivity | | |
|------|---------------------------|------------|------------|
| | 10 Percent | 12 Percent | 14 Percent |
| 1975 | 19,733 | 24,829 | 29,208 |
| 1976 | 20,178 | 25,389 | 29,867 |
| 1977 | 20,633 | 25,950 | 30,540 |
| 1978 | 21,098 | 26,536 | 31,229 |
| 1979 | 21,574 | 27,135 | 31,934 |
| 1980 | 22,061 | 27,747 | 32,654 |
| 1981 | 22,558 | 28,374 | 33,390 |
| 1982 | 23,067 | 29,015 | 34,143 |
| 1983 | 23,587 | 29,670 | 34,914 |
| 1984 | 24,119 | 30,340 | 35,701 |
| 1985 | 24,663 | 30,991 | 36,506 |

II. - Small Ruminant Herd Growth and Offtake

A. - Herd Productivity

The productivity rate of the Voltaic sheep herd has been estimated at 26 to 30.6 percent (SEDES, 1969, p. 68) and 27 to 30 percent (SCET International, 1972, p. 52). The goat herd is reported to have a faster productivity rate, 33 to 38 percent (SEDES, 1969, p. 68) and 37 to 40 percent (SCET International, 1972, p. 52). The Raymond-Dumas study of three northern ORDs (reported in SEDES, 1975a, p. 12) showed that small ruminant offtake rates of 29 to 40 percent led to a diminution of the national herd in the 1969-1974 period. The midpoints of these productivity rates (28 percent for sheep, 37 percent for goats) are used in the projections presented here.

A loss of 20 percent of the Sahelian small ruminant herd was reported during the drought (SEDES, 1975a, p. 11). Therefore, the small ruminant herd in 1974 numbered 4 million, approximately its size in 1969. It is assumed that the distribution of the herd is: Sahel, 800,000; center, 2.13 million; and south 1.07 million head. The herd is about 60 percent goats and 40 percent sheep.

B. - Herd Growth

Rates of growth for the small ruminant herd of 2 to 5 percent have been reported (SEDES, 1969, p. 68; SEDES, 1975a, p. 11; SCET International, 1972, p. 52). The actual rate of growth that will occur through 1985 will probably depend on both the prices of small ruminants and their prices relative to cattle. High small ruminant prices are expected to lead to higher offtake and lower growth in the short run. Low cattle prices relative to small ruminants would lead to similar consequences. The rate of growth will probably be in the range of 2 to 5 percent. Projections of the herd using 2, 3.5 and 5 percent rates of growth are shown in Table 3.6.

TABLE 3.6
VOLTAIC SMALL RUMINANT HERD GROWTH, 1975-1985
(In Thousands of Head)

| Year | Rate of Growth | | |
|------|----------------|-------------|-----------|
| | 2 Percent | 3.5 Percent | 5 Percent |
| 1975 | 4,080 | 4,140 | 4,200 |
| 1976 | 4,162 | 4,285 | 4,410 |
| 1977 | 4,245 | 4,435 | 4,631 |
| 1978 | 4,330 | 4,590 | 4,862 |
| 1979 | 4,416 | 4,751 | 5,105 |
| 1980 | 4,505 | 4,917 | 5,360 |
| 1981 | 4,595 | 5,089 | 5,628 |
| 1982 | 4,687 | 5,267 | 5,910 |
| 1983 | 4,780 | 5,452 | 6,205 |
| 1984 | 4,876 | 5,642 | 6,516 |
| 1985 | 4,973 | 5,840 | 6,841 |

A likely growth pattern, all other things equal, would be: the maximum 5 percent growth in the Sahel to restock the herd depleted by the drought and an intermediate rate in the rest of the country. This would produce the following national herd in 1985:

TABLE 3.7
 LIKELY GEOGRAPHIC DISTRIBUTION OF THE SMALL RUMINANT HERD, 1985

| | Number of Head | Percent of Total | Density, (head/km ²) |
|--------|----------------|------------------|-------------------------------------|
| Sahel | 1,368 | 23 | 34 |
| Center | 3,110 | 51 | 26 |
| South | 1,562 | 26 | 14 |
| Total | 6,040 | 100 | 22 |

Herd density would rise from 14.6 per km² in 1974 to 18.2 with low growth or 25.0 with high growth. Under the "likely" growth pattern density would rise to 22 per km².

C. - Meat Production

The estimates of small ruminant meat production shown in Table 3.8 use average carcass weights of 10 kg for goats and 15 kg for sheep. There is clearly a tradeoff between future meat production and current offtake. That is, the higher current offtake, the smaller the future herd from which to offtake meat. According to the projections, the supply of small ruminant meat in 1985 will be 18,000 to 22,000 tons.

TABLE 3.8
 VOLTAIC SMALL RUMINANT MEAT PRODUCTION, 1975-1985
 (In Metric Tons)

| Year | Herd Growth Rate | | | |
|------|------------------|-------------|--------------------------|-----------|
| | 2 Percent | 3.5 Percent | 3.8 Percent ^a | 5 Percent |
| 1975 | 14,933 | 14,407 | 14,326 | 13,860 |
| 1976 | 15,231 | 14,911 | 14,870 | 14,553 |
| 1977 | 15,536 | 15,433 | 15,436 | 15,281 |
| 1978 | 15,847 | 15,974 | 16,022 | 16,045 |
| 1979 | 16,164 | 16,533 | 16,631 | 16,847 |
| 1980 | 16,487 | 17,111 | 17,263 | 17,689 |
| 1981 | 16,817 | 17,710 | 17,919 | 18,574 |
| 1982 | 17,153 | 18,330 | 18,600 | 19,502 |
| 1983 | 17,496 | 18,972 | 19,307 | 20,478 |
| 1984 | 17,846 | 19,636 | 20,040 | 21,501 |
| 1985 | 18,203 | 20,323 | 20,802 | 22,576 |

^aThe "likely" rate -- 5 percent in the Sahel, 3.5 percent elsewhere.

III. - Projected Livestock Distribution

The projected distribution of the Voltaic livestock herd in 1985 is shown in Table 3.9; it is compared with the herd distribution in 1969 and 1974-1975. The hectares per UBT in the Sahel are shown to remain above the ratio in 1969, due mainly to the failure of the Sahelian cattle herd to recover to pre-drought levels. This pasture availability is below the 13 ha per UBT suggested by IBRD (1975a, p. 6), however. The center region is projected to reach 6.2 ha per UBT, below the minimum requirement suggested by IBRD (7-8 ha per UBT) as well. The south region, at 7.9 ha, just reaches the minimum level of pasture per UBT. This indicates that further expansion of the Voltaic livestock herd may require improved range management practices to expand available pasture.

IV. - Fed Animal Production

Chapter Two dealt with the three technological aspects of developing the fed animal production sector. They were the availability of feeder stock from immature males and culled draft oxen, the availability of feed inputs from agricultural and agro-industrial by-products, and the infrastructure for industrialized fed-animal production. Chapter Two also considered the potential for peasant participation in small-scale feeding activities. The results were some very imprecise estimates of upper bounds for fed animal production. Any projections of fed cattle output for 1985 are problematic, depending significantly upon the economic variables (premium paid for high quality beef, transportation costs, feed input costs, etc.) and the success of the government at implementing projects which will contribute to production capacity (feedlot, feed processing and distribution). The most optimistic projections would suggest that fed cattle production will be constrained by the availability of feeder cattle, in the range of 10,000 head per year. More realistic estimates of productive capacity suggest that feedlots will not likely be able to produce more than 5-8,000 head of fattened cattle. It does appear that the necessary feed inputs could be sufficiently available for both industrial and small-scale feeding of the dimensions suggested in Chapter Two, provided the proper economic and technological conditions are met. Domestic prices must match export opportunities and the processing and distribution of the inputs must be improved.

It may not be too unrealistic to project an annual fed cattle production rate of between 5,000 and 10,000 head with a little more than half coming from feedlot operations. It is important to note that while this suggests a range of quality beef production of between 850 and 1,715 tons, the net addition to Voltaic beef production from fattening alone (not considering the quality improvement) would be only 292 to 585 tons annually. This represents only 0.9 to 1.9 percent of total projected annual beef production as estimated in Table 3.4. In 1978 prices, the value added from feeding operations in 1985 would be from 128 to 256 million CFA F.

TABLE 3.9
PROJECTED VOLTAIC LIVESTOCK HERD, 1985

| Region | Area ^a | Cattle ^b | Percent of all Cattle | Cattle Density ^c | Small Ruminants ^b | Percent of All Small Ruminants | Small Ruminant Density ^c | Hectare ^d per UBT ^d |
|---------------|-------------------|---------------------|-----------------------|-----------------------------|------------------------------|--------------------------------|-------------------------------------|---|
| Sahel | | | | | | | | |
| 1969 | 40 | 600 | 24.0 | 15.0 | 1,000 | 25.0 | 25.0 | 6.3 |
| 1974-75 | 40 | 408 | 16.1 | 10.2 | 800 | 20.0 | 20.0 | 9.0 |
| 1985 | 40 | 497 | 15.5 | 12.4 | 1,368 | 22.6 | 34.2 | 6.6 |
| Center | | | | | | | | |
| 1969 | 118 | 1,270 | 50.8 | 10.8 | 2,000 | 50.0 | 16.9 | 9.0 |
| 1974-75 | 118 | 1,402 | 55.2 | 11.9 | 2,130 | 53.3 | 18.1 | 8.2 |
| 1985 | 118 | 1,778 | 55.5 | 15.1 | 3,110 | 51.5 | 26.4 | 6.2 |
| South | | | | | | | | |
| 1969 | 116 | 630 | 25.2 | 5.4 | 1,000 | 25.0 | 8.6 | 17.7 |
| 1974-75 | 116 | 730 | 28.7 | 6.3 | 1,070 | 26.8 | 9.2 | 15.6 |
| 1985 | 116 | 926 | 28.9 | 8.0 | 1,562 | 25.9 | 13.5 | 11.9 |
| Total | | | | | | | | |
| 1969 | 274 | 2,500 | 100.0 | 9.1 | 4,000 | 100.0 | 14.6 | 10.5 |
| 1974-75 | 274 | 2,540 | 100.0 | 9.3 | 4,000 | 100.1 | 14.6 | 10.4 |
| 1985 | 274 | 3,201 | 99.9 | 11.7 | 6,040 | 100.0 | 22.0 | 7.9 |

^aIn km².

^bIn thousands of head.

^cNumber of head per km².

^dComputed on the basis of; cattle = .8 UBT per head; small ruminants = .15 UBT per head.

CHAPTER FOUR

THE LIVESTOCK MARKETING SYSTEM

This chapter investigates the domestic livestock marketing system in Upper Volta. Included are discussions of domestic livestock flows, existing market and transportation infrastructure, Voltaic livestock marketing policy, and recent trends in livestock prices. Livestock flows are discussed with regard to the major domestic markets, the numbers of market entries, and livestock imports. Market infrastructure includes a description of the existing facilities. Trek routes, the Régie de Chemin de Fer Abi-Jan-Niger (RAN), and the road system are described under transportation infrastructure. The section on marketing policy describes the recent history of Voltaic domestic policy and its expected future course. The final part of this chapter looks at the historical pattern of livestock market prices.

I. - Livestock Flows

This section begins by discussing the types of animals sold in the various production, consumption, and redistribution zones of the country. The pattern of livestock imports and transits into Upper Volta is shown, Voltaic livestock markets are classified according to function, and the history of market entries is presented. A regional analysis of livestock production and consumption concludes the section.

A. - Types of Animals Sold

Lower quality cattle are sold for consumption close to production zones; those of higher quality are usually exported. The weakest cattle, usually cull cows and sick or injured cattle, are sold for slaughter in bush markets. These cattle are too weak to make the long journey to domestic or export slaughter markets, so they are used to supply local meat demand. The average dressed carcass weight of these animals is 50-90 kg. In domestic urban markets average carcass weights are much higher -- 100 kg -- with some animals weighing up to 150-200 kg.

Exported cattle are even heavier on average, but the supply of high-quality animals is limited, as only one-third of Voltaic cattle have carcass weights of 110 kg or more (SCET International, 1972, pp. 39-49). The large cattle are better able to withstand the rigors of the journey to coastal markets and allow unit export and import taxes to be spread over greater carcassweights.

In bush markets small ruminants are often substituted for cattle for slaughter, since they yield smaller amounts of meat. Dressed carcass weights average 10 to 13 kg (SEDES,

1974, pp 53, 56); hence butchers are assured of less waste when slaughtering for a small market which does not have refrigerated storage capacity.

B - Imports and Transits

1) - Imports

Cattle imports and transits have been of declining importance in Voltaic livestock flows in recent years. Cattle imports are defined as cattle originating outside the country destined for final sale within Upper Volta. Mali has been the major source of official Voltaic cattle imports, as shown in Table 4.1. Niger was an important source of Voltaic cattle imports before 1966, but since that time the trade has reversed direction. Beginning in 1975, Voltaic traders have exported cattle to the market in Téra, Niger for shipment to Nigeria.

TABLE 4.1
RECORDED^a CATTLE IMPORTS INTO UPPER VOLTA, 1966-1976

| Year | Source | | Total |
|-------------------|--------|-------|--------|
| | Mali | Niger | |
| 1966 | 23,138 | -- | 23,138 |
| 1967 | 13,557 | -- | 13,557 |
| 1968 | b | b | 9,573 |
| 1969 | b | b | 7,319 |
| 1970 | 10,622 | -- | 10,622 |
| 1971 | 13,805 | -- | 13,805 |
| 1972 | 7,949 | 40 | 8,005 |
| 1973 | 154 | -- | 154 |
| 1974 | 1,257 | -- | 1,257 |
| 1975 | -- | -- | 0 |
| 1976 ^c | -- | -- | 0 |
| Total 1966-1976 | | | 87,430 |

SOURCES: Service de l'Élevage, Statistiques; SEDES, Recueil Statistique, 1975; and SCET International, 1972.

^aCattle recorded as paying Voltaic import taxes.

^bBreakdown by country unavailable.

^cImports no longer allowed beginning in 1976.

Drought reduced official imports in 1968-1969 and 1972-1973; the border conflict between Mali and Upper Volta in 1974-1975 shut them off entirely. However, there have been continuous clandestine imports of cattle entering Upper Volta to avoid paying taxes.

2) - Transits

Transits are those cattle originating outside Upper Volta which pass through the country on their way to coastal markets. Until 1976, when transits were made illegal in Upper Volta, traders paid a Voltaic transit tax of 500 CFA F per head in addition to export taxes in the country of origin. Table 4.2 shows the evolution of transits through Upper Volta from 1960 to 1975.

A decline in transits, which began in 1971, was due to a combination of factors: 1) rising import, export, and transit taxes; 2) the Mali-Upper Volta border conflict of 1974-1975; 3) payment problems and political turmoil in Ghana; and 4) the Sahelian drought. Because transits through Upper Volta were made illegal in 1976, official transits after that date are zero. Both before and after transits were made illegal, many cattle bound for coastal markets entered Upper Volta clandestinely to avoid taxes. When Voltaic transit fees were raised in 1974 many Malian traders changed the route they took to the coast. Instead of trekking their cattle through Upper Volta to Bobo-Dioulasso where they would board the RAN for Ivorian markets, they took a more indirect route entirely within Mali (via Koutiala or Sikasso) to the Ivorian border and then to rail terminals at Ouangolodougou and Ferkéssédougou. The costs and distances to Abidjan for these three embarkation points are summarized in Table 4.3. Now that transits are illegal, all cattle originating outside Upper Volta must either be trekked around Upper Volta or enter illegally.

Primary clandestine entry points for Malian cattle into Upper Volta identified by Hernan (1977, p. 114) are shown on Map 4.1:

- Northeast: Déou, Markoye, and Gorom-Gorom
- North-central: Djibo and Thiou
- Northwest: Barani, Djibasso, and N'Dorola

Net transits between Upper Volta and Niger reversed (more Voltaic cattle now transit through Niger) as a result of the above-mentioned factors, especially the problems in the Ghanaian cattle market, the increased Voltaic transit fee, and high Nigerien cattle prices due to the post-drought restocking program.

TABLE 4.2

EVOLUTION OF RECORDED TRANSIT CATTLE^a THROUGH UPPER VOLTA, 1960-1975

| Year | From Mali | | Total From Mali | From Niger | | Total From Niger | Total Transit Cattle |
|------|-----------------------|------------------------------|--------------------|-----------------------|------------------------------|---------------------|----------------------------|
| | To the Ivory Coast | To Ghana, Togo, and Benin | | To The Ivory Coast | To Ghana, Togo, and Benin | | |
| 1960 | 25,406 | 11,250 | 36,656 | -- | 3,844 | 3,844 | 40,500 |
| 1965 | 19,621 | 30,313 | 49,934 | -- | 6,702 | 6,702 | 56,636 |
| 1966 | 63,421 | 37,047 | 100,468 | -- | 18,868 | 18,868 | 119,336 ^c |
| 1967 | b | b | b | b | b | b | 36,220 |
| 1968 | b | b | b | b | b | b | 48,272 |
| 1969 | b | b | b | b | b | b | 60,974 |
| 1970 | 13,096 | 35,062 | 48,158 | -- | 12,787 | 12,787 | 60,945 |
| 1971 | 17,857 | 36,219 | 54,076 | 6,453 | 10,335 | 16,788 | 70,864 |
| 1972 | 16,013 | 24,665 | 40,678 | -- | 7,492 | 7,492 | 48,170 |
| 1973 | 24,580 | 11,450 | 36,030 | 182 | 15,450 | 15,632 | 51,662 |
| 1974 | 5,690 | 10,685 | 16,375 | -- | 14,000 | 14,000 | 30,375 |
| 1975 | 3,702 | -- | 3,702 | 100 | 2,870 | 2,970 | 6,672 |

SOURCES: Service de l'Élevage, Statistiques; SEDES, Recueil Statistique, 1975; and SCET International, 1972.

^aCattle for which export taxes were paid in country of origin and transit tax was paid in Upper Volta.

^bBreakdown according to country unavailable.

^cThis figure, which seems abnormally high, was taken from SEDES, Recueil Statistique.

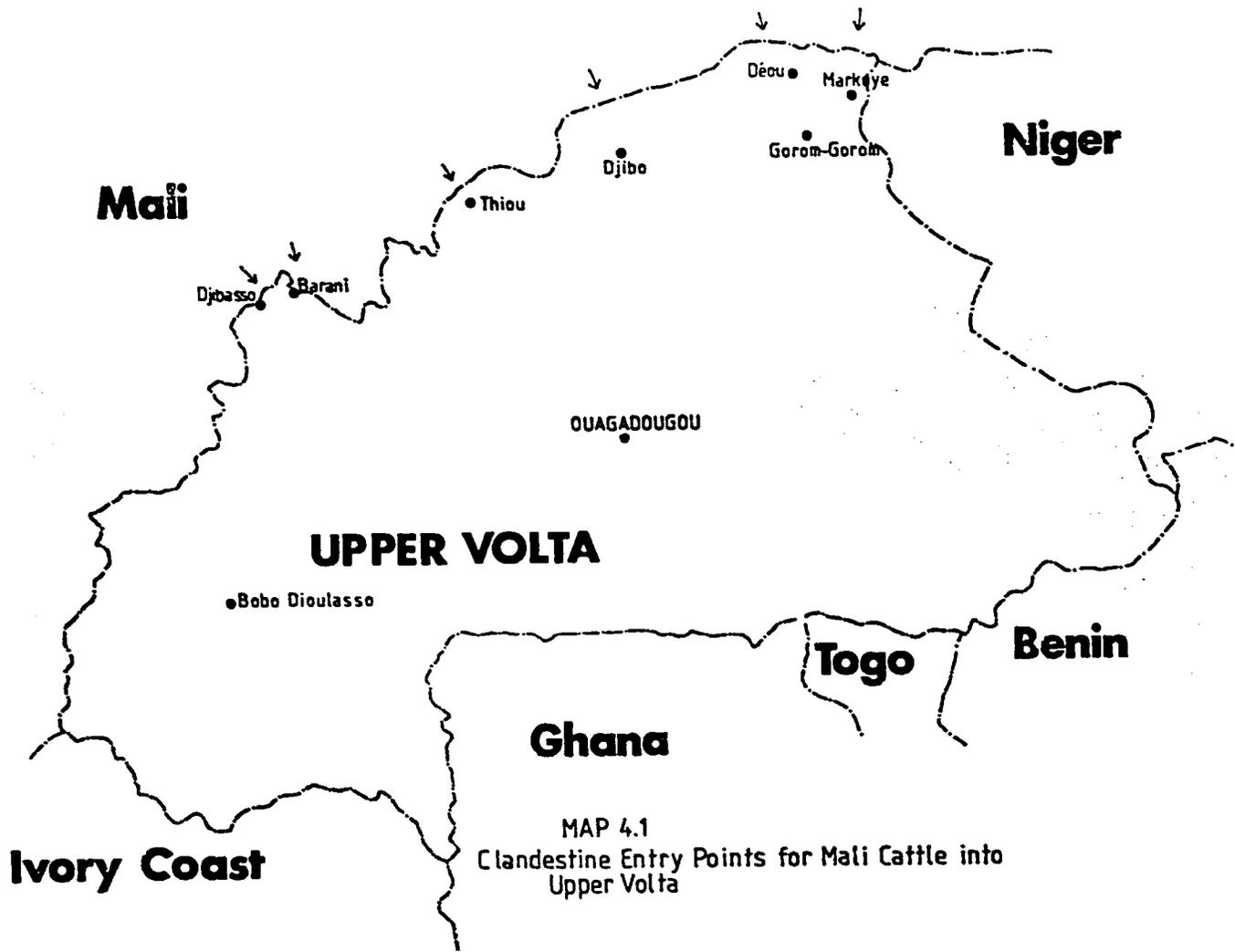


TABLE 4.3
RAIL TRANSPORT COSTS TO ABIDJAN FROM THREE RAN EMBARKATION POINTS

| | Bobo-Dioulasso | Ouangolodougou | Ferkéssédougou |
|-------------|----------------|----------------|----------------|
| Kilometers | 806 | 616 | 560 |
| CFA/head | 2,843 | 2,472 | 2,235 |
| CFA/head/km | 3.53 | 4.01 | 3.99 |

C. - Description of Markets and Cattle Flows

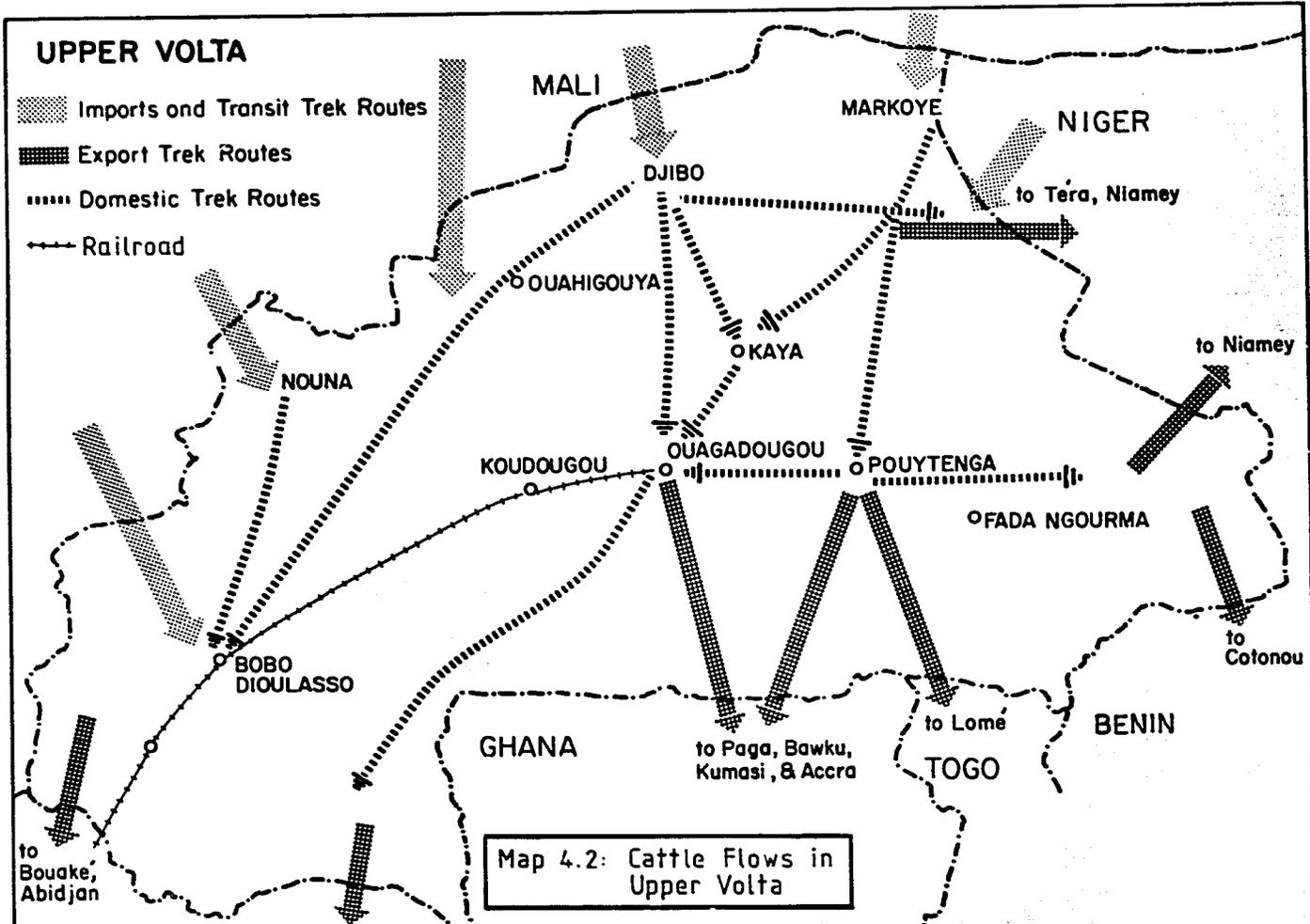
Within Upper Volta commercial cattle flows come from the northern regions going to the east, south-central, and southwest. The flows come from the production zones of the north and from transits originating in Mali and Niger. The cattle are destined for the domestic urban markets of Ouagadougou and Bobo-Dioulasso and also for export to coastal countries (Map 4.2). The directions of these flows determine in large part the geographic distribution of markets in Upper Volta.

Herman (1979) developed the following scheme for categorizing cattle markets both geographically and functionally:

- Collection markets -- Markets mostly in the northern zone where cattle first enter the marketing system.
 - a. Sellers -- primarily herders.
 - b. Buyers -- herders for stock replacement and traders forming herds to trek southward.
 - c. Local slaughter -- local butchers play only a small role.
- Redistribution markets -- Markets located mainly in the south where traders forming herds dominate.
 - a. Sellers -- almost all traders.
 - b. Buyers -- other traders assembling herds to take to terminal markets.
 - c. Local slaughter -- more sales for local consumption than in collection markets.
- Terminal markets -- Located in urban areas with most sales for local slaughter and consumption.
 - a. Sellers -- cattle traders.
 - b. Buyers -- local butchers.
 - c. Local slaughter -- almost all sales for local slaughter.

Map 4.3 shows the location of the voltaic markets classified according to this scheme.

- Collection markets: Nouna, Thiou, Djibo, Déou, Markoye, Gorom-Gorom, Dori and Seytenga



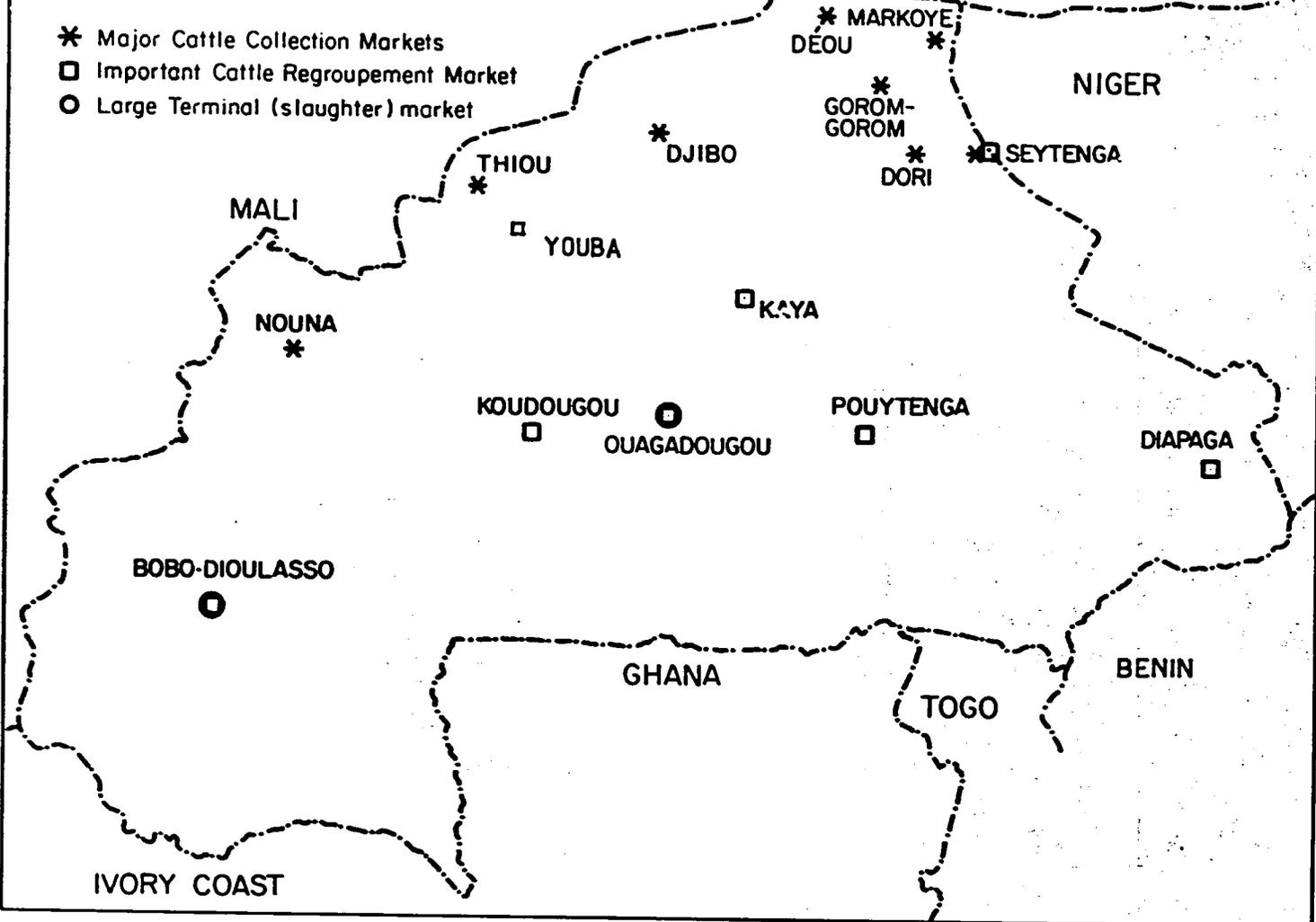
UPPER VOLTA

-  Imports and Transit Trek Routes
-  Export Trek Routes
-  Domestic Trek Routes
-  Railroad

Map 4.2: Cattle Flows in Upper Volta

MAP 4.3 UPPER VOLTA: MAJOR CATTLE MARKETS

- * Major Cattle Collection Markets
- Important Cattle Regroupement Market
- Large Terminal (slaughter) market



-- Redistribution markets: Koudougou, Kaya, Seytenga, Pouytenga, Diapaga, Ouagadougou, and Bobo-Dioulasso

-- Terminal markets: Ouagadougou and Bobo-Dioulasso

Seytenga is included both as a collection and redistribution market because it is in the production zone where cattle are first brought into the marketing system and because it serves as a place for herd formation for sales in Niger and Nigeria. Ouagadougou and Bobo-Dioulasso serve as redistribution points for cattle being shipped to coastal markets (especially for those going by train) and also are the two major slaughter markets in Upper Volta. The division of sales between these functions is about 50-50, hence they are classified as both redistribution and terminal markets.

Figure 4.1 shows the kinds of cattle which typically pass through the various markets. In general, weaker cattle are slaughtered closer to production zones; young cattle are sold to other herders or for animal traction. The stronger, mature cattle pass farther along through the system, and the strongest end up exported to coastal markets.

D. - Market Entries

Table 4.4 shows the recorded number of cattle offered for sale in selected markets of each type for 1967-1977. Total recorded entries peaked in 1972. Herman (1979) offers the following explanations for the recent decline:

- fall in offtake due to the 1972-1973 drought, particularly in the northeastern part of Upper Volta
- legal restriction of Malian and Nigerien transits.

Herman also notes that in 1976 and 1977 Seytenga became a major redistribution market for cattle destined for Niger and Nigeria. Subsequently this trade moved to Téra and Gothèye, Niger. In addition, Herman noted an increase in unrecorded activity in small southern collection markets, near major redistribution markets, as southern cattle ownership has grown.

Table 4.5 lists the forty-nine most important livestock markets in Upper Volta in 1969. The markets are ranked according to the number of cattle and small ruminants sold for other than local slaughter. The top ten to twelve markets are mainly those classified as redistribution markets; the rest are collection markets.

E. - Regional Production and Consumption

Table 4.6 and Map 4.4 show an estimate of Voltaic meat production and consumption by region in 1969. Production for each ORD was estimated using herd sizes and offtake rates and converting to meat equivalents; consumption was estimated by weighting rural

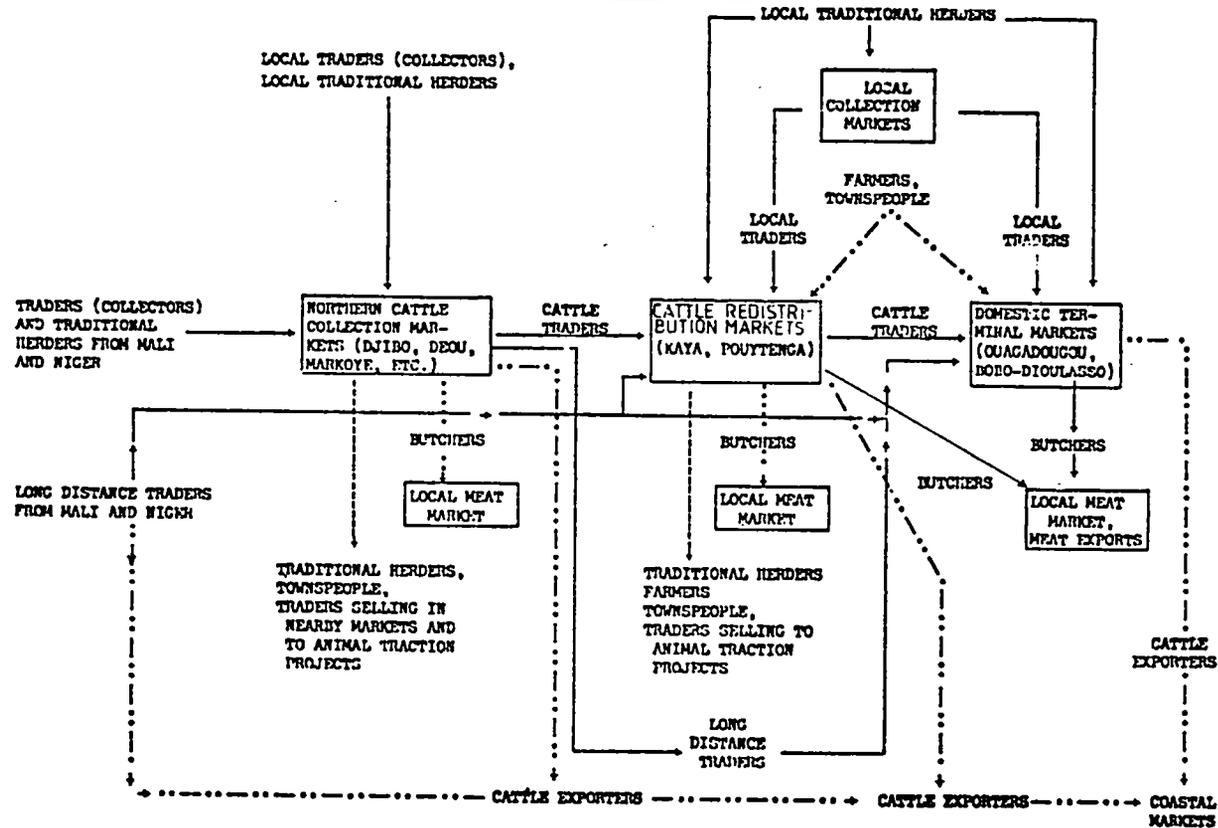
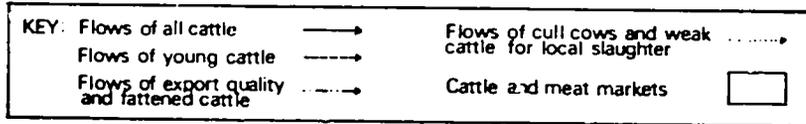


FIGURE 4.1 Organization of Cattle Marketing in Upper Volta

TABLE 4.4

NUMBER OF CATTLE OFFERED FOR SALE ANNUALLY IN SELECTED VOLTAIC MARKETS, 1967-1977

| Market | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
|-----------------------------|--|--------|---------|--------|---------|---------|---------|---------|---------|--------------------|---------|
| | <u>COLLECTION MARKETS</u> | | | | | | | | | | |
| Djibo | na | na | 4,000 | 13,328 | 13,197 | 15,210 | 9,787 | 6,949 | 9,403 | 6,700 ^b | 20,096 |
| Dori | 9,888 | 6,314 | 7,150 | 2,225 | 7,595 | 4,629 | 3,658 | 3,762 | 4,086 | 3,298 | 3,352 |
| Markoye | 47,241 | 28,664 | 22,770 | 21,467 | 24,354 | 23,935 | 18,579 | 13,359 | 6,387 | 5,262 | 7,152 |
| | <u>REDISTRIBUTION MARKETS</u> | | | | | | | | | | |
| Diapaga | 6,085 | 6,350 | 4,374 | 688 | 2,888 | 2,570 | 6,193 | 29 | 110 | 583 | 1,071 |
| Kaya | 27,199 | 32,111 | 24,482 | 31,922 | 33,794 | 39,102 | 33,973 | 21,181 | 14,950 | 16,832 | 21,123 |
| Pouytenga | 22,013 | 26,420 | 18,508 | 27,042 | 28,327 | 25,779 | 27,589 | 22,440 | 24,175 | 47,508 | 21,144 |
| Youba | 3,725 | 6,427 | 4,587 | 8,347 | 5,530 | 4,252 | 4,383 | 6,065 | 2,808 | 6,030 | 11,897 |
| | <u>TERMINAL MARKETS</u> | | | | | | | | | | |
| Bobo-Dioulasso ^a | 11,567 | 18,716 | 15,000 | 28,614 | 26,867 | 21,372 | 6,177 | 9,782 | n.a. | n.a. | n.a. |
| Ouagadougou | 30,480 | 32,160 | 26,207 | 28,026 | 31,078 | 43,537 | 40,364 | 35,490 | 25,278 | n.a. | n.a. |
| | <u>TOTAL OFFICIALLY RECORDED ENTRIES</u> | | | | | | | | | | |
| | | | 201,053 | | 285,703 | 290,666 | 271,809 | 181,072 | 159,971 | 215,236 | 180,620 |

SOURCE: Statistiques, Service de l'Elevage, Ouagadougou.

^aThe figures for Bobo-Dioulasso appear to be for only one of the two markets there. A shift in sales to the unrecorded market is likely to have occurred.

^bThe figure appearing in the official statistics was 47,508. This was assumed to be an error. Herman's market survey in Djibo counted only 4,467 head offered for sale from May through December. The figure appearing is Herman's estimate for 1976.

TABLE 4.5

FORTY-NINE LARGEST LIVESTOCK MARKETS, UPPER VOLTA
1969, Ranked by Order of Importance

| Market | Number of Head Sold Annually Except for Local Slaughter | |
|-------------------|--|--------------------|
| | Cattle | Small Ruminants |
| 1. Ouagadougou | 26,000 | 50,000 |
| 2. Pouytenga | 18,000 | 50,000 |
| 3. Markoye | 20,000 | 20,000 |
| 4. Kaya | 16,000 | 17,000 |
| 5. Bobo-Dioulasso | 15,000 | 8,000 |
| 6. Seytenga | 9,000 | 18,000 |
| 7. Gorom-Gorom | 7,000 | 14,000 |
| 8. Youba | 7,000 | 10,000 |
| 9. Tougan | 4,500 | 17,000 |
| 10. Diapaga | 4,000 | 15,000 |
| 11. Nouna | 4,500 | 4,000 |
| 12. Djibo | 4,000 | 2,000 |
| 13. Dori | 2,500 | 20,000 |
| 14. Garango | 2,500 | 10,000 |
| 15. Sikire | 1,500 | 20,000 |
| 16. Zorgho | 3,000 | 3,500 ^a |
| 17. Orodora | 3,500 | neg. ^a |
| 18. Aribinda | 1,500 | 18,000 |
| 19. Kongoussi | 2,000 | 6,000 |
| 20. Thiou | 2,000 ^a | 4,000 |
| 21. Ouargaye | neg. ^a | 20,000 |
| 22. Namounou | neg. ^a | 13,000 |
| 23. N'Dorola | 1,500 | 2,000 |
| 24. Petegoli | 1,000 | 3,000 |
| 25. Pô | 1,000 | 2,500 |
| 26. Bougue | 1,000 | 2,000 |
| 27. Bousse | 500 | 5,000 ^a |
| 28. Dedougou | 1,000 | neg. ^a |
| 29. Safane | 1,000 | neg. ^a |
| 30. Manga | 500 | 4,000 |
| 31. Bilanga | 500 | 3,000 |
| 32. Sebba | 500 | 3,000 |
| 33. Yako | 500 | 2,500 |
| 34. Sequenega | 500 | 2,000 ^a |
| 35. Botou | 500 | neg. ^a |
| 36. Leo | 500 | neg. ^a |
| 37. Lamdamaole | neg. ^a | 7,000 |
| 38. Bani | neg. ^a | 7,000 |
| 39. Tenkodogo | neg. ^a | 6,000 |
| 40. Zarre | neg. ^a | 6,000 |
| 41. Koupela | neg. ^a | 5,500 |
| 42. Guidire | neg. ^a | 5,000 |
| 43. Banfora | neg. ^a | 5,000 |
| 44. Kombissiri | neg. ^a | 5,000 |
| 45. Tougouri | neg. ^a | 4,000 |
| 46. Barsalogo | neg. ^a | 3,000 |
| 47. Gangaol | neg. ^a | 3,000 |
| 48. Bokin | neg. ^a | 2,500 |
| 49. So | neg. ^a | 2,000 |

SOURCE: SCET International, 1972, pp. 131-132.

^a Negligible numbers.

TABLE 4.6
 VOLTAIC MEAT PRODUCTION, CONSUMPTION, AND SURPLUS
 by ORD, 1969 (estimated)

| ORD | BEEF | | | | | GOAT AND MUTTON | | | | | Total Surplus |
|-------------------|-------------------------|---------|--------------------------|---------|---------|-------------------------|---------|--------------------------|---------|---------|---------------|
| | Production ^a | | Consumption ^b | | Surplus | Production ^c | | Consumption ^d | | Surplus | |
| | Tons | Percent | Tons | Percent | Tons | Tons | Percent | Tons | Percent | Tons | |
| Sahel | 7,000 | 25.0 | 800 | 3.7 | +6,200 | 3,260 | 22.5 | 620 | 5.1 | +2,640 | +8,840 |
| Yatenya | 1,750 | 6.3 | 1,750 | 8.1 | 0 | 1,090 | 7.5 | 1,275 | 10.5 | - 185 | - 185 |
| Kaya | 3,300 | 11.8 | 1,920 | 8.9 | +1,380 | 2,355 | 16.2 | 1,430 | 11.7 | + 925 | +2,305 |
| Ouagadougou | 2,550 | 9.1 | 5,650 | 26.3 | -3,100 | 1,090 | 7.5 | 2,230 | 18.3 | -1,140 | -4,240 |
| Fada N'Gourma | 3,200 | 11.4 | 900 | 4.2 | +2,300 | 1,270 | 8.8 | 670 | 5.5 | + 600 | +2,900 |
| Koupêla | 1,150 | 4.1 | 870 | 4.0 | + 280 | 360 | 2.5 | 650 | 5.3 | - 290 | - 10 |
| Koudougou | 1,980 | 7.1 | 2,500 | 11.6 | - 520 | 905 | 6.2 | 1,220 | 14.9 | - 915 | -1,435 |
| Volta Noire | 3,640 | 13.0 | 1,580 | 7.3 | +2,060 | 1,450 | 10.0 | 1,150 | 9.4 | + 300 | +2,360 |
| Bobo-Dioulasso | 1,830 | 6.5 | 3,650 | 17.0 | -1,820 | 1,270 | 8.8 | 960 | 7.9 | + 310 | -1,510 |
| Gaoua-Diebougou | 720 | 2.6 | 1,180 | 5.5 | - 460 | 725 | 5.0 | 880 | 7.2 | - 155 | - 615 |
| Banfoni | 880 | 3.1 | 700 | 3.3 | + 180 | 725 | 5.0 | 515 | 4.2 | + 210 | + 390 |
| Total Upper Volta | 28,000 | 100.0 | 21,500 | 99.9 | 6,500 | 14,500 | 100.0 | 12,200 | 100.0 | +2,300 | +8,800 |

SOURCE: SCET International, 1972.

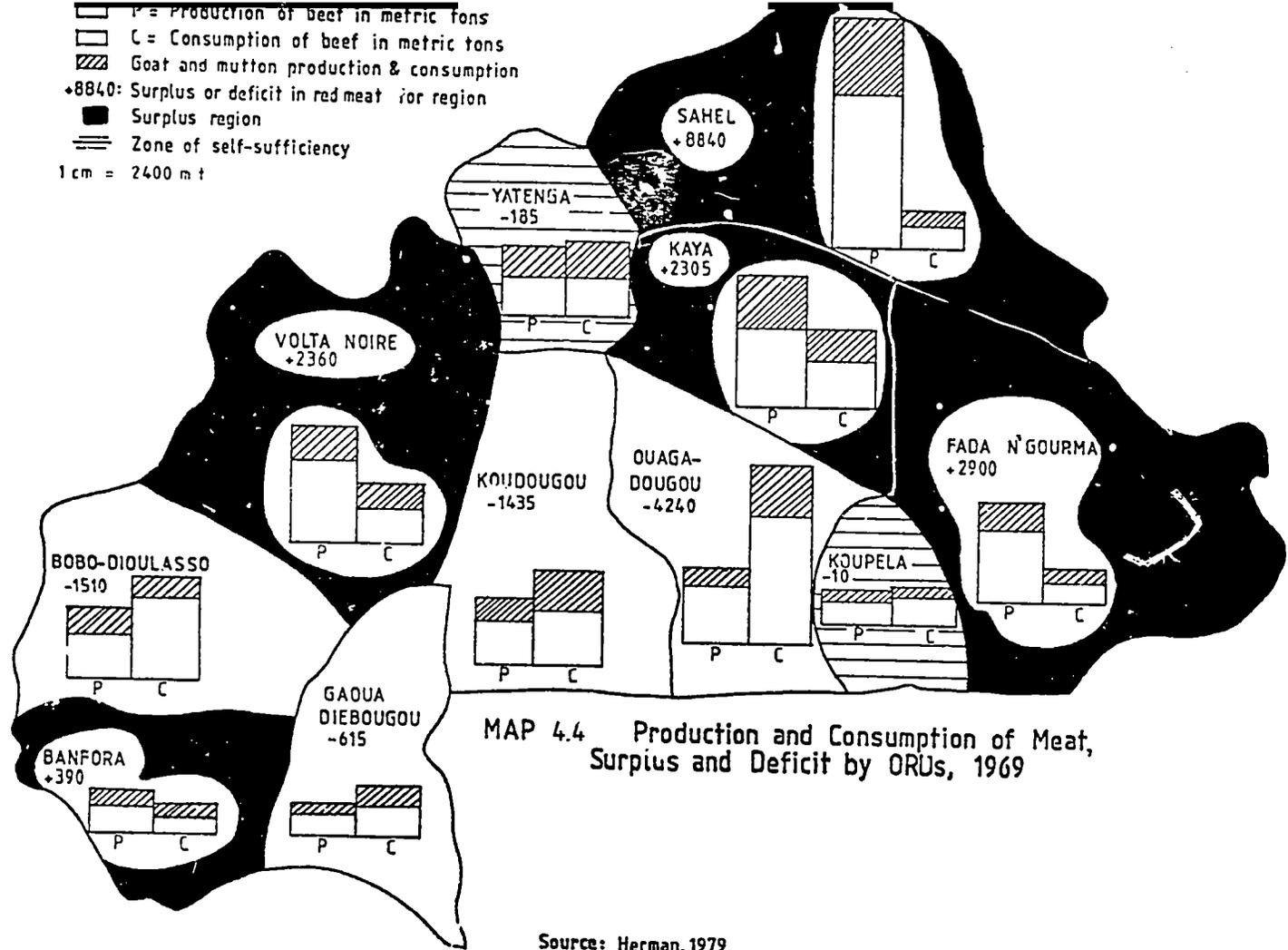
^aProduction based on herd population and production per head.

^bCalculated as follows: 3.3 kg per capita in rural areas; 29.5 kg per capita in urban centers.

^cProduction based on herd population and 3.625 kg meat production per head.

^d2.5 kg per capita.

P = Production of beef in metric tons
 C = Consumption of beef in metric tons
 Goat and mutton production & consumption
 +8840: Surplus or deficit in red meat for region
 Surplus region
 Zone of self-sufficiency
 1 cm = 2400 mt



MAP 4.4 Production and Consumption of Meat, Surplus and Deficit by ORUs, 1969

Source: Herman, 1979

and urban per capita meat consumption; the difference between production and consumption is the net surplus. The figure for urban per capita consumption, which is drawn from SCET International (1972), appears to be unrealistically high but is the only one available.

As shown by the dark portions of Map 4.4, the northern and northeastern parts of the country produce surplus meat, whereas the south-central and southwestern parts are net deficit areas. The Sahel, Kaya, Volta Noire, and Fada N'Gourma ORDs produced 61.2 percent of the country's beef and 57.5 percent of its small ruminant meat in 1969. Beef consumption in these ORDs was only 24.1 percent of the Voltaic total and their small ruminant meat consumption 31.7 percent. Conversely, the Ouagadougou, Bobo-Dioulasso, and Koudougou ORDs accounted for over one-half of total beef consumption but less than one-quarter of production. The surplus of production over consumption in the Sahel ORD alone was enough to account for over 95 percent of Upper Volta's beef surplus and all of its small ruminant meat surplus. Since these estimates come from the pre-drought year of 1969, it is likely that the northeastern part of Upper Volta is no longer so dominant in producing the domestic meat surplus, but the relative positions of the ORDs probably remain the same today. The flow of red meat from north-northeast to south-southwest for domestic consumption, as well as for export, continues to hold.

The disposition of the total domestic meat supply in 1969 is shown in Table 4.7. Beef accounted for half of total domestic meat consumption and with other red meats accounted for 81.8 percent of the total. Beef made up an even higher percentage of meat available for export, 61.2 percent. Nearly all of the pork produced was consumed domestically.

II. - Slaughter and Transport Infrastructure

A. - Slaughter

Slaughter infrastructure varies from almost nothing in small, rural markets to refrigerated abattoirs in Ouagadougou and Bobo-Dioulasso. In bush markets, because there is little equipment, slaughters are done on the ground. Government veterinary inspectors visit these markets infrequently. The Voltaic Livestock Service manages a system of local slaughterhouses in the medium-sized towns and markets throughout the country. The large abattoirs in the two major cities are relatively modern, have regular veterinary inspections and refrigeration capacity, allowing the export of chilled meat.

1) - Local Slaughterhouses

Each local slaughterhouse is managed by an agent of the Livestock Service. The agent is responsible for meat inspection, slaughterhouse operation, and collection of local

TABLE 4.7

NATIONAL MEAT SUPPLY AND DISPOSITION IN 1969-70 (ESTIMATED)
(In Metric Tons and Percents of Totals)

| Type of Meat | National ^a Production (Percent) | Imports ^b | Total Disposable Meat (Percent) | Domestic Consumption (Percent) | Available for Exports (Percent) |
|-----------------|--|----------------------|---------------------------------------|--------------------------------------|---------------------------------------|
| Beef | 28,000 (51.4) | 4,000 | 32,000 (53.3) | 21,500 (50.1) | 10,500 (61.2) |
| Goat and Mutton | 14,500 (26.6) | 1,500 | 16,000 (26.6) | 17,200 (28.4) | 3,800 (22.3) |
| Pork | 3,000 (5.5) | - | 3,000 (5.0) | 2,850 (6.6) | 150 (0.9) |
| Other Red Meat | 1,500 (2.8) | - | 1,500 (2.5) | 1,400 (3.3) | 100 (0.6) |
| Poultry | 7,500 (13.8) | - | 7,500 (12.5) | 5,000 (11.6) | 2,500 (14.7) |
| TOTAL | 54,500 | 5,500 | 60,000 | 42,950 | 17,050 |

SOURCE: SCET Internacional, 1972.

^a Production figures are calculated from the following data:

| | Offtake (Percent) | Herd Size | Average Carcass Weight |
|---------|----------------------|-------------|---------------------------|
| Cattle | 11.8 | 2.5 million | 95 kg |
| Sheep | 25.0 | 1.6 million | 13 |
| Goats | 35.0 | 2.5 million | 11 |
| Swine | 50.0 | 150,000 | 40 |
| Camels | 7.0 | 5.0 million | 150 |
| Horses | 9.0 | 70,000 | 125 |
| Donkeys | 7.0 | 200,000 | 50 |

^b Import figures are calculated from the following data:

| | Number of Head | Average Carcass Weight |
|-----------------|-------------------|---------------------------|
| Cattle | 31,000 | 130.0 kg |
| Small Ruminants | 110,000 | 13.5 kg |

slaughter taxes. The buildings are covered cement slabs, some containing railings and carcass hooks. Animals are slaughtered on the floor, then hung up for inspection. Scales are never used, even when available.

2) - Bobo-Dioulasso Slaughterhouse

The Bobo-Dioulasso slaughterhouse was built in 1961 at a cost of 30 million CFA F, with an annual capacity of 2,500 tons. It has three main slaughtering rooms for cattle and one for small ruminants, a scale for weighing live cattle in the access passage, two 1,200-kg capacity winches in the slaughter room, five winches in the carcass-dressing area (1,200 kg capacity each), a sanitation laboratory, a small weighing room for carcasses up to 500 kg, a small room for keeping spoiled meat awaiting incineration, an incinerator, cold rooms, a slaughter room for swine, a holding pen for swine, and an elevator for raising meat to the slaughterhouse loading dock one floor above the slaughter level.

The slaughterhouse is open daily, year round. Twenty people are regularly employed at the slaughterhouse, including five meat inspectors, five administrators, and manual laborers.

Herman (1979) describes the operation of the Bobo-Dioulasso abattoir as follows:

Cattle are delivered to the slaughterhouse in the evening and butchers return in the early morning to slaughter . . . animals are slaughtered on the floor and the carcasses are later lifted up by means of a hand winch or, more often, simply raised up by the apprentices. Working conditions are crowded and sanitation is poor; hot water is not available for cleaning up the slaughter floor. The carcasses are moved toward a hanging scale where the weight is recorded and the tax assessed; the carcasses are then inspected by veterinary agents and delivered to markets in the city by a municipal truck.

Herman also reports that the live-animal scale is not used and the elevator and refrigeration rooms do not work well. Meat exports are trucked to the main railway station, four km away, where they are loaded onto trains.

As part of the IBRD Western Upper Volta Livestock Development Project the Bobo-Dioulasso slaughterhouse was to be renovated in 1978 in order to improve sanitation, modernize its operation, and raise its capacity to 5,500 tons annually.

The output of the slaughterhouse in selected years from 1966 to 1976 is shown in Table 4.8. The 2,500-ton capacity of the slaughterhouse was approached most closely (88.2 percent) in 1971. Meat exports dropped from 28.2 percent of 1971 slaughters to 6.7 percent of 1973 slaughters.

TABLE 4.8
OUTPUT OF THE
BOBO-DIOULASSO SLAUGHTERHOUSE, 1966-1976

| Number Slaughtered | | | | | | | |
|--------------------|--------|---------------------|-------|-------|--------|---------|--------|
| Year | Cattle | Sheep | Goats | Swine | Horses | Donkeys | Camels |
| 1966 | 17,480 | 20,747 ^a | | b | b | b | b |
| 1971 | 20,097 | 7,561 | 2,748 | 2,762 | 459 | 1 | 1 |
| 1972 | 19,401 | 4,686 | 3,316 | 1,641 | 509 | 1 | 3 |
| 1973 | 20,215 | 2,657 | 3,631 | 705 | 512 | 31 | 2 |
| 1976 | 20,503 | 11,492 ^a | | b | b | b | b |

TONS OF MEAT^c

| Year | Beef | Sheep | Goat | Pork | Horses | Donkeys | Camels | Total |
|------|-------|------------------|------|------|--------|---------|--------|--------------------|
| 1966 | 1,661 | 239 ^a | | b | b | b | b | 2,178 ^d |
| 1971 | 1,909 | 98 | 30 | 110 | 57 | neg. | neg. | 2,204 |
| 1972 | 1,843 | 61 | 36 | 66 | 64 | neg. | neg. | 2,070 |
| 1973 | 1,920 | 35 | 40 | 28 | 64 | 2 | neg. | 2,089 |
| 1976 | 1,948 | 132 ^a | | b | b | b | b | 2,131 |

MEAT EXPORTS (kg)

| Year | Beef | Sheep | Goat | Pork | Horse | Total | Offals |
|------|---------|--------|-------|--------|--------|---------|--------|
| 1971 | 414,191 | 85,153 | 9,860 | 76,113 | 36,833 | 622,150 | 3,079 |
| 1972 | 277,913 | 38,596 | 8,343 | 42,982 | 30,905 | 398,739 | ----- |
| 1973 | 112,026 | 6,215 | 1,016 | 3,478 | 16,976 | 139,711 | ----- |

SOURCE: Service de l'Elevage.

^aSeparate for sheep and goats not available. The number shown is for sheep and goats combined.

^bSlaughters of swine, horses, donkeys, and camels not available.

^cThe following schedule is used:

| | |
|-----------------|------------|
| Cattle | 95 kg/head |
| Sheep | 13 |
| Goats | 11 |
| Sheep and Goats | 11.5 |
| Swine | 40 |
| Horses | 125 |
| Donkeys | 50 |
| Camels | 150 |

^dIncludes an estimate of tonnage of pork and horse, donkey, and camel meat.

3) - Ouagadougou Slaughterhouse

The Ouagadougou slaughterhouse was built in 1974 and opened in August 1975. Its construction, financed by FED and assisted by Italy, cost 600 million CFA F. It is located seven km from the center of Ouagadougou. There are four slaughter lines: two for large animals and one each for small ruminants and swine. Pork production is kept separate from the other operations because of Moslem beliefs regarding pork. The slaughter lines are mechanized and must be run by skilled operators. Other equipment includes hanging scales, an incinerator, a deep freeze, nine cold-storage rooms, a rendering facility, and a blood collection setup. The plant slaughter capacity is 13,000 tons per year. Cold-storage capacity is 40 tons. The public agency Abattoir Frigorifique de Ouagadougou manages the slaughterhouse, with ultimate control in the hands of ONERA and the Banque Nationale de Développement. Ninety workers are actually employed on the slaughter lines, while twenty additional people are employed as veterinary inspectors and administrators.

The output of the new Ouagadougou slaughterhouse and its antecedents for selected years from 1959 to 1976 is shown in Table 4.9. In 1976 only 31.5 percent of the slaughterhouse capacity was used. Meat exports from the slaughterhouse have been below government expectations. Currently, the slaughterhouse's main function is to prepare carcasses for local butchers; however it is planned that one day it will purchase animals and export meat on its own.

4) - Market Construction

Table 4.10 summarizes the state of new market construction in Upper Volta, as of the end of 1978.

B. - Transport

There are three methods used to transport livestock and meat in Upper Volta: on the hoof, by rail, and by truck. Most cattle are walked to domestic markets, those exported to Ivory Coast go mainly by train, and a few are shipped by truck. Meat is shipped in refrigerated rail cars to Ivory Coast. Small ruminants are usually trekked, sometimes are trucked, and often go as cargo on bush taxis.

1) - Trek Routes

Most cattle in Upper Volta are moved to market on hoof. There is little alternative to trekking cattle from production zones to redistribution markets. Thus, trek routes are an important part of Voltaic cattle transport infrastructure.

TABLE 4.9
OUTPUT OF THE OUAGADOUGOU SLAUGHTERHOUSE, 1959-1976

| Year | NUMBER SLAUGHTERED | | | | | | |
|------|--------------------|----------------------|--------|-------|--------|---------|--------|
| | Cattle | Sheep | Goats | Swine | Horses | Donkeys | Camels |
| 1959 | 10,086 | 4,547 | 6,924 | 657 | 93 | 7 | -- |
| 1966 | 22,890 | 3,325 | 16,881 | 1,036 | 210 | - | -- |
| 1971 | 25,884 | 7,169 | 15,546 | 609 | 241 | - | 181 |
| 1973 | 22,412 | 5,605 | 26,853 | 346 | 167 | - | 153 |
| 1976 | 22,352 | 115,060 ^a | | b | b | b | b |

| Year | TONS OF MEAT ^c | | | | | | | |
|------|---------------------------|------------------|------|------|-------|--------|-------|--------------------|
| | Beef | Sheep | Goat | Pork | Horse | Donkey | Camel | Total |
| 1959 | 958 | 59 | 76 | 26 | 12 | neg. | 0 | 1,131 |
| 1966 | 2,175 | 43 | 186 | 41 | 26 | 0 | 0 | 2,471 |
| 1971 | 2,459 | 93 | 171 | 24 | 30 | 0 | 27 | 2,804 |
| 1972 | 1,908 | 79 | 226 | 16 | 25 | 0 | 27 | 2,281 |
| 1973 | 2,129 | 73 | 295 | 14 | 21 | 0 | 23 | 2,555 ^d |
| 1976 | 2,123 | 333 ^a | | b | b | b | b | 4,094 ^d |

| Year | MEAT EXPORTS (kg) | | | | | | |
|------|-------------------|--------|-------|--------|--------|---------|--------|
| | Beef | Sheep | Goat | Pork | Horse | Total | Offals |
| 1971 | 661,202 | 40,577 | 4,312 | 8,874 | 25,460 | 740,725 | 8,670 |
| 1972 | 473,117 | 46,737 | 4,415 | 11,288 | 22,616 | 558,173 | 6,755 |
| 1973 | 609,349 | 36,019 | 7,429 | 10,730 | 6,509 | 670,036 | 44,629 |

SOURCE: Service de l'Elevage.

^aSeparate data for sheep and goats not available. The number shown is for sheep and goats combined.

^bSlaughters of swine, horses, donkeys, and camels not available.

^cThe following schedule is used:

| | |
|-----------------|------------|
| Cattle | 95 kg/head |
| Sheep | 13 |
| Goats | 11 |
| Sheep and Goats | 11.5 |
| Swine | 40 |
| Horses | 125 |
| Donkeys | 50 |
| Camels | 150 |

^dIncludes an estimate of tonnage of pork and horse, donkey, and camel meat.

TABLE 4.10
LIVESTOCK MARKET CONSTRUCTION^a

| Market | Progress of Construction ^b | Financing | Operation |
|----------------|---------------------------------------|-----------|----------------------|
| Po | Completed | FAC | Not in operation |
| Kaya | Completed | FAC | Operating |
| Pauyterga | Completed | FAC | Operating |
| Markoye | In progress | FAC | Not in operation |
| Bobo-Dioulasso | In progress | IBRD | Not in operation |
| Ouagadougou | Completed | FED | Operated by abattoir |
| Gorom-Gorom | Under study | None | Not in operation |

SOURCE: Club du Sahel Animal Husbandry Team, "Report on the Commercialisation Policies of the Sahelian Countries," 1978, p.5, November, 1978.

^aMarket equipment, such as scales, has been financed by CEAO and CEBV.

^bAs of November 1978.

Trekking cattle are moved an average of fifteen to thirty km per day, depending on the total distance to be travelled. The maximum daily trek distance is about forty-five km. The major concerns of drovers are finding a quick route to the destination and adequate water and pasture for the herd along the way. The major disadvantages of trekking are the time it takes to travel to market (slow turnaround of the owner's capital)¹ and the conflicts which result from the damage done by herds to farmers' fields along the way.

The demarcation of trek routes by the government is an attempt to reduce the conflicts between farmers and herders. Trek routes marked by concrete pylons have been established to give herders a right of way along a corridor from the northeast to the central south. However, these marked trek routes receive only limited use by drovers. The drovers find water and pasture along the routes to be inadequate; therefore, they continue to follow what they consider better paths. Only the shortest of the marked routes, such as the 105-km Kaya-Ouagadougou trail, are regularly employed by drovers.²

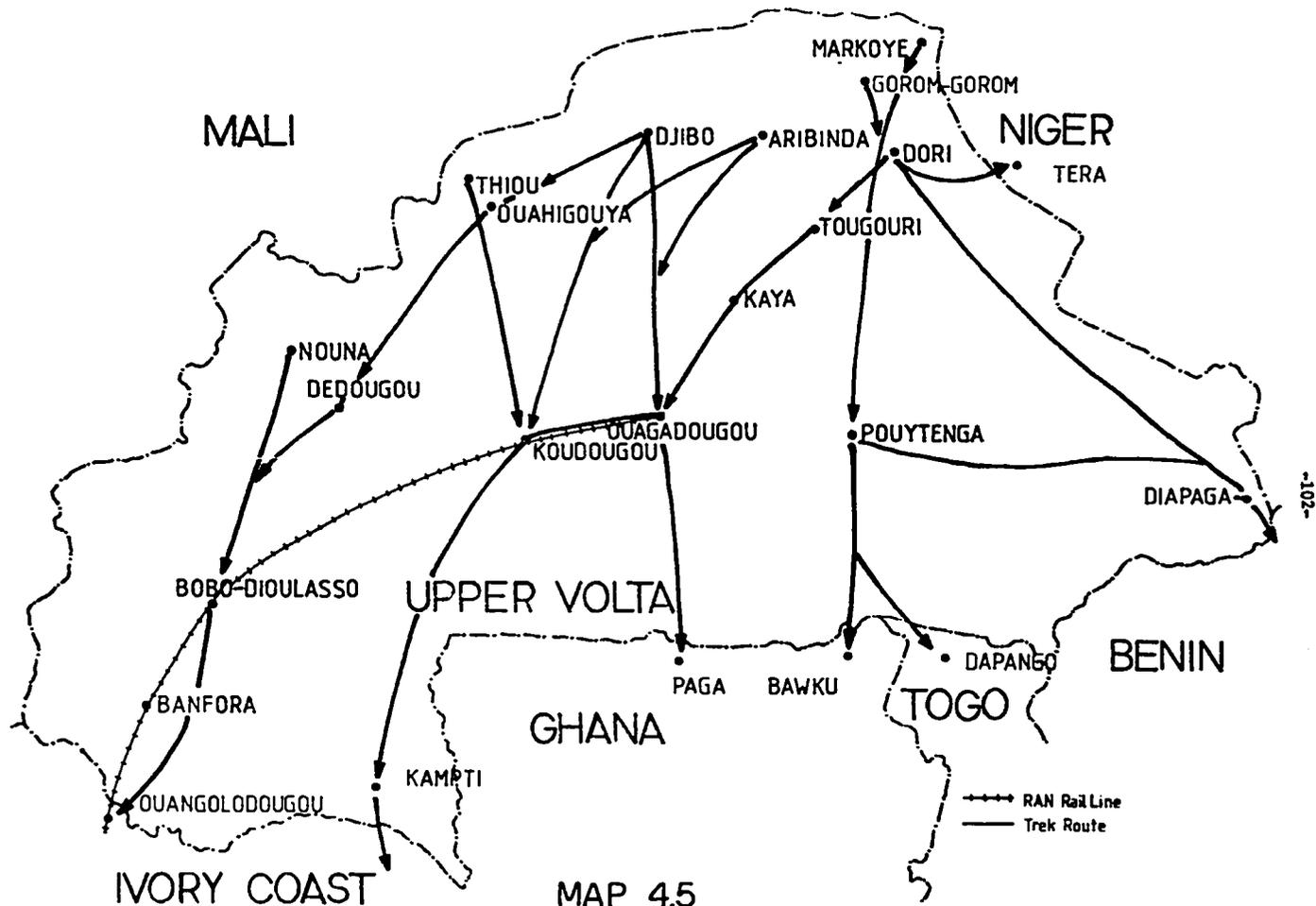
Trekking distances and travel times between three collection markets and Ouagadougou are given in the following table.

TABLE 4.11
TREKING TIMES AND DISTANCES

| Origin | Djibo | Markoye | Pouytenga |
|---------------------|-------------|---------|-----------|
| Destination | Ouagadougou | | |
| Total Distance (km) | 210 | 325 | 140 |
| Duration (days) | 8 - 12 | 15 - 20 | 3 - 7 |

SOURCE: Herman, 1977, p. 121.

Table 4.12 and Map 4.5 summarize the livestock trek routes in Upper Volta which are financed or are under consideration for financing by outside donors.



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MAP 4.5
Voltaic Trek Routes

TABLE 4.12
PROPOSED AND ACTUAL TREK ROUTES

| Route | Status | Financing |
|--|-------------|--|
| Markoye-Tougouri-Kaya-Ouagadougou | Operating | FAC |
| Markoye-Tougouri-Pouytenga-Togo-Ghana Frontier | Under Study | None |
| Djibo-Ouahigouya-Dédougou-Bobo-Dioulasso | In progress | IBRD-West Volta Animal Husbandry Project |

SOURCE: Club du Sahel Animal Husbandry Team, "Report on the Commercialisation Policies of the Sahelian Countries," 1978, p. 5.

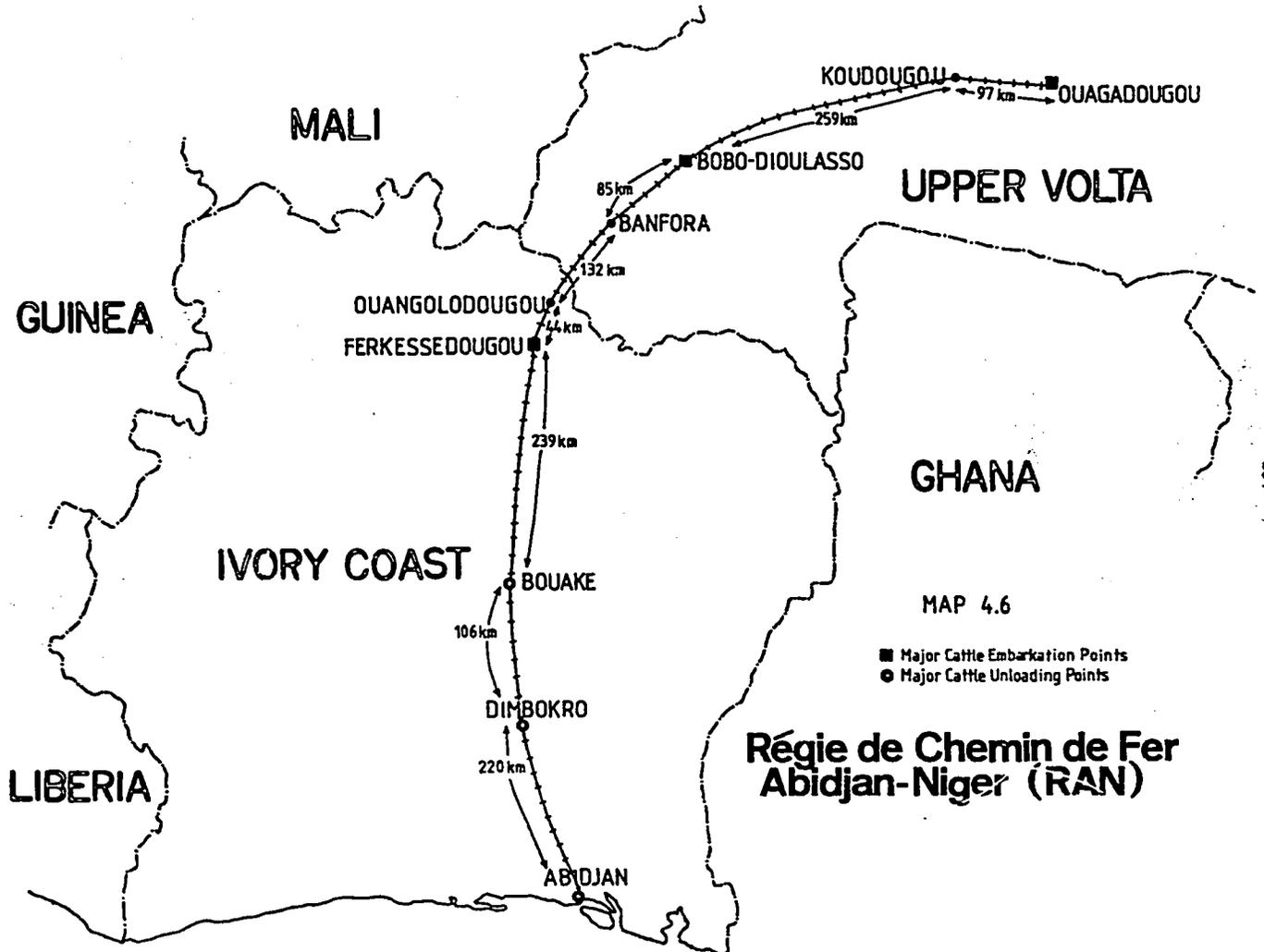
^aThe source lists Ouagadougou instead of Ouahigouya, apparently a typographical error.

2) - RAN Rail Line³

(a.) - Description. The RAN (Régie de Chemin de Fer Abidjan-Niger) rail line links the livestock production zones of Upper Volta to the markets of Ivory Coast. The system is managed by a semi-autonomous agency of the Ivorian and Voltaic governments. The line is 1,182 km in length (Map 4.6), running from Ouagadougou southwestward to Bobo-Dioulasso, then south through Ferkéssédougou and Bouaké in Ivory Coast, to Abidjan. The RAN is a single-rail track, which is a cause of some of its problems (discussed below). A ten-year modernization program, begun in 1971, aims to renew the rolling stock of the line and to bring the track up to modern standards. The track improvements have been completed, except for a 172-km section north of Bouaké, which was to have been finished by 1980. Also by 1980, double tracking was to have been in place between Yapo and Abidjan (about 65 km); which is the first part of a long-term plan to double track the 326 km from Abidjan to Bouaké.

In 1977 the RAN had the following rolling stock: 40 locomotives, 120 passenger cars, and 1,250 freight ca.s. Of the 1,250 freight cars, 202 were cattle cars.

(b.) - Role in Livestock Trade. The RAN is an important part of the livestock trade from Upper Volta to Ivory Coast; 98 percent of all cattle arriving in Abidjan in 1976 came



MAP 4.6

■ Major Cattle Embarkation Points
 ● Major Cattle Unloading Points

**Régie de Chemin de Fer
 Abidjan-Niger (RAN)**

by rail; 70 percent of them originated in Upper Volta. Cattle movements within Upper Volta and Voltaic exports to countries other than Ivory Coast are done by trekking, but exports to Ivory Coast, the destination of 78 percent of 1977 Voltaic cattle exports, are nearly all by train. The principal cattle-loading points along the RAN are Ouagadougou and Bobo-Dioulasso in Upper Volta and Ferkéssédougou in northern Ivory Coast. The cattle loaded in Ouagadougou originate throughout the eastern and northern production zones of Upper Volta. Bobo-Dioulasso and Ferkéssédougou serve western Upper Volta; many cattle are trekked across the Ivorian frontier to board the RAN at Ferkéssédougou. Ferkéssédougou is the major embarkation point for Malian cattle exports to Ivory Coast, as well. The major unloading points along the RAN are Dimbokro, Bouaké, and Abidjan, the last being most important of the three.

The cattle cars in service on the RAN as of June 1977 are described in the following table.

TABLE 4.13
RAN CATTLE CARS, JUNE, 1977

| Type | Number | Capacity (tons) ^a | Volume (m ³) | Animals per Car ^b |
|------|-------------------------|------------------------------|--------------------------|------------------------------|
| H12 | 116 | 15 (6) | 48 | 25 |
| H13 | 16 | 30 (8) | 69 | 30 - 35 |
| J14 | <u>70</u> <u>202</u> | 35 (9) | 80 | 35 |

SOURCE: RAN Service Commerciale, unpublished data, in Staatz, 1979.

^aFigures in parentheses are tonnages used to calculate merchants' rental fees.

^bRAN does not fix the number of animals transported per car. The figures presented are from observations made by Herman in Upper Volta.

These cars are metal boxcars with poor ventilation; only the J14 type has a grate allowing even a minimal amount of fresh air to the animals. The closed cars are preferred by the RAN over the more open type because they are also used to ship general merchandise, for which it is important to limit pilferage. The lack of ventilation in the cars, combined with the long trips and lack of feeding and watering, are causes for the heavy mortality and weight losses which occur during the shipping of cattle by train.

(c.) - RAN Problems. Three major problems are found with the RAN in transporting cattle: 1) heavy mortality and weight losses, 2) long waiting time for merchants to find available cattle cars at embarkation points, and 3) seasonal shortages of cattle cars. Some of these problems are interrelated -- the single track may be a cause of both the mortality and weight losses as well as the waiting time problem.

(i.) - Shrinkage. Weight and mortality losses (shrinkage) during shipping of cattle by rail can be laid to the following causes: poor ventilation of cattle cars, lack of food and water for cattle in transit, and long travel time because of poor scheduling. The first two have been outlined already. The RAN officially gives priority on the single rail to shipments of livestock over other merchandise. However, passenger traffic is given top priority, so cattle trains frequently spend time on sidings waiting for passenger trains to pass.

(ii.) - Rotation Time. The problems of waiting time for cars and seasonal shortages are closely related in that rotation of the cattle cars from north to south and back along the line is critical to both. Staatz (1979) studied the rotation of cattle cars on the RAN and heard many complaints among cattle merchants that waits for cattle cars in Ouagadougou of up to one week were common. Part of the delay in rotation of cars is thought to be from the use of cars for storage by merchants as a result of the shortage of warehouse space in Ouagadougou. Staatz calculated the difference between the theoretical minimum rotation time and actual rotation time. The minimum rotation time between Ouagadougou and Abidjan is eight days:

3 days for the trip south
1 day for cleaning and reloading
3 days for the trip north
1 day for unloading
8 days total rotation

The RAN estimated that actual rotation time is ten to twelve days.

Staatz also surveyed cattle car arrivals in Abidjan. The findings of the Staatz survey by car type are summarized in the following table:

TABLE 4.14
RAN CATTLE CAR ROTATION

| | H12 | H13 | J14 |
|-------------------------------------|--------|-------|--------|
| 1. Average Rotation Time (days) | 25.5 | 22.7 | 40.9 |
| 2. Maximum Number of Trips per year | 14.3 | 16.1 | 8.9 |
| 3. Animals Per Car | 25 | 32 | 35 |
| 4. Cars in Service, June 1977 | 116 | 16 | 70 |
| 5. Maximum Annual Volume | 41,470 | 8,243 | 21,805 |
| Total 71,518 head | | | |

SOURCE: Staatz, 1979, p. 194.

These results show that the average rotation time is considerably slower than either the theoretical minimum or the RAN estimate of actual rotation time. Thus, there is considerable slack in train schedules which could be exploited to expand the capacity of the rail system without adding rolling stock. Also, relatively easy policy changes could be made to improve car use. For example, Staatz noted that the longest average rotation time was that of the J14 car, the one with the largest capacity. The reason for this, Staatz hypothesized, is that the charges for using cars for storage in Ouagadougou are the same regardless of car capacity. The per unit cost of keeping a large car loaded is lower than that for a small car. Varying the charges according to car capacity would make more large, better-ventilated cars available for cattle exports. Higher charges for holding loaded cars in Ouagadougou would encourage warehouse construction, making cars available for cargo hauling.

From the survey results and data on actual number of head travelling on the RAN annually, Staatz concluded that it was carrying approximately 90 percent of its capacity in 1976. Because of seasonal demand and supply conditions⁴ for cattle exports, other seasonal goods competing with cattle for rail cars, and the 90 percent average use over the year, there are doubtless periods of rail car shortages.

C. - Roads

There are about 9,000 km of "classified" roads in Upper Volta, of which almost 4,500 km are considered principal roads. Only 500 km of inter-city roads are paved (IBRD, 1975b). All of the paved roads are two-lane and originate in either Ouagadougou or Bobo-Dioulasso. The major axes of paved road are the following (shown in Map 4.7):

- Ouagadougou - Koupéla - Togo border
- Ouagadougou - Ghana border
- Ouagadougou - Koudougou - Bobo-Dioulasso
- Bobo-Dioulasso - Mali border (toward Koutiala and San)
- Bobo-Dioulasso - Ivory Coast border.

There are no paved roads north of Ouagadougou, i.e. none leading to the major cattle producing regions.

The condition of other (unpaved) principal roads is generally poor. These routes are frequently impassable during the rainy season and rough at other times. Secondary roads are poorly maintained.

D. - Trucking

All trucks in Upper Volta are in private hands. There is no information available on the total number of vehicles or total tonnage in Upper Volta. International transportation of goods is divided between Voltaic and foreign truckers at percentages fixed through bilateral agreements (IBRD, 1975b, p. 21).

There is little trucking infrastructure in general in Upper Volta; none is specific to cattle transport. Both Bobo-Dioulasso and Ouagadougou have well-equipped truck depots outside of town. Several recently constructed markets have cattle-loading ramps. However, these ramps are poorly designed, so that cattle are loaded into trucks elsewhere, using easily-constructed dirt ramps.

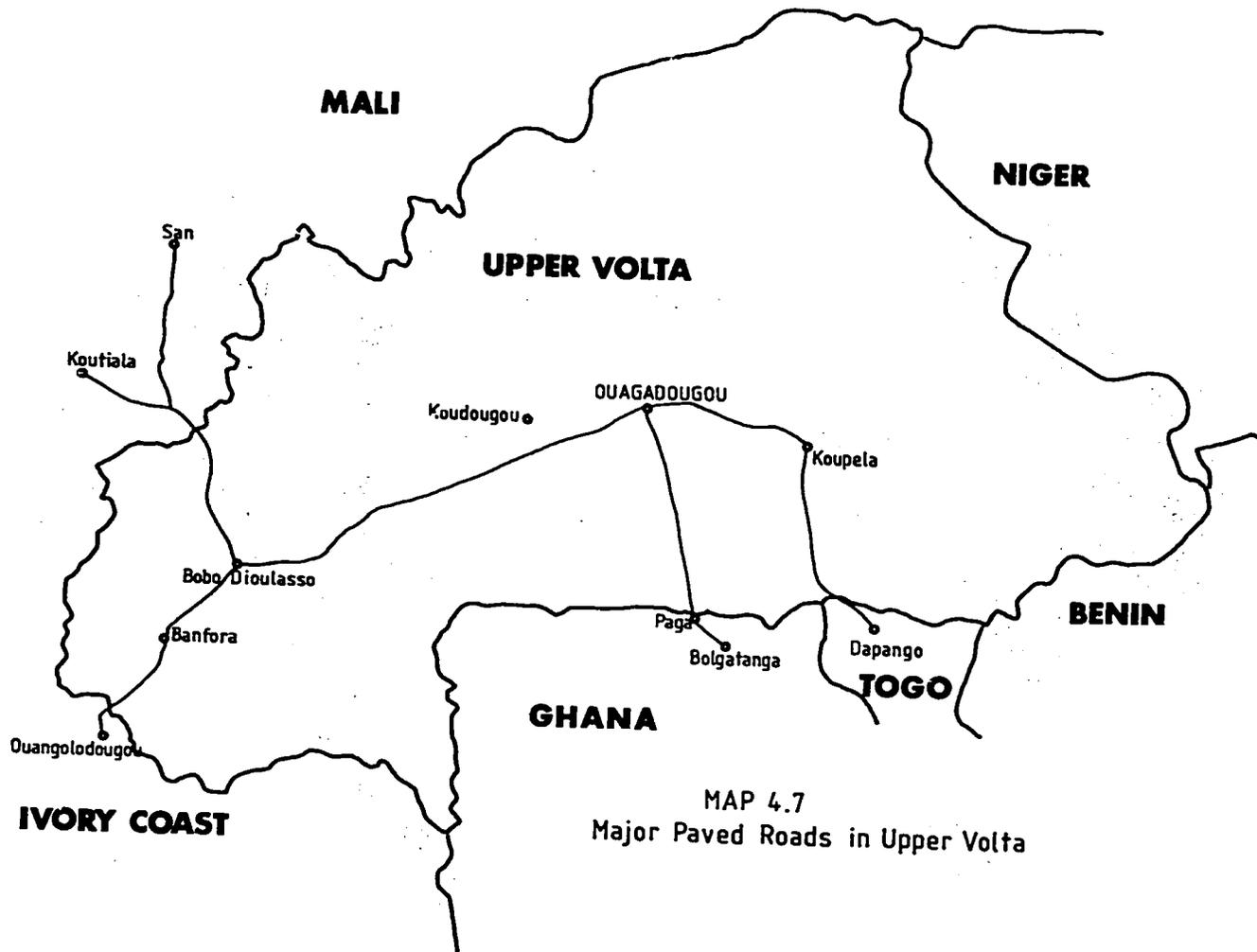
Small ruminants are easily and often transported between markets on the roof of bush taxis. They are rarely transported within Upper Volta as the sole or primary cargo of a truck.

III. - Livestock Market Prices

Livestock prices rose substantially over the period 1966-1977. Evidence of how prices of local-slaughter animals have changed in Upper Volta will be presented, as well as variations in prices among types of animals and seasons.

A. - Historical Livestock Prices, 1966-1977

This section sketches the evolution of livestock prices in Voltaic markets from 1966 to 1977. A study done by SEDES (1969) presents cattle prices for some Voltaic markets in



MALI

NIGER

UPPER VOLTA

OUAGADOUGOU

BENIN

GHANA

TOGO

IVORY COAST

MAP 4.7
Major Paved Roads in Upper Volta

1966. More substantial price information on a variety of slaughter animals is presented in SCET International (1972) for the period November 1969 to July 1970. Herman (1979) is the source of additional cattle price data from the Entente Livestock Project (ELP) survey of 1976-77.

1) - Prices in 1966

The SEDES study divided Upper Volta into two zones: the northeast, engaged primarily in the production of zebu cattle which, in 1966, brought an average carcass weight price of 90 to 100 CFA F per kg; and the southwest, where zebus, taurins and their cross-breeds are produced, with liveweight prices of 100-110 CFA F/kg. Markoye, Dori, and Kaya are listed as northeastern-zone markets; Pouytenga, Ouagadougou, Koudougou, and Bobo-Dioulasso are the major markets of the southwest.

SEDES (1969) found the following average market prices per head of cattle in 1966:

| | <u>CFA F per head</u> |
|---------------------|-----------------------|
| Markoye-Dori | 18,000 |
| Djibo-Kaya | 11,000 |
| Ouagadougou | 9,000 |
| Pouytenga-Koudougou | 6,000 |
| Bobo-Dioulasso | 10,000 |

These prices are of limited value for comparison, since the weight, sex, and age composition of the cattle sampled are not given. As will be seen below, a great part of the variation in prices of cattle at any point in time can be explained by these variables. The large difference in prices between Pouytenga and Markoye shown above may have been due to differences in the kinds of cattle sold. Whatever the reason, it does not make sense for prices in Markoye to be higher than those in Ouagadougou and Bobo-Dioulasso. These figures should therefore be discounted.

Cattle destined for export to coastal markets brought a producer price of 97 CFA F per kg carcass weight. The average carcass weight per animal was 165 kg, so the average producer price per head was 16,000 CFA F.

Producer prices ranging from 80 to 104 CFA F per kg were found; this range was explained as resulting from distance to markets and quality differences among cattle.

2) - Prices in 1969-1970

The SCET International study covering November 1969 to July 1970 found carcass weight and location of sale to be the most important variables in determining cattle prices. Animals slaughtered locally had lower carcass weights than those sold for export. There was a north-south price differential of 30 CFA F per kg of meat. In general, prices of similar

animals were higher, the larger the town in which they were sold and the closer the town to export markets. The distance to terminal markets may in fact be a more important factor than the size of the intermediate market itself.

TABLE 4.15
TOWN SIZE AND CATTLE PRICES, 1969-1970

| Size of Town | Town Name | Price per kg Carcass Weight |
|--------------------------------|----------------|--------------------------------|
| Small urban center | Pouytenga | 88 CFA F |
| Center of medium importance | Fada | 97 CFA F |
| Large urban centers | Ouagadougou | 101 CFA F |
| | Bobo-Dioulasso | 107 CFA F |

SOURCE: SCET International, 1972.

The survey found no significant difference between prices of male and female cattle.

The results of the survey of cattle prices are laid out in detail in Table 4.16.

The results of the survey done in Bobo-Dioulasso are broken down by carcass-weight groups in Table 4.17. The table shows that the prices paid reflected carcass weights, despite the fact that scales are almost never used; prices per kg are the same.

The survey also reported the prices of slaughter animals other than cattle. The results of this survey are presented in Table 4.18. Little difference was found between the carcass-weight prices of sheep and goats. Pigs and donkeys are of little importance in the Voltaic meat supply.

3) - Prices in 1976-1977

As a part of the Entente Livestock Project, Herman (1979) interviewed butchers and traders and carried out cattle market surveys in Djibo, Kaya, Pouytenga, and Ouagadougou. In the interviews with butchers and traders, it was found that they believed that cattle prices had gone up two to three times between the early 1960s and 1977. In a report written for SEDES (1975) Tyč claims that cattle prices in Upper Volta doubled between 1967 and 1974.

TABLE 4.16
SLAUGHTER-CATTLE PRICES

| Slaughterhouse | Period of Observation | | Males ^a | | | Females ^a | | | Total ^a | | |
|----------------|-----------------------|-------------|--------------------|------------------|--------------|----------------------|------------------|--------------|--------------------|-----------|--------------|
| | | | (1) Number | (2) Kg | (3) Price | (1) Number | (2) Kg | (3) Price | (1) Number | (2) Kg | (3) Price |
| Kaya | 3/10 | to 3/18/70 | 51 | 66 ^b | 80 | 49 | 84 ^b | 71 | 100 | 75 | 75 |
| Dori | 3/20 | to 6/16/70 | 12 | 86 | 74 | 75 | 73 | 78 | 87 | 75 | 78 |
| Dédougou | 12/69 | to 1/70 | 43 | 83 ^b | 88 | 24 | 91 ^b | 89 | 67 | 86 | 89 |
| Pouytenga | 10/18/69 | to 1/31/70 | 413 | 106 | 88 | 336 | 102 | 89 | 749 | 104 | 88 |
| Ouahigouya | 10/20/69 | to 3/1/70 | 100 | 98 | 94 | 296 | 84 | 89 | 396 | 87 | 90 |
| Fada | 10/21/69 | to 1/2/70 | 78 | 103 | 103 | 188 | 98 | 95 | 266 | 100 | 97 |
| Bobo-Dioulasso | 11/14/69 | to 4/30/70 | 502 | 111 | 108 | 198 | 104 | 104 | 700 | 109 | 107 |
| Koudougou | 11/19 | to 12/2/69 | 93 | 104 ^b | 107 | 18 | 107 ^b | 114 | 111 | 104 | 108 |
| Banfara | 11/13 | to 11/24/69 | 188 | 82 | 110 | 61 | 78 | 106 | 249 | 81 | 109 |
| Ouagadougou | | 7/70 | 34 | 104 ^b | 102 | 2 | 129 ^b | 93 | 36 | 105 | 101 |
| Gaoua | 12/69 | to 7/70 | 132 | 84 ^b | 97 | 13 | 88 ^b | 103 | 145 | 84 | 98 |

SOURCE: SCET International, 1972.

- ^a
- (1) Number weighed
 - (2) Average carcass weight
 - (3) Price per kg of meat in CFA F

^b It is unusual to find females heavier than males, but that is how the numbers turned out. The results from Ouagadougou are also biased by the fact that there were only two females slaughtered in the period.

TABLE 4.17

SLAUGHTER PRICES FOR CATTLE AT BOBO-DIOULASSO, NOVEMBER 1969-JULY 1970

| | Carcasses weighing less than 100 kg | Carcasses weighing between 100 and 130 kg | Carcasses weighing greater than 130 kg |
|--|---|---|--|
| Average Carcass weight | 83 kg ¹ | 114 kg | 147 kg |
| Number of Observations | 478 | 434 | 149 |
| of which: Male | 333 | 306 | 121 |
| Female | 145 | 128 | 28 |
| Average Price per kg carcass weight | 112 CFA F | 111 CFA F | 115.5 CFA F |
| Average Price per kg Liveweight | 50.7 CFA F | 52.1 CFA F | 55.2 CFA F |
| Average portion of Liveweight meat | 45% | 46.7% | 49.5 % |
| Maximum price per kg carcass weight | Month Price May 124 CFA F | May 124 CFA F | May 135 CFA F |
| Minimum price per carcass weight | Month Price November 91 CFA F | January 101 CFA F | December 102 CFA F |

SOURCE: SCET International, 1972.

TABLE 4.18
SLAUGHTER-ANIMAL PRICES

| Slaughterhouse | Period of Observation | Type of Animal | Number Weighed | Average Carcass Weight (kg) | Price per kg Carcass weight (CFA F) |
|----------------|-----------------------|----------------|----------------|-----------------------------|-------------------------------------|
| Koudougou | 11 and 12/69 | Sheep | 2 | 9 | 136 |
| Ouahigouya | 10/69 - 7/70 | | 85 | 10 | 116 |
| Ouagadougou | 7/70 | | 42 | 9.7 | 104 |
| Dori | 3 and 4/70 | | 48 | 13 | 84 |
| Koudougou | 11 and 12/69 | | 4 | 11.5 | 156 |
| Ouahigouya | 10/69 - 7/70 | Goats | 357 | 10.6 | 121 |
| Ouagadougou | 7/70 | | 42 | 9 | 97.3 |
| Dori | 3 and 4/70 | | 116 | 12 | 86 |
| Koudougou | 11 and 12/69 | Pigs | 12 | 37 | 50 |
| Sabba | 6/70 | Donkeys | 11 | 52 | 50 |
| Koudougou | 11 and 12/69 | Camels | 1 | 202 | 69 |

SOURCE: SCET International, 1972.

In addition, Tamboura Hassan, a former market tax collector in Djibo, was asked to estimate current and past cattle prices by type of animal. His estimates showed that prices had gone up two to three times, as the butchers and traders indicated. This impressionistic evidence was validated to a certain extent by the proximity of Hassan's estimates of current (1977) Djibo market prices to the findings of Herman's survey. This is shown in Table 4.19.

The results of Herman's ELP Market Survey for Pouytenga and Ouagadougou in 1976-1977 are shown in Table 4.20. Carcass-weight prices of local-slaughter cattle are given for the two markets by type of animal.

Little difference was shown in prices between 1966 and 1969-1970; SEDES reported cattle prices to be 100 to 110 CFA F per kg carcass weight in 1966 for markets such as Pouytenga and Ouagadougou; the results from SCET International showed per kg carcass weight prices of 88 CFA F in Pouytenga and 101 CFA F in Ouagadougou. These prices are roughly in the same range. However, the prices found in the ELP survey for all types of animals are far above those in either of the previous price surveys. Comparison of carcass weight prices for an average of all animals sold with prices given by animal types is difficult. However, the total group of slaughter animals is composed of relatively few calves, immature males and cows which are normally held for fattening and reproduction, so that the higher mature bull and steer prices are more representative of average prices. This indicates that prices have probably doubled since 1966, with nearly all of the rise coming since 1970, as was expressed in the Herman interviews. In addition, the price differential between small towns (e.g. Pouytenga) and large urban centers (e.g. Ouagadougou) noted in the SCET International report is maintained in the ELP survey results.

B. - Sales and Price Variations by Animal Type and Season

Cattle prices in Upper Volta vary according to the type of animal sold and season of the year as well as over time and across markets as shown above. This section describes how cattle sales are made, shows the price differentials among types of animals, and examines the seasonality of Voltaic cattle prices.

1) - Description of Sale

Prices of cattle are determined by the interaction of sellers, intermediaries, and buyers. In collection markets herders are usually represented by intermediaries,³ who sell cattle to local butchers, traders, other herders, and local farmers. In redistribution markets the sellers are usually cattle traders selling to other traders and local butchers. In the Voltaic terminal market traders sell cattle to long-distance traders, who are forming herds for export, and to local butchers, who serve the large local demand for meat.

The major motivation for nearly all of the sellers is to maximize returns for the animal offered for sale. The various buyers, however, have different motives when buying.

TABLE 4.19
COMPARISON OF TAMBOURA HASSAN'S PRICE ESTIMATES
AND FINDINGS OF THE ELP DJIBO MARKET SURVEY

| Animal Type | Hassan's Estimated Prices (CFA F) | | ELP Survey Prices 1976-1977 (CFA F) |
|-------------------|--------------------------------------|-----------|--|
| | 1962-1965 | 1976 | |
| Young Males | 5,000 | 17,000 | 17,914 |
| Mature Steers | 15-20,000 | 40-45,000 | 41,997 |
| Heifers | 10,000 | 25,000 | 24,042 |
| Cows ^a | 10,000 | 30,000 | 19,605 |

SOURCE: Herman, 1977, p. 97.

^aHassan's estimate is for still-productive cows, the ELP survey contained many less-valuable cull cows.

TABLE 4.20
PRICES OF LOCAL-SLAUGHTER CATTLE, POUYTENGA AND OUAGADOUGOU,
NOVEMBER 1976-MARCH 1977
(CFA F per kg carcass weight)

| Animal Type | Market | |
|------------------------------|-----------|--------------------------|
| | Pouytenga | Ouagadougou ^a |
| Calves and Immature Males | 166 | 149 |
| Mature Bulls | 197 | 237 |
| Mature Steers | 227 | 252 |
| Cows | 164 | 223 |

SOURCE: Herman, 1977, p. 99.

^aNo adjustment is made for the (presumably) higher quality meat in Ouagadougou.

Butchers judge animals based on their immediate meat output; hence the uniformity in prices per kg carcass weight across slaughter animals of different sizes, shown in Table 4.17. Traders look at animals not only for their immediate meat output, but also for their ability to withstand the rigors of travel. Herders and farmers as buyers value animals for their expected stream of future returns in the form of reproduction, milk production, weight gain, and animal traction. These differing motives lead to price variations by animal type across markets and to seasonal price changes as well.

2) Price Variations by Animal Type and Season

The ELP study (Herman, 1977 and 1979) provides information about cattle prices by type of animal. Table 4.21 shows the prices of types of cattle at three markets -- Djibo, Pouytenga, and Ouagadougou. In each market the price of mature steers is highest, reflecting that they have the greatest carcass weight. Malian calves brought the lowest prices in Djibo and Pouytenga and were not sold in Ouagadougou. Their prices are low because they have not yet reached a large carcass weight, nor do they have the potential reproductive capacity of heifers. They are bought only for their fattening potential; hence they are rarely sold at terminal markets. Immature males are established weight gainers, but have not reached peak weights, so they are priced between male calves and mature males. Heifers are potentially reproductive females. The classification "cows" includes both proven reproducers and old females which no longer have reproductive capacity and are valued only for their meat output. Thus heifer and cow prices overlap.

Prices at the Pouytenga market were particularly high in the survey period.

[This reflects] a reversal of cattle flows from the normal northeast-southwest direction which moved cattle toward traditional markets in the Ivory Coast to a massive flow of cattle toward Nigerian markets. The increased demand for both young cattle for the Nigerian herd reconstitution program and for mature slaughter animals which are ultimately exported to markets in Nigeria served to raise prices in northeastern markets relative to prices in cattle markets further south for all but cull cows. (Herman, 1977, p. 98).

In the Summary Report of the ELP study (Shapiro, 1979) the results of regression analysis of the determinants of Voltaic cattle prices are presented. Price information from the survey of herders in the Kaya, Pouytenga, and Djibo markets was used to examine price as a function of age and sex of the animal, region of the market, type of seller, season of the year, amount of seller market information, kind of buyer, and type of market. The results of the regression analysis are summarized below:

- Prices for males increase at an increasing rate with age, up to 5.7 years (average 5,000 CFA F per year overall); they increase at a decreasing rate to age 11.4, where they begin to fall.

TABLE 4.21
AVERAGE CATTLE PRICES BY ANIMAL AND MARKET TYPES, 1976-1977
(in CFA F)

| Animal Type | Market Type | | |
|----------------|----------------------|------------------------------|--------------------------|
| | Collection: Djibo | Redistribution: Pouytenga | Terminal: Ouagadougou |
| Male Calves | 10,846 | 10,332 | --- |
| Immature Males | 17,914 | 26,469 | 12,784 |
| Mature Bulls | 34,246 | 41,246 | 32,730 |
| Mature Steers | 41,997 | 42,615 | 39,471 |
| Heifers | 24,042 | 21,402 | 19,250 |
| Cows | 19,605 | 32,507 | 21,490 |

SOURCE: Herman, 1977, p.99.

- No strong age-price relation was found for females.
- A premium of 1,500 CFA F was paid for steers over bulls at all ages.
- Only slight evidence of higher prices was found for sales closer to major consumption and export centers.
- No difference was found between ethnic groups as sellers.
- Highest prices occur during the rainy season, lowest during the dry season; males hold their prices better than females during the dry season.
- The amount of seller market information had no significant effect on prices.
- Higher prices were paid for males when they were sold to butchers and traders; females brought higher prices when sold to herders and farmers.
- The type of market had no significant effect on prices.

The same kind of seasonal trends were found in the 1969-1970 survey of Bobo-Dioulasso market prices (SCET International, 1972). A general price differential of 23-33 CFA F per kg carcass weight was observed between the rainy and dry seasons. Also noted was a premium of up to 11 CFA F per kg over average prices for the best quality carcass.

IV. - Marketing Policy

Though livestock marketing policy is only modestly covered in the major livestock sector planning document (Sous-Commission de la Production Animale, 1976), the establishment of the Office National de l'Exploitation des Ressources Animales (ONERA) in 1976 and the implementation of several livestock marketing projects of large proportions emphasize the new-found importance given to livestock marketing policy in Upper Volta. The creation of ONERA was intended to stimulate a cooperative movement on the part of both livestock producers and marketing professionals: merchants, intermediaries, and butchers. ONERA is supposed to act as a guiding force in this movement, representing the broad governmental objective of making the marketing system more efficient and effective at seeking out new outlets for livestock products.

The specific functions of ONERA are broken into six categories. It took over the basic marketing responsibility from the Livestock Service. This includes the management and maintenance of all government operated marketing infrastructure; the most important of these are the livestock markets, slaughterhouses, and transportation facilities (including cattle trails). All public corporations or organizations engaged in livestock marketing

activities were placed under the supervision of ONERA; these included the Ouagadougou abattoir, the Feedlot de Banfora, and the Voltaic share in SOTRAF (Société de Transport Frigorifique, a joint venture with Ivory Coast and the RAN). Studies, proposals and implementation of marketing related projects are to be carried out by or under the auspices of ONERA. It is explicitly charged with the responsibility for researching alternative export markets for Voltaic livestock products and empowered to negotiate export contracts where possible. In this regard, ONERA would either act on behalf of the marketing professionals organized under its umbrella or operate as an intermediary and guarantor between Voltaic traders and prospective buyers. Finally, ONERA takes over the responsibility for collecting and disseminating marketing statistics, especially those relating to livestock product prices.

Livestock marketing policy is often discussed in terms of "rationalizing" the existing marketing system (CILSS, 1979, p. 5). To a large extent "rationalization" usually means modernization. In the past, marketing projects that upgraded livestock marketing infrastructure to or near European standards regardless of the modest needs of the Voltaic sector were most often favored. The most notable cases of this "rationalization" were the construction of the Abattoir Frigorifique de Ouagadougou and the establishment of a series of stockyard-markets throughout the country. In both cases relatively capital intensive technology replaced traditional labor-using methods in excess of any real short- or even mid-term requirements.⁶ Another meaning often attached to "rationalization" is a streamlining of the commercial livestock circuit. This follows the often heard criticism that there are too many middlemen in the livestock marketing chain. The focus of these attentions is the much-maligned intermediary. Despite the lip service paid to eliminating some of these occupations, it does not appear that the government has any real intention of imposing significant controls on the livestock marketing professionals.⁷

Perhaps the most important of all livestock marketing policies is commitment to increased processing of livestock products in Upper Volta. Specifically, the government seeks to encourage the exportation of meat and beef by-products, as opposed to live animals. The strategy incorporates the proposed expansion of fed animal production, increased slaughter and cold storage capacity, improved refrigerated transportation systems, and the organization of exporters by ONERA.

CHAPTER FIVE

THE DOMESTIC MEAT MARKETING SYSTEM

I. - Markets

A. - Bush Markets

The Voltaic meat marketing system is made up of bush, collection, redistribution and terminal markets (see Chapter Four). Each market type plays a different role in the domestic supply of meat.

The most important are the bush, or local, markets. Many of them are located in densely populated southern areas. Some of the bush markets around Kaya and Pouytenga are given below:

Kaya - Pissila, Tébéré, Zéko, Santaba

Pouytenga - Wenga, Bougритenga, Yaongo, Zamsé

The bush markets are supplied by local traders operating out of nearby redistribution markets (within a two days' trek). Each bush market supports several butchers, who buy cattle from the traders for immediate slaughter. The local traders earn a premium of about 2 percent of the value of the cattle for the service of bringing them to the bush markets. Markets usually meet every three days.

B. - Collection Markets

Collection markets also supply some local traders with cattle for slaughter in bush markets. About 15 percent of buyers at collection markets are local traders (Herman, 1977, p. 64). Most sales at collection markets go either to long-distance traders (50 percent) or to local herders (30 percent), who buy cattle for fattening or breeding. Only 1 percent of sales in collection markets go to butchers for immediate slaughter.

C. - Redistribution Markets

There are four categories of buyers in redistribution markets: those buying cattle for breeding and fattening - local herders, farmers and townspeople; those seeking cattle for immediate slaughter, i.e. butchers from local towns or nearby urban centers; local traders supplying nearby bush markets; and exporters, who buy the best quality and healthiest animals for trekking to coastal markets or railheads. Butchers from Ouagadougou sometimes attend the redistribution markets in Kaya, Pouytenga, and Koudougou to purchase animals for slaughter or resale to other butchers in Ouagadougou. Local butchers buy mainly cull cows in redistribution markets; in a survey of the Pouytenga market from November

1976 to March 1977, Herman (1977, pp. 78-79) found that 67 percent of local butchers' purchases were cull cows; 24 percent were young males; and 8 percent were mature males. The proportion of total redistribution market sales going to domestic consumption may be estimated from the observation (Herman, 1977, p. 80) that 18 percent of 15,930 animals sold in Pouytenga from July 1976 to March 1977 were cull cows. Thus, approximately 27 percent¹ of animals sold in redistribution markets are likely to be consumed in the area of the market.

D. - Terminal Markets

The number of cattle slaughtered from 1969 to 1975 in Upper Volta's two terminal markets, Ouagadougou and Bobo-Dioulasso, are shown in Table 5.1. The data for total cattle sold in each market are complete for Ouagadougou but omit morning-market sales in Bobo-Dioulasso. The Ouagadougou data show that from 50 percent to more than 80 percent of cattle sold go to local slaughter. In 1974 and 1975 slaughters in Bobo-Dioulasso exceeded those in Ouagadougou. In Ouagadougou, there are 250 registered butchers, sixty-five of whom buy and slaughter cattle regularly. In addition, there were twenty-three cattle exporters making purchases on the Ouagadougou market during the period February 1976 to March 1977 (Herman, 1977, p. 85).

TABLE 5.1
CATTLE SOLD AND SLAUGHTERED IN OUAGADOUGOU AND
BOBO-DIOULASSO, 1969-1975

| Market | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 |
|-------------------|--------|--------|--------|--------|--------|--------|--------|
| Ouagadougou | | | | | | | |
| Sold | 26,207 | 28,206 | 31,078 | 43,537 | 40,364 | 35,490 | 25,278 |
| Slaughtered | 18,711 | 19,770 | 25,884 | 20,048 | 22,412 | 16,563 | 15,203 |
| Bobo-Dioulasso | | | | | | | |
| Sold ^a | 15,000 | 28,614 | 26,867 | 21,372 | 6,177 | 9,782 | n.a. |
| Slaughtered | 16,016 | 17,734 | 20,097 | 19,408 | 20,125 | 22,161 | 19,404 |

SOURCE: Statistiques: Direction de l'Elevage, Ouagadougou, in Herman, 1977, p. 83.

^aCattle sold in the Bobo-Dioulasso morning market are not recorded. These cattle are mostly of export quality.

II. - Butchering and Meat Marketing in Ouagadougou

Surveys of wholesale and retail meat sales and prices in Ouagadougou were carried out in 1976 and 1977 (Herman, 1977, p. 141 ff.). From the survey results a detailed picture of meat marketing can be drawn.

Ouagadougou butchers are wholesalers, wholesaler-retailers, retailers, and exporters. All but the pure retailers buy cattle in the Ouagadougou market, and some travel to Kaya, Pouytenga, and Koudougou to make purchases. Wherever cattle are purchased, an intermediary's fee of 250 CFA F must be paid. The butchers keep a stock of cattle on hand to smooth out fluctuations in market prices. The total stock held by all butchers in Ouagadougou amounts to about one week's slaughter; it is held in a common reserve, watched over by Peul herders, at a cost of 100 CFA F per head.

Butchers deliver their cattle to the slaughterhouse in the early evening to be slaughtered during the night. The cost of slaughter is 1,000 CFA F per head. Carcasses and edible offals are delivered back to butchers at six in the morning.

Butchers involved in wholesale trade sell to retailers, restaurants, institutions (e.g. schools, the military), and meat grillers. Wholesalers display their meat in whole quarters plus offals on the ground in front of the slaughterhouse. Frequently wholesalers have regular customers, especially for the purchase of heads and tripe. Although the carcasses are weighed by the slaughterhouse, the butchers do not use that information, but estimate the carcass values on the basis of experience alone.

Meat sold to Ouagadougou's hotels and three European-style butcher shops usually consists of long hind quarters of better-than-average-quality meat. This meat is often refrigerated in the slaughterhouse cold rooms before delivery. Refrigerated storage costs 500 CFA F per carcass for the first three days, then 5 CFA F per kg per day thereafter.

Carcasses are transported from the slaughterhouse to their point of final sale by small trucks and motor bikes. Meat is sold in retail markets by butcher's apprentices.

Ouagadougou cattle slaughters from 1970 to 1976 are shown in Table 5.2. Carcass weights were estimated for the years prior to the opening of the new Ouagadougou slaughterhouse in 1976. For the years 1970-1972, 130 kg was used as the average carcass weight; beginning in 1973, 95 kg was used, reflecting the worsened condition of cattle because of the drought. When the slaughterhouse was opened all carcasses were weighed, with an average weight of 125 kg. It is likely that both the estimated weights and composition of slaughters prior to 1976 are unreliable.

A. - Wholesale Beef Prices

A sample of wholesale prices of 532 cattle slaughtered in Ouagadougou in the first four months of 1977 is shown in Table 5.3. The higher prices per kg for steers and calves is

TABLE 5.2

CATTLE SLAUGHTERS: OUAGADOUGOU, 1970-1976

| Year | Bulls | | Steers | | Cows | | Calves and Young Males | | Total Number Slaughtered | Total ^b Tons of Beef | Beef as Percent of All Meat | Total Tons of All Meat |
|------|--------|----------------|--------|----------------|--------|----------------|---------------------------|----------------|--------------------------------|---------------------------------------|-----------------------------------|------------------------------|
| | Number | % ^a | Number | % ^a | Number | % ^a | Number | % ^a | | | | |
| 1970 | 876 | 4 | 17,095 | 86 | 1,356 | 7 | 443 | 2 | 19,770 | 2,570 | 90 | 2,878 |
| 1971 | 2,143 | 8 | 20,357 | 79 | 1,651 | 6 | 1,733 | 7 | 25,884 | 3,364 | 89 | 3,766 |
| 1972 | 2,582 | 13 | 13,505 | 67 | 2,247 | 11 | 1,714 | 8 | 20,048 | 2,606 | 85 | 3,049 |
| 1973 | 988 | 4 | 17,844 | 80 | 3,018 | 13 | 562 | 3 | 22,412 | 2,129 | 83 | 2,556 |
| 1974 | 803 | 5 | 13,283 | 80 | 2,147 | 13 | 330 | 2 | 16,563 | 1,573 | 80 | 1,974 |
| 1975 | 478 | 3 | 13,710 | 90 | 767 | 5 | 168 | 1 | 15,123 | 1,444 | 66 | 2,176 |
| 1976 | 4,217 | 19 | 11,643 | 52 | 5,895 | 26 | 597 | 3 | 22,352 | 2,785 | 71 | 3,880 |

SOURCE: Statistiques: Service de l'Élevage, Ouagadougou.

^aPercent of total cattle slaughtered.

^bTonnage estimated from 1970 until September 1975.

TABLE 5.3
CATTLE DRESSING WEIGHTS AND PRICES: OUAGADOUGOU SLAUGHTERHOUSE

| Type | Number of Observations | Average Live Weight | Average Dressed Weight | Dressing Percentage ^a | Average Animal Price | Average Price Per kg Dressed |
|-----------------|------------------------|---------------------|------------------------|----------------------------------|----------------------|------------------------------|
| Castrated Males | 260 | 288.6 kg | 142 kg | 49.2% | 35,873 CFA F | 252.4 CFA F/kg |
| Bulls | 118 | 291.8 kg | 138 kg | 47.3% | 32,661 CFA F | 237.0 CFA F/kg |
| Cows | 140 | 261.7 kg | 112 kg | 42.8% | 25,000 CFA F | 223.2 CFA F/kg |
| Calves | 14 | 185.3 kg | 83 kg | 44.8% | 20,607 CFA F | 248.7 CFA F/kg |

SOURCE: Statistiques, Service de l'Élevage, Ouagadougou.

^aWeight of carcass cut at third vertebra without hide, head, hooves, or offals.

^bDoes not include cost of intermediary, transport from market to slaughterhouse, keeping animal between time of purchase and slaughter, taxes, or refrigeration.

attributable to their higher quality meat, often sold in European-style butcher shops or exported to Ivory Coast. Wholesale prices of fifth quarter parts are shown in Table 5.4. Hides are sold to either of two skin and hide exporters; edible parts are sold to local retailers.

B. - Wholesale Butchers' Margins

The pricing rule for wholesale butchers is to try to recoup the purchase price of the animal through the sale of the meat quarters. Hence, wholesale carcass prices are 225-250 CFA F per kg. Wholesalers' margins are therefore the difference between revenue from fifth-quarter sales and costs of slaughter. The costs of slaughter are given in Table 5.5. The average wholesaler's margin per head sold is 3,550 CFA F.

C. - Retail Meat Prices

Herman (1977, p. 149 ff.) conducted a detailed survey of retail meat sales in Ouagadougou from November 1976 to March 1977. The results of this survey are summarized in Table 5.6. The data show that beef prices are higher when it is sold in larger piles, perhaps indicating a form of price discrimination, if buyers of larger piles can be said to have less elastic demand for beef than buyers of smaller piles. More than half of all beef is sold in 50-CFA F piles. The net price differential between 100-CFA F piles of beef with and without bone indicates a value of 65 CFA F per kg for bone. Beef sold in cuts receives a considerable premium over that sold in piles. There is a premium of about 15 percent paid for small-ruminant meat over beef.

The retail price of bone-in beef sold in 50-CFA F piles has been sampled several times since 1966 (SEDES, 1975b):

| | <u>Price per kg</u> |
|----------------------------|---------------------|
| 1966-1967 | 104 CFA F |
| 1970 | 126 |
| 1974 | 250 |
| 1976-1977 (from table 5.6) | 280 |

TABLE 5.4

AVERAGE WHOLESALE PRICES: FIFTH QUARTER: OUAGADOUGOU SLAUGHTERHOUSE
(In CFA F per Kilogram)

| | Large Cattle, Good Quality, 150-200 kg Dressed Weight | Medium Cattle 120-150 kg Dressed Weight | Small or Thin Cattle Poor Quality Meat, 80- 120 kg Dressed Weight |
|--|---|---|---|
| Hides (45 CFA F/kg) | 750 CFA F | 550 CFA F | 400 CFA F |
| Head and hooves | 2,500 CFA F | 2,000 CFA F | 1,500 CFA F |
| Tripe (stomach and intestines) | 2,000 CFA F | 1,500 CFA F | 1,000 CFA F |
| Tongue and tail | 500 CFA F | 400 CFA F | 300 CFA F |
| <u>Foie complet</u> (liver, heart, lungs, and spleen) | 1,500 CFA F | 1,250 CFA F | 1,000 CFA F |
| Total for fifth quarter | 7,250 CFA F | 5,700 CFA F | 4,200 CFA F |
| Price of fifth quarter per kg of dressed carcass | 41 CFA F/kg | 42 CFA F/kg | 42 CFA F/kg |

SOURCE: Statistiques, Service de l'Élevage, Ouagadougou.

TABLE 5.5
WHOLESALE BUTCHERS' MARGINS IN OUAGADOUGOU
(In CFA F per Head)

| | <u>CFA F</u> |
|------------------------------------|---------------|
| Costs | |
| Intermediary's commission | 250 |
| Holding fee | 100 |
| Slaughter tax | 1,000 |
| Condemnation loss ^a | 150 |
| Apprentices' salaries ^b | 200 |
| Purchase price ^c | <u>31,250</u> |
| | 32,950 |
| Revenues | |
| Sale of meat ^d | 31,250 |
| Sale of fifth quarter ^e | <u>5,250</u> |
| | 36,500 |
| Margin | 3,550 |

SOURCE: Herman, 1977, p. 147.

^aOne-half percent of meat was condemned in Ouagadougou in 1976.

^bAverage apprentice's salary 8,000 CFA F per month.

^cCarcass weight 125 kg, 250 CFA F per kg.

^dMeat sold at purchase price of animal.

^eSales value of fifth quarter is 42 CFA F per kg carcass weight.

TABLE 5.6
RETAIL MEAT PRICES IN OUAGADOUGOU, NOVEMBER 1976-MARCH 1977

| Type of Meat | Number of Samples | Gross Price ^a (in CFA F) | Percent Bone | Net Price ^b (in CFA F) |
|-----------------------------------|-------------------|--|--------------|--------------------------------------|
| 25-CFA F piles of beef | 33 | 215 | 24 | 282 |
| 50-CFA F piles of beef | 88 | 280 | 27 | 383 |
| 100-CFA F piles of beef | 60 | 359 | 28 | 499 |
| 100-CFA F piles of boneless beef | 25 | n.a. | n.a. | 434 |
| Boneless beef cuts | | | | |
| Filet | 4 | n.a. | n.a. | 576 |
| Faux Filet | 3 | n.a. | n.a. | 663 |
| Beefsteak | 4 | n.a. | n.a. | 550 |
| Beef cuts with bone | 6 | 350 | 53 | 744 |
| Edible offals | | | | |
| Hump | 18 | n.a. | n.a. | 533 |
| Tripe | 16 | n.a. | n.a. | 171 |
| Organs | 18 | n.a. | n.a. | 360 |
| Mutton and goat meat ^c | 7 | 377 | 26 | 509 |

SOURCE: Herman, 1977, pp. 151-154.

^aPrice including bone.

^bPrice of meat, net of bone.

^cSold in piles of 50 and 100 CFA F.

CHAPTER SIX

DOMESTIC CONSUMPTION

I. - Meat Production and Consumption Patterns

A. - Beef Consumption

The domestic supply of beef generally comes from cattle that are thin and of poor quality. The mean dressed weight is under 100 kg, with an additional twenty-five kg of edible offals. Carcass weights vary geographically: the smallest and weakest cattle are slaughtered in bush markets, the larger and stronger go to domestic urban markets, and the largest and strongest are exported. The cattle slaughtered in bush markets are usually cull cows or sick or injured cattle, which may yield as little as fifty kg carcass weight. Carcass weights are considerably higher in urban centers; some large, high quality carcasses in Ouagadougou and Bobo-Dioulasso may reach 150 to 250 kg. Most high quality cattle, however, are shipped to coastal markets.

B. - Small Ruminant Consumption

In bush markets, meat comes from small stock more frequently than from cattle, since small stock is more divisible into small units. Many bush market butchers would run great risk of being left with unsold meat if they slaughtered cows with ninety-kg carcass weights, whereas small ruminants have ten-to-fifteen-kg carcass weights.

C. - Geographic Distribution of Meat Production and Consumption

The geographic pattern of beef, goatmeat and mutton production and consumption estimated for 1969 was shown in Chapter Four, Table 4.6 and Map 4.4. The Sahelian region alone produced a surplus sufficient to account for the entire national surplus. The map shows that the country was broadly divided between a surplus/self-sufficient zone in the north and east and a deficit zone to the south and west.

The total meat supply (including pork, poultry and other red meat) and domestic consumption pattern for 1969-1970 was shown in Table 4.4. Beef, goatmeat, and mutton made up 78.5 percent of total meat consumption. Poultry, which was the next largest type of meat consumed, is not a butchery meat--poultry is usually raised and consumed within households. The only category of meat reported gaining in relative popularity is pork (Herman, 1979). However, no specific rates of growth are known.

D. - Per Capita Consumption

Per capita meat consumption in Upper Volta in 1967 was estimated by SCET International (1972, p. 84). This estimation, broken down into major-urban, semi-urban, and rural meat consumption is presented in Table 6.1. While this study did not undertake a consumption survey, the figure of 29.5 kg for annual per capita intake of beef by residents of major urban areas seems to be too high. Comparison of the beef output of the Bobo-Dioulasso and Ouagadougou slaughterhouses in 1966 and 1976, net of exports, with population estimates in those years gives a per capita consumption figure of 15 kg annually.¹

TABLE 6.1
PER CAPITA MEAT CONSUMPTION, 1967
(In Kg per Capita)

| Area | Beef | Small Ruminants | Pork | Other Red Meat | Offals | Fowl | Total |
|--------------------------|------|-----------------|------|----------------|--------|------|-------|
| Major Urban ^a | 29.5 | 1.7 | 0.6 | 0.2 | 7.7 | 1.0 | 40.7 |
| Semi-Urban ^b | 13.0 | 2.2 | 0.4 | 0.1 | 3.6 | 1.2 | 20.5 |
| Rural ^c | 3.0 | 2.5 | 0.5 | 0.3 | 1.0 | 1.0 | 8.5 |
| Total Upper Volta | 4.3 | 2.5 | 0.5 | 0.3 | 1.3 | 1.0 | 9.9 |

SOURCE: SCET International, 1972.

^aOuagadougou and Bobo-Dioulasso with a combined estimated population of 188,000.

^bKoudougou, Kaya, Ouahigouya, Banfora, Réo, Villy, Nourma, Nandiala, Yako, Tenkodogo, Gourcy, Fada N'Gourma, and Tougan with a combined estimated population of 162,000.

^cPopulation estimated at 4,620,000. One would expect consumption of small ruminant meat to exceed that of beef in rural areas. See Delgado, 1980, p. 348)

A comparison of per capita meat consumption in Upper Volta and in neighboring countries in 1967 is shown in Table 6.2. This table does not account for fish consumption, which is much higher in coastal than in inland countries. When the measure is annual intake of animal protein, including fish, Upper Volta, (two kg fish per capita) falls far behind countries like Ivory Coast (22 kg fish per capita). Urban meat consumption, particularly of beef and offals, is several times that of rural consumption. To the degree that Upper Volta continues to urbanize, per capita meat and beef consumption should continue to rise.

TABLE 6.2
PER CAPITA MEAT CONSUMPTION IN WEST AFRICA IN 1967
(In Kg)

| Country | Consumption Per Capita |
|-------------|---------------------------|
| Niger | 14.6 |
| Upper Volta | 9.9 |
| Ivory Coast | 9.8 |
| Nigeria | 7.7 |
| Togo | 6.8 |
| Benin | 6.4 |
| Ghana | 4.3 |

SOURCE: SCET International, 1972, p. 84.

II. - Projected Meat Consumption Through 1985

A. - Sources of Changes in Consumption

Meat consumption in Upper Volta can be expected to rise because of population growth, income growth, and increasing urbanization. As the population grows, so will the domestic demand for meat, even if per capita consumption remains the same. The population of Upper Volta was 5.5 million in mid-1977 and was growing at 1.6 percent (IBRD, 1979). If that rate of growth continues, then meat consumption should grow at least as much.

As per capita incomes grow, so does the consumption of meat; how fast it grows depends on the income elasticity of demand. Few data are available on the income elasticity of meat consumption in Upper Volta, however. Therefore, a range of values will be used. Delgado (1980, pp. 344-6) suggests that in Mali the income-expenditure elasticity of demand for red meat is 1.25 in urban areas and 1.5 in rural zones. Upper Volta's may be slightly lower. Over the period 1960 to 1977 Voltaic per capita incomes grew at an annual rate of 0.6 percent. Thus if income elasticities of 1.0 and 1.5 were used, per capita consumption would be expected to grow at 0.6-0.9 percent annually.

As shown in the data presented in Table 6.1, urbanization also influences the per capita consumption of beef. Upper Volta had an urbanization rate of 3.6 percent for the years 1970 to 1975 (IBRD, 1979); but a higher rate of 5 percent per annum will be used to approximate future urbanization.² The urban population of Upper Volta was approximately 440,000 or 8 percent of the total population of 5.5 million in mid-1977 (IBRD, 1979).

B. - Projected Consumption

Tables 6.3 and 6.4 show projected rural, urban, and total Voltaic meat consumption through 1985; the first assumes an income elasticity of demand for meat of 1.0, and for offals of 0.5; the second assumes an elasticity of 1.5 for meat and 0.75 for offals. For projection purposes per capita consumption of 15 kg of beef and 2 kg of mutton and goatmeat were used for the urban population. The values for rural areas were 3 kg and 2.5 kg, respectively. Total beef consumption is expected to rise to 28-30,000 tons by 1985, a 32-36 percent increase over 1977. Small ruminant meat consumption is expected to rise to 16-17,000 tons, an increase of 20-23 percent. The reason beef consumption is expected to rise faster than goatmeat and mutton consumption is that urban dwellers have a higher propensity to eat beef, and the urban population is projected to grow much more rapidly than the rural population.

C. - Per Capita Consumption Projections

Per capita meat consumption in 1985 is shown in Table 6.5. The national average of beef consumption per head is expected to rise to 4.5-4.65 kg from 3.96 kg in 1977. Total per capita meat consumption is expected to rise by 6-8 percent over the 1977 level by 1985.

D. - Caveat to Projections

In addition to the assumptions explicitly stated, it is implicitly assumed that the prices of meat will remain constant relative to other goods available to Voltaic consumers. Should meat prices change relative to other goods, these projections would no longer hold. Higher relative prices for meat, perhaps caused by increased demand from coastal markets, would reduce domestic consumption. Lower relative prices, resulting from an increased supply of non-Voltaic chilled meat or fish to coastal markets, could increase Voltaic meat consumption.

TABLE 6.3
PROJECTED VOLTAIC MEAT CONSUMPTION, 1977-1985^a
(Tons)

| Year | Urban | | | | | Rural | | | | | Total | | | | |
|------|--------|---------------|-----------------|--------------------------|--------|--------|---------------|-----------------|--------------------------|--------|--------|---------------|-----------------|--------------------------|--------|
| | Beef | Bovine Offals | Small Ruminants | Other Meats ^b | Total | Beef | Bovine Offals | Small Ruminants | Other Meats ^b | Total | Beef | Bovine Offals | Small Ruminants | Other Meats ^b | Total |
| 1977 | 6,600 | 1,650 | 880 | 792 | 9,922 | 15,180 | 3,795 | 12,650 | 9,108 | 40,733 | 21,780 | 5,445 | 13,530 | 9,900 | 50,655 |
| 1978 | 7,033 | 1,745 | 937 | 844 | 10,559 | 15,484 | 3,863 | 12,903 | 9,290 | 41,540 | 22,518 | 5,608 | 13,841 | 10,134 | 52,101 |
| 1979 | 7,496 | 1,846 | 999 | 899 | 11,240 | 15,795 | 3,933 | 13,162 | 9,477 | 42,367 | 23,291 | 5,779 | 14,162 | 10,376 | 53,608 |
| 1980 | 7,989 | 1,953 | 1,065 | 958 | 11,965 | 16,112 | 4,003 | 13,426 | 9,667 | 43,208 | 24,101 | 5,957 | 14,492 | 10,626 | 55,176 |
| 1981 | 8,514 | 2,066 | 1,135 | 1,021 | 12,736 | 16,435 | 4,076 | 13,696 | 9,861 | 44,068 | 24,950 | 6,142 | 14,831 | 10,883 | 56,806 |
| 1982 | 9,074 | 2,185 | 1,209 | 1,088 | 13,556 | 16,765 | 4,149 | 13,971 | 10,059 | 44,944 | 25,839 | 6,335 | 15,180 | 11,148 | 58,502 |
| 1983 | 9,671 | 2,312 | 1,289 | 1,160 | 14,432 | 17,101 | 4,224 | 14,251 | 10,260 | 45,836 | 26,772 | 6,536 | 15,540 | 11,421 | 60,269 |
| 1984 | 10,306 | 2,445 | 1,374 | 1,236 | 15,361 | 17,444 | 4,300 | 14,537 | 10,466 | 46,747 | 27,751 | 6,746 | 15,911 | 11,703 | 62,111 |
| 1985 | 10,984 | 2,587 | 1,464 | 1,318 | 16,353 | 17,794 | 4,378 | 14,828 | 10,676 | 47,676 | 28,779 | 6,965 | 16,293 | 11,994 | 64,031 |

^aAssuming an income elasticity of demand of 1.0 for meats and 0.5 for offals.

^bInclude pork, fowl, and other meats.

^cTotals may not add up due to truncation errors.

TABLE 6.4
ALTERNATIVE VOLTAIC MEAT CONSUMPTION PROJECTIONS, 1977-85
(Tons)

| Year | Urban | | | | | Rural | | | | | Total | | | | |
|------|--------|------------------|--------------------|------------------------------|--------|--------|------------------|--------------------|------------------------------|--------|--------|------------------|--------------------|------------------------------|--------|
| | Beef | Bovine Offals | Small Ruminants | Other, ^b Meats | Total | Beef | Bovine Offals | Small Ruminants | Other, ^b Meats | Total | Beef | Bovine Offals | Small Ruminants | Other, ^b Meats | Total |
| 1977 | 6,600 | 1,650 | 880 | 792 | 9,922 | 15,180 | 3,795 | 12,650 | 9,108 | 40,733 | 21,780 | 5,445 | 13,530 | 9,900 | 50,655 |
| 1978 | 7,086 | 1,751 | 944 | 850 | 10,631 | 15,515 | 3,867 | 12,929 | 9,309 | 41,620 | 22,602 | 5,619 | 13,874 | 10,159 | 52,254 |
| 1979 | 7,608 | 1,860 | 1,014 | 913 | 11,395 | 15,858 | 3,940 | 13,215 | 9,515 | 42,528 | 23,467 | 5,801 | 14,229 | 10,428 | 53,925 |
| 1980 | 8,169 | 1,975 | 1,089 | 980 | 12,213 | 16,208 | 4,016 | 13,507 | 9,725 | 43,456 | 24,378 | 5,991 | 14,596 | 10,705 | 55,670 |
| 1981 | 8,771 | 2,097 | 1,169 | 1,052 | 13,089 | 16,567 | 4,092 | 13,805 | 9,940 | 44,404 | 25,339 | 6,189 | 14,975 | 10,992 | 57,495 |
| 1982 | 9,418 | 2,226 | 1,255 | 1,130 | 14,029 | 16,933 | 4,170 | 14,111 | 10,160 | 45,374 | 26,351 | 6,397 | 15,366 | 11,290 | 59,404 |
| 1983 | 10,112 | 2,364 | 1,348 | 1,213 | 15,037 | 17,307 | 4,249 | 14,423 | 10,384 | 46,363 | 27,420 | 6,614 | 15,771 | 11,598 | 61,403 |
| 1984 | 10,858 | 2,510 | 1,447 | 1,302 | 16,117 | 17,690 | 4,330 | 14,741 | 10,614 | 47,375 | 28,548 | 6,841 | 16,189 | 11,917 | 63,495 |
| 1985 | 11,658 | 2,665 | 1,554 | 1,399 | 17,276 | 18,081 | 4,413 | 15,067 | 10,848 | 48,409 | 29,739 | 7,078 | 16,622 | 12,247 | 65,686 |

^a Assuming an income elasticity of demand of 1.5 for all meats, and 0.75 for offals.

^b Includes pork, fowl, and other red meats.

^c Totals may not add up due to truncation errors.

TABLE 6.5
 PROJECTED PER CAPITA MEAT CONSUMPTION, 1977, 1985
 (Kilograms)

| Population and Type of Meat | Year | | |
|-----------------------------|-------|-------------------|-------------------|
| | 1977 | 1985 ^a | 1985 ^b |
| <u>Urban</u> | | | |
| Beef | 15.00 | 16.90 | 17.93 |
| Bovine Offals | 3.75 | 3.98 | 4.10 |
| Small Ruminants | 2.00 | 2.25 | 2.39 |
| Other Meats | 1.80 | 2.03 | 2.15 |
| Total | 22.55 | 25.16 | 26.57 |
| <u>Rural</u> | | | |
| Beef | 3.00 | 3.10 | 3.14 |
| Bovine Offals | 0.75 | 0.76 | 0.77 |
| Small Ruminants | 2.50 | 2.58 | 2.62 |
| Other Meats | 1.80 | 1.86 | 1.89 |
| Total | 8.05 | 8.30 | 8.42 |
| <u>Total</u> | | | |
| Beef | 3.96 | 4.50 | 4.65 |
| Bovine Offals | 1.27 | 1.09 | 1.11 |
| Small Ruminants | 2.46 | 2.55 | 2.60 |
| Other Meats | 1.80 | 1.88 | 1.92 |
| Total | 9.49 | 10.02 | 10.28 |

^aIncome elasticity of demand of 1.0 for meats and 0.5 for offals.

^bIncome elasticity of demand of 1.5 for meats and 0.75 for offals.

CHAPTER SEVEN

EXPORTS OF CATTLE AND RED MEAT

This chapter describes the history of Voltaic cattle and meat exports from 1960 to 1977, shows the sources and destinations, and examines seasonal patterns. The chapter is divided into three parts: cattle exports, meat exports, and small ruminant exports.

I. - Cattle Exports

A. - Importance and Description

Livestock products are Upper Volta's largest category of exports; they account for nearly one-half of official exports by value. Most official exports and export tax revenues come from the shipment of live animals (mostly cattle) to coastal markets. However, livestock exports have been declining in volume and percent of total Voltaic exports (SCET International, 1972, Part II, pp. 211-213).

The cattle exported are of the largest size (average net carcass weight 150 kilograms) and the highest quality produced, for three reasons: they must be healthy to make the long trip to coastal markets; there is much greater demand for high quality beef on the coast than in Upper Volta; and fixed costs per head exported can be spread over a greater number of kilograms (Herman, 1979). Exported cattle are usually males, either adult steers or bulls. Exported cattle account for about 13 percent of offtake (IBRD, 1975a, Annex 1, p. 4).

The countries importing Voltaic cattle are Ivory Coast, Ghana, Togo, Benin, and Nigeria. Two-thirds of the total number of cattle shipped to Ivory Coast go by train and one-third are trekked. Cattle are often trekked, rather than shipped by rail, to avoid paying export taxes. Trucking is used to export cattle to Togo only; exports to all other countries are on the hoof. In 1970, 63 percent of cattle exports went by train, 36 percent on hoof, and 1 percent by truck (SEDES, 1975b, p. 164). As exports since 1970 have shifted away from Ivory Coast, the proportion shipped by train has fallen and that on the hoof has risen.¹

B. - Recent History of Cattle Exports

1) - 1960-1965

The period 1960 to 1965 was a period of growth in cattle exports. As shown in Table 7.1 and Figure 7.1, exports grew steadily in this early-independence period, increasing 9.2 percent per year, on average. The initial spur to this growth was probably the completion of the Ouagadougou-Abidjan rail line in 1954. Three reasons for the growth of exports in 1960-1965 are: growth of herd size and offtake due to favorable environmental conditions;

TABLE 7.1

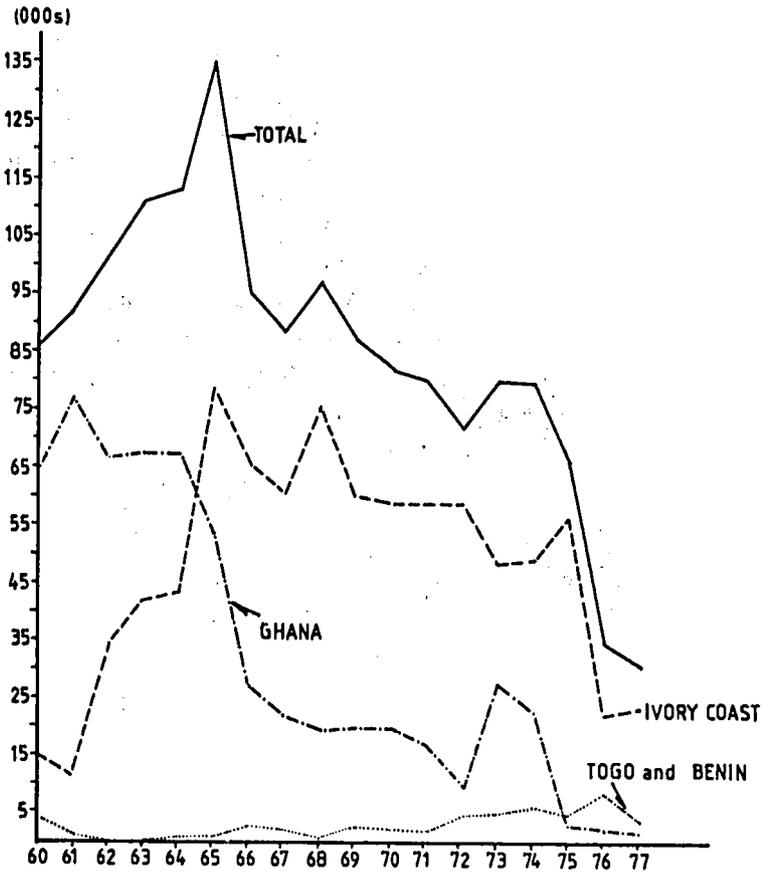
EVOLUTION OF CATTLE EXPORTS FROM UPPER VOLTA, 1960-1977

| Year | Destination | | | | | | Total Number Exported |
|----------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|--------------------------|
| | Ivory Coast | | Ghana | | Togo and Benin | | |
| | Number of Head | Percent of Total | Number of Head | Percent of Total | Number of Head | Percent of Total | |
| 1960 | 16,406 | 19 | 64,648 | 74 | 5,895 | 7 | 86,949 |
| 1961 | 12,280 | 13 | 78,427 | 84 | 2,128 | 2 | 92,835 |
| 1962 | 34,397 | 33 | 67,803 | 66 | 509 | 1 | 102,709 |
| 1963 | 43,852 | 39 | 68,382 | 61 | - | - | 112,234 |
| 1964 | 44,235 | 39 | 68,638 | 60 | 1,703 | 1 | 114,576 |
| 1965 | 79,486 | 59 | 53,765 | 40 | 1,940 | 1 | 135,189 |
| 1966 | 66,629 | 68 | 27,306 | 28 | 4,054 | 4 | 97,989 |
| 1967 | 62,239 | 70 | 23,184 | 26 | 3,046 | 4 | 88,469 |
| 1968 | 76,824 | 78 | 19,396 | 20 | 2,083 | 2 | 98,303 |
| 1969 | 62,539 | 72 | 20,711 | 24 | 3,458 | 4 | 86,708 |
| 1970 | 59,207 | 71 | 20,865 | 25 | 3,248 | 4 | 83,320 |
| 1971 | 59,589 | 73 | 18,482 | 23 | 3,045 | 4 | 81,116 |
| 1972 | 58,041 | 80 | 9,949 | 14 | 4,915 | 7 | 72,905 |
| 1973 | 48,573 | 60 | 27,497 | 34 | 5,365 | 7 | 81,435 |
| 1974 | 49,490 | 62 | 23,481 | 29 | 6,957 | 9 | 79,928 |
| 1975 | 57,918 | 87 | 3,706 | 6 | 4,826 | 7 | 66,450 |
| 1976 | 23,219 | 66 | 3,503 | 10 | 8,416 | 24 | 35,138 |
| 1977 | 24,729 | 78 | 2,835 | 9 | 4,004 | 13 | 31,892 ^a |
| TOTAL (1960-1977) | 879,653 | 57 | 602,576 | 39 | 65,592 | 4 | 1,548,145 |
| TOTAL (1967-1977) | 582,368 | 72 | 173,609 | 22 | 49,363 | 6 | 805,664 |

SOURCE: Statistiques, Service de l'Élevage, Ouagadougou.

^aIncludes 324 head exported to Nigeria.

FIGURE 7.1: Evolution and Destinations of Cattle Exports from Upper Volta, 1960 —1977



SOURCE: Statistiques, Service de l'Elevage, Ouagadougou.

increased demand from the rapidly growing Ivorian economy; and improved transportation systems, which reduced exporter response time to changing market conditions. In addition, it is believed that record-keeping for cattle exports improved (Herman, 1979).

2) - 1965-Present

Cattle exports dropped precipitously from 1965 to 1966; thereafter the pattern was of uneven, slight decline through 1975, followed by a sharp drop-off in 1976. The first major fall in exports was due mainly to a dramatic decrease in shipments to Ghana; the second seems to have been due to a decline in sales to Ivory Coast. Both of these drop-offs were probably caused by demand conditions in the two major consuming countries, which will be discussed in the next section.

There were two periods of drought affecting the supply of cattle in Upper Volta. The first, in 1968, resulted in an immediate surge of export sales as herders tried to salvage some gain from cattle weakened due to the lack of rainfall. The 1968 drought also reduced the number of surviving calves. This showed up as a supply decrease in 1972, when offtake was reduced so that herds could be rebuilt and there were fewer four-year-old cattle.

The second period of drought lasted from 1972 to 1973. The effect of distress sales on supply showed up in 1973 and 1974; that of the decrease in four-year-old cattle showed in 1976 and 1977. The combination of reduced supply and reduced demand for Sahelian beef in Ivory Coast in 1976 and 1977 caused the serious decrease in exports in those years. Such low numbers of cattle exports from Upper Volta (as low as about 20,000) had not occurred since the construction of the Ouagadougou-Abidjan railroad in 1954. However, it has been suggested that many exports to alternative markets in Niger and Nigeria in the 1970s went unrecorded (Herman, 1979).

C. - Destinations of Cattle Exports

1) - Exports to Ghana

In the period from 1960 to 1964, Ghana was the leading importer of Voltaic cattle. The Ghanaian share of Voltaic imports began dropping significantly in 1965, levelling off in 1967-1971. In the earlier period the Ghanaian share was in the neighborhood of 60 percent or more; it fell to the twenties in 1967-1971, then followed an erratic pattern from 1972 to 1977, ending with only 6 percent of imports.

The large decline in Ghanaian cattle imports in 1965 and 1966 was probably due to political instability² and uncertainties surrounding the value of the new Ghanaian currency, the cedi.

Through the period 1967-1971 the quantity of Voltaic cattle imported by Ghana remained fairly constant, but at a lower level than pre-1965. The sharp decline in cattle

imported by Ghana in 1972 was again due to political and economic turmoil there. In January of 1971 the cedi was devalued by 55 percent. A military coup occurred in January 1972; then, in February, the new government revalued the cedi by 45 percent. The uncertainties about the value of the cedi were enough to deter cattle imports alone; however, the new government disrupted the cattle trade further by requiring foreign cattle merchants to sell to Ghanaian traders only at border quarantine stations.³

In March 1972 the Cattle Development Board (later renamed the Meat Marketing Board, or MMB) was established in Ghana. The MMB's function is to purchase, transport, and arrange for the distribution of all cattle imported into Ghana.

The MMB had trouble importing many Voltaic cattle in the remainder of 1972 because of drought-caused supply reductions, and a maximum authorized buying price that was low relative to that paid in other coastal markets (Sullivan, 1979, in Volume II of this series.) In 1973 and 1974 the MMB made substantial cattle purchases in the Ouagadougou market but was spending itself out of its cash reserves. This occurred because of two factors: (1) The MMB was forced to pay a higher price for cattle than it was allowed to charge at retail because of price controls. Later both the official buying and retail prices were raised. (2) An outbreak of hoof and mouth disease infected quarantine stations on the northern border in December 1973, causing a backup of cattle at the border; in the meantime, alternate sources were found for meat. When the border was reopened, markets were saturated, cattle went unsold into the dry season, and many lost substantial amounts of weight or died (Sullivan, 1979).

The financial problems of the MMB reduced its role in the Ouagadougou market in 1975, 1976, and 1977. The MMB was only authorized to pay cedis 0.30/lb. liveweight for cattle in 1977, despite the fact that the going price was cedis 0.60/lb.⁴ In addition, the lagged effect of the 1972-1973 drought on offtake had a negative impact on supplies of Voltaic cattle in 1976-1977. Private Voltaic cattle merchants lost confidence in their ability to profit from sales to Ghana because of the problems with quarantine in 1974 and delays in payment for sales which had to pass through the Bank of Ghana because of currency controls. These factors combined to reduce official Ghanaian imports of cattle from Upper Volta in 1976-1977 to the lowest levels recorded in at least forty-five years.

2) - Exports to Ivory Coast

Ivory Coast was second to Ghana as an importer of Voltaic cattle at the time of independence, but moved quickly to become the largest importer by 1965. From 1967 to 1977 Ivory Coast accounted for 72 percent of Voltaic cattle exports, and the quantity was fairly constant from 1967 to 1975. The only significant deviations from the norm of about 60,000 head per year came in 1968, when imports rose to 76,824 head, probably as a result of the increased supply due to drought-induced salvage sales, and in 1973 and 1974 when imports fell below 50,000 head, probably because of the competition for Ouagadougou cattle on the part of Ghana's MMB.

The dramatic fall in Ivorian Imports of Voltaic cattle in 1976 and 1977 (to less than 25,000 head each year) can be explained by three factors: (1) reduced supply in Upper Volta as a result of the destocking of herds in the 1972-1973 drought, (2) competing demands for Voltaic cattle, particularly in Niger and Nigeria, and (3) competition from less expensive frozen beef imports into Ivory Coast. The lagged effect of the drought was noted earlier. In late 1975 Ivory Coast began importing large amounts of inexpensive frozen beef from Europe and South America to assure a stable source of beef in the face of falling Sahelian cattle supplies (Staatz, 1979, 1980). At the same time, Niger closed its borders to cattle exports and instituted a herd reconstitution program. The effects were to draw cattle eastward from Upper Volta toward Niger (young stock) and Nigeria (slaughter cattle to replace the diminished Nigerien supply).

3) - Exports to Togo, Benin, and Other Countries

Togo and Benin imported a small share of Voltaic cattle throughout the 1960-1977 period. Their share of Voltaic exports was slowly growing in the early seventies; it reached 9 percent in 1974. Then, in 1976 there was a sudden surge of imports of Voltaic cattle, as the number imported went from 4,826 to 8,416. The Togo-Benin share of Voltaic exports went up to 24 percent. Contributing to this increase was lower demand for Voltaic cattle by Ivory Coast as a result of frozen meat imports. In 1977 Togo-Benin imports fell to their lowest level since 1971. There were no outstanding events in Togo and Benin during this period which would have significantly affected demand (Josserand, 1979, in Volume II of this series.

Only 324 Voltaic cattle were officially exported to Nigeria in the 1960-1977 period. However, since the cutoff of exports of cattle from Niger to Nigeria in 1976, Nigeria has looked increasingly toward Upper Volta as a source of cattle.

In 1976, Nigerian cattle traders began appearing in increasing numbers in cattle markets along the Upper Volta-Niger border. After several months, Voltaic traders established their own contacts in markets in Niger and northwestern Nigeria and exported animals directly. Currently, cattle are trekked through northern Benin by Voltaic merchants and resold at Nigerian border markets. Since few such exports are officially recorded, the importance of this flow is not known.

D. - Sources of Cattle Exports

Table 7.2 shows the sources (by Upper Volta's three major regions) and destinations of export and transit cattle⁵ in 1970-1975, as officially recorded. The majority (52 percent) of Voltaic export cattle in this period came from the central and north region. The east and west regions supplied 21 and 27 percent of 1970-1975 cattle exports, respectively. More transit cattle (46 percent) passed through the east than through the other regions. The

TABLE 7.2

CATTLE FLOWS: EXPORTS AND TRANSITS BY REGION, 1970-1975

| WEST (BOBO-DIOULASSO) | | | | | | |
|------------------------------|----------------|---------------|--------------|----------|----------------|---------------|
| YEAR | TO IVORY COAST | | TO GHANA | | TOTAL | |
| | EXPORTS | TRANSITS | EXPORTS | TRANSITS | EXPORTS | TRANSITS |
| 1970 | 28,304 | 13,096 | 102 | -- | 28,406 | 13,096 |
| 1971 | 16,866 | 22,486 | 119 | -- | 16,985 | 22,486 |
| 1972 | 14,260 | 15,155 | 162 | -- | 14,422 | 15,155 |
| 1973 | 21,230 | 24,664 | 824 | -- | 22,054 | 24,664 |
| 1974 | 21,030 | 5,520 | 1,386 | -- | 22,416 | 5,520 |
| 1975 | 22,971 | 3,702 | 391 | -- | 23,362 | 3,702 |
| TOTAL | 124,661 | 84,623 | 2,984 | | 127,645 | 84,623 |
| Percent of Regional Total | 98 | 100 | 2 | 0 | 100 | 100 |
| Percent of Grand Total | 37 | 97 | 3 | 0 | 27 | 31 |

TABLE 7.2 (Continued)

| CENTRAL AND NORTH (OUAGADOUGOU, KAYA, AND MARKOYE) | | | | | | |
|---|----------------|----------|----------|----------|----------------------|----------|
| YEAR | TO IVORY COAST | | TO GHANA | | TOTAL | |
| | EXPORTS | TRANSITS | EXPORTS | TRANSITS | EXPORTS | TRANSITS |
| 1970 | 30,903 | — | 3,295 | 13,610 | 34,198 | 13,610 |
| 1971 | 42,628 | 1,824 | 3,569 | 17,801 | 46,197 | 19,625 |
| 1972 | 43,781 | 858 | 739 | 15,596 | 44,520 | 16,454 |
| 1973 | 27,343 | 98 | 14,086 | 5,447 | 41,429 | 5,545 |
| 1974 | 28,460 | 170 | 8,940 | 5,321 | 37,400 | 5,491 |
| 1975 | 34,947 | 100 | 1,527 | — | 36,474 | 100 |
| TOTAL | 208,062 | 3,050 | 32,156 | 57,775 | 240,218 ^a | 60,825 |
| Percent of Regional Total | 87 | 5 | 13 | 95 | 100 | 100 |
| Percent of Grand Total | 63 | 3 | 31 | 35 | 52 | 23 |

TABLE 7.2 (Continued)

| EAST (POUYTENGA) | | | | | | | | |
|------------------------------|---------------|----------------|---------------|---------------|--------------|-----------|---------------------------|----------------|
| YEAR | TO GHANA | | TO TOGO | | TO BENIN | | TOTAL | |
| | EXPORTS | TRANSITS | EXPORTS | TRANSITS | EXPORTS | TRANSITS | EXPORTS | TRANSITS |
| 1970 | 17,468 | 29,872 | 2,663 | 4,309 | 585 | 58 | 20,716 | 34,239 |
| 1971 | 14,794 | 26,364 | 2,685 | 2,389 | 360 | -- | 17,839 | 28,753 |
| 1972 | 9,048 | 12,667 | 4,638 | 3,894 | 189 | -- | 13,875 | 16,561 |
| 1973 | 12,587 | 19,632 | 4,645 | 1,821 | 709 | -- | 17,941 | 21,453 |
| 1974 | 13,156 | 16,384 | 6,669 | 2,980 | 288 | -- | 20,113 | 19,364 |
| 1975 | <u>1,788</u> | <u>809</u> | <u>4,811</u> | <u>2,061</u> | <u>15</u> | <u>--</u> | <u>6,614</u> | <u>2,870</u> |
| TOTAL | 68,841 | 105,728 | 26,111 | 17,454 | 2,146 | 58 | 97,098^b | 123,240 |
| Percent of Regional Total | 71 | 86 | 27 | 14 | 2 | 0 | 100 | 100 |
| Percent of Grand Total | 66 | 65 | 100 | 100 | 100 | 100 | 21 | 46 |

TABLE 7.2 (Continued)

| YEAR | TOTAL UPPER VOLTA | | | | | | | | | |
|------------------------------|----------------------|---------------|----------------|----------------|---------------|---------------|--------------|-----------|----------------|----------------|
| | TO IVORY COAST | | TO GHANA | | TO TOGO | | TO BENIN | | TOTAL | |
| | EXPORTS | TRANSITS | EXPORTS | TRANSITS | EXPORTS | TRANSITS | EXPORTS | TRANSITS | EXPORTS | TRANSITS |
| 1970 | 59,207 | 13,096 | 20,865 | 43,482 | 2,663 | 4,309 | 585 | 58 | 83,320 | 60,945 |
| 1971 | 59,569 | 24,310 | 18,482 | 44,165 | 2,685 | 2,389 | 360 | -- | 81,096 | 70,864 |
| 1972 | 58,041 | 16,013 | 9,949 | 28,263 | 4,726 | 3,894 | 189 | -- | 72,905 | 48,170 |
| 1973 | 48,573 | 24,762 | 27,497 | 25,079 | 4,656 | 1,821 | 709 | -- | 81,435 | 51,662 |
| 1974 | 49,490 | 5,690 | 23,482 | 21,705 | 6,669 | 2,980 | 288 | -- | 79,929 | 30,375 |
| 1975 | <u>57,918</u> | <u>3,802</u> | <u>3,706</u> | <u>809</u> | <u>4,811</u> | <u>2,061</u> | <u>15</u> | <u>--</u> | <u>66,450</u> | <u>6,672</u> |
| TOTAL | 332,798 | 87,673 | 103,981 | 163,503 | 26,210 | 17,454 | 2,146 | 58 | 465,135 | 268,688 |
| Percent of Regional Total | 72 | 33 | 22 | 61 | 6 | 6 | 1 | 0 | 100 | 100 |
| Percent of Grand Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

SOURCE: Statistiques, Service de l'Elevage, Ouagadougou.

^aIncludes a small number of exports to Togo.

^bIncludes a small number of exports to Ivory Coast.

export cattle from the west, central and north regions were headed mainly to Ivory Coast. Transit cattle going through the west were also destined for Ivorian markets, but 95 percent of transit cattle in the central and north went to Ghana. The Ghanaian market was the major destination for both export and transit cattle in the east. Togo took 27 percent of exports from the east and 14 percent of transits there; Benin was not a market. Transits in all regions declined in 1974 and 1975, showing the effects of the drought on the other countries of origin for cattle and the disruptions caused by the border conflict with Mali. Only the east region of Upper Volta in 1975 showed a significant decline in exports as a result of the drought. Exports to Ghana were strong in 1973 and 1974 as a result of the activity by Ghana's MMB in Voltaic markets, as explained above. In 1975 both exports and transits to Ghana declined dramatically, reflecting the quarantine and currency problems there. In 1976 the Voltaic government banned all livestock transits.

II. - Meat Exports

A. - Importance and Description

Nearly all Voltaic meat exports go to Ivory Coast.⁶ Over four-fifths of meat exports are beef (Herman, 1979). The meat is shipped from Ouagadougou and Bobo-Dioulasso mainly in refrigerated rail cars owned by CODEPAG (a private, mainly French company now called Fruitière Ivoirienne), on the RAN. It is a policy goal of Upper Volta to increase meat exports so that more of the value added to livestock products will originate in Upper Volta.

B. - Meat Exports from 1960 to 1977

Total meat exports made up less than 10 percent of the edible portion of Voltaic livestock-product exports in 1960-1977.⁷ The quantity exported rose fairly steadily from 1960 to 1968, rising from 425 tons to 1,692 tons (Table 7.3 and Figure 7.2). From the peak in 1968, meat exports declined gradually to 878 tons in 1974; then, in 1975 and 1976 a sharp drop-off occurred, leaving exports at only 189 tons in 1977. The peak in 1968 may have been due, once again, to the temporary increase in the supply of beef because of drought-induced salvage sales. Also during this period, mechanical problems with refrigerated rail cars caused losses for meat exporters, reducing their willingness to export in the next few years (Herman, 1979). The fall in exports below pre-1968 levels which occurred in 1971-1974 may have been due to the lagged destocking effect on the Voltaic herd. The low quantities exported in 1975-1977 were certainly a result of the substitution of non-West African meat imports in Ivory Coast in those years, as will be explained below.

C. - The Market for Voltaic Meat in Ivory Coast

Total annual Ivorian meat imports rose from 406 to 1,352 tons from 1960 to 1967; the Voltaic share of those imports rose from 42.4 to 65.2 percent (Staatz, 1980, p. 43). From

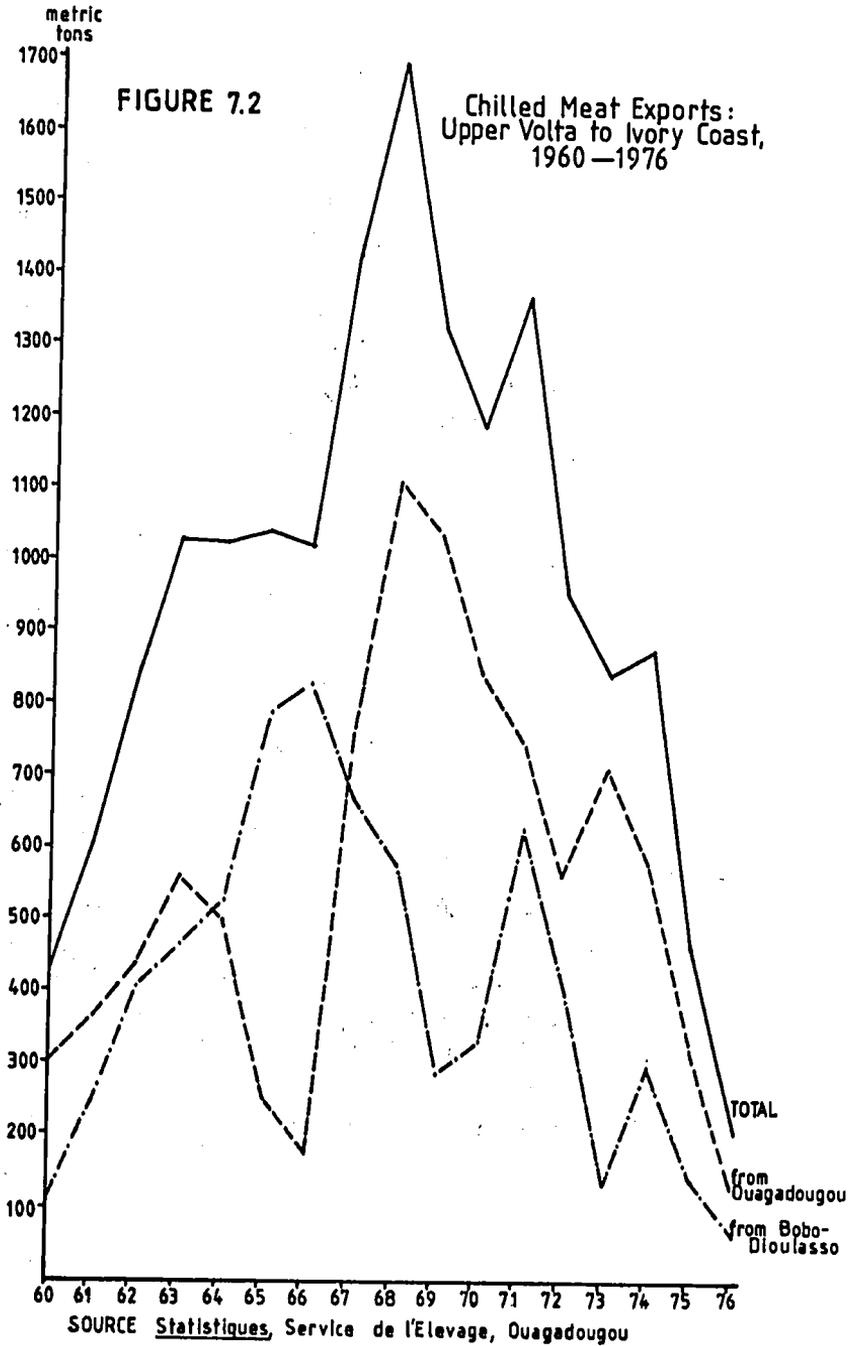
TABLE 7.3

CHILLED MEAT EXPORTS: UPPER VOLTA TO IVORY COAST, 1960-1977
(In Metric Tons)

| Year | FROM OUAGADOUGOU | | FROM BOBO-DIOULASSO | | TOTAL MEAT EXPORTS |
|-------------|------------------|----------------------------|---------------------|----------------------------|-----------------------|
| | Meat Exports | % of Total Meat Exports | Meat Exports | % of Total Meat Exports | |
| 1960 | 306 | 72 | 119 | 38 | 425 |
| 1961 | 366 | 60 | 248 | 50 | 614 |
| 1962 | 437 | 52 | 409 | 48 | 846 |
| 1963 | 561 | 54 | 471 | 46 | 1,032 |
| 1964 | 506 | 49 | 528 | 51 | 1,034 |
| 1965 | 255 | 24 | 791 | 76 | 1,046 |
| 1966 | 177 | 18 | 829 | 82 | 1,006 |
| 1967 | 760 | 53 | 670 | 47 | 1,430 |
| 1968 | 1,112 | 66 | 580 | 34 | 1,692 |
| 1969 | 1,040 | 78 | 287 | 22 | 1,327 |
| 1970 | 850 | 71 | 339 | 29 | 1,189 |
| 1971 | 749 | 55 | 625 | 45 | 1,374 |
| 1972 | 565 | 59 | 399 | 41 | 964 |
| 1973 | 715 | 84 | 139 | 16 | 854 |
| 1974 | 582 | 66 | 296 | 34 | 878 |
| 1975 | 326 | 69 | 147 | 31 | 473 |
| 1976 | 138 | 65 | 74 | 35 | 212 |
| 1977 | - | - | - | - | 189 |
| TOTAL | | | | | |
| (1960-1976) | 9,445 | 58 | 6,951 | 42 | 16,396 |
| (1966-1976) | 7,014 | 62 | 4,385 | 38 | 11,399 ^a |

SOURCE: Statistiques, Service de l'Elevage, Ouagadougou.

^a1966-1977 total meat exports were 11,588 tons.



1967 to 1974 Ivorian meat imports were fairly constant, ranging from 1,077 tons in 1973 to 1,521 tons in 1969. The small quantities of meat imported from Mali ceased in 1970. The Voltaic share of 1967-1974 Ivorian imports grew from 65.2 to 77.0 percent. Over 90 percent of Ivory Coast's meat imports in this period came from Sahelian countries; the remainder came from Europe. This imported meat was almost entirely high quality beef, sold in European-style butcher shops.

Beginning in 1975, however, Ivory Coast made substantial imports of frozen and chilled meat from new sources in South America and Southern Africa and increased imports from Europe. The quantity of meat imported into Ivory Coast rose from 1,243 tons in 1974 to 16,611 tons in 1976 and again to 17,961 tons in 1978 (Staatz, 1980, p. 48). These new non-Sahelian imports were of a different quality than pre-1975 Sahelian imports; most were of lower quality, were shipped frozen by sea, and were suitable for sale to ordinary Ivorian consumers on the class 2 market. The lower quality meat imports competed favorably with locally slaughtered cattle, helping to reduce the demand for Sahelian cattle. In addition, air-transported high-quality meat began to be imported by Ivory Coast from non-Sahelian sources. These imports replaced much of the traditional Sahelian meat imports. The Sahelian share of Ivorian meat imports fell abruptly from 88 percent in 1974, to 12 percent in 1975 and to less than one percent in 1978. Upper Volta's share of the Ivorian market fell in parallel fashion (Staatz, 1980, p. 43):

| <u>Year</u> | <u>Percent</u> |
|-------------|----------------|
| 1974 | 77.0 |
| 1975 | 8.4 |
| 1976 | 1.2 |
| 1977 | ± 1.1 |
| 1978 | 0.3 |

(first 6 months)

D. - Seasonality of Cattle Exports

The seasonal pattern of Voltaic cattle exports is determined by supply conditions in Upper Volta, demand conditions in the importing countries, and transportation conditions. The supply of cattle for export depends mainly on the demand for cash by herders, millet prices, and the relative condition of cattle. Demand conditions appear to be of lesser importance; their major impact takes the form of competition from Malian cattle supplies. Bad weather, which deters travel by cattle traders, and good weather, which makes trek routes to coastal markets favorable, have a substantial impact on Voltaic cattle exports.

1) - Supply Conditions

Herders supply cattle for sale (for export or domestic consumption) mainly in response to their need for cash and the condition of the animal, which affects both the price it will bring at the market and its potential for rapid weight gain.

Herders need cash to purchase millet, to pay taxes, and to finance traditional ceremonies. Millet prices are relatively low following the harvest (December-February). Hence, herders are willing to sell cattle in this period to generate the necessary cash. Similarly, taxes are due in December each year; so herders have a demand for cash in the fourth quarter. Traditional ceremonies are held in the months of December, January, and February, causing a desire to sell cattle. Thus, cash needs make the supply of cattle relatively large in quarters I and IV.

The condition of cattle is important to the herder's decision to sell; when cattle are in good condition they bring a higher price; when they are in poor condition, a lower price. When they are gaining weight rapidly their value is rising, and it is disadvantageous to sell. Voltaic cattle are in the poorest condition in the hot, dry season (March, April, and May); they gain weight rapidly during the rainy period of June through September, are in peak condition in September through December, and are in slowly deteriorating condition from January to March. All other things being equal, based on animal condition, herders are most likely to sell in September-December, least likely to sell in March-May.

2) - Demand Conditions

The dominant demand condition affecting Voltaic cattle exports is competition from Malian cattle exports on the Ivorian market. In addition, there is seasonality in the Ivorian demand for meat because of holidays, harvest incomes, cyclical urban-rural migration, and possibly some counter-cyclical effect of the Tabaski holiday.

Malian cattle exports are greatest during the months October-February, when the cattle are at their heaviest weights; they are least following the dry season (May-June) when weights are low (Delgado, 1980). Since the trekking period is about sixty days, the arrival of Malian cattle in Ivory Coast is recorded two months later, i.e. peak Ivorian imports of Malian cattle should be in December-April; the lowest quantity in July-September.

All other demand conditions equal, the Malian cattle supply would be competitive with the Voltaic supply in the months December-February, complementary to the Voltaic supply in March and April, and similarly low in June-August.

However, all other demand conditions are not equal. Two factors influencing demand for cattle imports in Ivory Coast are the tradition of holding ceremonies and festivals at the end of the year, in the immediate post harvest period, and the migration of people in and out of high meat-consumption urban areas. When Ivorian incomes are high from sales of crops harvested at the end of the year, the general demand and harvest-festival demand for beef--hence the demand for imported cattle--are high. This demand effect would be expected to show up in December and January.

There is reason to believe that the demand for beef in Ivory Coast is reduced in July and August due to the temporary departure of expatriates, students, and teachers from high beef-consumption urban areas. It has been found (Staat, 1979) that per capita beef

consumption in Ivory Coast is much higher in urban than in rural areas. When the school year ends in June and July many students and teachers from urban boarding schools return to their home villages until September, where they eat less beef, lowering demand. July and August are traditionally vacation months for European expatriates working in Ivory Coast. This also reduces the demand for cattle imports.

Finally, there may be some substitution of mutton for beef consumption during the Tabaski period. Sheep are traditionally slaughtered for the Moslem holiday. The consumption of unusually high amounts of mutton during the Tabaski period may reduce the demand for beef.

Therefore, the expected pattern of demand for Voltaic cattle exports is as follows: highest demand in the post-harvest and ceremonial months, December and January; somewhat lower demand because of strong Malian competition and lower demand in the following months; lowest demand in June, July, and August when urban-rural migration in the major importing country, Ivory Coast, is greatest; and a recovery to moderate demand from September, with rural-urban migration, through November.

3) - Transportation and Travel

The availability of transportation for both animals and traders and the distances of cattle from markets influence the seasonal pattern of exports.

The transportation of animals is limited in two periods during the year, March-May and November-February. The dry season occurs during the former period, which makes trekking of cattle difficult because of the lack of water along trek routes. The latter period is the harvest period in Ivory Coast, causing the RAN rail line to be congested with priority crop shipments.

The annual rainy season transhumance to the north in search of forage takes cattle away from their home villages, making sales for export less likely. The Voltaic transhumance period is from the first rains (May-July) to the end of the harvest season (October-January), when cattle return to graze on crop stubble in the fields. Herds do not spend this whole period on transhumance, however; during this period each herd spends about three months away in the north searching for better conditions. The months June-October are most likely to display reduced exports due to the transhumance.

Another influence on the same period is the effect of the rains on travel by southern cattle merchants. The rains, which sometimes begin as early as May and last through September, make travel from the southern markets to northern production zones difficult, hence they further inhibit cattle exports in this period.

4) - Evidence

The factors which would be expected to positively influence exports of cattle are the demand for cash by herders to buy millet, pay taxes, and finance ceremonies, the demand for

beef and for end-of-year festivities, and the peak physical condition of cattle. All of these positive factors occur in quarters I and IV. The most important negative factors are the poor condition of trek routes and the difficulty of travel by traders during the rainy season, competition from Malian exports, and the period of rapid weight gain. Except for Malian competition, which peaks in quarters I and II, these negative effects come mainly in the second and third quarters.

Table 7.4 shows the quarterly pattern of cattle exports from Upper Volta in 1970-1975. The pattern shown seems to confirm the hypothesis that cattle exports would be relatively high in quarters I and IV and low in quarters II and III.

Tables 7.5 and 7.6 show quarterly patterns of cattle imports by the two largest importers of Voltaic cattle, Ivory Coast and Ghana. The final row of Table 7.5 shows the average percent imported in each quarter for 1974 and 1976 (1975 is left out since there was an unusual drop-off in cattle imports in the last six months of the year). The two-year average shows the expected peak in quarter IV and trough in quarter III, corresponding to the Voltaic pattern of exports. However, the pattern in the first two quarters is the opposite of that of Voltaic exports. Whereas the second quarter is the biggest for Ivorian cattle imports, it is the smallest for Voltaic exports. This reflects both supply and transportation conditions restricting Voltaic exports and the effect of large numbers of Malian and Mauritanian cattle brought to Ivorian markets in quarter II.

For Ghana, the data presented in Table 7.6 show that the first and fourth quarters are the periods of greatest cattle imports, corresponding to Voltaic supply conditions. Imports during the second and third quarters are lower but in reverse order of importance compared to Voltaic exports.

III. - Small Ruminant Exports

A. - Importance and Description

Small ruminants make up a large part of Voltaic livestock exports. Table 7.7 shows that more than 2.7 million sheep and goats were exported from 1967-1977. Over the same period, slightly over 800,000 cattle were exported (see Table 7.1). The relative value of small ruminant exports to cattle exports was roughly 56 percent.⁸ Small ruminant exports never made up more than 19 percent of total Voltaic meat exports in 1967-1977 (Table 7.8). Moreover, their importance seems to be declining; small ruminant meat exports represented less than 8 percent of total meat exports in 1973-1977. As in the cases of cattle and beef, exports of small ruminants and small ruminant meat have been declining in recent years (Tables 7.7 and 7.8).

Ivory Coast is the major market for small ruminant exports, having taken 87 percent of total exports in 1967-1977. Ghana is the second-ranking consumer of Voltaic small

TABLE 7.4
 QUARTERLY CATTLE EXPORTS FROM MAJOR MARKETS,^a
 1970-1975

| Quarters Year | I | | II | | III | | IV | | Total |
|------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|---------|
| | Number of Head | Percent of Total | |
| 1970 | 5,606 | 24 | 4,115 | 18 | 5,410 | 23 | 7,910 | 34 | 23,041 |
| 1971 | 6,142 | 29 | 4,318 | 20 | 5,317 | 25 | 5,317 | 25 | 21,094 |
| 1972 | 1,944 | 9 | 2,096 | 10 | 8,078 | 38 | 9,082 | 43 | 21,200 |
| 1973 | 5,097 | 18 | 3,556 | 12 | 7,031 | 24 | 13,316 | 46 | 29,000 |
| 1974 | 14,139 | 35 | 6,378 | 16 | 7,381 | 18 | 12,314 | 31 | 40,212 |
| 1975 | 8,304 | 31 | 5,063 | 19 | 4,917 | 18 | 8,415 | 32 | 26,699 |
| Total | 41,232 | 28 | 25,526 | 18 | 38,134 | 22 | 56,354 | 32 | 161,246 |

SOURCE: Service de l'Elevage, unpublished data.

^aMajor Markets: Ouagadougou, Bobo-Dioulasso, Kaya, Pouytenga, and Djibo.

TABLE 7.5
 QUARTERLY CATTLE IMPORTS INTO IVORY COAST, 1974-1976

| Quarter | I | II | III | IV |
|-----------------------------|------|------|------|------|
| Year | | | | |
| 1974 | 25.7 | 28.3 | 18.4 | 27.6 |
| 1975 | 38.8 | 27.2 | 19.0 | 14.9 |
| 1976 | 21.3 | 27.5 | 22.3 | 28.9 |
| Aug. of 1974 and 1976 | 23.5 | 27.9 | 20.4 | 28.2 |

SOURCE: Staatz, 1979, p. 82.

TABLE 7.6

GHANA CATTLE IMPORTS, 1967-1977

| Quarters Year | I | | II | | III | | IV | | Total |
|------------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|---------|
| | Number of Head | Percent of Total | |
| 1967 | 18,918 | 32 | 10,605 | 18 | 9,277 | 16 | 19,527 | 34 | 58,327 |
| 1968 | 11,225 | 24 | 5,430 | 12 | 12,069 | 26 | 17,534 | 38 | 46,258 |
| 1969 | 16,072 | 23 | 18,733 | 26 | 10,154 | 14 | 26,559 | 37 | 71,518 |
| 1970 | 17,365 | 28 | 16,261 | 26 | 10,311 | 17 | 17,740 | 29 | 61,677 |
| 1971 | 14,376 | 27 | 10,616 | 20 | 3,315 | 6 | 24,920 | 47 | 53,227 |
| 1972 | 11,325 | 32 | 7,631 | 22 | 6,157 | 18 | 9,946 | 28 | 35,059 |
| 1973 | 12,171 | 23 | 8,675 | 17 | 12,045 | 23 | 19,469 | 37 | 52,360 |
| 1974 | 25,528 | 46 | 11,666 | 21 | 8,318 | 15 | 10,506 | 19 | 56,018 |
| 1975 | 6,896 | 80 | 720 | 8 | 306 | 4 | 734 | 8 | 8,656 |
| 1976 | 1,491 | 35 | 544 | 13 | 1,531 | 36 | 640 | 15 | 4,206 |
| 1977 | 1,652 | 42 | 616 | 16 | 587 | 15 | 1,090 | 28 | 3,945 |
| Total 1967- 1977 | 137,019 | 30 | 91,497 | 20 | 74,070 | 16 | 148,665 | 33 | 451,251 |

SOURCE: Ghana Veterinary Statistics.

FIGURE 7.3
 DESTINATIONS OF VOLTAIC SMALL RUMINANT EXPORTS, 1960-1977

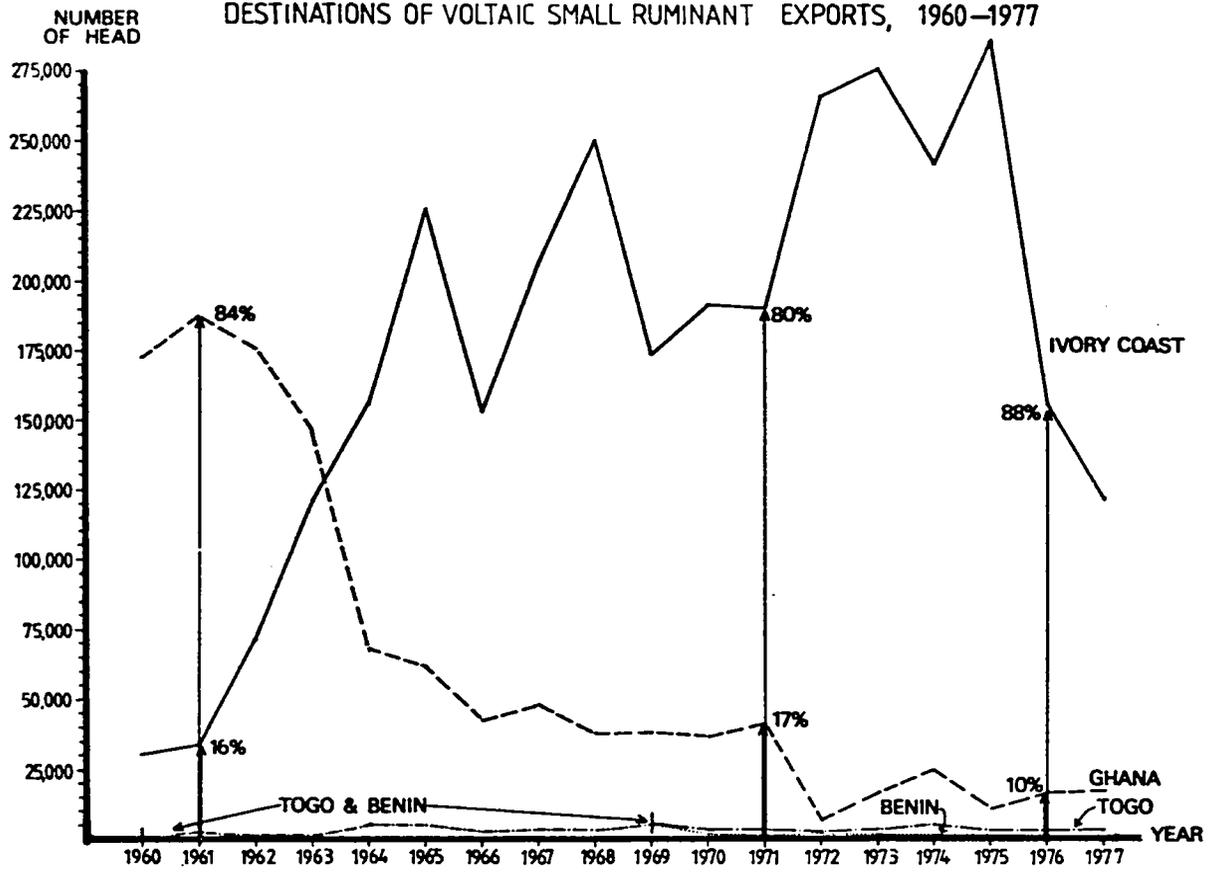


FIGURE 7.4
EVOLUTION OF SHEEP EXPORTS FROM UPPER VOLTA, 1970-1977

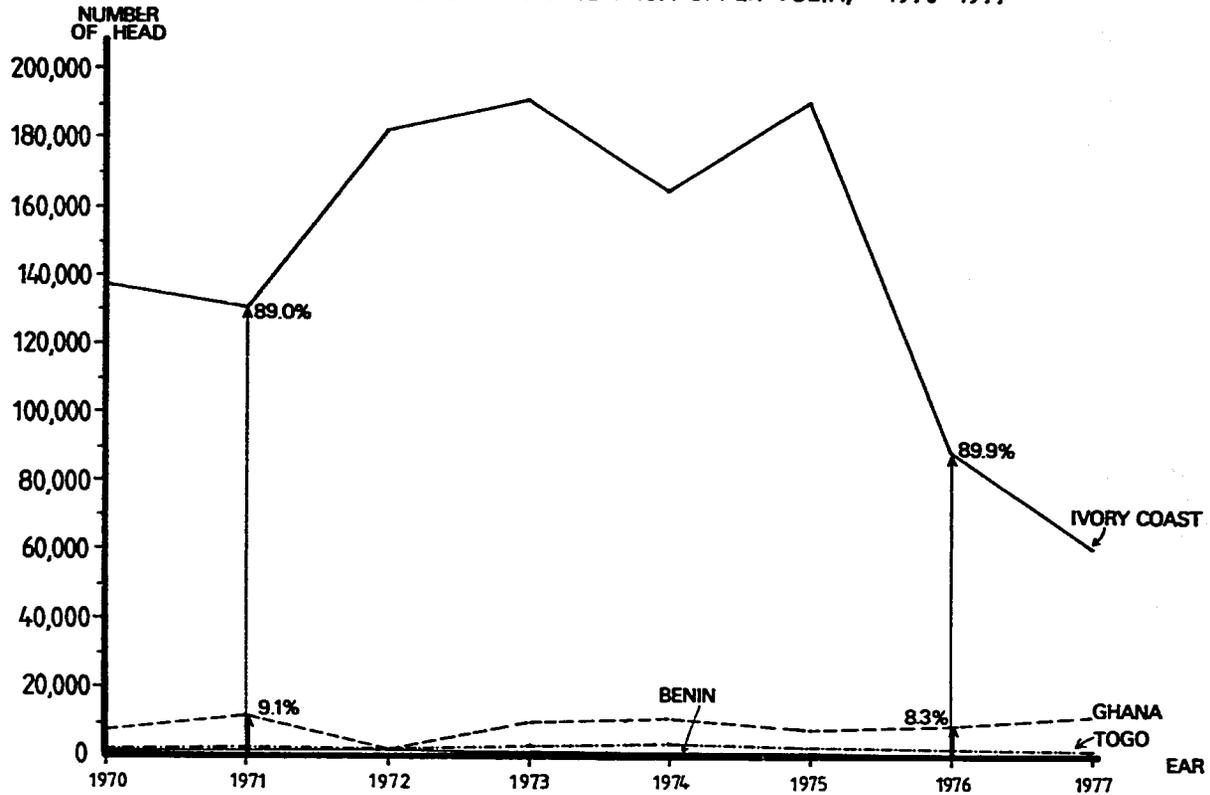


FIGURE 7.5
EVOLUTION OF GOAT EXPORTS FROM UPPER VOLTA, 1970-1977

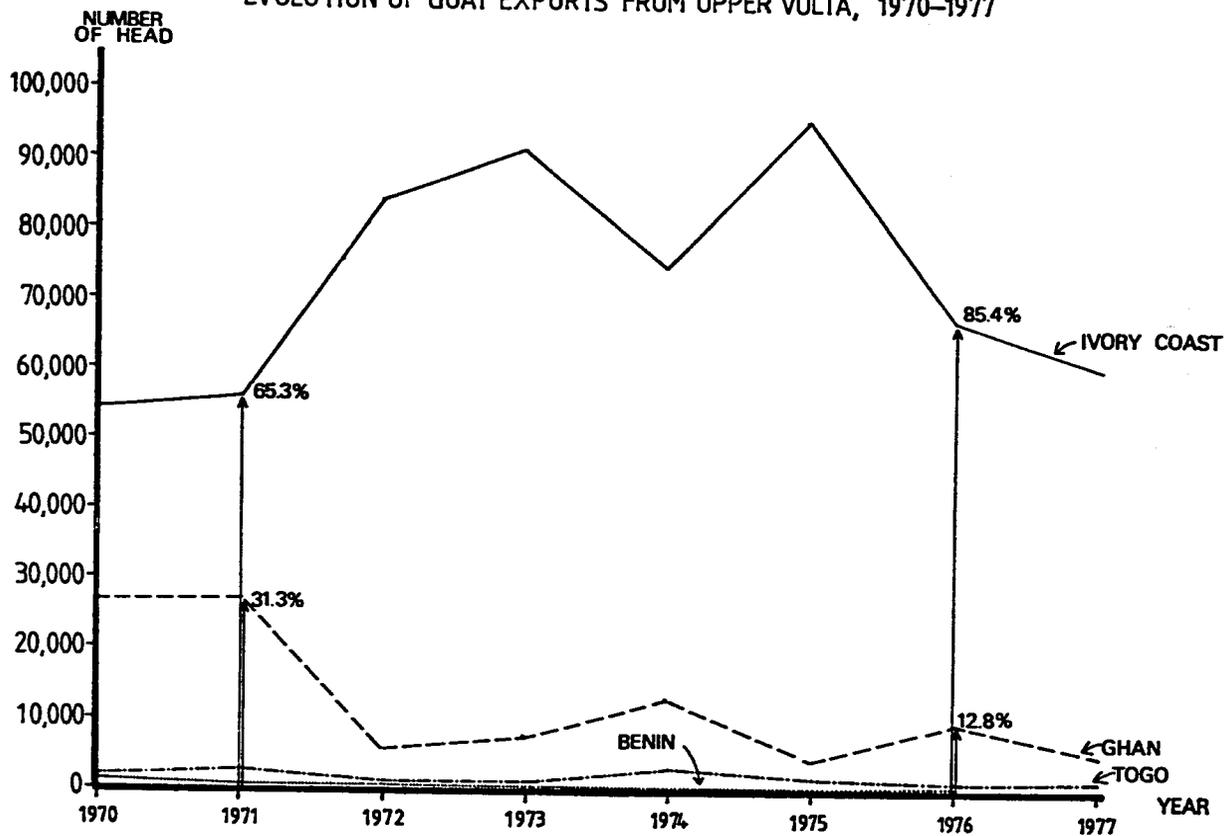


TABLE 7.7

DESTINATIONS OF VOLTAIC SMALL RUMINANT EXPORTS,
1960-1977

| Year | Ivory Coast | | Ghana | | Togo | | Benin | | Total Number Exported |
|-----------------|----------------|------------------|----------------|------------------|---------------------|------------------|--------------------|------------------|-----------------------|
| | Number of Head | Percent of Total | Number of Head | Percent of Total | Number of Head | Percent of Total | Number of Head | Percent of Total | |
| 1960 | 30,863 | 15 | 173,556 | 85 | 23 ^a | — | — | — | 204,442 |
| 1961 | 34,855 | 16 | 187,068 | 84 | 1,071 ^a | — | — | — | 222,994 |
| 1962 | 74,356 | 30 | 175,556 | 70 | 841 ^a | — | — | — | 250,753 |
| 1963 | 120,816 | 45 | 146,177 | 55 | 572 ^a | — | — | — | 267,565 |
| 1964 | 156,931 | 68 | 68,815 | 30 | 6,333 ^a | 3 ^a | — | — | 232,079 |
| 1965 | 225,443 | 77 | 62,038 | 21 | 5,690 ^a | 2 ^a | — | — | 293,171 |
| 1966 | 153,019 | 77 | 42,812 | 22 | 2,789 ^a | 1 ^a | — | — | 198,620 |
| 1967 | 206,079 | 79 | 48,961 | 19 | 4,282 ^a | 2 ^a | — | — | 259,322 |
| 1968 | 250,019 | 86 | 37,666 | 13 | 4,586 ^a | 2 ^a | — | — | 292,271 |
| 1969 | 174,526 | 80 | 38,231 | 17 | 6,369 ^a | 3 ^a | — | — | 219,126 |
| 1970 | 191,563 | 82 | 36,363 | 16 | 3,218 | 1 | 2,081 | 1 | 233,225 |
| 1971 | 191,382 | 80 | 40,755 | 17 | 4,387 | 2 | 1,452 | 1 | 237,976 |
| 1972 | 265,798 | 95 | 8,202 | 3 | 3,626 | 1 | 2,141 | 1 | 279,767 |
| 1973 | 276,644 | 92 | 19,812 | 6 | 4,001 | 1 | 1,353 | — | 301,810 |
| 1974 | 241,511 | 88 | 25,296 | 9 | 6,362 | 2 | 430 | — | 273,599 |
| 1975 | 286,864 | 95 | 11,437 | 4 | 3,776 | 1 | 478 | — | 302,555 |
| 1976 | 156,327 | 88 | 18,287 | 10 | 2,855 | 2 | 262 | — | 177,731 |
| 1977 | 123,263 | 85 | 18,063 | 13 | 3,047 | 2 | — | — | 144,373 |
| Total 1960-1977 | 3,160,259 | 72 | 1,157,095 | 26 | 63,828 ^a | 1 ^a | 8,197 ^b | — | 4,389,379 |
| Total 1967-1977 | 2,363,976 | 87 | 303,073 | 11 | 46,509 ^b | 1 | 8,197 ^b | — | 2,721,755 |

SOURCES: SCET International, 1972, Vol. I, p. 90
Service de l'Elevage, Statistiques, 1970-1977.

^aIncludes exports to Benin.

TABLE 7.8
SOURCES OF SMALL RUMINANT MEAT EXPORTS, 1967-1977
(In Tons)

| FROM OUAGADOUGOU | | | | | FROM BOBO-DIOULASSO | | | | |
|------------------|--------------|-------------|--------------|-------------------------------|---------------------|--------------|-------------|--------------|-------------------------------|
| Year | Sheep | Goat | Total | Percent of Total Meat Exports | Year | Sheep | Goat | Total | Percent of Total Meat Exports |
| 1967 | 96.0 | 7.8 | 103.8 | 13.7 | 1967 | 157.0 | 9.7 | 166.7 | 24.9 |
| 1968 | 44.8 | 2.6 | 47.4 | 4.3 | 1968 | 140.2 | 15.8 | 156.0 | 26.9 |
| 1969 | 51.0 | 1.8 | 52.8 | 5.1 | 1969 | 64.7 | 3.1 | 67.8 | 23.8 |
| 1970 | 41.8 | 4.7 | 46.5 | 5.5 | 1970 | 63.9 | 7.4 | 71.3 | 21.0 |
| 1971 | 40.9 | 4.3 | 45.2 | 6.0 | 1971 | 85.1 | 9.9 | 95.0 | 15.2 |
| 1972 | 46.7 | 4.4 | 51.1 | 9.0 | 1972 | 38.6 | 8.3 | 46.9 | 47.5 |
| 1973 | 36.0 | 7.4 | 43.4 | 6.1 | 1973 | 6.2 | 1.0 | 7.2 | 5.2 |
| 1974 | 47.2 | 3.4 | 50.6 | 8.7 | 1974 | 13.4 | 0.5 | 13.9 | 4.7 |
| 1975 | 13.4 | 1.3 | 14.7 | 4.5 | 1975 | 8.8 | 1.5 | 10.3 | 7.0 |
| 1976 | 1.7 | — | 1.7 | 1.3 | 1976 | 10.6 | — | 10.6 | 14.4 |
| 1977 | <u>2.1</u> | <u>0.1</u> | <u>2.2</u> | <u>1.9</u> | 1977 | <u>8.2</u> | <u>—</u> | <u>8.2</u> | <u>10.9</u> |
| Total | 421.6 | 37.8 | 459.4 | 6.6 | Total | 596.7 | 57.2 | 653.9 | 17.7 |

TABLE 7.8 (Continued)

| TOTAL FROM OUAGADOUGOU AND BOBO-DIOULASSO | | | | |
|---|----------------|-------------|----------------|-------------------------------------|
| Year | Sheep | Goat | Total | Percent of Total Meat Exports |
| 1967 | 253.0 | 17.5 | 270.5 | 18.9 |
| 1968 | 185.0 | 18.4 | 203.4 | 12.0 |
| 1969 | 115.7 | 4.9 | 120.6 | 9.1 |
| 1970 | 105.7 | 12.1 | 117.9 | 9.9 |
| 1971 | 126.0 | 14.2 | 140.2 | 10.2 |
| 1972 | 85.3 | 12.7 | 98.3 | 10.2 |
| 1973 | 42.2 | 8.4 | 50.6 | 5.9 |
| 1974 | 60.6 | 3.9 | 64.6 | 7.7 |
| 1975 | 22.3 | 2.8 | 25.1 | 5.3 |
| 1976 | 12.3 | — | 12.4 | 6.1 |
| 1977 | <u>10.3</u> | <u>0.1</u> | <u>10.4</u> | <u>5.5</u> |
| Total | 1,018.3 | 95.0 | 1,113.3 | 10.4 |

SOURCES: 1) Statistiques, Service de l'Elevage.
 2) SEDES, Recueil Statistique, 1975.
 3) SCET International, 1972.

ruminants, with about 11 percent of 1967-1977 exports. The remainder of official exports go to Togo and Benin. About 40 percent of exported small ruminants in 1967-1977 were shipped by rail; nearly all of the rest went by truck. All exports shipped by rail were destined for Ivory Coast; about 75 percent of exports going to Ivory Coast in that period went by train.

More than 1.2 million sheep were exported by Upper Volta in 1970-1977 (see Table 7.9), while nearly 700,000 goats were exported in the same period (Table 7.10). Ivory Coast, Togo, and Benin all imported more sheep than goats, but more goats were exported (56.8 percent) to Ghana.

B. - Recent History of Small Ruminant Exports

1) - 1960-1965

Small ruminant exports in the 1960-1965 period followed a pattern similar to that of cattle exports: growth in the number of exports, with Ivory Coast taking over Ghana's position as the leading importer. The growth in Ivorian incomes, improved Upper Volta-Ivory Coast transportation, and the currency and political problems in Ghana can again be cited, as with cattle, as the causes of these trends.

2) - 1965-Present

Small ruminant exports were fairly steady from 1965 to 1975, between about 200,000 to 300,000 head. The share going to Ivory Coast over this period ranged from 77 to 95 percent. Ghana's share dropped below 10 percent in 1972-1975. Togo and Benin never made up more than 4 percent of the market. In 1976 the number of small ruminants exported fell below 200,000 for the first time since 1965, then fell off even more in 1977 to 144,373. This sharp decline was due almost entirely to a diminution in sales to Ivory Coast. This decline in live animal exports is paralleled by those in small ruminant meat (see Table 7.8), live cattle and beef exports (Table 7.1 and 7.3).

The droughts of 1968 and 1972-1973 did not seem to have as severe an impact on small ruminant exports as on cattle exports. Salvage sales pushed 1968 exports to 21 percent above the 1960-1967 average; then, beginning in 1969, exports dropped below that average for three years. The recovery of herds from the 1968 drought and salvage sales due to the 1972-1973 drought pushed exports up to 180,000 in 1972 and 300,000 in 1973. Part of the falloff in export sales in 1975 and 1977 may have been due to the lagged destocking effect of the second drought.

Small ruminant meat exports were in steady decline throughout the 1967-1977 period; they show little sign of being affected by the droughts.

TABLE 7.9

EVOLUTION OF SHEEP EXPORTS FROM UPPER VOLTA, 1970-1977

| Year | Destination | | | | | | | | Total Number Exported |
|------------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|--------------------------|
| | Ivory Coast | | Ghana | | Togo | | Benin | | |
| | Number of Head | Percent of Total | |
| 1970 | 137,137 | 92.1 | 9,604 | 6.5 | 1,267 | 0.9 | 831 | 0.6 | 148,839 |
| 1971 | 135,284 | 89.0 | 13,821 | 9.1 | 1,995 | 1.3 | 903 | 0.9 | 152,003 |
| 1972 | 183,746 | 96.8 | 2,434 | 1.3 | 2,250 | 1.2 | 1,398 | 0.7 | 189,828 |
| 1973 | 185,574 | 93.0 | 10,025 | 5.0 | 2,823 | 1.4 | 964 | 0.5 | 199,386 |
| 1974 | 166,929 | 91.5 | 11,985 | 6.6 | 3,262 | 1.8 | 355 | 0.2 | 182,531 |
| 1975 | 191,442 | 95.3 | 7,215 | 3.6 | 1,914 | 1.0 | 387 | 0.2 | 200,958 |
| 1976 | 89,642 | 89.9 | 8,297 | 8.3 | 1,718 | 1.7 | 16 | — | 99,673 |
| 1977 | 62,214 | 81.5 | 12,823 | 16.8 | 1,275 | 1.7 | — | — | 76,312 |
| Total 1970- 1977 | 1,151,968 | 92.0 | 76,204 | 6.1 | 16,504 | 1.3 | 4,854 | 0.4 | 1,251,530 |

SOURCES: 1) Statistiques, Service de l'Elevage, Ouagadougou.

2) SEDES, Recueil Statistique, 1975.

3) SCET International, 1972.

TABLE 7.10

EVOLUTION OF GOAT EXPORTS FROM UPPER VOLTA, 1970-1977

| Year | Destination | | | | | | | | Total Number Exported |
|------------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|--------------------------|
| | Ivory Coast | | Ghana | | Togo | | Benin | | |
| | Number of Head | Percent of Total | |
| 1970 | 54,426 | 64.5 | 26,759 | 31.7 | 1,951 | 2.3 | 1,250 | 1.5 | 84,386 |
| 1971 | 56,098 | 65.3 | 26,934 | 31.3 | 2,392 | 2.8 | 549 | 0.6 | 85,973 |
| 1972 | 82,052 | 91.2 | 5,768 | 6.4 | 1,376 | 1.5 | 743 | 0.8 | 89,939 |
| 1973 | 91,070 | 90.7 | 7,787 | 7.8 | 1,178 | 1.2 | 389 | 0.4 | 100,424 |
| 1974 | 74,582 | 81.9 | 13,311 | 14.6 | 3,100 | 3.4 | 75 | 0.1 | 91,068 |
| 1975 | 95,422 | 93.9 | 4,222 | 4.2 | 1,862 | 1.8 | 91 | 0.1 | 101,597 |
| 1976 | 66,685 | 85.4 | 9,990 | 12.8 | 1,137 | 1.5 | 246 | 0.3 | 78,058 |
| 1977 | 61,049 | 89.8 | 5,240 | 7.7 | 1,772 | 2.6 | -- | -- | 68,061 |
| Total 1970- 1977 | 581,384 | 83.1 | 100,011 | 14.3 | 14,768 | 2.1 | 3,343 | 0.5 | 699,506 |

- SOURCES: 1) Statistiques, Service de l'Elevage, Ouagadougou.
 2) SEDES, Recueil Statistique, 1975.
 3) SCET International, 1972.

C. - Destinations of Small Ruminant Exports

1) - Exports to Ghana

Three phases in the small ruminant trade with Ghana may be seen: (1) the period up to 1963, (2) 1964-1971, and (3) 1971-present (Figure 7.3). Through 1963 Ghana was the leading importer of Voltaic small ruminants (Table 7.7), importing over 100,000 head annually since at least 1949 (SCET International, 1972, p. 90). Beginning in the early sixties, Ivory Coast expanded its imports of Voltaic small ruminants and drew away some of the sales to Ghana.

By 1964 Ghana was only the second leading importer of Voltaic small ruminants, its share of exports having fallen to 30 percent. The political problems in Ghana in 1965 and 1966 pushed imports under 50,000 head in 1966; they remained below a 20 percent share and under 50,000 head through 1971.

In 1972, following a coup and the ensuing turmoil, Ghana's imports fell to 8,202 head and 3 percent of Voltaic exports. From 1973 to 1977, imports picked up but never reached pre-1972 levels again.

Tables 7.9 and 7.10 and Figures 7.4 and 7.5 show that Ghana imports a high proportion of goats to sheep relative to other destinations. However, there was a significant decline in Ghanaian goat imports from the 1970-1971 level, whereas sheep imports remained steady from 1970 to 1977.

2) - Exports to Ivory Coast

Ivory Coast's imports of small ruminants from Upper Volta have grown from only 15 percent of the market in 1960 to between 80 and 95 percent from 1968 to 1977. There was a more or less steady growth in the number of head imported, from 30,863 in 1960 to 286,864 in 1975. In 1976, however, only 156,327 head were imported, and in 1977 imports fell to a level lower than any year since 1963. Nonetheless, Ivory Coast remained by far the largest consumer of Voltaic small ruminants, taking 88 percent in 1976 and 85 percent in 1977.

In the early and mid-sixties Ivorian imports of Voltaic small ruminants experienced nearly uninterrupted growth, as the economic prosperity and population growth in Ivory Coast provided increased demand for all types of animal protein.

After reaching about 80 percent of the market in 1967, Ivory Coast experienced a slight decline, or pause, in the growth of imports over the next three years. This can probably be accounted for by two factors: (1) real total and per capita income growth began to slow in Ivory Coast, reducing the rate of growth of demand for meat (Staatz, 1979) and (2) the 1968 drought led to an increase in supply from salvage sales in the short run and a longer-run decrease in supply because of herd restocking.

In 1972 Ivory Coast benefited from reduced competition from Ghana, herd recovery from the 1968 drought, and the beginning of salvage sales from the 1972-1973 drought to

reach the highest level (265,798 head) and greatest share of Voltaic exports (95 percent) up to that time. The number of small ruminants imported in 1973 was even higher than in 1972, despite some recovery by Ghana, and remained high through 1975.

The importation of frozen and chilled beef into Ivory Coast from Europe, non-Sahelian Africa, and South America in late 1975 marked the beginning of a dramatic downturn in small ruminant imports from Upper Volta. Imports fell by 45 percent from 1975 to 1976, and by another 21 percent from 1976 to 1977. This implies a high degree of substitution between small ruminant meat and beef by Ivorian consumers.

Tables 7.9 and 7.10 show Ivorian small ruminant imports from 1970 to 1977 broken down into sheep and goats. The decline in imports of sheep has been much greater than the decline in goat imports (53 percent from 1975 to 1976 for sheep, 30 percent for goats). Ivory Coast imported substantially more sheep than goats every year until 1977, when the numbers were almost equal (61,049 goats and 62,214 sheep).

3) - Exports to Togo and Benin

Exports of Voltaic small ruminants to Togo and Benin have never been of great importance. Combined they have always accounted for less than 4 percent of total Voltaic exports. After rising from insignificant levels to 6,333 head and a 2.7 percent share of the market in 1964, Togo-Benin imports ranged between 4,100 and 6,800 head from 1964 to 1975, with only one exception. In 1976 and 1977 Togo-Benin imports dropped along with those of Ghana and Ivory Coast to their lowest level in years. Around 3,000 head were imported by Benin and Togo in those years.

D. - Sources of Small Ruminant Exports

Small ruminants for export may come from any part of Upper Volta. However, most come from the northern region, made up of the ORDs of Sahel, Kaya, and Ouahigouya (also known as Yatenga). Table 7.11 shows estimates for the net surplus of small ruminant production over consumption by ORD for 1969. The Sahel and Kaya ORDs show the largest net surpluses, while Yatenga shows only a small deficit. The Sahel ORD surplus is large enough by itself to account for the national surplus. These figures indicate the export potential of each ORD, using the rough measure of exportable surplus. Table 7.12 estimates the share of the northern Region in total Voltaic small ruminant exports as 73.5 percent in 1974. Nearly 25 percent of herd offtake in that region went for export. Sahel alone exported 91,000 head, one-third of Voltaic exports.

E. - Seasonality of Small Ruminant Exports

The seasonal pattern of small ruminant exports from Upper Volta is affected by supply conditions similar to those affecting cattle exports, but the overwhelming influence is the demand effect of the Moslem holiday Tabaski.

TABLE 7.11
DOMESTICALLY PRODUCED SMALL RUMINANT
MEAT SUPPLY: DISTRIBUTION, CONSUMPTION AND SURPLUS^a
BY ORD, 1969 (ESTIMATED)

| <u>ORD</u> | <u>Production^b</u> | <u>Consumption^c</u> | <u>Surplus</u> |
|-------------------|-------------------------------|--------------------------------|----------------|
| Sahel | 3,260 | 620 | + 2,640 |
| Yatenga | 1,090 | 1,275 | - 185 |
| Kaya | 2,355 | 1,430 | + 925 |
| Ouagadougou | 1,090 | 2,230 | - 1,140 |
| Fada N'Gourma | 1,270 | 670 | + 600 |
| Koupéla | 360 | 650 | - 290 |
| Koudougou | 905 | 1,820 | - 915 |
| Volta Noire | 1,450 | 1,150 | + 300 |
| Bobo-Dioulasso | 1,270 | 960 | + 310 |
| Gaoua-Diebouyou | 725 | 880 | - 155 |
| Banfora | 725 | 515 | + 210 |
| Total Upper Volta | 14,500 | 12,200 | + 2,300 |

SOURCE: SCET International, 1972.

^aIn metric tons.

^bProduction based on herd population and 3.625 kg of meat production per head in the herd.

^c2.5 kg per capita.

TABLE 7.12

EXPORT OFFTAKE: NORTHERN REGION, 1974

| Circonscriptions | Total Offtake ^a | Sales to Exporters ^a | Percent of Offtake Exported | Percent of National Exports ^b |
|-----------------------|----------------------------|---------------------------------|-----------------------------|--|
| Kaya | 316 | 67 | 21.2 | 24.5 |
| Ouahigouya | 172 | 43 | 25.0 | 15.7 |
| Sahel | 320 | 91 | 28.4 | 33.3 |
| Total Northern Region | 808 | 201 | 24.9 | 73.5 |

SOURCES: SEDES, *L'Elevage des Petits Ruminants dans les Circonscriptions de Kaya, Ouahigouya, et du Sahel*, Paris, November 1974.

^aIn thousands of head.

^bTotal national small ruminant exports in 1974 were 273,599 (see Table 7.7).

1) - Tabaski Demand

Tabaski is a holiday celebrating the willingness of Abraham to sacrifice his son to God, with the last-minute intervention from heaven substituting a sheep for the son, Isaac. Thus, Moslems celebrate Tabaski by the slaughter of sheep. The date of Tabaski changes from year to year according to an uncorrected lunar calendar (the annual movement is eleven days towards the beginning of the year). The consumption of sheep in Moslem areas is especially high in the quarter in which Tabaski falls. This shows up through high numbers of sheep exported during the quarter of Tabaski, and the quarter preceding, when Tabaski occurs near the beginning of a quarter. Therefore, Tabaski demand for sheep exports would be expected to have occurred in the following pattern:

| Year | Quarters of Tabaski Demand |
|------|----------------------------|
| 1966 | I, II |
| 1967 | I |
| 1968 | I |
| 1969 | I |
| 1970 | I |
| 1971 | I |
| 1972 | I |
| 1973 | I, IV |
| 1974 | IV |
| 1975 | IV |
| 1976 | IV |
| 1977 | IV |
| 1978 | IV |

This demand pattern is reflected in Tables 7.13 and 7.14; Ivorian demand was high for small ruminants from all sources in the fourth quarter in each of the years 1974-1977. Demand for Voltaic small ruminants in 1966-1969 was high in the first quarter.

2) - Supply Conditions

Many of the factors affecting the supply of cattle in Upper Volta also affect the supply of sheep and goats. Small ruminants are in good condition in August and September, as climatic conditions are favorable, although their condition varies less by season than is the case for cattle. Cash needs, a major motivation to sell both cattle and small ruminants, are high in December-February when millet prices are relatively low, and in December-February when ceremonies requiring large outlays are traditionally held. During the rainy season (May-September) cattle gain weight rapidly, making herders reluctant to sell; small ruminants are not subject to this rapid weight gain, however, and hence are more easily sold by herders in this period. Finally, there is likely a tendency for herders who hold both cattle and small ruminants to balance fluctuations in cattle sales by sales of small ruminants. That is, in periods when herders are less willing to supply cattle or when the price for cattle is low, herders in need of cash may try to sell small ruminants.

3. - Transportation

Small ruminants are more frequently trucked than trekked for export; trek routes are in best condition in September and October and roads used for trucking are in best condition from October until the next rainy season. The northern transhumance from October to January or February, which inhibits cattle sales, does not affect small ruminants, because they are not taken on transhumance. However, the May-September rainy season reduces the travel of traders from southern markets to small ruminant production zones. The hot, dry period of March and April makes cattle trek routes poor because of the lack of water, but makes for good trucking conditions, as roads are dry and clear. Rail shipment of small ruminants is limited during the Ivorian harvest period from November to February, because the RAN line is tied up with crop shipments.

4) - Evidence

From the data presented in Tables 7.13 and 7.14, it is clear that the demand effect of Tabaski dominates all others in determining the seasonal pattern of small ruminant exports. A method for abstracting from the effect of Tabaski is to use the percent of imports occurring in the fourth quarter in 1966-1969 (Table 7.14) and the percent occurring in the first quarter of 1974-1977 (Table 7.13) as representative of non-Tabaski-influenced market

TABLE 7.13

RECORDED QUARTERLY SMALL RUMINANT IMPORTS
INTO IVORY COAST, 1974-1977

| | I | | II | | III | | IV | | Total Number Imported |
|-------------|----------------|------------------|----------------|------------------|----------------|------------------|----------------|------------------|-----------------------|
| | Number of Head | Percent of Total | |
| 1974 | | | | | | | | | |
| Upper Volta | 48,287 | 26 | 39,179 | 21 | 19,307 | 10 | 81,031 | 43 | 187,804 |
| Total | 87,976 | 23 | 90,333 | 23 | 57,907 | 15 | 149,614 | 39 | 385,830 |
| 1975 | | | | | | | | | |
| Upper Volta | 69,557 | 27 | 73,279 | 29 | 28,917 | 11 | 81,764 | 32 | 253,517 |
| Total | 103,908 | 29 | 106,243 | 30 | 40,687 | 12 | 101,804 | 29 | 352,642 |
| 1976 | | | | | | | | | |
| Upper Volta | 41,795 | 25 | 43,712 | 26 | 24,409 | 15 | 57,382 | 34 | 167,298 |
| Total | 72,852 | 24 | 82,763 | 28 | 46,158 | 15 | 98,532 | 33 | 300,305 |
| 1977 | | | | | | | | | |
| Upper Volta | 31,671 | 19 | 24,382 | 15 | 25,439 | 16 | 82,524 | 50 | 164,016 |
| Total | 54,964 | 20 | 47,617 | 17 | 49,829 | 18 | 125,304 | 45 | 277,714 |
| 1974-1977 | | | | | | | | | |
| Total | | | | | | | | | |
| Upper Volta | 191,310 | 25 | 180,552 | 23 | 98,072 | 13 | 302,701 | 39 | 772,635 |
| Total | 319,700 | 24 | 326,956 | 25 | 194,581 | 15 | 475,254 | 36 | 1,316,491 |

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

TABLE 7.14

SMALL RUMINANT RAIL EXPORTS DESTINED FOR IVORY COAST, 1966-1969

| Year | Quarters | | | | | | | | Total Number Exported ^a |
|-------|---------------------------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|---------------------------------------|
| | I | | II | | III | | IV | | |
| | Number Exported ^b | Percent of Total | Number Exported | Percent of Total | Number Exported | Percent of Total | Number Exported | Percent of Total | |
| 1966 | 42.1 | 44.2 | 22.2 | 23.3 | 15.8 | 16.6 | 15.0 | 15.8 | 95.2 |
| 1967 | 32.3 | 38.0 | 17.2 | 20.3 | 16.1 | 19.0 | 16.3 | 22.7 | 84.9 |
| 1968 | 33.2 | 30.4 | 22.8 | 20.9 | 17.6 | 16.1 | 34.9 | 31.9 | 109.3 |
| 1969 | 43.6 | 45.5 | 15.5 | 16.2 | 13.7 | 14.3 | 23.0 | 24.0 | 95.9 |
| Total | 151.2 | 39.7 | 77.7 | 20.2 | 63.2 | 16.6 | 92.2 | 24.1 | 384.3 |

SOURCE: SCET International, 1972, Vol. I, p. 96.

^aDifferences due to rounding.

^bIn Thousands.

conditions for those quarters. These figures, along with the average percent exported in the second and third quarters from both data sets, standardized to 100 percent are as follows:

| <u>Quarter</u> | <u>Percent of Annual Exports</u> |
|----------------|--------------------------------------|
| I | 29.3 |
| II | 25.3 |
| III | 17.3 |
| IV | 28.0 |

These figures indicate that the demand for cash by herders to pay taxes, buy millet, and finance ceremonies in December through February must be fairly strong, making the first and fourth quarters above average for small ruminant exports. The rains which reduce the ability of southern traders to reach the producing zones are most severe in July, August, and September, reducing exports to their lowest level in the third quarter. The second quarter is typically the period of fewest cattle sales, so the near-average adjusted share of small ruminant exports occurring in that quarter (25.3 percent) may be the result of counter-cyclical sales by herders.

CHAPTER EIGHT

EXPORT COSTS

I. - Transportation Costs for Cattle Exports

Cattle are exported from Upper Volta mainly by trekking, by train (to Ivory Coast only) or by a combination of the two; trucking is rarely done.

A. - Costs of Trekking Cattle for Export

The costs of trekking cattle from Upper Volta to Lomé, Togo; Téra, Niger; and Paga, Ghana are presented in Table 8.1. The differences between costs of trekking for export and for domestic transit come from fixed export and import fees and variable transport costs. An export authorization of 200 CFA F per head (row G) must be paid, plus a Voltaic export tax. The same export tax (row H) is supposed to be paid by all exporters; however amounts actually paid vary. The amounts presented are those found by the Entente Livestock Project survey (Shapiro, 1979, p. 408). In addition, import taxes (row N) vary by destination of the herd.

Cattle which will pass through the trypanosomiasis zone must be vaccinated at a cost of 50 CFA F per head. The varying costs of salary and food for herders and agent (row J) arise from both the distance travelled and the difficulty of the trek. The import taxes (row N) shown do not necessarily reflect official import taxes; they are actual amounts reported paid in interviews with merchants. Official import taxes are 35 percent of value of cattle imported into Ghana (Sullivan, p. 168) and 1200 CFA F per head for cattle going to Togo (Josserand, p. 394). Finally, there is a market tax of 1,000 CFA F per head per day in the Lomé market, not charged elsewhere.

As in the case of domestically trekked herds, the cost per kilometer is higher for shorter treks because of fixed costs. The cost of exporting cattle by trekking is one half to seven times higher per kilometer than domestic trekking. The difference is accounted for principally by the export and import taxes.

Trekking cattle adds 86.4, 52.5, and 55.5 CFA F per kg carcass weight to the cost of cattle exported to Lomé, Téra, and Paga. Taxes are 72.7 percent of the export cost to Lomé, 75.1 percent to Téra, and 83.9 percent to Paga. There are additional costs to export -- the opportunity costs of the capital used to finance the export herds and the time of the trader; they are discussed below.

TABLE 8.1

COSTS OF TREKKING CATTLE TO FOREIGN MARKETS
(Prices in CFA F)

| Market of Origin: Destination: Distance: Duration of Trek: Distance per Day: | Pouytenga Lomé (Togo) 860 km 45-75 days 12-20 km | Kaya Téra (Niger) 215 km 9-18 days 24-25 km | Ouagadougou Paga (Ghana) 170 km 8-12 days 14-21 km | | | |
|--|--|---|--|-----------------|-----------------|-----------------|
| | <u>Per Head</u> | <u>Per Herd</u> | <u>Per Head</u> | <u>Per Herd</u> | <u>Per Head</u> | <u>Per Herd</u> |
| I. Cattle Purchase | | | | | | |
| A. Intermediary's commission | 250 | 12,500 | 250 | 12,500 | 250 | 12,500 |
| B. Identification mark | 10 | 500 | 10 | 500 | 10 | 500 |
| C. Holding before trek ^a | 50 | 2,500 | 50 | 2,500 | 100 | 5,000 |
| II. Voltaic Taxes | | | | | | |
| D. Trader's license | 83 | 4,150 | 83 | 4,150 | 83 | 4,150 |
| E. Veterinary inspection | 150 | 7,500 | 150 | 7,500 | 150 | 7,500 |
| F. Certificate of origin | 2 | 100 | 2 | 100 | 2 | 100 |
| G. Authorization to export | 4 | 200 | 4 | 200 | 4 | 200 |
| H. Export tax | 7,500 | 375,000 | 4,930 | 246,500 | 6,519 | 325,950 |
| III. Transport Costs | | | | | | |
| I. Vaccination of cattle (against Trypanosomiasis) | 50 | 2,500 | - | - | 50 | 2,500 |
| J. Salary and food for herders and agent | 1,640 | 82,000 | 330 | 16,500 | 200 | 10,000 |
| K. Mortality, lost animals, forced sales | 675 | 33,750 | 675 | 33,750 | 675 | 33,750 |
| L. Return transport for herders and round trip transport for seller | 400 | 20,000 | 100 | 5,000 | 80 | 4,000 |
| IV. Costs at Terminal Market | | | | | | |
| M. Market tax | 100 | 5,000 ^b | - | - | - | - |
| N. Import tax (<u>laissez-passer</u>) | 1,550 | 77,500 | 800 | 40,000 | 200 | 10,000 |
| O. Gift to landlord | 500 | 25,000 | 500 | 25,000 | n.a. | n.a. |
| Total Costs of Trekking | 12,964 | 648,200 | 7,884 | 394,200 | 8,323 | 416,150 |
| Total Cost per Kilometer | 15 | 754 | 37 | 1,833 | 49 | 2,448 |

SOURCE: Herman, 1977, p. 126.

^a Cost of herders to watch cattle while herd is constituted.

^b Traders are charged 1,000 CFA F per day per herd as market tax.

NOTE: Herd size is 50 head.

B. - Costs of Exporting Cattle by Rail

Virtually all Voltaic cattle exported to Ivory Coast are transported by rail from Ouagadougou, Bobo-Dioulasso, or northern Ivory Coast embarkation points. Nearly all of these cattle are destined for Abidjan, but some are sold in the Intermediate markets of Bouaké, Dimbokro, and Agboville.

The cattle travel on the Régie Chemin de Fer Abidjan-Niger (RAN) in three types (sizes) of cars. Rarely is a choice of car type given to traders. The car types, their capacities, and costs are given in Table 8.2.

TABLE 8.2
COSTS AND CAPACITIES OF RAN CATTLE CARS
(Prices in CFA F)

| Car Type | Standard Load | Maximum Load | Cost | Cost per Head (Std. Load) |
|----------|---------------|--------------|---------|---------------------------|
| H12 | 25 head | 27 head | 95,255 | 3,810 |
| H13 | 32 head | 37 head | 126,640 | 3,958 |
| J14 | 35 head | 40 head | 142,330 | 4,067 |

SOURCE: Herman, 1977, p. 129.

The scheduled length of the trip from Ouagadougou to Abidjan is 44 hours. However, because of delays in loading and unloading, customs inspections, and late-running trains, cattle often spend 92 hours in the cattle cars (Herman, 1977, p. 127).

The costs of transporting cattle from Ouagadougou to Abidjan by rail are presented in Table 8.3. Parts I and II of the costs are similar to those presented in the costs of trekking. The herd size used is twenty-five head, the standard load for an H12 rail car.

Loading cars (row I) includes the cost of clipping the horns of cattle to reduce their chances of injuring each other. Car preparation (row J) includes putting grass mats and straw on the floor to give the cattle traction against falling.

A convoyeur accompanies the car to try to keep the cattle standing, so that they will not be trampled. The convoyeur transfers the cattle in the terminal market to the trader's representative or intermediary who oversees the sale. Convoyeurs are paid 5-6,000 CFA F per trip and allowed 2,500 CFA F for food (row K).

TABLE 8.3
 COSTS OF EXPORTING CATTLE BY RAIL
 (Prices in CFA F)

| | | |
|---|-----------------|-----------------|
| Market of Origin: | Ouagadougou | |
| Destination: | Abidjan | |
| Distance: | 1,145 km | |
| Duration: | 3-7 days | |
| Distance per Day: | 163-382 km | |
| I. Cattle Purchase | <u>Per Head</u> | <u>Per Herd</u> |
| A. Intermediary's commission | 250 | 6,250 |
| B. Identification mark | 10 | 250 |
| C. Holding before transport | 160 | 4,000 |
| II. Voltaic Taxes | | |
| D. Trader's license | 83 | 2,083 |
| E. Veterinary inspection | 150 | 3,750 |
| F. Certificate of origin | 4 | 100 |
| G. Authorization to export | 8 | 200 |
| H. Export tax | 6,519 | 162,975 |
| III. Transport Costs | | |
| I. Loading cattle cars ^b | 30 | 750 |
| J. Preparation of car | 160 | 4,000 |
| K. Food and salary of <u>convoyeur</u> | 320 | 8,000 |
| L. Cattle-car rental | 3,810 | 95,255 |
| M. Unofficial costs ^c | 0-800 | 0-20,000 |
| N. Mortality | 1,247 | 31,175 |
| O. Weight loss | 3,750 | 93,750 |
| IV. Costs in Abidjan | | |
| P. Watering and holding cattle | 40 | 1,000 |
| Q. Market tax | 500 | 12,500 |
| R. Gift to landlord | 200 | 5,000 |
| S. Unloading cattle | 20 | 500 |
| Total cost of rail transport ^e | 17,661 | 441,538 |
| Total cost per kilometer | 15.4 | 386 |

SOURCE: Herman, 1977, p. 130.

^aA herd is 25 animals, the standard load of an H12 car.

^bIncludes 500 CFA F for loading and 250 CFA F for cutting the horns of the cattle.

^cThese costs include payments to expedite car availability, gratuities to customs officials, and fees paid to RAN employees to move cars to unloading positions in Abidjan.

^dAssumes a 10 percent carcass-weight loss, an average carcass weight of 150 kg, and a cost of 250 CFA F/kg.

^eUsing average unofficial costs.

Mortality losses (row N) include dead cattle thrown from the car en route, those sold before reaching Abidjan because of poor condition, and those arriving dead in Abidjan. The figures for these losses come from an Entente Livestock Project survey of 94 herds transported on the RAN between Ouagadougou and Abidjan (Shapiro, 1979, p. 411).

Unofficial costs (row M) include payments to make cattle cars available more quickly in Ouagadougou (delays can be reduced from two months to 15-20 days), gratuities paid to customs officials, and fees paid to RAN employees to expedite the movements of cars from the arrival point, Treichville, to the slaughterhouse at Port Bouët.

The weight loss during the trip is estimated as 10 percent of carcass weight (Herman, 1977, pp. 132-133). It is assumed that the average animal has a Ouagadougou carcass weight of 150 kg and is purchased at 250 CFA F per kg carcassweight. Thus, there is a loss of 150 kg x 250 CFA F/kg = 3,750 CFA F per animal.

Rail transport adds 17,661 CFA F to the cost of cattle bought in Ouagadougou. This amounts to 118 CFA F per kg carcass weight. Over 50 percent of the total cost of transport comes from taxes -- 45.1 CFA F per kg go to Voltaic taxes and 3.3 CFA F per kg to Ivorian taxes. The additional costs of rail export and the opportunity costs of capital and time are discussed below.

C. - Profitability of Voltaic Cattle Exports

The profitability of cattle exports depends on the prices paid for cattle in Voltaic markets, the costs of export, both explicit and implicit, and the prices received for the cattle in terminal markets. All of the explicit costs and some of the implicit costs of exporting by trek to three markets and by rail to Abidjan were presented above. Prices of export-quality cattle in Upper Volta and selling prices in some of the export markets are known. Estimates of the opportunity cost of capital and traders' time are also available.

The profitability of exporting can be calculated as the annual rate of return on capital invested in the herds and their transportation. The annual rate of return depends on the time capital is tied up in assembling, transporting, selling, and receiving payment for a herd exported. In addition, the opportunity cost of traders' time depends on how long he must be involved in the transaction. Table 8.4 presents estimates of the mean turnaround time for capital invested in Voltaic cattle exports.

The amount of capital tied up in exporting cattle is composed of the purchase price plus the explicit costs of transport. Export-quality cattle¹ cost 230-280 CFA F per kg (Herman, 1977, p. 132) and weigh about 150 kg each. Thus, the cost of buying fifty head for export is 1.7-2.1 million CFA F. Total costs of export transportation are given in Tables 8.1 and 8.3. Mortality costs, lost animals, forced sales, and weight losses en route do not entail outlays by the trader, but are losses in what may be recovered when the animals are sold. Therefore, they are separated from the traders' capital costs in Table 8.5, so that the return to traders' capital may be calculated.

TABLE 8.4
CAPITAL TURNAROUND TIME FOR VOLTAIC CATTLE EXPORTS
(In Days)

| Origin: Destination: | Pouytenga Lomé | Kaya Téra | Ouagadougou Paga | Ouagadougou Abidjan |
|----------------------------------|-------------------|--------------|---------------------|------------------------|
| Assembly | 21 | 12 | 10 | 10 |
| Duration of Trip | 60 | 13.5 | 10 | 5 |
| Selling and wait for credit | 5 | 16 | 72 ^a | 8 |
| Return trip | 2 | 1 | 1 | 1 |
| Total capital turnaround time | 88 | 42.5 | 93 ^a | 24 |

^aThere is a sixty-day wait for receipts from cattle sales in Ghana to pass through credit controls. Therefore, capital is tied up for the full 93 days, but traders only give up 33 days of their time.

TABLE 8.5

PROFITABILITY OF VOLTAIC CATTLE EXPORTS
(in CFA F)

| Origin: Destination: Means of transport | Pouytenga Lomé trek | Kaya Téra trek | Ouagadougou Paga trek | Ouagadougou Abidjan train |
|--|---|--|--|--|
| Costs | | | | |
| Capital Costs | | | | |
| Herd purchase ^a | 1,725,000 2,100,000 | 1,725,000 2,100,000 | 1,725,000 2,100,000 | 1,725,000 2,100,000 |
| Out of pocket transport ^b | 614,450 | 360,450 | 382,400 | 633,226 |
| Total capital outlay | 2,339,450 2,714,450 | 2,085,450 2,460,450 | 2,107,400 2,482,400 | 2,358,226 2,733,226 |
| Implicit Costs | | | | |
| Reduced herd quantity and quality ^c | 33,750 | 33,750 | 33,750 | 249,850 |
| Opportunity cost of trader ^d | 88,000 | 42,500 | 33,000 | 23,000 |
| Total implicit costs | 121,750 | 76,250 | 66,750 | 272,850 |
| Total costs | 2,461,200 2,836,200 (per kg carcass) | 2,161,700 2,536,700 (288-338) | 2,174,150 2,549,150 (290-340) | 2,631,076 3,006,076 (351-401) |
| Receipts from sale | 2,497,500 3,097,500 (333-413) ^e | n.a. | 3,330,000 (444) ^f | 3,120,000 (416) ^g |
| (per kg carcass) | | | | |
| Margin | 36,300 261,300 | --- | 780,850 1,155,850 | 113,924 488,924 |
| Annual rate of return on capital ^h (percent) | 6.4-39.9 | --- | 130.5-227.5 | 63.3-312.5 |
| Receipts required to earn 20 percent on capital ^j (per kg carcass) | 2,770,547 (369) | 2,400,392 (320) | 2,478,596 (330) | 2,852,202 (380) |

^a Herd size: 50 head; avg. wt: 150 kg; price: 230-280 CFA F/kg, (Herman 1977, p. 132).

^b All transport costs, less weight loss, mortality, lost animals, and forced sales losses.

^c Lost sales value of herd because of weight loss, mortality, lost animals, and forced sales.

^d Traders' time evaluated at 1,000 CFA F/day (Staatz, p. 387).

^e Estimated from Josserand, pp. 398-400

^f Estimated from Sullivan, 1979.

^g Staatz, 1979, p. 379.

^h Formula used: $\frac{\text{Receipts} - \text{Total Costs}}{\text{Total Capital Outlay}} \times \frac{365}{\text{Turnaround Time}} = \text{Annual Rate of Return on Capital}$

^j Assuming a purchase price of 255 CFA F/kg in Upper Volta.

TABLE 8.6

SHARES OF WHOLESALE PRICE OF VOLTAIC CATTLE EXPORTS
(CFA F per Kg/Percent of Total)

| Origin Destination Means of transportation | Pouytenga Lomé trek | | Kaya Téra trek | | Ouagadougou Paga trek | | Ouagadougou Abidjan train | |
|--|---------------------------|-------|----------------------|-------|-----------------------------|-------|---------------------------------|------|
| | (CFA F) | (%) | (CFA F) | (%) | (CFA F) | (%) | (CFA F) | (%) |
| Return to seller in market of origin | 255.0 | 68.4 | 255.0 | 63.1 | 255.0 | 60.0 | 255.0 | 61.3 |
| Purchase costs | 2.1 | 0.6 | 2.1 | 0.5 | 2.4 | 0.6 | 2.8 | 0.7 |
| Taxes and official charges | | | | | | | | |
| Voltaic | 51.5 | 13.8 | 34.5 | 8.5 | 45.1 | 10.6 | 45.1 | 10.8 |
| Importing country | 11.0 | 2.9 | 5.3 | 1.3 | 1.3 | 0.3 | 3.3 | 0.8 |
| Total | 62.5 | 16.8 | 39.8 | 9.9 | 46.4 | 10.9 | 48.4 | 11.6 |
| Direct transport cost | 17.3 | 4.7 | 6.2 | 1.5 | 2.2 | 0.5 | 33.2 | 8.0 |
| Indirect Transport costs | | | | | | | | |
| Mortality losses | 4.5 | 1.2 | 4.5 | 1.1 | 4.5 | 1.1 | 8.3 | 2.0 |
| Weight loss | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 25.0 | 6.0 |
| Total | 4.5 | 1.2 | 4.5 | 1.1 | 4.5 | 1.1 | 33.3 | 8.0 |
| Trader's salary | 11.7 | 3.1 | 5.7 | 1.4 | 4.4 | 1.0 | 3.1 | 0.7 |
| Trader's margin | 20.0 | 5.4 | 91.0 | 22.5 | 110.0 | 25.9 | 40.0 | 9.6 |
| Sales price at final destination | 373 | 100.2 | 404 ^a | 100.0 | 425 | 100.0 | 416 | 99.9 |

^aEstimated as the average at the other three wholesale prices.

Total costs include the capital outlays, the losses of herd quality and quantity, and the opportunity cost of traders' time. Their opportunity cost is evaluated as 30,000 CFA F per month by Staatz (1979, p. 387). A charge of 1,000 CFA F per day for traders' time is made in the Table.

The rate of return may be calculated by subtracting total costs from receipts to find the traders' margin, then dividing by the capital outlay. This is the rate of return for a single export trip. The annual rate of return depends on the number of rotations of capital that can be made in a year. Receipts from herds exported to Lome, Paga, and Abidjan are estimated in Table 8.5. Information on cattle prices in Tera is not available. From these data, high rates of return are found for rail exports to Abidjan and cattle trekked to Paga, with modest returns on the trek to Lome.

The final line of Table 8.5 shows the total receipts required in each market to give traders a 20 percent annual rate of return on their capital investment, assuming cattle are bought at 255 CFA F per kg in Upper Volta. Twenty percent is generally used as the opportunity cost of capital in West Africa (Staatz, 1979, p. 377). Note that the required sales price per kg to reach a 20 percent return is lowest for cattle sold in Tera. This indicates a high rate of return for this route.

Despite the finding of generally high profits from the above calculations, it should not be assumed that cattle exporting is necessarily highly profitable. The figures used in making the calculations are subject to considerable error. A slight fall in sales prices or rise in purchase prices could change export profits into losses. It can be safely assumed, however, that some profits are made by Voltaic cattle exporters, since they remain in the business of exporting cattle. Moreover, it can be assumed that relatively large profits² are made by exporting cattle by rail to Abidjan, since there are long waits for cattle cars, and a large proportion of all cattle exported go there. Profits may be somewhat higher than opportunity cost because exporting cattle is risky;³ the sales price may not always be high enough to cover purchase price plus transport costs and there is substantial variation in mortality and shrinkage losses.⁴ There may be a premium paid to traders so that they will assume these risks.

Another element which adds to the variability of profits is whether or not taxes are paid. As shown below, taxes make up a large proportion of export costs. If taxes are avoided, then larger profits result. The figures presented attempt to show actual taxes paid by traders, rather than the official charges, so they give an intermediate value between avoided-taxes high profits and full-taxes-paid low profits.

If it is assumed that the figures in Table 8.5 are correct, that does not necessarily indicate that traders make the annual returns on their capital shown. In order to do so they would have to continuously rotate their capital throughout the year, by exporting herd after herd. In practice this is not done; because of seasonality of supply, demand, and travel conditions it is not possible to realize the maximum number of rotations. Most Voltaic

traders ship cattle to Abidjan only during September to February, which would limit them to about eight rotations of capital per year. It should be noted, however, that the annual rates of return shown are the figures that should be used to measure the profitability of cattle exports, since the capital is not tied up when traders do not export and is available for other uses.

If, for whatever reason, the profitability of cattle exports were reduced, there appears to be considerable slack in the capital turnaround times shown in Table 8.4. Herd assembly time and selling time could be reduced considerably by greater efficiency for all routes. Faster action by the Central Bank of Ghana in making cedi-CFA F conversions and a reduction in the nine-day quarantine of imported animals could make considerably faster rotation of capital on the Ouagadougou-Paga route possible.

D. - Shares of Wholesale Price of Exported Cattle

Table 8.6 shows a breakdown of the proceeds per kg carcass weight exported on the four routes. In all cases more than 60 percent goes to the purchase of the herd in Upper Volta. Taxes and other official charges make up 10 percent or more of costs in four of the routes. Direct transport costs are of moderate importance on only two of the routes: 4.7 percent of charges on the Pouytenga-Lomé trek and 8.0 percent of charges on the Ouagadougou-Abidjan rail shipment. Indirect transportation costs are important only for the train shipments, where weight loss is 6.0 percent of total costs. As discussed above, the trader's margin is subject to considerable error, since it is calculated as the residual of other costs subtracted from the selling price. In addition, profit as a percent of selling price has little analytical meaning.

Table 8.7 has additional information that allows shares to be calculated from the beginning of the marketing chain for exports originating in Ouagadougou. By comparing these figures with those in Table 8.6, it can be seen that the return to the producer for cattle trekked to Paga is 49.4 percent; for those shipped by rail to Abidjan it is 50.5 percent. Total taxes and official charges are 11.6 percent for Paga and 12.3 percent for Abidjan. Total transportation costs are 3.2 percent of the Paga total and 17.7 percent of the Abidjan total. This divergence is compensated by the faster capital rotation possible on the Abidjan route.

TABLE 8.7
SHARES OF OUAGADOUGOU SALES PRICE
OF DOMESTICALLY PRODUCED CATTLE

| | CFA F/kg Carcass Weight | Percent of Sales Prices in Ouagadougou |
|--|----------------------------|--|
| Return to producer | 210.0 | 82.4 |
| Cattle purchase expenses | 2.4 | 0.9 |
| Taxes and official charges | 2.7 | 1.1 |
| Transport costs | 1.9 | 0.7 |
| Mortality losses | 4.5 | 1.8 |
| Other Costs | 0.7 | 0.3 |
| Trader's Margin | <u>32.8</u> | <u>12.9</u> |
| Return to seller in Ouagadougou market: | 255.0 | 100.0 ^a |

^aTotal figures may not add up due to rounding.

II. - Costs of Voltaic Meat Exports

Nearly all Voltaic meat exports go to Ivory Coast, transported by rail in privately owned⁵ refrigerated cars operated by the RAN. Table 8.8 shows the costs of exporting meat from Ouagadougou to Abidjan. The offals, or fifth quarter, of cattle slaughtered in Upper Volta cannot be profitably exported because they are quick to spoil and lose much of their sales value when frozen (Staatz, 1979, p. 250). Therefore, the fifth quarter is sold before the meat is exported. Hence, the sale price of the fifth quarter is subtracted from the cost of exporting. There is a similar reduction in the sale price of the meat in Abidjan because, in contrast to exported cattle, there are no offals to be sold. No estimates of the losses resulting from meat spoilage due to rail-car breakdowns have been made. Therefore, the margin calculated is overstated, since it does not account for these losses nor for the risks to traders.

According to impressionistic evidence gathered by field investigators (Herman, 1977, p. 158 and Staatz, 1979, p. 46) refrigerated rail-car breakdowns are frequent. Although there is some possibility of salvage sale of meat carried in malfunctioning cars, the losses can be great. Herman reports that one large Ouagadougou butcher quit exporting meat and turned to exporting cattle exclusively when two large shipments of beef were spoiled.

TABLE 8.8
COSTS OF REFRIGERATED-RAIL MEAT EXPORTS

| | <u>Costs per kg CFA F</u> |
|--------------------------------------|---------------------------|
| Purchase price | 255 |
| Costs of purchase | 2.3 |
| Slaughter tax | 6.7 |
| Refrigeration tax | 4 |
| Sale of fifth quarter | -42 |
| Transportation to train station | 2 |
| Preparation for export | 2 |
| Voltaic sanitary inspection | 1 |
| Export tax | 8 |
| Transportation in refrigerated car | 40 |
| Ivorian sanitary inspection | 10 |
| Costs of exporter | |
| Roundtrip travel | 11 |
| Lodging | 5 |
| Total Cost | <u>305</u> |
| Sales price in Abidjan ^a | 346 |
| Margin (excluding losses in transit) | 41 |

SOURCES: Staatz, 1979, p. 253; Herman, 1977, pp. 150 and 159.

^aThe wholesale price of cattle in Abidjan is 416 CFA F/kg carcass weight; offals are 17 percent of the value of a carcass, so the value of meat is 83 percent of the carcass wt. sales price (416 CFA F x .83 = 346 CFA F).

A. - Model of Voltaic Meat Exports

In long-run equilibrium, assuming free entry and equal risks, profits from the export of cattle and meat would be equal. Without better information about both, it is not possible to test this hypothesis. However, it is possible to identify how meat and cattle exports can be equally profitable simultaneously. When cattle are exported, meat, edible offals, and inedible portions are delivered to a southern market and transportation costs⁶ must be paid on the entirety. When meat is exported, only meat is delivered to the southern market; the edible offals must be sold at the point of slaughter,⁷ and refrigerated transportation must be paid only for meat. Cattle exports can be expected to gain a higher price for the edible offals sold in the southern market, but pay a higher transportation cost per unit of meat delivered. For meat and cattle exports to coexist in the long run, the price differential for offals per unit of meat must equal the difference in transportation costs per unit.

Staatz (1979, pp. 258-271) uses a model to show how changes in market conditions leading to high profits for meat exports will lead to a limited expansion of meat exports. Staatz assumes (1) that the prices of meat and offals in Ivory Coast are unaffected by the level of meat and cattle exports from Upper Volta, (2) that the ratio of meat to offal prices is constant in Ivory Coast, and (3) that the price of offals in Upper Volta is affected by the quantity of offals supplied. This means that changes in the quantity of Voltaic meat exported affect only Voltaic prices. An increase in meat exports, *ceteris paribus*, means an increase in the supply of offals in Upper Volta, lowering the equilibrium price. The lower price of offals makes meat a less profitable export relative to cattle; so Voltaic meat exports are self-braking.

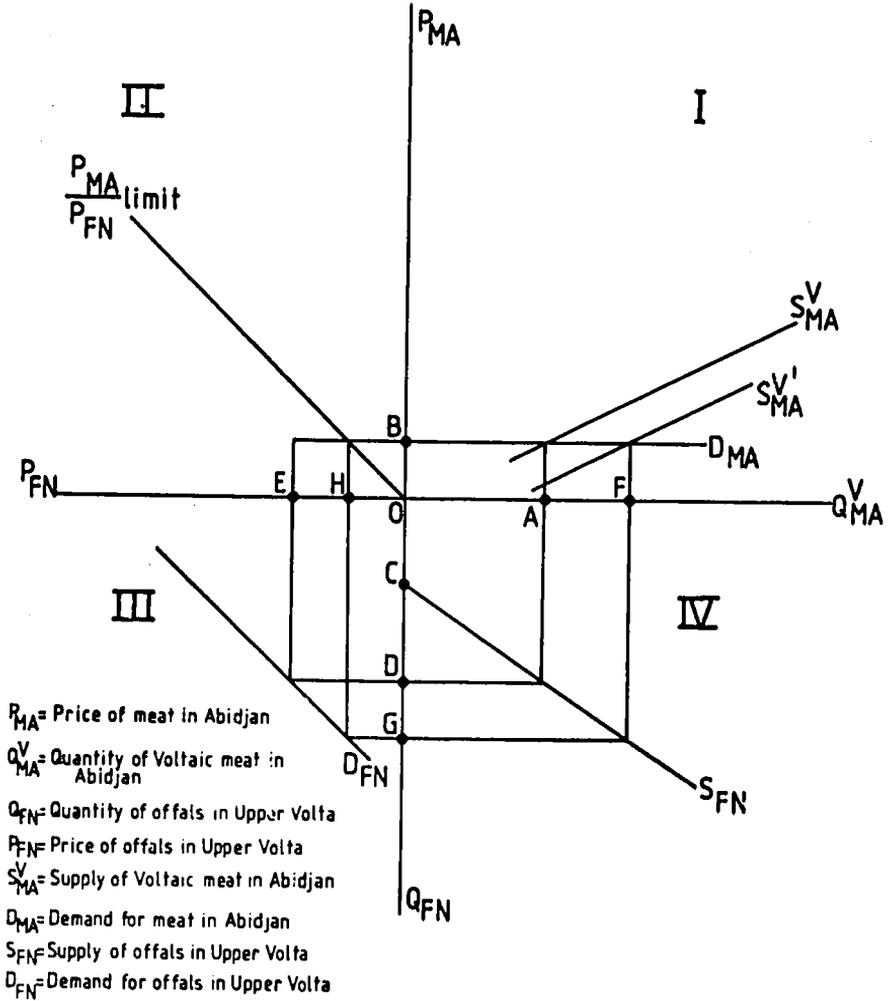
1) - Diagrammatic Presentation

This self-braking effect is shown in Figure 8.1. The first quadrant shows the market for meat in the primary southern market for Voltaic meat, Abidjan. The demand for meat (D_{MA}) is assumed perfectly elastic. The supply of Voltaic meat in Abidjan initially is given by S_{MA}^v . The quantity exported is OA; the price is $OB = D_{MA}$.

The relationship between the quantity of meat exports and the supply of offals in Upper Volta is shown in quadrant IV. There is some quantity of offals available from domestically slaughtered cattle, given by the distance OC. Added to OC are offals from cattle slaughtered for export, given by the curve S_{FN} .

Quadrant III shows the demand for offals in Upper Volta, labeled D_{FN} . It is a normally-sloped demand curve, i.e. the greater the quantity supplied, the lower the market-clearing price.

FIGURE 8.1: SELF-BRAKING VOLTAIC MEAT EXPORTS



In the second quadrant, the ray labeled " P_{MA}/P_{FN} limit" shows the maximum possible ratio of the meat price in Abidjan (P_{MA}) to the price of offals in Upper Volta (P_{FN}) which allows meat exports to be competitive with cattle exports. Price ratios above the ray make meat a less profitable export than cattle; those below it make meat exports more profitable than cattle.

With the initial supply curve of Voltaic meat in Abidjan (S_{MA}^V), it can be seen that meat exports are more profitable than cattle exports. The quantity of meat sold, OA, defines the quantity of offals supplied in Upper Volta. It is OD, given by the S_{FN} curve in the fourth quadrant. With OD offals supplied, the demand curve for offals shows that the market-clearing-price is OE. The price ratio between meat in Abidjan and offals in Upper Volta (P_{MA}/P_{FN}) is OB/OE, less than P_{MA}/P_{FN} limit, so meat exports are more profitable than cattle exports.

It should be noted that the lower the ratio P_{MA}/P_{FN} , the more profitable is the export of meat. In the initial meat-export supply conditions, then, excess profits are made. These excess profits would encourage more traders to enter the market to export meat.

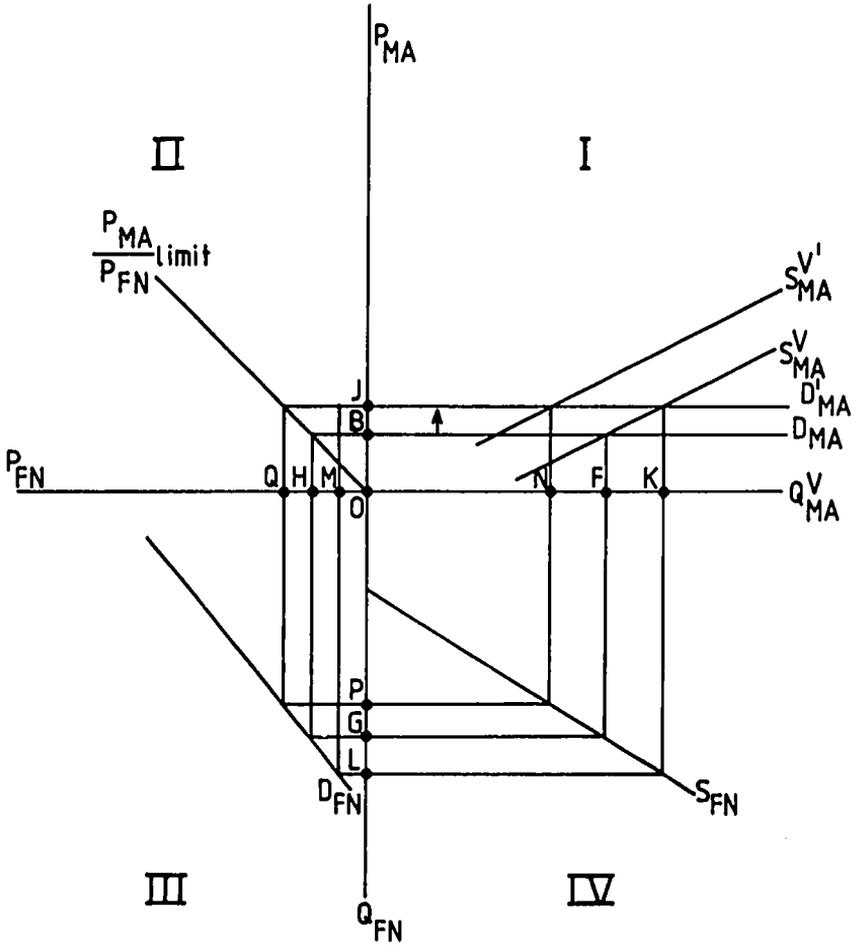
As the number of meat exporters increase, the supply curve of Voltaic meat in Abidjan will shift to the right. As the meat-supply curve moves to the right, it causes an increase in the quantity of offals supplied in Upper Volta. This causes the equilibrium price of offals to fall, leading to a higher P_{MA}/P_{FN} ratio (recall that the price of meat in Abidjan is constant). Hence, profits fall. The process of additional meat exporters entering the business should occur until there are no profits made by exporting meat in excess of those that can be made exporting cattle. The equilibrium position for Voltaic meat exports is shown on Figure 8.1 by supply curve S_{MA}^V . The quantity of Voltaic meat sold in Abidjan is OF in equilibrium; the quantity of offals supplied in Upper Volta is OG; the Voltaic price of offals OH; and the ratio of Abidjan/meat to Voltaic offals prices is $OB/OH = P_{MA}/P_{FN}$ limit, where meat exports are no more profitable than cattle exports.

2) - Changes in Market Conditions

The effects of changes in market conditions on the quantity of meat exported can be shown using the diagram.

(a.) - Increase in Abidjan Meat Prices. In Figure 8.2 is shown the effect on Voltaic meat exports of an increase in the price of meat in Abidjan. Initially, meat exports are in equilibrium at quantity OF and price OB; the Voltaic offals market is in equilibrium at price OH and quantity OG. Assume that the price of meat in Abidjan rises to OJ shown by demand curve D_{MA}^1 .⁸ Voltaic meat exporters would like to export quantity OK of meat. However, selling OK of meat in Abidjan increases the supply of Voltaic offals to OL, causing a decline in the equilibrium price of offals to OM. The combination of the rise in the Ivorian meat price and fall in the Voltaic offal price means that the ratio of the prices exceeds the limit.

FIGURE 8.2: INCREASE IN ABIDJAN MEAT PRICES



Therefore, meat exporting is less profitable than cattle exports; there will be a shift from meat to cattle exports causing a decline in offal supplies, until the price of offals rises sufficiently to bring the ratio back to the limit. This will happen only when enough exporters shift from meat to cattle so that ON of meat is exported (Voltaic meat supply curve S_{MA}^V), OP of offals supplied, and a price of OQ for offals. The result of a price increase in Abidjan is a decline in the equilibrium quantity of Voltaic meat exports. This outcome is a curious one, but it should be remembered that the decline in meat exports will be more than compensated by live animal exports.

(b.) - Processing and Exporting Offals. Figure 8.3 shows the effect of introducing a method of processing and exporting some greater portion of offals.⁹ This is done by rotation of the supply curve of Voltaic offals (S_{FN}^V) in the fourth quadrant towards the axis representing the quantity of Voltaic meat in Abidjan (Q_{MA}^V). This new supply curve of offals (S_{FN}^V) shows that fewer offals are supplied on the Voltaic market for every quantity of meat exported to Abidjan. At the old equilibrium quantity of meat exports, OF, the quantity of offals supplied is OG. This decline in offals supply to OR causes the price of offals to rise to OS; hence, the P_{MA}/P_{FN} ratio falls to $OB/OS < P_{MA}/P_{FN}$ limit, where excess profits are made by exporting meat. Long-run equilibrium will again be obtained by entry of new meat exporters into the market. The new equilibrium is shown by the supply curve of meat in Abidjan, S_{MA}^V , with OT quantity of meat exports, the original OG supply of offals, and the P_{MA}/P_{FN} ratio restored to OB/OH , where no excess profits are made.

(c.) - Change in Cost of Transportation. The effect of a decrease in the relative cost of transportation of meat exports¹⁰ is shown in Figure 8.4. Such a decrease means that a higher ratio of prices of meat in Abidjan to offals in Upper Volta will allow meat exports to be profitable. This is so because meat exports can compete with cattle exports only if meat exports enjoy transport costs low enough to cover the offals-price differential between Upper Volta and Ivory Coast. If the cost of meat transportation falls, then a greater north-south offal price differential may exist. The greater differential is shown by rotation of the P_{MA}/P_{FN} limit ray in the second quadrant towards the P_{MA} axis. At the original quantity of meat exported, OF, the P_{MA}/P_{FN} ratio of OB/OH now allows excess profits to be made in exportation of meat, attracting market entrants until the increased supply of offals reduces the price of offals to OU, where the P_{MA}/P_{FN} ratio of OB/OU is equal to P_{MA}/P_{FN} limit. The new equilibrium quantity of offals is OV, the new quantity of meat exported is OW, greater than the original quantity exported, OF. An increase in the relative cost of transport of meat to cattle would result in the rotation of the price-ratio limit towards the P_{FN} axis and a decrease in the quantity of meat exports.

FIGURE 8.3: PROCESSING AND EXPORTING OFFALS

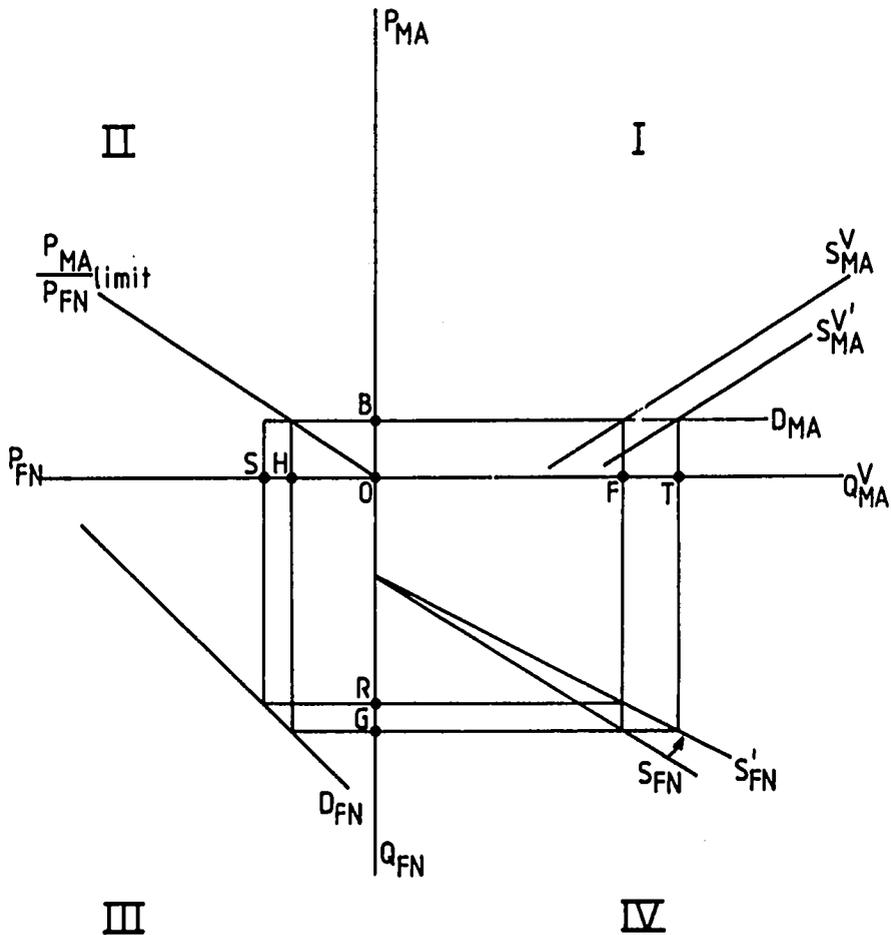
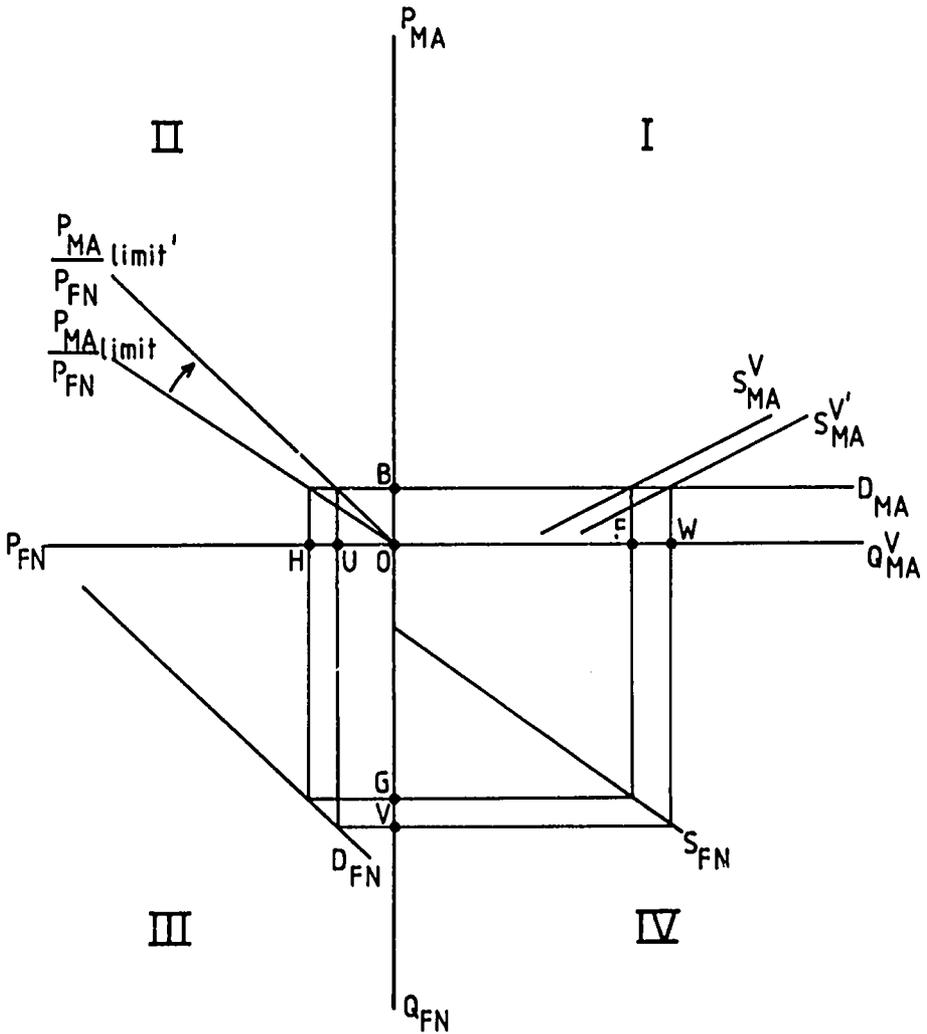


FIGURE 8.4: CHANGE IN TRANSPORTATION COSTS OR RELATIVE PRICES OF MEAT AND OFFALS IN ABIDJAN



(d.) - Changes in the Relative Prices of Meat and Offals In Abidjan. The effects of changes in the relative prices of meat and offals in Abidjan can be shown with similar rotations of the P_{MA}/P_{FN} limit ray. A reduction in the price of offals in Abidjan means that a lower price of offals in Upper Volta will maintain the differential in transportation costs. Hence, the P_{MA}/P_{FN} limit ray would be rotated toward the P_{MA} axis with a decline in the price of offals relative to meat in Abidjan or, conversely, toward the P_{FN} axis with a rise in the relative price. The former case would increase Voltaic meat exports; the latter would decrease them.

CHAPTER NINE

PROJECTIONS OF LIVESTOCK AND MEAT EXPORTS TO 1985

I. - Available Surplus

Estimates of national production and domestic consumption of meat through 1985 were made in Chapters Three and Six. In both cases ranges of values were presented. In the absence of information about relative price changes, these projections may be used to indicate the availability of Voltaic meat for export. Increased relative meat prices in export markets would both discourage domestic Voltaic consumption of meat and encourage production; decreased coastal meat prices would tend to encourage Voltaic consumption and discourage production. Since it is difficult to forecast even the direction of price changes, it is necessary to discuss Voltaic meat availability assuming no change in relative prices.

A. - Beef Surplus

Table 9.1 shows the expected trends of beef production and domestic consumption for 1977 through 1985. The difference between the two yields is the expected surplus available for export. No distinction is made here between exports on the hoof and chilled beef exports.

TABLE 9.1
AVAILABLE SURPLUS OF BEEF THROUGH 1985
(Thousand Metric Tons)

| Year | National Production | Domestic Consumption | Available for Export |
|------|------------------------|-------------------------|-------------------------|
| 1977 | 26.0 | 21.8 | 4.2 |
| 1978 | 26.5 | 22.5 | 4.0 |
| 1979 | 27.1 | 23.3 | 3.8 |
| 1980 | 27.7 | 24.1 | 3.6 |
| 1981 | 28.4 | 24.9 | 3.5 |
| 1982 | 29.0 | 25.8 | 3.2 |
| 1983 | 29.7 | 26.8 | 2.9 |
| 1984 | 30.3 | 27.8 | 2.5 |
| 1985 | 31.0 | 28.8 | 2.2 |

The figures for national production are taken directly from the column in Table 3.4 which assumes an overall herd productivity rate of 12 percent. This is mid-way between an optimistic rate of 14 percent, and a pessimistic one of 10 percent.

Expected domestic consumption is derived from the estimates made in Chapter Six, using income elasticities of 1.0 for meat and 0.5 for offals. These estimates reflect an increasing rate of urbanization and a slight improvement in income per capita. The urban sector, which constitutes 8 percent of the population, is assumed to grow at 5 percent per year, while the rural sector increases by only 1.6 percent. Income per capita in urban areas improves at 1.5 percent annually, but in rural areas it grows weekly at a 0.4 percent rate. These rates correspond to a national rate of growth of per capita income of 0.6 percent, the historical rate achieved in the 1960-77 period (IBRD, 1979b, p. 126). A one percent increase in income is assumed to induce an equivalent one percent rise in beef consumption in both urban and rural sectors.

The net result of the above postulates is a shrinking surplus of beef available for export over the coming years. While Voltaic beef production is projected to increase by 19 percent from 1977 to 1985, it would not keep pace with the growth of domestic demand, which is projected to increase by 32 percent over the same period. As stated before, most of the rise in consumption can be attributed to the growth of urban population. If consumption follows the anticipated pattern, Voltaic exports of cattle and beef will decline. The exportable surplus in 1985 is forecast at 2,200 tons, down from an estimated level of 4,200 tons in 1977. Put in terms of total production, exports decline from 16 percent in 1977 to only 7 percent in 1985. Demand for beef in Voltaic towns and cities will compete more and more with the coastal market for the limited supply of cattle and beef.

It is necessary to remember that the above trends are based on the assumption of an increasing level of per capita consumption. Heavy demand in coastal markets, however, could cause beef prices in Upper Volta to increase sufficiently to restrain or even reduce beef consumption intake per person, thus making more beef available for export, the central point illuminated by these projections in the impending conflict between the goals of increasing beef and cattle exports, and maintaining the urban centers supplied with beef at low prices.

B. - Edible Offals Surplus

The estimates of possible production and consumption of edible offals through 1985 are shown in Table 9.2. As in the case of beef, the future appears to hold increasing Voltaic offals consumption. Domestic production would grow at the same rate as beef production, but domestic demand for offals is expected to grow at a rate lower than that for beef. This follows from the assumption that income elasticity for offals is only 0.5 while for beef it was set at 1.0. These trends suggest that the price of offals in Ouagadougou would go up but at a slower rate than beef prices, i.e. the relative price of offals will decline vis-a-vis the price of beef in Upper Volta. The model of relative profitability of beef versus cattle

exports, developed in Chapter Eight, showed that beef exports were relatively more profitable the higher the price of edible offals in the other area, other things equal. Thus lower relative prices of edible offals in Upper Volta would indicate less profitable beef exports in the future.

TABLE 9.2
AVAILABLE SURPLUS OF EDIBLE OFFALS THROUGH 1985
(In Thousands of Tons)

| Year | National Production ^a | Domestic Consumption | Available for Export |
|------|----------------------------------|----------------------|----------------------|
| 1977 | 6.49 | 5.45 | 1.04 |
| 1978 | 6.63 | 5.61 | 1.02 |
| 1979 | 6.78 | 5.78 | 1.00 |
| 1980 | 6.94 | 5.96 | 0.98 |
| 1981 | 7.09 | 6.14 | 0.95 |
| 1982 | 7.25 | 6.34 | 0.91 |
| 1983 | 7.42 | 6.54 | 0.88 |
| 1984 | 7.59 | 6.75 | 0.84 |
| 1985 | 7.75 | 6.97 | 0.78 |

^aAssumes 0.25 kg of edible offals produced for every 1.0 kg of beef.

The availability of bovine edible offals for export follows a similar declining trend as that for beef exports. The decline, however, is less drastic for offals, from an equivalent of 1,040 tons in 1977 to 780 tons in 1985. This drop of 25 percent is less than the corresponding fall of 48 percent in the exportable surplus of beef.

C. - Small Ruminant Surplus

By contrast to the deficits forecast for Voltaic beef and edible offals in 1985, Table 9.3 shows that a growing surplus of small ruminants is likely to exist. By 1985 an estimated 4,500 tons of small ruminant meat in excess of domestic consumption could be produced in Upper Volta. This means that on the order of 375,000 head of sheep and goats will be available for export in 1985.

TABLE 9.3
AVAILABLE SURPLUS OF SMALL RUMINANT MEAT THROUGH 1985
(In Thousands of Tons)

| Year | National Production | Domestic Consumption | Available for Export |
|------|------------------------|-------------------------|-------------------------|
| 1977 | 15.4 | 13.5 | 1.9 |
| 1978 | 16.0 | 13.8 | 2.2 |
| 1979 | 16.6 | 14.2 | 2.4 |
| 1980 | 17.3 | 14.5 | 2.8 |
| 1981 | 18.0 | 14.8 | 3.2 |
| 1982 | 18.6 | 15.2 | 3.4 |
| 1983 | 19.3 | 15.5 | 3.8 |
| 1984 | 20.0 | 15.9 | 4.1 |
| 1985 | 20.8 | 16.3 | 4.5 |

D. - Overall Picture

In light of the individual forecasts made for beef, edible offals, mutton and goatmeat, some overall conclusions may be reached. First, small ruminants seem to have greater export potential than cattle. Second, some conjecture as to the behavior of relative prices may now be made. Given that surpluses are more likely in small ruminants, the surpluses are probably going to exert downward pressure on small ruminant prices. This will both increase domestic consumption and decrease production. The relative scarcity of cattle on the other hand, will push prices up, producing the opposite consequences. Finally the estimates show that it is probable that there will be lower relative prices for edible offals vis-a-vis beef in Voltaic markets, making beef exports less competitive relative to live cattle exports.

II. - Market Prospects

A. - Ivory Coast

Ivory Coast has been the most important market for Voltaic livestock and meat exports since 1965. Despite declines in absolute numbers imported, it remained the most important (78 percent) foreign market for Voltaic cattle through 1977. Ivory Coast imported only 24,729 head of Voltaic cattle in 1977 as against peak imports of 79,486 in 1965 (see Table 9.4). All of Upper Volta's beef exports go to Ivory Coast. Beef exports peaked at 1,692 tons in 1968 and fell to 189 tons by 1977. Ivorian imports of Voltaic small ruminants reached a peak at 286,864 head in 1975 and fell to 123,263. Even with this dramatic falloff, Ivory Coast was still taking 85 percent of Voltaic small ruminant exports.

TABLE 9.4

LIVESTOCK AND MEAT IMPORTS FROM UPPER VOLTA, 1977 AND PEAK YEAR

| | Imports from Upper Volta | |
|-------------------------------------|--------------------------|------------------------|
| | 1977 | Peak Year ^a |
| Cattle (head) | | |
| Ivory Coast | 24,729 | 79,486 |
| Ghana | 2,835 | 78,427 |
| Togo and Benin | 4,004 | 8,416 |
| Total | 31,892 | 166,329 |
| Meat equivalent (tons) | 3,986 | 20,791 |
| Beef (tons) | | |
| Ivory Coast | 189 | 1,692 |
| Small Ruminants (head) | | |
| Ivory Coast | 123,263 | 286,864 |
| Ghana | 18,063 | 187,068 |
| Togo and Benin | 3,047 | 6,369 |
| Total | 144,373 | 480,301 |
| Meat equivalent (tons) | 1,732 | 5,764 |
| Total meat equivalent (tons) | 5,907 | 26,555 |

^aLargest quantity imported in any year since 1960.

As has been argued elsewhere in this study, Ivory Coast demand for Sahelian livestock should be strong in the next few years, now that more normal conditions prevail. Given the commercial and political ties between the countries, Ivory Coast is expected to remain by far the most important market for Voltaic livestock and meat.

B. - Ghana

Ghana was the most important market for Voltaic livestock until the mid-sixties. Ghana imported 78,427 head of Voltaic cattle and 187,068 small ruminants in 1961, and over 68,000 cattle as late as 1964. However, by 1977 Ghana's imports from Upper Volta had fallen to 2,835 head of cattle and 18,063 small ruminants, only 9 and 13 percent of all Voltaic exports. As noted in Chapter Seven, currency inconvertibility problems and price and other policies implemented by the government-controlled Ghanaian Meat Marketing Board have been the major factors in the decline in trade. Until these problems are resolved, livestock trade between Upper Volta and Ghana is unlikely to be of major proportions. However, Ghanaian demand for animal protein for its 10.6 million people could potentially be as great as that of Ivory Coast.

C. - Togo and Benin

Togo and Benin have imported small but steady quantities of Voltaic cattle and small ruminants since 1960. With combined populations of 5.6 million, they have some potential to expand imports from Upper Volta. Nonetheless, they are not likely to become major livestock and meat trading partners in the near future.

D. - Other Countries

Niger imported some cattle from Upper Volta in the mid-seventies. These imports were mainly to help re-stock the Nigerien herd, which had been severely reduced by the drought. As a traditionally livestock-surplus country, it is unlikely that Niger will import significant quantities of Voltaic livestock in the foreseeable future.

Nigeria's large population and rapidly rising incomes make it a market with potentially rapid growth in livestock imports. Currently, however, it is well supplied with Nigerien, Chadian, and domestic livestock.

Some potential does exist, particularly for small ruminants, in certain new markets in North Africa and the Middle East. Volume V contains a detailed discussion of these possibilities.

FOOTNOTES TO CHAPTER ONE

¹This description is based on that found in SCET International, (1972), p. 11.

²Most herders now purchase salt for their cattle, rather than migrating for it.

³Delgado found that less than one-third of the Fulani-controlled herds which he surveyed in the southern region of Tenkodogo actually belonged to the Fulani. Each herd was made up of cattle belonging to three or four proprietors (Delgado, 1977, p. 33).

⁴Surviving calves divided by total herd size

⁵Tropical Livestock Unit (Unité Bovin Tropical), the pasture requirement of different livestock classes, e.g. 1 UBT = 1 lactating cow = 2/3 draft ox = 1.1 adult steer = 4 six-month old calves = 5 sheep = 6.6 lambs = 5.8 goats (SEDES, 1974).

⁶Organisme Regional de Développement (Regional Development Authority).

FOOTNOTES TO CHAPTER TWO

¹See IBRD, 1975a, Appraisal of a Livestock Development Project, Upper Volta, for a detailed description of the project.

²An additional consideration is that only approximately one-third of the national herd are taurin cattle. To the extent that they may be less desirable as feeder cattle, the availability of cattle inputs to fed production diminishes further.

³The resale price was raised by SODEXPAD to 200 CFA F per kilogram liveweight in late 1979.

FOOTNOTES TO CHAPTER FOUR

¹The relative costs of trekking, trucking, and shipping cattle by rail are discussed in Chapter Eight.

²Herman, 1977, p. 120. Until the water and pasture available along marked trek routes are improved, they will be little used. Marked routes with good water and pasture could decrease shrinkage as well as reduce farmer-drover conflicts.

³Much of this section relies on Staatz, 1979.

⁴For a full explanation of these conditions, see Chapter Seven.

⁵Herman, 1979, discusses the role of the intermediary in facilitating the sale of cattle by herders in primary markets.

⁶In the case of the slaughterhouse, the facility was designed to operate with about thirty semi-skilled laborers at its 13,000-ton annual capacity. Traditional methods required

approximately 300 butcher apprentices and modest physical capital. In 1978 the slaughterhouse operated at less than one-third of capacity. Even so, it actually employed 90 workers.

⁷As evidence, one should note that Upper Volta has failed to implement either the CEBV or the OCBV agreements concerning regulation of marketing professionals.

FOOTNOTES TO CHAPTER FIVE

¹Since 67 percent of local butchers' purchases are cull cows and all cull cows sold likely went to local butchers, the 18 percent of total cattle sales that were cull cows is 67 percent of local butchers' purchases. Hence, local butchers buy about 27 percent of all cattle sold.

FOOTNOTES TO CHAPTER SIX

¹Slaughterhouse output was shown in Tables 4.8 and 4.9; chilled meat exports will be found in Table 7.3. Combined population has been estimated at 188,000 in 1966 and 270,000 in 1976, a 3.6 percent increase. A higher rate of growth would of course have lowered the per capita consumption estimate.

²A population growth rate as high as 7.8 percent has been reported in Ouagadougou (SAED, 1978, p. 20).

FOOTNOTES TO CHAPTER SEVEN

¹The only train line from Upper Volta to the coast runs to Abidjan, Ivory Coast.

²President Nkrumah was deposed in a military coup in February 1966.

³For a more detailed explanation of Ghana's political problems and their effects on cattle imports, see Sullivan, 1979, in volume II.

⁴Conversation between Charles Steedman and Major George Brock, Deputy Chief Executive, Cattle Development Board, November 1977.

⁵Cattle originating in another country passing through Upper Volta on their way to their ultimate sale in a third country.

⁶A total of 129 tons of meat were exported to Ghana in 1968 and 1969. This is the only exception to Ivory Coast as the market for Voltaic meat.

⁷Adjusting cattle exports to meat equivalent.

⁸This figure is calculated assuming: (1) the average carcass weight of cattle was 140 kg with 25 percent offals, (2) the average carcass weight of small ruminants was 16.5 kg with 15 percent offals, (3) the price ratio of offals to meat was .55:1, and (4) the price ratio of beef to small ruminant meat was .66:1.

FOOTNOTES TO CHAPTER EIGHT

¹Export-quality cattle must be larger and stronger than cattle used for domestic consumption, so that they can survive the rigors of travel.

²Relative to opportunity cost.

³Monopoly power inherent in the Ouagadougou-Abidjan route because of the transportation constraint is shared by the trader and the bureaucrat who controls the assignment of cars. The "unofficial" costs represent a "monopoly tax."

⁴Staatz (1979, p. 393) estimates net losses because of mortality to occur 15 to 20 percent of the time on the Ouagadougou-Abidjan trip.

⁵The refrigerated rail cars are owned by Fruitière Ivoirienne.

⁶Transportation costs include: (1) shrinkage from mortality en route, lost animals, weight loss, and forced sales of cattle, spoilage of meat during shipment; (2) risk; and (3) freight rates for cattle cars and refrigerated cars.

⁷Edible offals cannot be profitably exported because of rapid spoilage and consumer resistance to chilled offals.

⁸The price of meat in Abidjan might rise because of reduced supplies from other sources, e.g. South America or Mali, or because of increased Ivorian demand as a result of rising incomes.

⁹Suggested by Staatz (1979, p. 271) as a means of releasing the brake on meat exports.

¹⁰This decline might result from better maintenance of the refrigerated rail cars, reducing meat-spoilage losses; or an adjustment in RAN freight rates favoring meat over cattle exports.

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