DEVELOPMENT OF THE LIVESTOCK SECTOR IN WEST AFRICA

by

E. D. Eddy

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1 mm.	=	.04 inches
1 km.	=	.62 miles
1 hectare	=	2.471 acres
1 square kilometer	=	.386 square miles
1 metric ton	=	1.102 short tons
	=	.984 long tons

RATES OF EXCHANGE IN JUNE 1975

(U.S. dollar equivalents)

Currency	Country	Dollar Equivalents
CFA Franc	Franc Zone	211.2
Cedi	Ghana	1.1
Liberian Dollar	Liberia	.3
Mali Franc (MF)	Mali	423.7
Ouguiya	Mauritania	42.5
Naira	Nigeria	.6
Leone	Sierra Leone	.8

Source: African Development 9:6 (June 1975):16.

ABBREVIATIONS

BCEAO - Central Bank of West African States (Banque Centrale des Etats de l'Afrique de l'Ouest)

CEAO - Economic Community of West Africa (Communaute Economique de l'Afrique de l'Ouest)

FAC - France, Fund for Aid and Cooperation (Fonds d'Aide et de Cooperation)

FED - European Development Fund (Fonds Europeens de Developpement)

IBRD - International Bank for Reconstruction and Development

IDA - International Development Association

IMF - International Monetary Fund

IFAN - Fundamental Institute of Black Africa (Institut Fondamental d'Afrique Noire; prior to 1966 - Institut Francais d'Afrique Noire), Dakar, Senegal

OMVS - Organization for the Development of the Senegal River (Organisation pour la Mise en Valeur du Fleuve Senegal)

SEDES - Society for the Study of Economic and Social Development (Societe des Etudes pour le Developpement Economique at Social)

UNESCO - United Nations Educational, Scientific, and Cultural Organization

UNDP - United Nations Development Program

US-AID - United States Agency for International Development

DEVELOPMENT OF THE LIVESTOCK SECTOR IN WEST AFRICA*

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I. INTRODUCTION

A. Statement of Purpose

This paper will discuss the role of the livestock sector in West African economies and the potential of that sector for contributing to the overall development of a particular group of countries in the Sahel zone of West Africa. As a result of the well-publicized 1968-73 drought in West Africa donor agencies throughout the world are currently evaluating medium and long term development strategies for the stricken zones and especially for those countries in the Sahel region. Short term relief efforts have been in progress for several years, although many feel that they were rather late in coming. With the resumption of favorable rainfall patterns in the past year, the fear of widespread famine and disaster has abated, and critical shortages are no longer so apparent. West African countries are now anxious to initiate more permanent solutions for economic imporvement, and medium term development of the livestock sector may provide important contributions to such improvement.

B. Geographical Region

The area covered by this study is sub-Saharan West Africa, and its geographical boundaries are outlined in Map A. In contrast to the customary grouping of contemporary political units in West Africa, I have included the Republic of Chad, which is often regarded as a Middle or Central African nation. However, this state merits inclusion in a discussion of West African livestock, since it is a major exporter of livestock to coastal West African states, livestock plays an important role in the Chadian economy (see Chapter II), and, if included within the West Africa group, Chad contains the third largest national herd (after Nigeria and Mali).1/ Furthermore, the majority of Chad's land area (approximately 60%) is devoted almost exclusively to the semi-nomadic herders whose livelihood depends on their herds.

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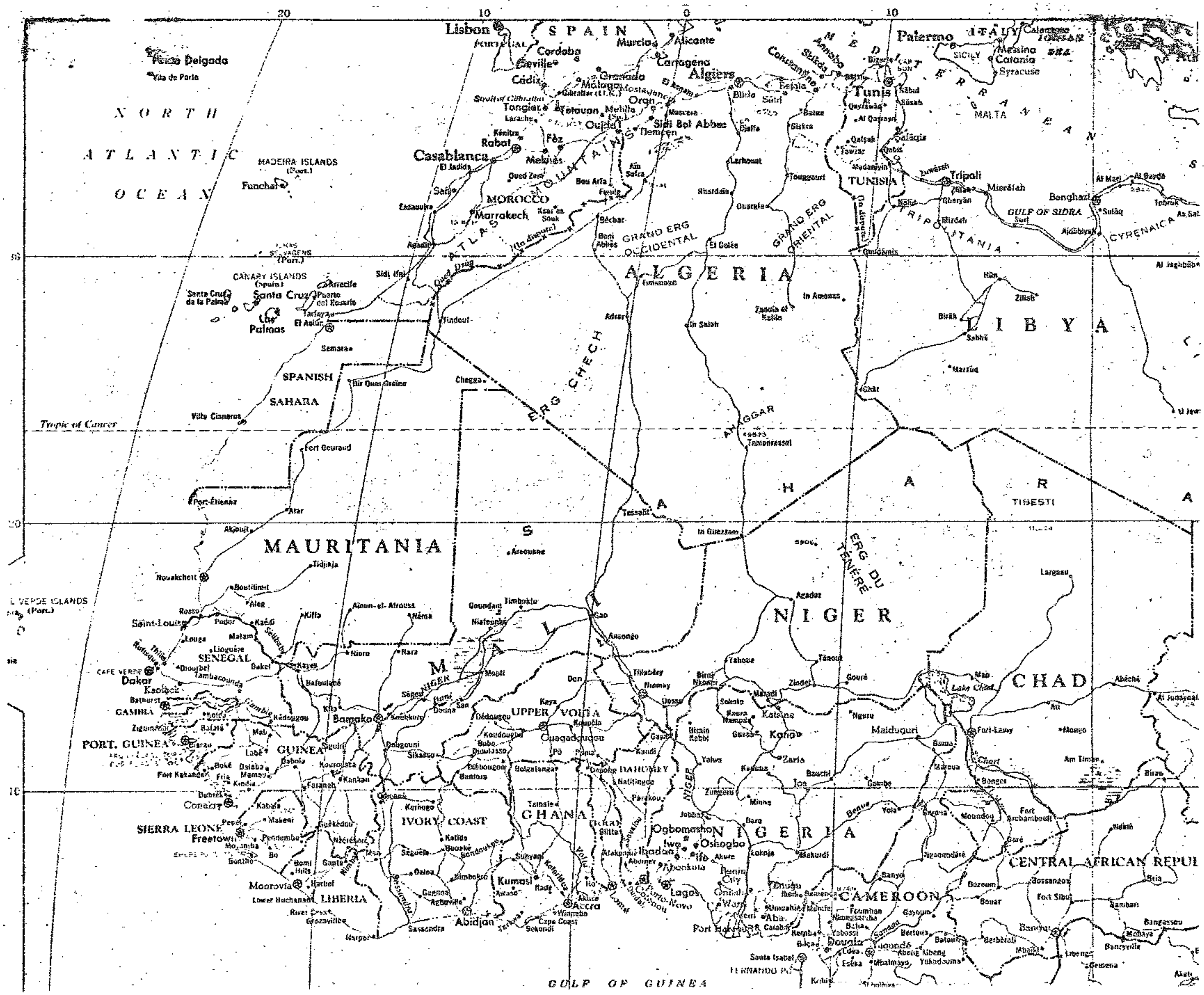
* In slightly modified form this paper was first submitted as part of the requirements for Agricultural Economics 660: Food, Population, and Employment, Fall Term, 1974/75.

1/ Based on FAO estimates: see Table 4.

MAP A. WEST AFRICA: POLITICAL BOUNDARIES



Within this region, there are two distinct subgroups as defined by the relative supply of and demand for livestock and livestock products. The firs will be referred to as the Sahel nations and is comprised of those nations with a relative abundance of livestock and a comparative advantage over other West African nations for livestock production. For reasons which will be defined in the following chapter, this subgroup consists of Chad, Mali, Mauritania, Niger, and Upper Volta.

The second subgroup will be referred to as the coastal nations and is defined as the major present and potential market and consumption center for livestock products. This subgroup includes Dahomey, Ghana, Ivory Coast, Nigeria, Sierra Leone, and Togo. The common characteristics of this subgrou will be discussed in greater detail in Chapter II.

C. Methodology

The livestock sector as defined within this study is confined to cattle since the cattle trade comprises the largest portion of the livestock trade within West Africa, and in the Sahel countries, cattle herds are the most valuable economic asset of the livestock sector. It must be noted, however, that a variety of other animals are raised within West Africa, including pig chickens, goats, sheep, donkeys, horses, and camels. For instance, a 1962 estimate of the herds within the Sahel zone alone listed 22-25 million head of sheep and goats and one million camels as well as 12 million head of catt (12, p. 311). This paper, however, considers only cattle.

Livestock sector development is approached on three levels: that of th political states, the people, and the land. Chapter II considers the first of these three, and an overview of the livestock situation is presented for the Sahel states and the Ivory Coast. A brief evaluation of livestock (catt sector development plans is also presented for selected nation-states. The appendices provide additional information on the livestock sectors in these states, such as herding modes, annual meat production, and estimates of domestic consumption and foreign trade.

Since a detailed presentation for each country would be too ambitious for this study, the instances of Mali and the Ivory Coast have been selected for more thourough examination. The country summaries described above are intended to provide a background against which the reader may evaluate the particular instances of Mali and the Ivory Coast. There are three reasons behind the choice of these two countries. First, behind Nigeria, estimates show that Mali has the most important national cattle herd of West Africa, and the Government of Mali has named livestock development as one of the highest priorities of its most recent Five Year Plan (1974-78). Second, in the classical economic definition of growth, the economy of the Ivory Coast has maintained the most rapid rate of growth out of all of francophone West Africa, and the consequent rapid expansion of urban centers and urban income has produced an increasingly rapid rise in the demand for meat. Third, I have spent one year working with the Ministry of Production of the Republic of Mali and have traveled along the major route used to truck cattle from Mali down to the coastal markets of the Ivory Coast, so I am somewhat familiar with the system of cattle production in Mali and the marketing system in the Ivory Coast.

Chapter III examines the impact of livestock sector development at the micro-economic level, e.g., that of the "traditional" herder. A variety of ethnic groups are associated specifically with the raising of cattle and other livestock in West Africa, including Tuareg, Bella, Toubou, Moor, and Fulani. For many centuries, the predominant occupation of these groups has been livestock herding in the Sahel and Sahara regions, and their former slave-raiding activities have introduced livestock production to other West Africans with different cultural backgrounds. Production techniques vary from the seasonal transhumance of large herds or groups of herds over several thousand miles to semi-nomadic herding patterns which cover a range of one or two hundred miles to "modern" intensive sedentary ranching methods. In addition, several occupational groups, such as the Haussa, the Dioula, and the Sarakolle, have become associated with the trading and marketing of livestock. The marketing process extends from the transactions between the herder and the itinerant trader in the bush to merchants running fleets of Mercedes-Benz trucks to refrigerated slaughterhouses.

Out of this spectrum of economic activity, the present study focuses on the herding techniques and economic motivations of the semi-nomadic Fulani of the Sahel zone. The section incorporates socio-economic information from the anthropological literature on the Fulani, and an attempt is made to delineate those aspects of Fulani cattle production which complement or contradict the development strategies proposed by the various nation-states described in Chapter II.

Chapter IV examines the ecological and environmental effects of changing cattle populations and land use patterns. The recent drought has altered drastically the West African environment, and some experts maintain that if former land use patterns are allowed to persist, fragile ecosystems such as those of the Sahara and the Sahel may become entirely uninhabitable. An extreme extension of this argument is expounded by the "desertification" contingent, who claim that the Sahara is steadily advancing and will eventually take over West Africa. Additionally, many feel that the natural cycle of events which normally cause West African droughts was aggravated by the overgrazing which occurred when livestock populations were allowed to exapnd beyond the carrying capacity of the rangeland. A historical perspective on the issue of ecological disruptions is provided in this chapter by a review of former West African droughts and the climatic, ecological, and other factors which have caused and are causing such phenomena.

Each of the above sections contains a discussion of what the material presented in that section implies for livestock development policy. As mentioned above, the latter sections also review contradictions with those objectives established in previous sections.

A word of caution is necessary at the outset regarding the reliability of the estimates and controlled exchange figures presented in the following chapters. Much of the available data is only approximate, and official figures may represent as little as 25% of the true numbers. There are often wide discrepancies among estimates even for a basic planning statistic such as national cattle populations. Ferguson, for instance, found that cattle population estimates for the Northern Region of Nigeria in the early 1960's

ranged between 4.3 million and 15 million (25, p. 15). Until 1973, the accuracy of official cattle population figures was hampered by the fact that direct taxes were levied on cattle, motivating herders to disguise the true number of their animals. After 1968, cattle losses due to the drought, for which only rough approximations are currently available, significantly altered cattle populations.

Furthermore, many herders hold the belief that talking about their cattle in quantitative rather than qualitative terms is either embarassing or ostentatious and should be avoided in any case. The following is an example from Stenning:

> Pastoral Fulani men, who have to do with cattle, are notorious for avoiding all official attempts to count the beasts in their herds or discuss their ages systematically. To ask a man how many beasts he has is pointless and indiscreet, for cattle are not counted, lest by doing so their number is made finite... Asked how a fertility inquiry might be carried out a chief replied: "If you want to count our children, call the elders one by one, lest they feel shame or pride. If you want to count cattle, go and do so if it pleases you, but do not tell us their number, for it is not our custom to count them." (60, p. 148)

Under these conditions, it is difficult to establish reliable data on herd numbers or herd characteristics.

II. CATTLE IN WEST AFRICA

A. Introduction

This section presents an overview of the role of cattle in selected West African economies as well as a detailed analysis of the role of that sector in the Malian economy. For each country examined in this section, information is presented in the appendices on domestic meat production and consumption, foreign trade, and leather production where applicable.

As previously mentioned, most of this data must be analyzed with extreme caution. Consumption estimates are based most often on dated budget studies of small samples of the urban population. Results of the budget studies are projected forward with population growth rates and other demographic information, assuming no change in the patterns of consumption. Data on controlled slaughters, exports, and imports usually represents only 25% of the actual totals. Changes in government policy can have a large influence on these figures, and where information is available, such policy changes have been noted. In light of this, time series on slaughters and trade must be taken only as indicators of trends, and trade data are more useful in showing the directions of the cattle trade rather than quantifying that trade.

Where livestock production is given as a percent of the Gross Domestic Product, the value of this production includes meat, live cattle, leather and skins, and foreign trade. However, this does not include the value of milk and manure production, two important livestock products for which no valuation

is available. Thus, the proportion is somewhat underestimated.

This section dwells primarily on meat production and the uses of cattle as a source of animal protein, since the bulk of the international livestock trade in West Africa is in meat and live cattle for slaughter. The trade in livestock for slaughter developed as a result of the colonial situation. First, as urban areas expanded when colonial regimes were established, the demand for meat increased. Second, colonial governments instituted a head tax which had to be paid in cash, and herders were forced to sell a few cattle each year in order to fulfill this requirement. This prompted the creation of a specialized commercial sector dealing in cattle.

However, in traditional livestock producing areas (e.g., the Sahel), with the exception of ranching operations designed to produce cattle for slaughter, milk is the most important resource derived from cattle, and cattle are used primarily as a form of investment and secondarily as work animals in mixed farming zones. The implications of these contradictions on livestock sector development policy will be discussed at the end of the third section.

Finally, it must be noted that the 1968-73 drought has revised much of the information presented in this section. A complete picture of the impact of the drought will not be available for some time. This will be discussed further in the fourth chapter, but it must also be kept in mind for the discussion below. For instance, it is difficult to say what percentage of actual live cattle exports leaving the Sahel countries were intended for market and what percentage were emigrating south to find better pasture and water resources.

B. The Sahel

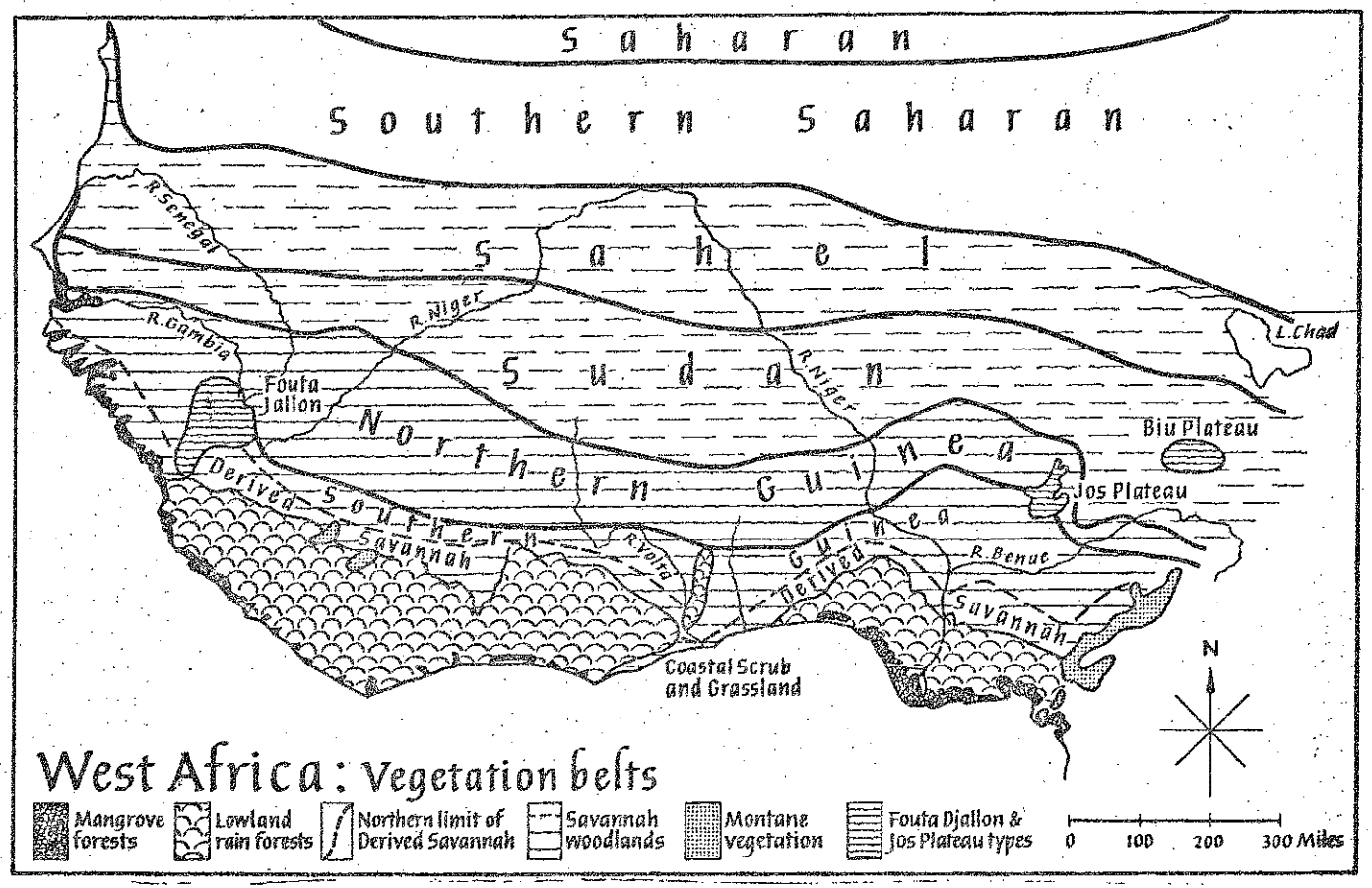
The Sahel is a climate zone contained within a corridor of land approximately 200 to 300 miles wide traversing West Africa from east to west from the shores of the Atlantic to the Lake Chad watershed (see Map B). Its name is derived from an Arabic word meaning "border" or "shore", since the zone marks the southern extent of the Sahara Desert.

The normal annual rainfall in this area ranges from 100 to 600 mm. per year. The aridity of the area is partially offset by several major river systems: the Niger, the Senegal, and the Lake Chad watershed. The Niger River, for instance, flows through the Sahel zone for approximately 1700 miles and annually floods a 60,000 square mile zone in the midst of the Sahel. This interior delta area becomes an important source of pasture for around 1.5 million cattle in the dry season when the river's waters recede (35).

Juxtaposed between the Sahara Desert and the Savanna grasslands, the Sahel is the traditional center of livestock production in West Africa. The majority of the inhabitants of the Sahel zone rely on livestock for their economic livelihood, and livestock is one of the most important elements of the trade between the Sahelian and the coastal nations.

The Sahel zone runs through Senegal, Mauritania, Mali, Upper Volta, Niger, and Chad. However, as defined above, Senegal has been deleted from the group heretofore referred to as the Sahelian nations. This is because aggregate

MAP B. WEST AFRICA: VEGETATION BELTS



Source: Ajayi, J.F.A. and M. Crowder, History of West Africa (New York: Columbia Univ. Press, 1972), Vol. 1, p. 4.

indicators of the condition of the Senegalese economy show it to be in relatively better shape than the economies of the other Sahelian nations. Also, Senegal is a net importer of livestock and livestock products as opposed to being a net exporter, as are other Sahelian nations. A 1970 estimate showed Senegal to be deficient in beef meat and offals by 12,800 tons, and Senegal presently imports about 72,000 head of cattle per year from Mauritania (62, p. 13). Activities within the livestock sectors of the remaining Sahelian countries are listed in this section, and the salient features of their economies are summarized below.

One of the most obvious characteristics of the Sahelian nations is their low population densities relative to other West African countries (see Table 1). Only 18% of the total West African population live within Chad, Mali, Mauritania, Niger, and Upper Volta, but these five countries cover 69% of the total land area within West Africa. With the exception of Upper Volta, the Sahelian nations have the lowest population densities in West Africa, ranging from 1.2 to 4.3 inhabitants per square kilometer, while the average for other West African countries is nearly 10 times that of the Sahel nations (30 inhabitants per square kilometer). In addition, the population density is as low as 0.1 inhabitants per square kilometer in the Saharan zone, which covers 53% of the Sahel's total area.

One feature of the population dynamics of the Sahel zone and a factor which has contributed to the low populations densities is the mass emigration to the coastal countries of both people and livestock as a result of the drought and better job opportunities in the south. One million people have immigrated permanently to the Ivory Coast from the north, mainly from Mali and Upper Volta. An additional 400,000 temporarily migrate south from these two countries to be seasonal workers. An estimated 25% of the population of Niger has been lost as a result of either death or emigration, and the net emigration loss from Upper Volta alone is approximately 100,000 inhabitants per year (20, Annual Supplement, 1974, Ivory Coast, Togo, Dahomey, Niger, Upper Volta, p. 5).

The Sahel nations also have the lowest portion of the population living in urbanized areas (municipalities with more than 10,000 inhabitants) as compared with other West African nations. The urban portion of the population in 1970 amounted to 7.6% in Chad, 7.1% in Mali, 1.7% in Mauritania, 4.3% in Niger, and 4.3% in Upper Volta (64;68). In contrast, 29% of the total population of Ghana in 1971 lived in urban areas, and the proportions for Nigeria, Ivory Coast, and Senegal ranged from 15% to 30% in 1970 (23;64;68).

General economic indicators for four of the Sahelian nations are summarized in Table 2. These figures are the results of a UN study which indicated that the four nations listed were among the 25 "least developed countries" in the world. The reliability of some of these indicators as measures of welfare is debatable, but the general impression that the Sahelian economies are in need of improvement cannot be avoided. To the extent that GDP can be accepted as a measure of growth, the fact that the growth rate of the GDP in these four countries has barely kept pace with the growth rate of the population is indicative of economic stagnation if not decline.

TABLE 1
West Africa: Estimates of Population, Surface Area, and Population Density, Mid-1973

Country	Population (000)	% of West Africa	Surface Area ($km.^2$)	% of West Africa	Population per $km.^2$
Chad	3,868	3.4	1,284,000	17.3	3.0
Mali	5,376	4.8	1,240,000	16.7	4.3
Mauritania	1,257	1.1	1,030,700	13.9	1.2
Niger	4,304	3.8	1,267,000	17.1	3.4
Upper Volta	5,737	5.1	274,200	3.7	21.0
(Sahel Total)	(20,542)	(18.2)	(5,095,900)	(68.7)	(4.0)
Dahomey	2,912	2.6	112,622	1.5	25.9
Gambia	493	.4	11,295	.2	43.6
Ghana	9,355	8.3	238,537	3.2	39.2
Guinea	4,208	3.7	245,957	3.3	17.1
Guinea-Bissau[a/]	509	.4	36,125	.5	14.1
Ivory Coast	4,641	4.1	322,463	4.3	14.4
Liberia	1,659	1.5	111,369	1.5	14.9
Nigeria	59,607	52.7	923,768	12.4	64.5
Senegal	4,227	3.7	196,192	2.6	21.5
Sierra Leone	2,861	2.5	71,740	1.0	39.9
Togo	2,117	1.9	56,000	.8	37.8
West Africa:	113,131	100.0	7,421,968	100.0	15.2

Source: United Nations, Department of Economic and Social Affairs, Statistical Office, Demographic Yearbook, 1973, ST/STAT/SER.R/2, (New York: UN, 1974), Table 2.

a/ Former Portuguese Guinea.

As indicated in Table 3, the Sahel states, with the exception of Mauritania, consistently are running balance of payments deficits. The increase in the deficit in recent years is primarily a result of rising food and oil prices. The former, food, has been especially important since the quantity of grain imports to the Sahel countries has increased rapidly in this decade. As an example, the quantity of annual grain imports to Mali since 1960 is shown in Chart 1. Total grain imports in 1971/72 were three times the average for the decade of the 1960's, and the value of imports of food and beverages as a proportion of the total value of controlled imports increased from 20% in 1964/65 to 37% in 1972 (see Table 10). Mauritania has the advantage of important mineral resources, but the others rely almost entirely on agricultural exports.

Livestock, cotton, and groundnuts are the predominant agricultural exports of the Sahel states, and in recent years, livestock has been gaining in importance. In 1972, controlled exports of livestock and livestock products formed 22% of the total value of exports from Chad, 49% from Upper Volta, and 21 % from Niger. The actual share is probably much greater, since controlled exports of livestock are thought to be as little as 25% of actual livestock exports.

The Sahelian nations contain the majority of the livestock resources of West Africa, and the most common mode of production is extensive traditional herding. Throughout the past decade, the Sahel countries have maintained one half of the total cattle population of West Africa and one eighth of the cattle population of all of Africa.[2/] Excluding the cattle contained within Nigeria, the five Sahel states contain three quarters of the total cattle resources of West Africa (65).

An additional measure of the importance of livestock in the Sahel countries is the proportion of the human population engaged within the livestock sector. This is estimated to be 70% in Mauritania, 50% in Chad, 30% in Mali, 20% in Niger, and 15% in Upper Volta, or 30% of the total population of these five states (7, p. 19). In each of these countries, the livestock sector contributes 10 to 20% of the national output.

Several physical characteristics of the Sahelian countries make them the optimum location for the raising of livestock. Their primary advantage over the coastal nations is that they contain immense tracts of land which are free of the tse-tse fly (Glossina morsitans), which is the vector for Trypanosomiasis, or sleeping-sickness, a disease which is fatal for cattle. This disease became an important problem throughout southern West Africa in the early part of this century as a result of the ecological disturbances incurred in the process of colonization. The zone where it is endemic reaches approximately to the 14th parallel, roughly the southern limit of the Sahel zone.

The Sahel nations also are ideally suited for livestock production because grazing the animals in the Sahel and Saharan zones entails a minimum of interference with agricultural production. 73% of the total land area in these

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2/ The cattle resources of the Sahel in 1972 amounted to 15% of the number of cattle on agricultural holdings in the United States in that year.

TABLE 2
Economic Indicators for Four Sahelian Countries, 1969-71

Statistic	Mali	Niger	Upper Volta	Chad
1971 GDP per capita at 1970 market prices ($)	54	84	57	77
Agriculture as % of GDP (1971)	44.5	63.3	42.7	48.0
Manufacturing as % of GDP (1971)	11.4	6.9	10.5	9.1
Exports as % of GDP (1971)	19.4	16.0	6.3	12.5
Active agricultural population as % of labor force	91	91	89	91
Enrollment ratio at first & second level of education	15	8	--	15
Electricity consumption in Kwh per capita (1970)	8	10	5	11
Roads in km. per 1000 $km.^2$ (1969)	10	6	61	9

Source: United Nations Economic Commission for Africa, Survey of Economic Conditions in Africa, 1972 (New York: UN, 1973), p. 283.

TABLE 3
Balance of Payments: Selected West African Countries, 1968-72[a/]

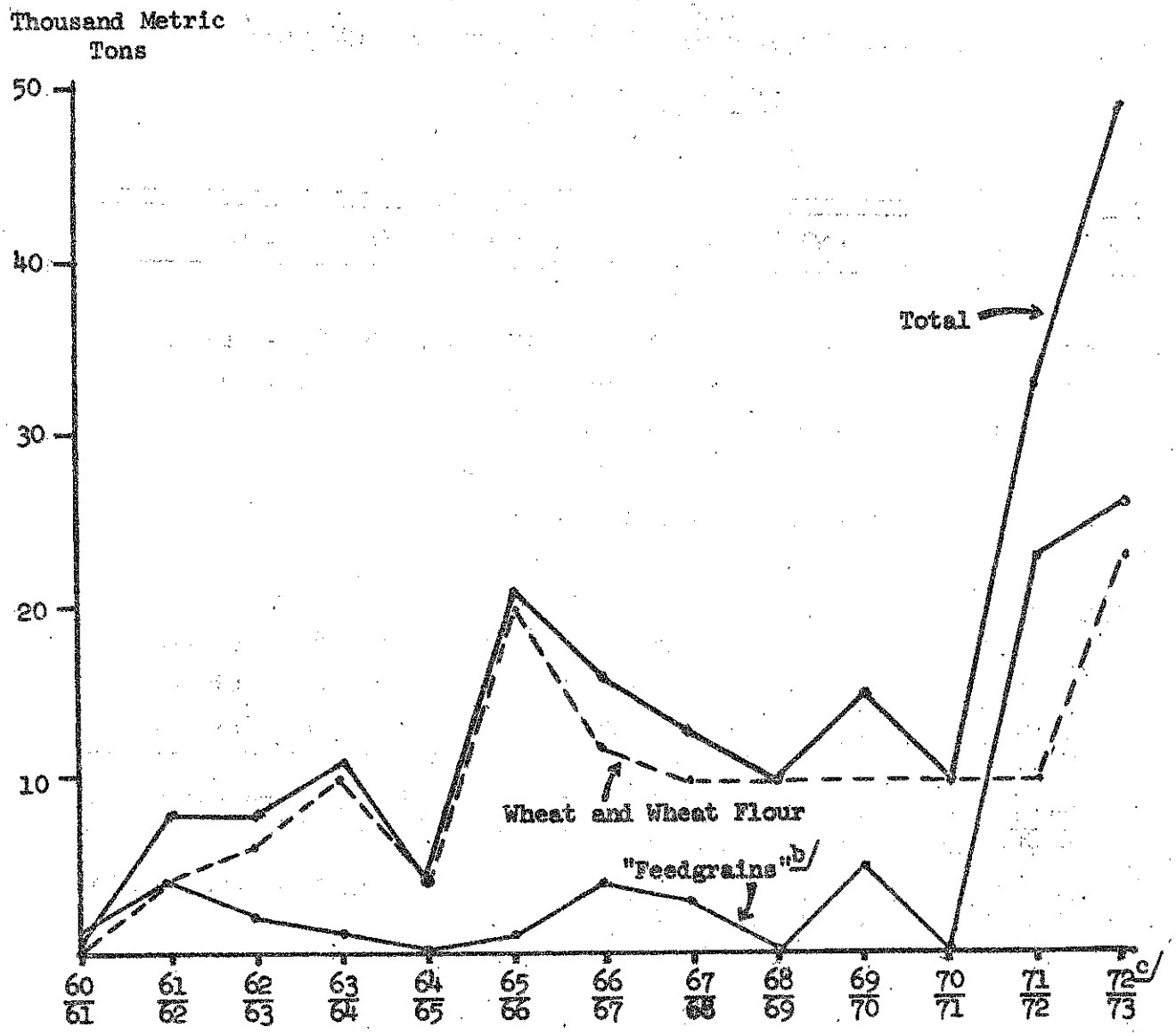
(millions of SDRs)

Country	1968	1969	1970	1971	1972
Sahel					
Chad	- 16	- 23	- 27	- 28	- 31
Mali	- 16	---	- 14	- 22	- 30
Mauritania	+ 4	+ 2			
Niger	- 16	- 22			
Upper Volta	- 21	- 33	- 30		
Coastal					
Ghana	+ 24	+ 29	+ 21	- 58	+143
Ivory Coast	+113	+126	+ 90	+ 85	+115
Nigeria	+ 68	+252	+249	+416	+675

Source: UN, Department of Economic and Social Affairs, Statistical Office, Statistical Yearbook, 1973 (New York: UN, 1974).

a/ Years where available. Balance of payments defined as payments for goods, freight, and insurance.

CHART 1. MALI: GRAIN IMPORTS, 1960/61-1972/73[a/]



Source: United States Department of Agriculture, Foreign Agriculture Service, "World Grain Trade Statistics, 1950-51/1972-73," FAS M-258 (Washington: GPO, Sept. 1974), Tables 26, 27, 29, 30, 36-38.

a/ Year beginning July 1.

b/ Primarily sorghum for human consumption.

c/ Preliminary figures.

TABLE 4
West Africa: Cattle Population Estimates by Country, 1961-65 (average), 1968-72 (annual)[a/]

(million head)

Country	1961-65	1968	1969	1970	1971	1972
Chad	4.25	4.50	4.50	4.50	4.55	4.40
Mali	4.04	5.10	5.35	5.35	5.25	4.50
Mauritania	2.24	2.40	2.55	2.56	2.45	2.30
Niger	3.70	4.40	4.50	4.00	4.00	3.90
Upper Volta	1.96	2.42	2.45	2.50	2.55	2.40
Total - Sahel	16.19	18.82	19.35	18.91	18.80	17.50
Dahomey	.34	.55	.58	.61	.64	.69
Gambia	.17	.22	.23	.25	.26	.27
Ghana	.49	.54	.61	.90	.93	.91
Guinea	1.58	1.78	1.80	1.84	1.85	1.86
Guinea-Bissau[b/]	.23	.24	.25	.26	.27	.28
Ivory Coast	.30	.36	.40	.41	.42	.44
Nigeria	10.86	11.20	11.07	11.18	11.29	11.40
Senegal	1.76	2.48	2.53	2.60	2.50	2.10
Sierra Leone	.15	.21	.23	.24	.25	.26
Togo[c/]	.16	.18	.18	.19	.20	.21
Total - West Africa	32.23	36.58	37.22	37.40	37.42	35.92
Total - Africa	132.31	149.42	153.66	156.47	158.42	158.34

Source: UN, Dept. of Econ. & Social Affairs, Stat. Office, Statistical Yearbook, 1973 (New York: UN, 1974); original data from FAO reports.

a/ 12 month periods ending Sept. 30 of year shown. Estimates for Liberi unavailable, but the national herd is less than that of Sierra Leone.

b/ Former Portuguese Guinea.

c/ Registered for taxation.

five countries is unsuitable or marginally suitable for agricultural production. 53% lies in the Saharan zone and receives a normal annual rainfall of less than 250 mm. per year. Crop production in this area is restricted to oases. Another 20% lies in the Sahel zone, receiving a normal annual rainfall of between 200 and 500 mm. Some grain, mainly sorghum and millet is grown in the southern half of this zone, but livestock raising is more of a complement to than a conflict with farming activities in this region. In light of these physical characteristics, it would appear that the optimal allocation of the majority of the land resources in the Sahelian nations within the next few years would be to livestock production.

C. Livestock Sector Overview and Development Plans for the Sahel Nations

1. Chad

In terms of value added to GDP, cotton and livestock are Chad's principal resources. In 1970, the value of livestock (all animals) and livestock products amounted to 11.57 billion CFA Francs, or 19.5% of the total GDP (23). In addition, the value of controlled exports of cattle and meat accounted for 12% of the total value of recorded exports in 1973 and 23% in 1971 (7, Annex B, Table III).

Based on FAO estimates, Chad contains the second largest national cattle herd of the five Sahelian nations (4,400,000, or approximately one fourth of the total in the Sahel in 1972: se Table 4). 60% of these are concentrated in the N'Djamena area, specifically the regions of Batha, Kanem, and Chari-Baguirmi (23).

Two artificial irrigated pasture projects are to be undertaken with financing from FAC. A February 1973 FAC study recommended: (1) a 16 month project to install a feed lot on the borders of Lake Chad near Bol; and (2) a 16 month project to develop forage resources on the borders of the Chari River below N'Djamena (the capitol, formerly Fort Lamy) to develop forage resources for use by the mixed farmers (farmer-herders) of the region. The total planned investment for the FAC 1973-75 intermediary program was budgeted for 560 million CFA Francs, including the projects listed below and an animal health program budgeted at 113 million CFA Francs.

The CBLT (Lake Chad Basin Commission) has begun a project to improve traditional herding to the south of the lake in the cantons of Assale in Chad and Serbewol in Cameroon. The project is designed to cover 5300 square kilometers and include 130,000 head of cattle. An eighteen month intermediate program has been approved with an estimated planned investment of 175 million CFA Francs, financed essentially by US-AID (65 million) and FAC (60 million). The total project cost is projected to be 600 million CFA Francs (23).

After the introduction of plows in the southern cotton zone in 1958, the number of work animals has increased rapidly, progressing at 30-40% per annum between 1965 and 1970. An integrated development project for southern Chad foresees an increase of 16,200 head of work animals per year (23).

In the area of water resources, the United Nations donated 2.2 million U dollars in February 1972 to restore existing wells and create new ones, and in February 1973, FAC extended a credit of 115 million CFA Francs for the creation of 170 new wells and the purchase of equipment to service, maintain, and renovate pastoral water sources (59).

The Decennial Plan (1971-80) provides for a slaughterhouse capacity for all of Chad of 27,600 tons of beef meat in 1980 with a refrigerated storage capacity of 10,300 tons. The long distance of the Farcha slaughterhouse from major herding zones is a perpetual problem (see Appendix section on Chad). To assure a more regular supply of slaughter animals, a FAC credit of 51 million CFA Francs was granted in February 1973 for a cattle route from the 13th parallel (Abeche - N'Djamena) and supply routes from Ouaddai and Biltine (23).

2. Mauritania

In 1972, the national herd was estimated to be 2,300,000 head, with 78% of the total concentrated in the four southern Regions. 92% of the land area is unsuitable for agriculture (71% lies in the Saharan zone, which normally receives no more than 250 mm. of rainfall annually), and herding is the principal resource of the rural sector.

In December 1973 State of the Nation address, cattle losses due to the drought were estimated to be 90% in the northern and southwest regions and 40% in the south-eastern regions where cattle density is the highest (15 head/km.^{2}).

Two livestock development projects included within the Second Plan became operational in 1973: (1) A four year project in the southwest (Kaedi, Aleg, and Rosso Regions) has been implemented with financing from US-AID and the UI of around 200 million Ouguiyas. The project includes health and water development programs as well as range protection services by means of fire brea 2) A pilot zone for livestock was implemented in Kaedi with a credit of 11.1 million Ouguiyas from FAC. Additionally, a national livestock and veterinary research center recently went into operation (23).

The following projects are in the planning stage or have been partially implemented: (1) the construction of a grazing ranch and quarantine center 30 kilometers north of Kaedi, in the hopes of increasing forage production and improving slaughterhouse meat quality, to be undertaken with a FAC credit of 131 million CFA which was received at the end of 1968; (2) a semi-intensive grazing ranch to be created at Rosso for cattle-breeding; (3) a livestoc development project in the south-east (Nema, Aioun-el-Atrouss, and Kiffa Regions), which received a credit from FED in December 1972 of 138 million Ouguiyas for three years (23).

3. Niger

Livestock raising is practiced over more than 650,000 square kilometers in Niger, or over more than half of the country's total area. Sedentary herding covers 130,000 km.^{2} in the agricultural zone, and herding is the principal activity for 220,000 km.^{2} out of the Sahel zone and the sole economic activity for 300,000 km.^{2} in the Saharan zone. Livestock is the sole economic resource for an estimated one million nomads (23).

The total value of Niger's national herd was estimated to be 50 billion CFA Francs in 1970, or approximately twice the administrative estimate. Animal production contributed approximately 16 billion CFA Francs to the GDP in 1970, or around 20% of the total for that year. Exports of live animals and animal products have accounted for between 20% and 25% of the total value of exports in recent years (23;59).

Estimates of the 1972 national cattle herd vary between 3,900,000 (65) and 4,200,000 (23). The herd suffered 12-20% losses between 1968 and 1969 as a result of the drought (23;59), and an FAO study estimated that 600,000 head died and another 3,000,000 head moved south out of Niger as a result of the drought in 1973 (23). Based on the FAO estimate of the 1972 herd size, this would mean a loss of 92% between 1972 and 1973. However, alternative estimates of losses due to the drought in 1973 range as low as 20-50%.

In 1972, cattle were concentrated in three departments -- Tahoua, Zinder, and Niamey -- with approximately equal numbers (900,000) in each (23).

Studies are underway for two additional ranches in the west and central west Sahel regions, each with a planned production potential of 1,000-1,500 tons of meat. The studies are being subsidized by a FAC credit, and a dossier for further financing is to be submitted to IBRD (23). The slaughterhouse facilities at Tahoua and Maradi are scheduled for expansion with financing to be undertaken by US-AID (see Appendix section on Niger) (59, II-69).

4. Upper Volta

Upper Volta contained 2,400,000 head of cattle in 1972, or 6.7% of the West African total for that year and 13.7% of the total for the Sahel countries (65). The national herd has sustained heavy losses as a result of the drought, and an estimated five to ten years will be necessary to reconstitute it (23). Half of the country's pasture resources have been destroyed, and approximately one million head died in 1973 as a result of the drought (59).

The Five Year Plan for 1972-76 has forecast 3,589 million CFA Francs in investment for the livestock sector. 297 million has been allocated for 12 studies, and 3,652 million for 27 projects. The goal is to increase the value of the nation's livestock holdings to 32.5 billion CFA Francs in 1976 as against 27 billion in 1971 and to increase the value of production from the livestock sector to 9.2 billion in 1976 versus 7.6 billion in 1971 (23).

Sixteen of the projects included in the above plan are designed to build the infrastructure within the livestock sector and will take up 1,527 million CFA Francs out of the above total investment. The nature of these projects and the funding allocated to them from various donor agencies is as follows:

(1) Two livestock development district projects, which include marketing programs and the construction of cattle routes: one district in the central region has received 100 million CFA Francs from US-AID, the other in the western region has received 100 million from FED;

(2) Cattle parks, holding lots, and feed lots in and around Ouagadougou (the capitol), with 183 million CFA from FED;

(3) A slaughterhouse in Bobo-Dioulasso (western region), to be constructed and equipped with 400 million CFA from US-AID and the UN and with 300 million at the end fo the AID-UN plan from another unspecified donor;

(4) The development of bush slaughterhouses, with a 50 million CFA grant from FAC.

The slaughterhouse in Ouagadougou currently produces 6,000 tons of meat per year, and the plan includes a project to expand production to 13,000 tons, with a refrigerated stroage capacity of 3,500 tons. The project was budgeted at 496 million CFA in 1972/73, but its needs are currently estimated at 700 million. 520 million has already been donated by FED.

Four production projects are included in the plan, at an investment of 625 million CFA Francs. They include: (1) a forage production unit at Koudougou, to be financed by 200 million CFA from AID; (2) a feed lot at Bobo-Dioulasso, which will receive 300 million CFA from IBRD in 1975/76; and (3) a grazing ranch in the Banfora region, which will receive 100 million CFA from FED in 1976 and an additional 200 million from another donor.

In addition, there are three health protection programs to be implemented with an investment of 567 million CFA and four pastoral water projects, with a total investment of 842 million CFA.

The goals of the above plan with respect to beef meat production are listed in the following table:

TABLE 5

Upper Volta: Beef Meat Production Goals from the 1972-76 Five Year Plan

(tons)

Item	1976	1985
Production	31,000	41,400
Imports	4,500	6,100
Consumption	26,000	35,400
Exports	9,500	12,100

Source: Ediafric-Service, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974).

D. Mali

1. Overview

The importance of the agricultural sector in the Malian economy is indicated by the fact that 43% of the 1971 GDP was derived from that sector (68). Furthermore, the active agricultural population forms 91% of the total labor force (66, p. 283). The majority of Mali's industrial production is devoted to agro-business or import displacing industries which are currently operating at at levels well below their productive capacity. Livestock has an important potential for contributing to this sector in terms of repatriated revenues which contribute to capital formation and livestock by-products such as leather around which additional industries might be developed.

In 1970, production of beef meat on the hoof accounted for approximately 12% of the GDP, and if milk production is included, the share rises to 14.5%. Stryker estimates that actual cattle exports (including re-exports of cattle) amounted to 36% of the value of total exports in that same year, contributing more to the total value of exports than any other commodity. The second most important export, cotton, contributed only half of the above amount (62, p. 7).

Behind Nigeria, Mali contained the largest number of cattle in 1972: one eighth of the West African total and one quarter of the total Sahelian herd. The expansion of the cattle population since 1954 is indicated in Table 6.[3/] In the decade from 1959 to 1969, the cattle population increased by 61%. The most remarkable increase occurred during the first five years of that period when the population grew by 40%.

A 1968 estimate claimed that around 600,000 of Mali's inhabitants were either nomadic or semi-nomadic herdsmen (mainly Fulani, Tuaregs, and Moors) and that farmers depend on 250,000 head of cattle as work animals (45, p. 282). In addition, many traders and butchers are occupied either full or part time with cattle, and the total number of people engaged in the livestock sector in Mali is estimated to be 30% of the total population (7, p. 19).

Approximately 60% of the cattle are located in the two northeastern regions of Mopti and Gao. Alternatively, 70% of the herd is located in the three regions (Segou, Mopti, and Gao) which contain the interior delta of the Niger, a 60,000 square mile zone which is flooded by the Niger River for half of the year and which becomes an important source of pasture in the dry season as the rivers dry up (23; 62, p. 5). The remainder of the herd is distributed among the other three regions to the west (Kayes, Bamako, and Sikasso), with about 10% in each region. The northern location of the cattle is partially explained by the fact that 84% of the herds are zebu, a breed which is not

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3/ Note that Stryker's figures for recent years differ from the FAO estimates quoted earlier in the chapter on which the above proportions are based. Stryker's 1971 figure is probably a more realistic estimate of losses due to the drought.

TABLE 6
Mali: Cattle Population Estimates of the Service de l'Elevage, 1954-1971

(million head)

Year	Population	Year	Population
1954	3.076	1963	4.262
1955	3.337	1964	4.640
1956	3.258	1965	4.594
1957	3.260	1966	4.773
1958	3.362	1967	5.213
1959	3.314	1968	5.350
1960	3.513	1969	5.350
1961	3.862	1970	5.350
1962	3.923	1971	4.707

Sources: Stryker, J. Dirck, "Livestock Production and Distribution in the Malian Economy" (supplementary report prepared for US-AID, Washington, Aug. 20, 1973, mimeographed), Appendix Table A-1; FAC & OMVS, Approvisionnement en Viandes de l'Afrique de l'Ouest (Paris: SEDES, 1973), Part I, p. 347; Mali, Service de l'Elevage, Rapport Annuel, 1971.

trypano-tolerant and thus cannot survive in the Sudanese and Guinean climate zones to the south of the 13th parallel (62, p. 5). In June 1974, the Government of Mali announced that cattle losses due to the drought were estimated to be 40% for the entire country and 90-100% in the northeastern regions.[4/]

2. Domestic Meat Production & Consumption

Per capita consumption of beef meat in Bamako, the capitol, is estimated to be 32.8 kilograms per year, or around 3 ounces per day. Consumption per capita of beef meat and offals in other urban centers is estimated to be 19.2 kilograms per year (around 2 ounces per day). Finally, beef meat consumption in rural areas is estimated to be 8.0 kilograms per year, or three quarters of an ounce per day (62, p. 18). The average annual per capita consumption of meat for the entire country is relatively high by West African standards.

Estimates of domestic consumption for selected years from 1928-1971 are presented in Table 9. In numbers of cattle slaughtered, total national consumption has approximately doubled over this period. As indicated by the following short table, however, annual cattle marketings have more than tripled from 1954 to 1971:

TABLE 7
Mali: Presentations of Cattle, Selected Years, 1954-1971

(000 head)

Year	1954	1958	1968	1969	1970	1971
Presentations	132	223	339	503	418	442

Source: Stryker, J. Dirck, "Livestock Production and Distribution in the Malian Economy" (supplementary report prepared for US-AID, Washington, Aug. 20, 1973, mimeo.), p. 8.

The slaughterhouse in Bamako, constructed in 1965 with a FED credit of 678 million MF, is the most modern slaughterhouse in West Africa. It is capable of slaughtering 55,000 head of cattle per year, and the corresponding productive capacity is 10,000 tons of beef meat. However, it is currently underutilized: only 23,315 head of cattle were slaughtered in 1972 and only 3,349 tons of meat were produced (23). Controlled slaughters for the entire country have remained relatively stable over the past decade. Figures for selected years are presented in Table 8.

4/ Facts on File, June 10, 1974.

TABLE 8

Mali: Controlled Slaughters of Cattle, Selected Years, 1960-1972

(000 head)

Year	1960	1964	1966	1967	1968	1969	1970	1971	1972
Slaughters	62	78	70	60	65	79	80	83	87

Source: Ediafric-Service, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974).

3. Foreign Trade

As indicated previously, cattle and cattle products are Mali's most important exports. Statistics on external commerce are shown on page 23 (Table 10). Live cattle exports became a significant proportion of the total value of exports after 1939, and since independence, live cattle export alone have accounted for between 25% and 30% of the total value of exports. These statistics, however, represent controlled exchange, which may reflect as little as one quarter of actual live cattle exports. The most recent Three Year Plan noted that the amount of controlled slaughters and exports has diminished steadily since 1963, to be replaced by an increasing volume of clandestine transactions (23).

TABLE 9 - Mali: National Herd Size, Local Consumption and Net Export Figures for Cattle, Selected Years, 1928-1971

(thousand head)

Year	National Herd	Domestic Consumption	% of Herd	Estimated Exports	% of Herd
1928	1,460	44	3	-	-
1939	1,830	63	3	10	2
1945	2,185	67	3	20	1
1954	3,076	44	1	75	2
1959	3,300	57	2	89	3
1964	4,640	73[a/]	2	167[b/]	4
1968	5,350	63	1	160[c/]	3
1969	5,350	80	1	170[d/]	3
1970	5,350	78	1	190[d/]	4
1971	4,707	74	2	n.a.	n.a.

Sources: Amin, Samir, Trois experiences africaines de developpement: le Mali, la Guinee, et le Ghana (Paris, 1965) for years 1928-1945; Stryker, J. Dirck, "Livestock Production and Distribution in the Malian Economy" (supplementary report prepared for USAID, Washington, Aug. 20, 1973, mimeographed) for years 1954-1971; Fonds d'Aide et de Cooperation (FAC) & Organisation pour la Mise en Valeur du Fleuve Senegal (OMVS), Approvisionnement en Viandes de l'Afrique de l'Ouest (Paris, Societe d'Etudes pour le Developpement Economique et Social (SEDES), 1973). Original data from reports of the Service de l'Elevage for various years, unless otherwise indicated.

a/ Number slaughtered in 1963.

b/ Estimate of Lacrouts, Sarniguet & Tyc.

c/ National accounts estimate for the fiscal year 1967-68.

d/ National accounts estimate for the calendar years 1969 & 1970.

TABLE 10 - Mali: Statistics on External Commerce, Controlled Exchange, Selected Years, 1928-1972

(Billions of Mali Francs)

Commodities	1928	1939	1945	1959	64/65	68/69	1970	1971	1972
Imports (for years 1964-72)									
Food & Beverages					6.6	7.8	10.9	11.5	14.7
(% of total imports)					(20)	(31)	(37)	(34)	(37)
Fuel					2.8	2.7	3.0	3.4	3.6
Construction Materials					3.4	1.2	1.8	1.0	2.1
Masonry, Mechanical & Electric					4.5	3.6	4.1	5.0	6.4
Hardware					1.1	0.5	0.6	1.0	1.1
Vehicle Spare Parts					3.8	2.7	2.1	3.5	3.8
Chemicals, Tobacco, Soap					1.3	1.9	2.4	3.8	4.2
Textiles & Leather					5.4	2.6	2.8	2.0	1.5
Other					3.5	2.3	1.6	1.7	2.0
TOTAL Imports					32.4	25.3	29.3	33.7	39.4
Exports									
Shelled Peanuts	0.6	2.1	0.2	1.8	4.0	0.8	1.6	2.7	2.4
Cotton Fiber	-	0.2	0.3	0.4	2.6	4.3	5.5	5.9	7.1
Oil & Cake[a/]					0.1	1.0	1.1	2.4	1.1
Cotton Seeds[a/]					0.1	0.1	0.3	0.4	0.6
Textile[b/]					0.1	-	0.7	1.0	1.5
Other	0.2	0.3	-	0.7	0.9	0.4	0.3	0.4	1.3
TOTAL Modern Sector	0.8	2.6	0.5	2.9	7.8	6.6	9.5	12.8	14.1
Live Cattle	-	0.2	0.4	1.9	3.9	4.0	5.7	5.5	5.6
(% of total exports)	(0)	(5)	(18)	(25)	(28)	(30)	(30)	(26)	(25)
Fish	0.3	0.4	0.4	1.5	1.8	1.6	1.5	1.2	0.8
Other	0.9	1.0	0.9	1.3	0.5	1.1	2.5	1.8	2.3
TOTAL Traditional Sector	1.2	1.6	1.7	4.7	6.2	6.7	9.7	8.5	8.7
TOTAL Exports	2.0	4.2	2.2	7.6	14.0	13.3	19.2	21.3	22.7
BALANCE (Net Exports)					-18.4	-12.0	-10.1	-12.4	-16.7

Sources: Amin, Samir, Trois experiences africaines de developpement: le Mali, la Guinee et le Ghana (Paris, 1965) for years 1928-59; USAID, Mali Livestock Sector Grant: Program Proposal (Working Draft, January 1975) for years 1964-72.

TABLE 10 (CONT.)

a/ For the years 1928-1959, earnings derived from oil and cake are included in the statistics for peanuts, and those derived from cotton seeds are included with cotton fiber.

b/ Information on the years 1928-59 unavailable, but earnings derived from this commodity during this period probably negligible.

TABLE 11. GHANA AND THE IVORY COAST: EVOLUTION OF TOTAL IMPORTS OF CATTLE, 1965-1970

(head)

Year	Ghana	Percent Imported from Mali	Ivory Coast	Percent Imported from Mali
1965	61,926	44	103,198	33
1966	60,666	41	101,622	20
1967	58,325	38	119,643	38
1968	46,658	51	164,758	41
1969	70,504	53	172,064	67
1970	60,735	34	198,400	59

Sources: Stryker, J. Dirck, "Livestock Production and Distribution in the Malian Economy" (supplementary report prepared for USAID, Washington, Aug. 20, 1973, mimeographed); Ghana, Economic Survey, various years; Ivory Coast, Direction de la Statistique, Situation Economique de la Côte d'Ivoire, various years, for Ivory Coast data through 1968; Mali, Ministère de la Production & FED, Projet d'Execution pour la Création du Centre d'Embouche de Niono (Paris, SEDES, 1972), for Ivory Coast data for 1969 and 1970.

Mali's principal clients for livestock exports are Ghana and the Ivory Coast, as can be seen from Tables 11 and 12. In 1970, 59% of Mali's live cattle exports went to the Ivory Coast and 17% went to Ghana. Other clients in that year were Senegal (1%), Niger (8%), Liberia (4%), and Upper Volta (11%) (62, p. 10). While Ghana is potentially an important market, the reason for its small share in Mali's cattle exports at present is the severe exchange controls and high taxes imposed in Ghana. In 1972, a 5.0% import duty was imposed on live animals, along with an 11.5% sales tax and a 5.0% import surcharge. Furthermore, in 1971, the Ghanaian government initiated a requirement that cattle be quarantined at the frontier and then turned over to Ghanaian traders. This requirement has had a strong effect on the quantity and the quality of animals imported into Ghana. Ivory Coast, on the other hand, requires only fees for the use of market facilities and slaughter houses (62, p. 17). However, the rapid rise in incomes and urban populations in both of these countries signals a commensurate rapid rise in the demand for meat, which neither country can fulfill from domestic stocks.

In any case, it is likely that these two countries will be Mali's greatest future markets, especially if there is an easing up on price controls, foreign exchange and import restrictions. Table 13 lists Stryker's projections for Malian production and the demand for beef meat in the Ivory Coast and Ghana up to 1980. It is apparent from these projections that the Malian surplus available for export will lag behind the demand in these two countries and this is based on conservative estimates for Ghana. It is on the basis of such projections that Mali is implementing programs to expand cattle production and marketing over the next decade.

4. Development Plans

The Five Year Plan for 1974-78 has set the following priorities for the Malian economy: (1) rebuild the national herd and develop cattle production, (2) increase processing facilities for domestic products; (3) meet the health and education needs of the people; and (4) reduce the country's geographic isolation by means of an improved transportation network. The latter is especially important for the development of the external trade in livestock. Out of the total projected budget for the Five Year Plan, 32.5% (125.4 billion MF) is to go to the rural sector (18, Senegal, Mali, Mauritania, Guinea, 1974, no. 4, p. 9).

Within the above, the fundamental objectives of the Five Year Plan for meat and livestock are: (1) maximize exports in coordination with other Sahelian countries in order to establish a primary position as meat supplier first with West Africa, second with North Africa, and finally with Europe; (2) export more high quality processed, as opposed to primary, products, which entails the development of meat processing and transport facilities as well as an increased availability of subsidized cattle feed supplements; (3) satisfy domestic demand with products that are in less demand in exterior markets, such as lower quality beef, goats, sheep, chickens, and milk products; and (4) improve and stabilize herder revenues via pasture improvement programs while redirecting annual herd increases toward ranches and feed lots for finishing and processing in the slaughterhouses (44, p. 1).

TABLE 12
Ghana and the Ivory Coast:
Origin of Imports of Cattle, 1965-1970

(000 head)

Ghana	Country of Origin					
Year	Mali	Upper Volta	Niger	Nigeria	Mauritania	Total
1965	27.3	22.8	4.0	2.1	-	56.2
1966	24.8	26.0	8.5	2.3	-	61.6
1967	22.1	29.3	8.4	2.4	-	62.2
1968	23.9	15.5	5.9	2.1	-	47.4
1969	37.6	18.3	9.7	1.1	-	66.7
1970	20.9	9.3	4.5	.1	-	34.8
Ivory Coast						
1965	34.4	64.8	-	-	1.9	103.2
1966	20.0	44.3	.1	-	37.2	101.6
1967	46.1	56.1	.7	-	16.7	119.6
1968	67.8	80.6	...	-	16.4	164.8
1969	115.8	49.1	...	-	44.3	209.2
1970	117.6	51.2	...	-	62.3	231.1

Source: J. Dirck Stryker, "Livestock Production and Distribution in the Malian Economy " (supplementary report prepared for US-AID, Washington, Aug. 20, 1973, mimeo.), Appendix Table A-9.

TABLE 13 - Mali: Projections of Demand for and Supply of Exports of Beef Meat and Offals to the Ivory Coast and Ghana, 1970-1985

(tons of meat and offals)

Malian Supply	1970	1975	1980	1985
Production	84,300	94,000	104,500	116,200
Consumption	48,900	56,400	65,200	75,400
Surplus	35,400	37,600	39,300	40,800
Demand				
Ivory Coast	36,000	54,700	74,600	-
Ghana	15,500	19,500	23,200	-
Total Deficit	51,500	74,200	97,800	-

Source: Stryker, J. Dirck, "Livestock Production and Distribution in the Malian Economy" (supplementary report prepared for USAID, Washington, Aug. 20, 1973, mimeographed), p. 19 (Table 10). Estimates and methodology are derived from Tables 8 & 9 & Appendix Table A-10. The primary sources for the information upon which the estimates are based are as follows: Fonds d'Aide et de Cooperation (FAC) & Organisation pour la Mise en Valeur du Fleuve Senegal (OMVS), Approvisionnement en Viandes de l'Afrique de l'Ouest (Paris, Societe d'Etudes pour le Developpement Economique et Social (SEDES), 1973); FAC & Conseil de l'Entente, Approvisionnement en Viandes de l'Afrique Centre Ouest (Paris, SEDES, 1969); Ivory Coast, Ministere du Plan, Plan Quinquennal de Developpement Economique, Social, et Culturel, 1971-75 (Abidjan, 1971); Lacrouts, M., Les Problemes Generaux Poses Par l'Approvisionnement en Viandes de la Cote d'Ivoire (Abidjan, 1966); and household surveys conducted in the Ivory Coast in 1962-1964.

The overall plan will be conducted in several phases, with programs and objectives extending to 1988. Within the first phase (1974-78), the objectives are to: (1) rebuild the national herd up to its 1972 level; (2) develop feed lots and smallholder facilities for finishing cattle for slaughter, with 120,000 head to be finished by the end of the first phase; (3) fulfill the demands of the agricultural sector for work animals, which is expected to be 120,000 head per year by the end of the phase; (4) improve water and pasture resources and marketing facilities over a 40,000 $km.^2$ zone; and (5) develop substitutes to fulfill the domestic demand for meat (41, p. 7).

During this period, all price restrictions on beef meat will be lifted, and official prices will be imposed on lamb and mutton. Feed supplements will be subsidized as follows: (1) cotton seed will be sold to herders at 10 MF/kg. (this entails a subsidy of 10 MF/kg. with respect to the export value); (2) cotton seed and groundnut cakes will be sold at 37 and 42 MF/kg., respectively, with a subsidy of 30-40 MF/kg. with respect to export value; (3) molasses will be sold at 6.5 MF/kg. and rice bran at 5 MF/kg. Additionally, a portion of the marketed cotton seed (100 kg. per ton) will be returned to cotton producers during the dry season to feed work animals (44, p. 8).

Other policy elements will be: (1) prohibition of slaughters and exports of young animals over the entire country; (2) agreement on a mutual export policy with Upper Volta. The latter is not a likely possibility at the moment due to the prevailing border hostilities between Mali and Upper Volta.5/

The proposed programs for accomplishing the above objectives in the Sahel zone, where herders are primarily nomadic, are: (1) land improvement programs, including fire breaks, the opening of 400 new watering points which will be restricted to certain herders, and opening new lands to livestock through the eradication of the trypanosomiasis vector; (2) expansion of the extension service, aiming for 1 veterinary agent for each 400 livestock units in zones covered by the plan; (3) veterinary programs to control epidemics, with the objective of diminishing the natural herd mortality rate by 1%; (4) feeding programs, the objective of which will be to increase the natural herd natality rate by 1%; (5) a program for obtaining calves in exchange for labor contributed to pastoral improvement programs; and (6) the eventual conversion of Sahelian zones into areas for maintaining breeding stock. A separate set of programs is proposed for sedentary livestock production zones in Southern Mali. These have a stronger emphasis on selective breeding programs to improve trypano-tolerant breeds and providing an increasing number of work animals to replace older and less useful animals and to supply animals for new farms. It is interesting to note that only this southern zone is to be thoroughly covered by the plan (44).

Approximately a dozen feed lot projects are included in the plan, two of which (at the Office du Niger and Gao) will be experimenting with irrigated

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5/ The Malian delegates to the newly established CEAO were recently withdrawn from that organization as a result of this conflict, and a skirmish between Voltaic and Malian troops was reported on June 4.

forage production. The most important obstacle to the success of these feed lots is expected to be the lack of experienced personnel to manage them, since such projects are relatively new to Mali. The two irrigated projects will be run by the state, but others are expected to be under private management. The feed lots will be complemented by village cooperatives (44, p. 12).

Supplementary programs entail the development of primary markets and industrial processing facilities. Marketing interventions will be limited to supplying equipment such as cattle transports and scales and constructing cattle parks in the proximity of major markets. Improvements in the industrial sector will be confined to expanding the Gao and Mopti slaughterhouses and constructing drying houses for leather production. In addition, some loading ramps and cattle transports will be provided for the feed lots (44, pp. 22-23).

At present, external financing for projects proposed within the above plan consists primarily of: (1) a 15 million dollar International Development Association credit aimed at furthering the critical dry season forage resource in the Niger River Delta; and (2) a 7 million dollar livestock sector grant from US-AID to be applied to a variety of projects which are summarized below.

According to the January 1975 program proposal for the US-AID grant, 37% of the total budget will be applied to technical assistance (expatriate personnel, including language training and interpreters for same), 34% to expenditures on capital and equipment with an additional 10% allocated for operating and maintenance costs. Important actions within the program consist of: (1) a new lands activity aimed at opening up new grazing areas for cattle through eradication of the Trypanosomiasis vector; (2) a Sahel grazing activity entailing extensive improvements for controlled pasture resources in the Bamako region; and (3) a training and communications activity consisting of constructing, staffing, and maintaining two training centers, one at the above site and another at the Sotuba research station on the outskirts of the capitol. The above three activities account for 20% of the total sector grant, respectively (72).6/

The new lands activity is research-oriented and is rather vague in its outline at present. Study teams will be set up to determine areas of tse-tse fly concentration and the feasibility of various eradication techniques. Some test sites for eradication were proposed earlier in the formulation of the program, but analyses of these projects proved them to be far too costly (27). Some tse-tse sterilization techniques which are currently under study in the United States and Nigeria may prove to be useful.

6/ These are approximate proportions, since a simple addition of the subtotals listed for the various activities within the sector grant does not agree with the specified grand total (7.4 as opposed to 7.1 million). The above are based on my calculations. A further complication is that at least 13% of the total grant has been allocated to unspecified activities or contingency funds.

The Sahel grazing activity is designed to cover 850,000 hectares around Dilly in the central portion of the western Sahel. The area proposed contains approximately 100,000 head of cattle, 200,000 sheep and goats, and 50,000 people, including nomads who make seasonal migrations through the area. Grazing rights are to be restricted, and improvements in pasture and water resources are to be financed with land use fees after the third year of the program (72).

E. Ivory Coast

1. Overview

The national cattle herd of the Ivory Coast is one of the smallest in West Africa. The herd size was estimated at 440,000 head in 1972 (Table 4), or only slightly more than 1% of all cattle in West Africa in that year. Approximately 88% of Ivory Coast's cattle are trypano-tolerant breeds, characterized by their small size and realtively slow growth rates. Of the trypano-tolerant breeds, 70% are Baoule and 30% N'Dama (22, p. 57). The remainder are Zebus which have moved south from the Sahel and are currently located in the northern regions of the Ivory Coast.

The bulk of the cattle (70%) are located in the northern "departements" (administrative districts), and another 19% are found in the eastern districts. The growth rate of the total herd is approximately 3% per annum, corresponding to a doubling of the herd size every 23 years (22, p. 57). In 1960, the herd was estimated at 269,000 head.

2. Domestic Meat Production and Consumption

Domestic consumption of fresh meat, excluding local consumption of wild game, is estimated to be 75,000 tons per year. All together, including beef, fish, chicken, and wild game, the consumption of animal products is on the order of 40 kilograms per person per year, or less than four ounces per day. Even at this low rate of consumption, the Ivory Coast does not derive enough animal protein from domestic sources to fulfill its needs. Annual meat production is estimated to be only 25,000 tons (22, p. 57). Cattle imports from the Sahelian countries amounted to 179,101 head in 1972, 182,682 head in 1971, 168,841 in 1970, 219,477 in 1969, and 156,016 in 1968.[7/] Imports from Niger, Upper Volta, and Mali amount to approximately 45,000 tons of beef meat per year (59, II-18).

Controlled cattle slaughters within the Ivory Coast have doubled over the period 1963- 72. Judging from the relative quantities of controlled slaughters from the major meat sources, cattle is the predominant source of meat, as shown in the following table.

7/ From (22): probably based on official import figures. Stryker's estimates are somewhat contradictory: 164,758 head in 1968, 172,064 head in 1969, and 198,400 head in 1970 (62, Table A-8).

TABLE 14
Ivory Coast: Controlled Slaughters of Cattle, Goats, Sheep, and Pigs, 1963-72

(000 head)

Meat Source	1963	1965	1967	1968	1969	1970	1971	1972[a/]
Cattle								
Abidjan	33	47	50	30	61	61	61	66
Ivory Coast	64	81	93	103	112	119	117	125
Goats & Sheep								
Abidjan	17	19	23	14	30	31	42	30
Ivory Coast	24	25	33	45	47	50	63	46
Pigs								
Abidjan	7	8	9	5	10	10	9	9
Ivory Coast	8	9	10	11	11	10	10	10

Source: Ediafric-Service, L'Economie Ivoirienne (Paris: Ediafric-Service, 1973).

a/ First 11 months only.

Given the relatively low yield of meat per unit slaughter of goats and sheep and the relatively low quantity of slaughters for pigs, it is apparent that of the above three, cattle are by far the most important meat source.

Cattle production centers around mixed farmers and a few ranching operations. Extension services for those farmers who keep cattle are operated out of livestock administration centers. Interesting results have been obtained from these centers by selecting superior strains of N'Dama and Baoule cattle and cross-breeding N'Dama with Jersey breeds. The livestock centers then supply farmer/herders with these selected breeding stock.

In addition to the extension activities of the administrative centers, an experimental livestock extension program, based on "livestock cells", was begun at the end of 1962. The program was interrupted at the beginning of 1963 by an outbreak of peri-pneumonia and was not taken up again until 1966. The objective was to encourage the growth of small livestock herds in regions relatively poor in livestock. Prospective livestock raisers were given 1 bull and 5-20 calves, and this loan was paid back as the herd increased. The program has not shown encouraging results, mainly since the "livestock cells" are too widely dispersed. At the end of 1969, 154 cells were in operation and had distributed 3,478 head of cattle (22).

Two ranching operations, currently directed by SODEPRA (a branch of the Animal Production Ministry), were created in the early 1960's. In conjunction with the above mentioned program, they are designed to increase the number of N'Dama cattle while distributing these animals to prosepctive herders. The

Abokouamekro ranch, which covers 16,000 hectares in the Toumodi region, is expected to attain its production capacity of 945 head per year in 1975. The other ranch, put into operation in 1965 at Sipilou, covers 10,000 hectares in the Biankouma region and is expected to furnish its planned capacity of 1,350 head per year in 1978. These ranches presently are producing 4 year old cattle of the N'Dama breed, with a live weight of 370 kg., which are capable of producing 200 kg. of top quality meat at slaughter (22).

A nursery and seed farm for forage plants is in operation at the research center in Bouake-Minankro (22). This is a potentially import intervention since the prospects for forage production are particularly excellent in the northern savanna zones of the Ivory Coast (58) and are far superior to the forage production capabilities of the Sahel region.

The meat marketing system in Abidjan has two rather unique components which are worth noting. The first is the forage production center at Koumassi (Ile de Petit Bassam) which supplies food for the animals in the Abidjan market. The second is the market itself, which was built in 1967-68. The market maintains 21 barns for cattle, each capable of holding up to 750 head (22).

It is also worth noting that as a result of a campaign financed by FED and US-AID and conducted by the Sanitary Service of the Animal Production Ministry against bovine diseases, no outbreaks of bovine diseases have been recorded since 1964.

3. Development Plans

The Five Year Plan (1971-75) does not hope to eliminate or even stabliize the deficit in meat production in the Ivory Coast, but to reduce the rate of increase of the deficit. The Plan supposes that deficit of beef meat will double in absolute size between 1970 and 1980 and will increase in relative value from 86.5% to 88.1%. Consumption of beef meat is expected to rise to 59,300 tons in 1975 and to 80,000 tons in 1980, while domestic production is projected to be only 6,500 tons in 1975 and 9,500 tons in 1980 (23). In addition, the effects of the following planned interventions will probably not be felt for some time.

The total cost of the livestock sector development program included in the Five Year Plan is evaluated at 5.9 billion CFA Francs. However, only 436 million had been invested by the end of 1972. These projects are administered through the Animal Production Ministry, which was created in 1966 (22, pp. 58-59).

The original Five Year Plan has been modified by the public investment program for 1973-75. The following is a summary of projects included in both the Five Year Plan and the public investment program.

The veterinary program already consists of mobile veterinary units and veterinary centers and control stations on established cattle routes. The 1971-75 plan proposed the development of the infrastructure for veterinary services by the construction of three new principal immunization centers, five secondary centers, thirty veterinary posts, and five new entry control posts. Also, a Laboratory for Animal Pathology is to be constructed at Bingerville with aid from the UNDP (22, p. 60).

A dossier for a program for controlling parasitic diseases has been submitted to foreign aid agencies for funding. The program hopes to treat 60% of the national herd in five years and to raise the growth rate of herds treated by the program from 3% to 10% per year (22, p. 60). A preliminary program for the control of epizootic infections was approved by the Entente Livestock Community in mid 1972.

Other sector development programs under the Five Year Plan concentrate on two specialized areas: (1) development of imporved forage and feed; and (2) development of improved breeding stock. The former, as previously indicated, is a potentially important project for the Ivory Coast. On the one hand, agro-industrial by-products acceptable as feed supplements are becoming available in larger quantities. On the other hand, the potential for artificial forage production in the Ivory Coast is extraordinary. Yields for Stylosanthes gracilis and Panicum maximum are reported to be around 8.5 times the yields from the best pastures in France (22, p. 60). This is an especially important intervention, since it seems that the expansion of Trypano-tolerant herds has been impaired by a lack of forage with sufficient digestibility during the dry season. Under the stress of malnutrition, Trypano-tolerance breaks down, and the cattle succumb to sleeping sickness (58, p. 39)

The development of the "livestock cells" described above will be continued, but the program has been reoriented towards an emphasis on special zones particularly the Savanna Belt in the northern Ivory Coast. Extensions are planned for the Abokouamekro and Sipilou ranches, and the Sipilou ranch will be expanding into mixed-farming operations since the soils of the region are especially rich. The latter project has been undertaken by the Entente Livestock Community with an American loan of 250 million CFA Francs (22, p. 60).

In 1971, a study financed by FAC proposed the development of a breeding and extension ranch for Baoule cattle in Zola, south east of the Bouna Game Reserve. Also, a 1970-71 FED study proposed the development of a third production ranch at Marahoue. The ranch would cover 80,000 hectares containing 20,000 head of cattle with an initial investment of 1.5 billion CFA Francs. It is expected to reach its production capacity of 5,000 head per year in 1990 (22).

An ambitious but progressive development program for the traditional sector began in 1971 in the northern region of Korhogo. The program is due to be extended to Boundiali and Odienne. A project for increasing the number of cattle available as work animals is also planned for the Boundiali and Korhogo regions. The number of cattle used for plowing in cotton growing zones is expected to reach 10,000 head by 1979 (22).

An experiemental program for livestock raising in palm groves has been undertaken with UNDP funds. Results indicate that it is possible to attain an annual production of 100 kg. of gain per hectare of palm grove. A SODEPALM project envisages a breeding stock of 50,000 head of Baoule cattle on 100,000 hectares of palm groves, corresponding to a production of more than 1500 tons of meat in carcasses per year (22, p. 61).

The recent public investment program puts a heavier emphasis on the development of slaughterhouses. The newly constructed slaughterhouse in Abidjan will aim for a slaughter and refrigerated storage capacity of 42 tons of meat per day. 36 tons of this will be beef, meaning that 240 head of cattle are to be slaughtered daily. This corresponds to an annual production of 12,000 tons. In addition, storage facilities for meat in transit will be designed to hold 14 tons per day. A sausage production plant for utilizing offals and slaughter by-products will be annexed to the slaughterhouse. The former slaughterhouse, which produced 6,000 tons per year but has been unable to fulfill the regional demand since 1965, will be transformed into an auction house and warehouse for meat in transit. The above program is to be undertaken with an investment of 1.02 billion CFA Francs, and slaughters are projected to be 94,000 to 117,000 head of cattle in 1975 (22).

The new slaughterhouse in Bouake, as opposed to the original one, will have refrigeration equipment to accomodate 11 tons per day and a slaughter capacity of 3,000 tons per year. The amount of investment budgeted for 1974 and 1975 is 432 million CFA Francs (22).

The construction or modernization of nine secondary slaughterhouses will be undertaken with an investment of 180 million CFA. Two refrigerated slaughterhouses, each with a capacity of 400 tons per year, will be installed at Odienne and Bondoukou (22).

F. Livestock Sector Development Policy at the National Level

It is apparent from the above summaries that livestock development programs in the Sahelian nations and in the Ivory Coast emphasize the exploitation of cattle resources primarily as a meat source and secondarily as a source of animal traction in the agricultural sector. It is also apparent that a deficit of animal protein sources exists in the coastal nations and that the Sahel states have considerable potential for expanding livestock exports to accomodate that deficit once herds are rebuilt back to their pre-drought level.

Proposed interventions are primarily aimed at ranching operations and controlled grazing activities. Secondary activities, in approximate order of importance as a proportion of total investment, include construction and expansion of industrial processing facilities (mainly slaughterhouses), rebuilding water and forage resources, veterinary services, provision of infrastructure for transport and marketing, and scattered intensive forage cultivation projects.

While the industrial sector dealing with cattle is of secondary importance in the national development plans at present, it should receive greater emphasis in subsequent years in the Sahel nations. It is more to the advantage of the Sahelian nations to export processed livestock products than to rely on processing facilities in the Ivory Coast. As a corollary to developments in the industrial sector, transportation networks must be expanded and improved to facilitate shipping of the final product.

A factor that must be considered in future development plans is that while the Sahel has a comparative advantage for livestock production, the northern regions of the coastal states (Guinea Savanna and Derived Savanna zones) have

a comparative advantage for forage production. This suggests that given the regional cooperation necessary for any successful livestock program, the optimum strategy may be one of "zonal stratification", such as proposed by Van Dyne (55, pp. 38-49). This would entail the maintenance of a breeding stock in the Sahel and Saharan zones, the off-take from which would be fattened and processed in the Middle Belt to the south, and then shipped to the consumption centers along the coast. This strategy would avoid the weight losses commensurate with lengthy shipments of live cattle and would result in an expanded supply of higher quality meat.

An additional advantage would be that this strategy initially involves a minimum of interference with traditional cattle production systems in the Sahel. For reasons explained in the following two chapters, the potential fo modernization and expansion of livestock production in the Sahel is limited by cultural and ecological constraints. The traditional livestock production systems of the Sahel have a central role to play in sector development, but these systems cannot support and will not readily adapt to extensive and particularly sudden changes.

III. ECONOMICS OF FULANI HERDER POPULATIONS

A. Introduction

In the previous section, evidence was presented to show the significant role that cattle have played and can play in West African economies, and particularly that of Mali. An increase in cattle production and especially cattle marketing (e.g., rise in off-take rates) could benefit Mali and the Sahel countries in several ways: increased availability of dairy products leading to a better diet for herder populations; increased availability of animal protein for local urban populations and for the urban populations of the external markets of the coast where extensive cattle production is not feasible; increased foreign exchange for the Sahel countries, which could be applied to their persistent balance of payments deficit, free them from dependence on foreign aid, and generally give the depressed Sahelian economies a much needed boost; and increased government revenues from export taxes and fees.

Several major foreign aid programs, as indicated in the previous section, are aimed at addressing the above problems. However, these programs are subject to severe socio-cultural constraints which must be taken into consideration. For instance, how is it possible to establish an effective government program designed to reach nomadic herders who have been heavily taxed for many years, yet relatively neglected by modern political administrations?[8/] How does one convince a herder to increase his sales to meat markets

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8/ As an example, in Mali, it is estimated that livestock revenue from all sources contribute 8 to 10% of total budget receipts, but expenses allocated to the livestock sector are only 1.5% of budget outlays (72, p. 16). This situation was improved when direct cattle taxes were abandoned in 1973.

and cattle merchants when such a herder never intended his cattle for market? How does one persuade a herder to think of his livestock in terms of monetary value and potential revenue when he has formerly considered them as a part of his family, as a life-force sustaining friendships, marriages, filial relationships, and lineage ties? All of these above issues stress the fact that any livestock program must be designed in conjunction with, and preferably within, existing socio-cultural institutions.

This section is therefore aimed at presenting a few of the more important aspects of the present economic life of selected herder populations in the Sahel. It is of necessity a sketchy presentation, since reliable material on African herder populations has only begun to emerge, and no really comprehensive, thorough, and up-to-date micro-economic studies are as yet available. Hopefully, the material presented in this section will demonstrate the importance of such research and suggest ways in which such information can be applied to the implementation process of a modern livestock program. Successful implementation of land use management, fly eradication, and herder training programs, without severe ecological and social disruption as has been the case in the past (see Chapter IV), is a tremendous challenge, but an essential element of any livestock sector policy.

B. Problems of the Study of Nomadic Societies

Studies of nomadic societies entail numerous complications, and the field as a whole has lagged seriously behind other disciplines of sociology and economics. Whereas most branches of sociology underwent major revision as a result of the work of Malinowski, nomadic studies and studies of the Fulani in particular did not manage to free themselves of the traditional ethnographic approach until the late 1950's when the writings of Dupire, Hopen, and Stenning first appeared. Prior to that time, the Fulani were subjected to the ludicrous misconceptions of the early ethnographers, as Ogot explains in the following example:

> For some strange reason, the African nomadic pastoralists, such as the Masai were for a long time looked upon by most European writers as their 'lost brothers'. Dubious anthropological and anatomical pieces were produced to 'prove' that the Fulani or the Bahima were originally non-African. And in order to show that Africans were a people without culture or civilisation, all African achievements were ascribed to these pastoralists! This brand of racialism reached its acme in the notorious 'Hamitic myth'. One of the foremost exponents of the myth, C. G. Seligman, had the audacity to state in his well-known book, Races of Africa, that "the civilisations of Africa are the civilisations of the Hamites, its history the record of these peoples and of their interaction with the two more primitive African stocks, the Negro and the Bushmen." (51, p. 126).

Webster was another example of the all-too-common Seligman tradition. In 1931, he wrote that the Fulani were certainly of "white or partly white origin" and that "I have been fortunate enough to know a few families whose boast was that they had never intermarried with the 'black', who, on the strength of my white blood, admitted me to some extent to their family life, so long as I was

accompanied by no black." (78, p. 238). This preoccupation with racial research has pre-empted more useful studies of herders and herding practices.

Thus, it was not until the late 1950's that researchers such as Dupire, Hopen, and Stenning, around whose works this section is based, began to push nomadic studies out of the quagmire into which Seligman and company had forced it. One of the guidelines for economic studies of nomadic societies is a brief article by Barth (6). This article shows various characteristics of livestock as capital and how such characteristics affect the social organization of a nomadic group. The salient features of livestock which Barth enumerates are that in a nomadic society all productive capital is consumable, a large proportion of income is in the form of capital gains, there is a perpetual fear of partial or total loss of capital, and the rate of income decreases as capital is increased. The final aspect is a result of the fact that once the herd becomes too large, the owner is forced to hire shepherds and run the risk of less careful herd maintenance and pilfering. The consequences of such an organization of capital are that certain patterns of social organization become necessary and that there is a simultaneous development of families and herds, since families become nearly autonomous herding units.

C. The Fulani

Several ethnic groups derive their livelihood from livestock raised in the Sahel and Saharan zones. These include Tuaregs, Moors, Toubous, Bella, and Fulani. In contrast to the Saharan herders who are fully nomadic and trek their herds over long distances, Fulani herders operate in the Sahel and are generally semi-nomadic, performing an annual transhumance cycle which is rarely more than one or two hundred miles.

The ethnic classification of Fulani is a general one which comprises many sub-groups and sub-cultures, both herders and farmers, from throughout West Africa. As of the early 1950's, there were approximately six million Fulani herders in West Africa. Table 15 on the following page shows their estimated distribution. Europeans refer to the Fulani by several different names: the French use the Wolof term "Peul(s)", the British in Gambia use the Bambara word "Fula", the Hausa term "Fulani" (used here as the general term) is used in Nigeria and Ghana, and the name used by the Germans is "Fulbe" (sing.: "Pullo"). All refer to a group of people whose main occupation is normally cattle herding, who speak some dialect of "Fulfulde", the name for the Fulani language family, and who claim similar myths of origin. The Fulani sub-groups which will be considered in this study are the Wodaabe Fulani of Niger and northern Nigeria, the Fulbe na'i of northern Nigeria, the Bororo of Niger, and the Fulani groups which frequent the dry season pasturage of the inland Niger Delta of Mali.

The areas of concentration of Fulani herder populations in Mali is shown in Map C (following page), where shaded areas indicate high Fulani population density . The largest concentration of Fulani herders in Mali is the interior Niger Delta, running from Segou to Timbuktu. This area deserves special mention because it was here that Cheikh Ahmadou implemented one of the most successful West African programs to revise and improve herding practices in the early nineteenth century.

TABLE 15 - West Africa: Fulani Population Estimates, Early 1950's

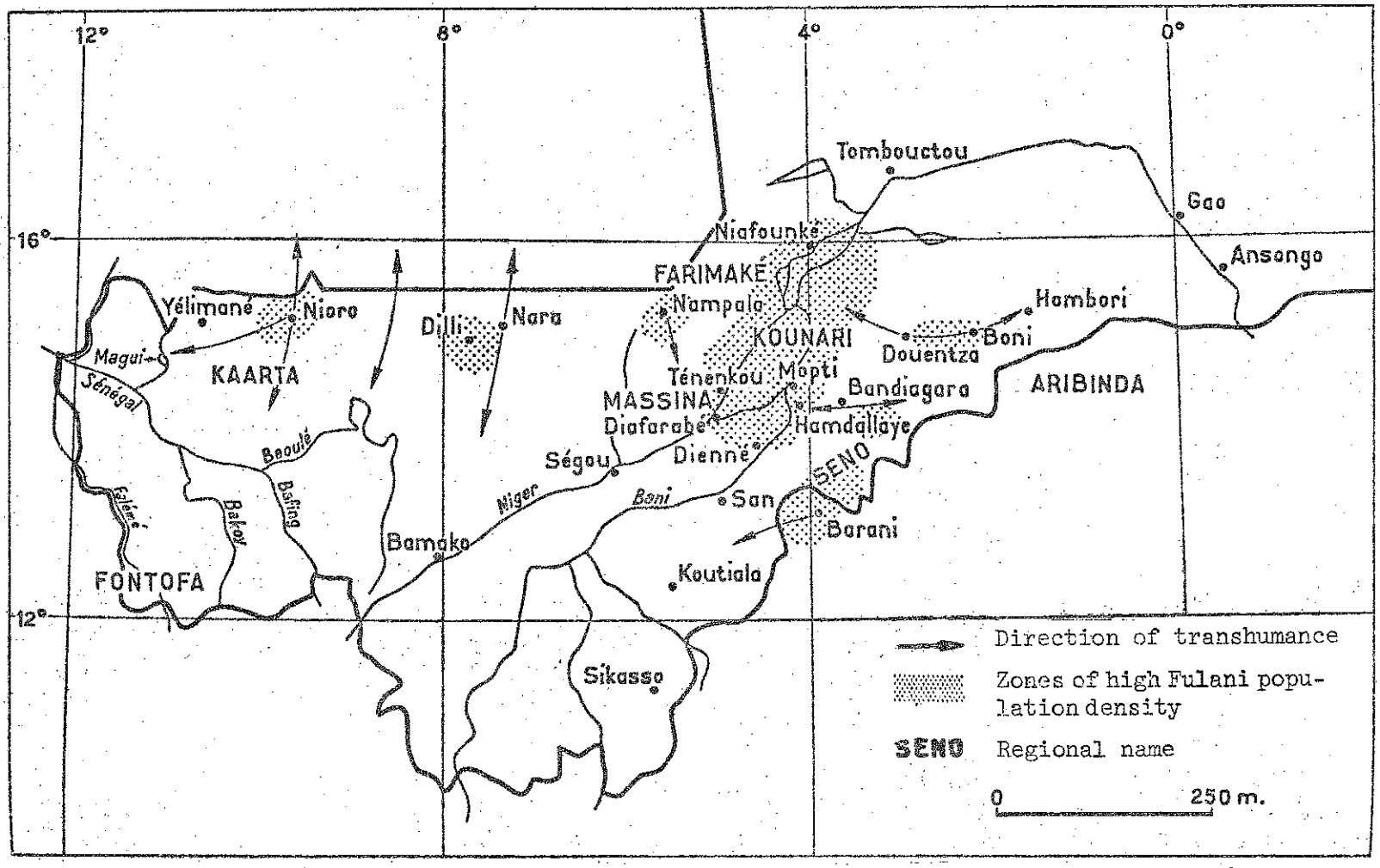
Territory	Approximate Numbers	
Mauritania	12,000	(1952)[a/]
Senegal	250,000	(1952)
Soudan (Mali)	600,000	(1952)
Dahomey	54,000	(1952)
Guinea (Conakry)	720,000	(1952)
Cameroun Francais	305,000	(1954)
British Cameroons & Nigeria[b/]	3,630,000	(1951-1953)
Gambia	58,700	(1954)
Gold Coast (Ghana)	5,500	(1950)
Guine Portuguesa (Guine Bissau)	36,500	(1948)
TOTAL	5,992,700	

Source: Stenning, Derrick J., Savannah Nomads (London, 1959), p. 1.

a/ Figures in parentheses are the year of census or estimate.

b/ Probably includes Fulani populations based in Niger and migrating to Nigeria in the dry season.

MAP C. DISTRIBUTION OF FULANI HERDER POPULATIONS IN MALI



Source: Brasseur, G., Les Etablissements Humains au Mali, Mémoires de l'IFAN no. 83 (Dakar, Senegal: IFAN, 1968), p. 144.

D. Herd Composition

This overview of Fulani micro-economics will be divided into the following three general headings: herd composition, grazing patterns, and resources derived from cattle. Information on herd composition includes the variety of animals herded and relative animal numbers. While many other variables related to this topic ideally should be quantified, due to the paucity of reliable information from micro-level studies of this subject, the present discussion will be restricted to the above two. The question of animal numbers aggregated to the national level has been covered in the previous chapter.

Some information on herd composition is supplied by two tables on the following pages. The first gives three estimates of age/sex ratios for Malian Zebu herds. Zebu breeds are the most common among the Fulani and are preferred for their ability to adapt to the Sahelian climate. They are, however, susceptible to Trypanosomiasis, so they are not well-suited for regions south of the Sahel where the disease is endemic. They are also selectively bred for their milk-producing characteristics and appearance and are not good meat animals.

The herd composition estimates point out that the majority of the animals in the herds are females. This bears out the reports of several of the sociological studies, which claim that cattle fertility is of utmost importance to most Fulani herders. Another feature of Fulani herd composition is that relative to the standards for other areas, a large proportion of older animals are kept in the herd. This is a form of insurance and a means of avoiding risk. The Sahel is often ravaged by epidemics of various cattle diseases, such as rinderpest, and is subject to extreme fluctuations of climate. The cattle who survive the longest in such conditions are also likely to be the ones who are most resistant to the dangers of the environment. Therefore, these cattle provide the best breeding stock and provide additional economic security in that they are more likely to survive future catastrophes.

The second table (Table 17) gives birth and mortality rate estimates for northern Nigerian herds in the early 1950's, as compared with those of Britain at the time. The most striking difference between the Nigerian and the British figures occurs in the comparison of output, or annual surplus. This is a reflection of the fact that the Fulani, and most other cattle herding groups in West Africa, do not raise cattle for market.

This is an item of paramount importance for herd composition. Fulani exploit their cows for milk, but cattle are slaughtered only for special ceremonies and when they become useless. Furthermore, cattle are sold only to raise money for tax or in exchange for grain and other staple foods, particularly at the end of the dry season when food resources are scarce and the land becomes less and less capable of sustaining the herds. (Fluctuations in climate, which may create situations where herders have to abandon their cattle entirely and take up new life styles and subsistence patterns, will be discussed in the next section.)

In contrast to the above, Tuareg herders, for instance, market their stock on a much greater scale in order to purchase items which most Fulani would consider frivolous. In one anthropologist's opinion, "the economic goal of

TABLE 16 - Mali: Alternative Estimates of Zebu Herd Composition

(percentage)

Herd Component	1965 Study[a/]	Interior Delta[b/]	Other Regions[c/]
Females			
Cows	38.2	36.1	36.0
1 to 2 Year Old Heifers	23.2[d/]	15.7	18.4
Calves	9.5	10.2	10.6
Total	70.9	62.0	65.0
Males			
Oxen/Bulls	6.0	15.6	11.8
1 to 2 Year Old Males	13.7[d/]	12.5	12.7
Calves	9.5	9.9	10.5
Total	29.2	38.0	35.0

Source: Stryker, J. Dirck, "Livestock Production and Distribution in the Malian Economy" (supplementary report prepared for USAID, Washington, Aug. 20, 1973, mimeographed), Appendix Table A-2.

a/ From Lacrouts, M., Sarniguet, J. & Tyc, J., Exploitation du Cheptel Bovin au Mali (Mali, Ministere du Developpement & France, Fonds d'Aide et de Cooperation (FAC), 1965). Estimates based on a theoretical model assuming the following parameter values:

Cow's age at first calving: 4 years; fecundity rate: 65%. Mortality of calves during first year: 30%; of heifers and young males during second year: 5-10%; of adults: 2% per generation.

Sales of males during second year: 10%; during third year: 30%; during third through eighth year: 50% per generation; after eighth year: all remaining.

Sales of cows: 2% of each generation sold as sterile; all remaining sold after 10 years.

This model was consistent both with an observed 3% rate of growth and with the age and sex composition of most Malian herds to the extent to which these could be estimated.

b/ Estimates derived from survey of 26,000 animals by Dr. Coulomb in the Mopti Region, slightly modified to conform to a theoretical model with the following parameters:

TABLE 16 (Cont.)

Cow's age at first calving: 3-4 years; fecundity rate: 65%

Mortality rates:	Males	Females
0-1 year	32%	27%
1-2 years	5%	5%
2-3 years	2%	2%
over 3 years	2%	2%

Sales of each male age group after first year: 10%; after seventh year: higher rates.
Sales of cows after third year: 2% of each age group; after ninth year: higher rates.
This model yields a growth rate of herd size of 3%.

c/ Estimates derived from a theoretical model which yields a growth rate of 2% and assumes that the off-take rate is somewhat higher than in the Interior Delta.

d/ Includes three year olds.

TABLE 17 - Northern Nigeria: Comparisons of Herd Composition and Output Among the Wodaabe Fulani, 1950-1954

Herd element of characteristic	I[a/]	II[b/]	III[c/]	IV[d/]	V[e/]
Breeding cows and heifers (per hundred head)	30	30	40.8	46.6	46.1
Average birth rate[f/]	40	70	56.5	35.8	84.5
Calf mortality (%)	15	18	40	22	17.7
Calves reared annually (%)	85	82	60	78	82.3
Herd mortality (%)	5	8	10	4	4.3
Output (annual surplus per hundred cattle)	5.2	9.2	6.5	6	27.8

Source: Stenning, Derrick J., Savannah Nomads (London, 1959), p. 171. Stenning sources are indicated below.

a/ Shaw, T. & Colville, G., Report of the Nigerian Livestock Mission (London, 1950), p. 62.

b/ Sharwood-Smith, B. E., "Report on the Cattle-owning Fulani of Gwandu District, Sokoto Province" (1933, unpublished). Details quoted in Shaw & Colville, op. cit.

c/ Provincial Veterinary Officer, Adamawa Province, and staff, Survey of five Ba'en and Jafun'en herds (personal communication, 1954).

d/ Bornu Native Administration Veterinary Staff, "Survey of nine Mare'en, Wodaabe, and Daneeji herds in Biu Division, Bornu Province" (Bornu Province, Nigeria, 1952).

e/ Figures for Great Britain, included here as a basis for comparison. Source: Marley, Royal Statistical Society Journal, vol. 110, part 3, 1947. Details quoted in Shaw & Colville, op. cit.

f/ Measured as number of calves born yearly per hundred breeding cows and heifers.

the Bororo (a Fulani sub-group in Niger) is not to raise their material standards but to accumulate livestock." (15, p. 342). For the Fulani, herds are intricately linked with the human family, and the size of one is directly related to the other. Just as the family starts with a man's first marriage, so does his herd. Livestock for the Fulani is as much an indicator of social stability as it is of economic conditions. Fulani herders are not particularly concerned with maximizing their money incomes. Rather, social prestige, capital investment, and risk aversion are the more critical variables in determining herd composition.

E. Grazing Patterns

This subject is concerned with the methods or techniques of herding: the aggregates in which animals are herded and the grazing characteristics. Pastoral Fulani herding units are typically based on lineage ties. The maximal lineage is defined in one sense by acknowledgement of a common ancestor. These are large aggregates which do not necessarily herd their cattle together, but which come together for special occasions at least once a year. Members of secondary divisions associate within a common residence for those times of the year when water and forage resources permit large residence units, that is, the months of the wet season.

The minimal lineage unit is composed of the domestic compounds within which are found the family cattle corral, the corral fire, and the houses of servants and wives. This group will nearly always travel together.

This neat classification system is never so clear-cut in actuality Co-residence and resultant intermarriage between previously unrelated groups may foster new lineages. Brothers may associate in times of hardship whereas formerly they travelled separately. The relative spatial distribution of groups or individuals throughout the year is the most precise indicator of the socio-political relationships which determine herding patterns. However, several distinguishing features of groups other than territorial limits, such as their cultural past, their life style, the identifying marks placed on their cattle, their matrimonial practices and the extent of intermarriage, specific games, and different dialects are also important in determining livestock herding associations. (16, p. 241)

Socio-political ties are reaffirmed and new ones begun by two important Fulani gatherings, the worso and the gerewol. The worso, an annual occasion, is the time for reaffirmation of social ties, and death within the family is practically the sole acceptable excuse for absence. Absence under any other circumstances is tantamount to a negation of former ties. During the worso, lineage groups gather to celebrate the year's important social events, such as marriage, naming, rites of passage to adulthood, but it is also the occasion for transacting and discussing the year's important business, the time when family elders make the major decisions for the year to come, such as allocation of water and pasture rights, tax payments, settlement of disputes, and punishment of crimes. The alignment of the residence units at this time is the primary indicator of the existing ties between groups, those with historical ties being aligned north-south and those with genealogical ties east-west.

The gerewol, on the other hand, is the occasion for the creation of new ties, and it is a good criterion for the degree of cohesion and centralization within a larger group. Whereas the worso draws together the same minimal lineage, the gerewol unites different primary and even maximal lineages. When a lineage group invites another group for a gerewol, an invitation is expected in return. The gerewol itself normally takes place in the wet season and entails six or seven days of dancing and festivities.

As a result of kinship and ceremonial ties, Fulani herd movements are "essentially conservative" and thus, migration patterns change radically only when accompanied by extreme changes in the environment. There are three major types of herd movements: transhumance, migratory drift, and migration (60, p. 206). Transhumance is the normal cycle of seasonal movement which is essential to the Fulani grazing system and which is organized around small herding aggregates. On the other hand, migration is a permanent displacement, a one-way move of a large population in order to escape an unpleasant or dangerous situation. (A famous example is the Hejira of the Prophet.) This is the ultimate political prerogative of Fulani herders:

> The strength of the traditional Pastoral Faulani economy, and its most refined techniques, lie in its capacity for free seasonal movements as requirements in pasture and water, avoidance of disease, and availability of markets dictate. Measures which deny, or appear to deny, this freedom of movement, without plainly adequate compensation related to its causes, are likely to provoke the Pastoral Fulani to exercise their ultimate prerogative - movement out of a political situation which is uncongenial to them. (60, p. 237)

Migration also occurs as a result of changes in climate.

Migratory drifts are those gradual changes in the location of the transhumance orbits which occur over long periods of time. Whereas transhumance is a seasonal phenomenon occurring in annual cycles, and migration is a special instance prompted by particular circumstances, migratory drift is a response to slight environmental changes. Migratory drift is therefore defined as shifts of the transhumance orbit from year to year. Since migratory drift is an outgrowth of patterns of transhumance, the latter will be emphasized in this analysis.

The transhumance cycle of the Wodaabe Fulani of Nigeria, as described by Stenning (60), is characterized by a dispersal of the family or herding unit in the dry season and concentration of herder populations in more or less settled camps in the wet season. In the Sahel, the rains end around October: this is a time of celebration and easy living. It is the time for dancing the gerewol, the time when the mud and flies of the wet season cease to be a bother, and the time when grass and water are still plentiful and man and beast are at their fittest.

However, by February, the tough dry season has started. Several months have passed with little, if any, rain, and the scorching harmattan winds which blow off the Sahara Desert have dried up most of the water and forage resources. Watering holes become crowded, and good pasture is scarce. The herders must move south in search of more favorable conditions, but not

so far south that they run into the zone of endemic sleeping sickness.

June is generally the advent of the wet season, when herders can move north again to less crowded pastures. It is the most unstable period for the herders, and most of their day is spent "following the clouds": wandering after dark clouds with some promise of rain in the hope of finding a bit of new pasture. Since man and beast are weakest and most dispersed and the natural conditions most unfavorable at this time, the risk of disease and the problem of communication among herder groups is greatest.

When it is commonly agreed that the weather and pasture conditions are favorable enough, the wet season camps are set up, and the worso takes place. But wet season herding has its own set of disadvantages: the cattle move with difficulty through the mud, and they are easily stampeded by a hard rain or prowling hyenas. Also, the camps must be moved frequently so that the women can be near markets where they can trade milk for market.

Thus, there is continual movement in practically every season of the year. Among the Wodaabe in northern Nigeria, camps usually move three times a week, and there are auspicious or obligatory days for such movements. Moving on off-days is thought to bring misfortune. Moving may be postponed up to three days for feasts or special occasions, but the Wodaabe are never in one place for more than a week.

A critical problem of such a transhumance cycle is the allocation of scarce water and forage resources in the dry season. Land in the Sahel is for the most part publicly owned, and outside of arrangements among herder groups and neighboring farmers, herd movements are practically unrestircted. However, external political factors often constitute an exception. In Niger, for instance, there is an officially established border beyond which nomads cannot move south at the end of the wet season until farmers' harvests are completed (33, p. 107).

An example of a successful land use management scheme implemented more than a century ago is the controlled transhumance cycles around the interior Niger delta in Mali. The mass transhumance towards the dry season pastures of the delta begins around the time of the grain harvest. As the herders pass over the farmers' fields, their cattle clear away the stubble and fertilize the soil. For this service, the farmers pay the herders in millet and corn. This intimate socio-economic relationship is interrupted by years of poor rainfall when cattle movements begin early and the harvest is late, provoking disputes between farmers and herders.

The herders move along traditionally established paths and associate with particular farmers along these paths. Year after year, a herder will establish his temporary camp in the same farmers' fields. The paths are between 100 and 200 miles long coming from both north and south, so that the annual transhumance cycle in the Delta area is generally 200 to 400 miles long. Armed conflict may result if the paths are not respected.

The herds are organized into convoys of up to 75,000 head each in order to make this voyage. As the convoys approach the delta, they pass through one of seventeen traditional gateways. Each gateway is controlled by the village claiming the pasture around it and is governed by a chief of pasture who imposes a tax on each head of cattle passing through.

The delta plains are divided into thirty seven districts. Each district is the communal property of a lineage. The distribution of the district is governed by a "complex weave of verbal agreements" (35, p. 67) which were negotiated by Cheikh Ahmadou, the Fulani leader of the early nineteenth century. However, since the independence of Mali in 1960, the situation has been complicated by a government decree that all lands in the delta are public property. Prior to this decree, there were only a few Tuaregs using the delta pastures, but now close to 3000 are found in the delta at the end of the dry season, resulting in frequent clashes over grazing rights.

The herders remain in the delta until June when the rains begin. They move out rapidly after the first rain and are out of the delta by the second heavy rain, since if they are caught in the delta at the time of the third rain, they would be trapped in a sea of mud. Those herders who came from the lands to the south return along the same paths. Those who came from the north first move southwest along the Niger and the Diaka rivers for about a month and then return notrh. This allows time for sufficient grass to grow in the dryer northern Sahel.

F. Resources Derived from Cattle

The final subject area concerns the economic goods derived directly or indirectly from the raising of cattle. In terms of food resources, the Fulani herders' diet is better than that of most of the grain farmers of the region and the Fulani are generally in better health:

> Pastoral Fulani diet is normally of a more varied and balanced nature than that of most grain-producing agricultural societies in West Africa. In addition to cereal foods, milk is readily available in most seasons; in some areas this is supplemented by herbal soup (li'o), while meat is consumed at periodical feasts. One of the most noticeable results of this diet is the marked absence among Pastoral Fulani children of skin diseases, sores and ulcers, in contrast to those in sedentary villages. (60, p. 167)

Therefore, disease among Fulani herders is often not the result of poor nutrition but of exposure, which brings pneumonia, bronchitis, rheumatism, and common digestive complaints, especially dysentery.

There are four ways in which productive capital in the form of cattle is allocated within the Fulani society: inheritance prior to death, marriage, loans, and new purchases of cattle financed by the sale of smaller livestock and/or crops (16, p. 288). The first two are practically the same, since most transfers of cattle from one generation to the next occur at times of marriage. Generally the marriage arrangements consist of animal sacrifices, family gifts, the dowry, small gifts, and more the

important gifts of money, animals, or cloth from the family of the fiance (16, p. 33). It is through the marriage that cattle are transferred to the sons, and the new family's herd is begun.

Cattle loans are an important custom which distinguish Fulani herders from sedentary Fulani (15, p. 343). When a boy becomes five or six years old, his father seeks for "lenders" from among his friends or relatives. Those who acquiesce loan the young boy a heifer, usually a three-year old of the borrower's choice, until the animal has thrice dropped a calf. The heifer is then brought back to the camp of the lender, and the offspring are kept by the borrower. In this way, a father can build up herds for his children which he will give over to them when they marry.

The details of the execution of the loan are strictly controlled by custom, but reciprocity is not obligatory. However, a young man can demand a loan from the descendants of those who received such a loan from his parents or grandparents. Therefore, the credit institution provides not only a mode of restocking present herds, but also financial security and insurance for future generations.

Outside of the Fulani society, cattle can be converted to alternative resources through the market when it is necessary to obtain goods which are not produced within the Fulani herder society. There are basically two forms of converting livestock resources in this way: barter, or exchange in kind, and sale for money. The barter system among the Fulani is primarily an exchange of fresh or sour milk and butter for grain. There is great seasonal variation in the relative prices of these commodities, and normally each exchange entails a lengthy discussion of the relative values of the goods.

The barter system is also used when the cattle themselves are traded for cloth and when the herders are far from the village markets and are forced to trade with the wandering dioula traders. When cattle are traded through the barter system, the terms of trade are rarely in favor of the herders, particularly in the latter instance given above. In the latter case, the herders are forced to pay excessive amounts for the "privelege" of buying in the bush, since the dioulas have no effective commercial competition.

Monetary exchange has a limited range of usage and is employed only for those goods or services which cannot be obtained by exchange in kind, such as the service of healers; certain expensive jewelry; clothes and furnishings; and salt for the animals. Money is also necessary for the fulfillment of certain obligations, such as paying tax. The form of money currently in use among the Bororo Fulani of Niger and the values attributed to it are linked to older trading customs. When money and the sale of animals are required, however, the Fulani prefer to dispense with the sheep and goats which they raise on the side as opposed to parting with their cattle.

When the Fulani wish to sell animals, they sometimes resort to a system of trader middlemen (15, pp. 348-350). These middlemen are licensed professionals who ensure a certain amount of security in deals which often involve credit and nomadic clients who can disappear at any moment. The middlemen house the herders when they come to village markets and bring items ordered from the market to the herders' camps when they visit their clients.

The markets where Fulani herders trade vary widely in size and importance. There are those held twice a week or weekly; urban or rural; primarily for internal or external trade and dominated by local buyers or strangers; those which are seasonal or active throughout the year; those which specialize in cattle or livestock trade; and those which are oriented towards butchery or sale (15, pp. 350-351). The Fulani themselves generally make a distinction between those markets where they go to sell their livestock and those which they attend mainly for social reasons, such as meeting family and friends, exchanging news, and keeping in touch with the outside world.

Cattle supply and prices, both relative and absolute, fluctuate with the seasons. Supply is determined by the herder's need for tax money and food supplements such as salt for the cattle and millet and the traders' demand for cattle for slaughter and export. There are generally three peak periods of supply: March-April, July-August, and December-January.

The absolute price is greatest in the December-January period when the volume of agricultural trade is also at a maximum. The increased purchasing power of the farmers at this time, along with the increased demand of the dioula traders seeking to buy beef for export to the coastal markets, corresponds well with the supply conditions. Herds are in good shape since they have just returned from their wet season pastures to the north.

Another price rise, although of secondary importance, occurs at the end of the wet season (September-October). While most of the cattle are still at their wet season pastures, those that are available are in good condition and in demand by traders from the coastal markets. Price is lowest at the end of the dry season (May-June) when the purchasing power of the domestic market is low, the poor condition of the cattle has lowered export demand, and the Fulani are anxious to sell their cattle to obtain food supplements and tax money.

The two commodities which are essential to the herders and which form the majority of their market purchases are millet and salt. Fluctuations in the price of salt depend upon the arrival of the salt caravans coming from the Saharan mines. Millet prices, however, go through seasonal fluctuations, and the grain is least expensive after the harvest and most expensive just prior to the next harvest, when cattle prices are at their annual minimum.

The commercial habits of the Fulani herders are generally poorly adapted to the seasonal fluctuations in price. To raise money for tax, herders will often sell their animals towards the end of the dry season when the animals are in the poorest condition and prices are low, or animals will be sold in July to buy clothes and salt just before the departure for wet season pastures. At the latter time, prices are only slightly higher. In addition, the herders only buy millet when they have no milk to exchange for it, and this is at the end of the dry season when millet prices are high.

G. Traditional Herder Economies and Livestock Sector Development Policy

One of the key problems which must be addressed by Sahelian livestock development programs is getting the herders to recognize a surplus (or to redefine their own concept of surplus) and to market cattle in order to keep herds within the limits of the carrying capacity of the range. This is where those development strategies aimed at a more modern market infrastructure have a relative advantage. For instance, in Mali, off-take rates are likely to be higher around Mopti and the inland delta area than they would be in more remote areas such as those which will be covered by the US-AID program discussed in the previous chapter.

Imposing fees for land use and implementing controlled grazing may be an unpopular device since most herders currently are not accustomed to any restrictions on pasture other than agreements among herders and farmers who are alternative users. Land use fees would force the herders to market more cattle, but for reasons cited above, this is an unpleasant situation for the herders, and they simply may exercise their prerogative of moving away from it. Imposing fees for land use could only be justified by marked improvement in the forage and water resources available on the land. Since improvements over a wide zone would be economically infeasible, this could create privileged areas which might either be ignored by the herders or overrun by them.

It is crucial that the herders themselves make the major planning decisions for development programs. Establishing effective communication with the herders will be a challenge since they are constantly on the move and are highly suspicious of the motives of government personnel. However, training and communications programs might be possible if conducted by someone from within the herder groups and if the programs take place at times when the herders are normally gathered to discuss business. An example of such an occasion would be the worso.

Fly eradication programs which open up new grazing land for livestock have the disadvantage of being extremely costly while possibly having detrimental effects on the environment. In addition, the result may be that herder groups such as the Fulani would migrate to areas previously used only for agriculture. This may entail disputes due to the conflicting interests of the herders and the farmers.

Finally, and most importantly, the basic contradiction between the development policies discussed in the previous chapter and the economic motivations of traditional herders is that the herders regard cattle primarily as a source of milk, not meat. Small local markets for milk have already developed, as explained above, but the exploitation of cattle as a milk source does not figure prominently in the development plans of any of the West African states. Auxiliary programs to increase milk yields are likely to be readily accepted by the herders and may make other interventions more palatable.

This discussion must not be taken as a plea to keep the Fulani and other traditional herder groups in some sort of anthropological reserve. The intention is to show that herder management decisions are based quite rationally on

practical considerations and that the reluctance of herders to participate in development schemes may reflect more on the assumptions on which these schemes are based than on the intrinsic backwardness of a nomadic existence. Traditional livestock production systems must be a central element of livestock development plans, but they should be integrated into the plans rather than adapted to them. The strategy of "zonal stratification" discussed at the end of the previous chapter may provide such integration.

IV. DISRUPTIONS IN PAST YEARS

A. The 1968-1973 Drought

From 1968-1973, West Africa suffered from deficient rainfall and a drought in the Sahel zone which decimated the cattle herds. The extent of the rainfall deficiencies and the apparent return to close to normal precipitation in 1974 is illustrated in the following tables (normal raingall has been computed over a 50 year period):

TABLE 18
Sahel-Sudano Rainfall, 1972-1974

(% of normal, by month)

	Normal	1972	1973	1974	Monthly rains as % of total annual normal rains
May	100	99	52	64	5.6
June	100	96	68	70	11.2
July	100	67	75	112	22.2
August	100	63	75	91	32.2
September	100	59	58	83	19.8
October	100	80	37	...	5.2

TABLE 19
Rainfall by Climate Band in the Sahel, June-September, 1972-1974

(% of normal)

Zone	Normal	1972	1973	1974	June-Sept. rains as % of total annual normal rains
0 - 500 mm. (25 stations)	100	42	57	79	90.5
500 - 900 mm. (32 stations)	100	69	65	90	88.6
900 mm. (19 stations)	100	75	82	96	81.5
Total/Average	100	68	70	91	85.4

Source: (for both tables) Elliot Berg, The Recent Economic Evolution of the Sahel (Ann Arbor: Center for Research on Economic Development, mimeo., April 3, 1975), adapted from S. Bethke, Sahel-Sudano Rainfall (FAO: World Food Program, mimeo., Oct. 1974), p. 3.

The above rainfall statistics indicate drastic shortages during 1972 and 1973 and a return to near normal rainfall in 1974. The 1972 and 1973 figures, however, may even underestimate the severity of the situation. In measuring the extent of a drought, annual or even monthly rainfall data may be deceptive. It is more instructive to look at the amount of "useful rain", defined as a rainfall of at least 3 mm. which is followed by a similar one within a week at most. Drought then corresponds to a shortage of useful rain preventing a normal development of vegetation (8; 9).

An example is provided by the rainfall data for Agades, Niger in 1967 and 1968. 1967 was considered to be a year of abnormally low rainfall, bringing only 155.3 mm. 1968 brought 165.1 mm., which was close to the mean annual rainfall (164.2 mm.) over a 33 year period for Agades. However, in actuality, 1967 was a good year for forage availability, while 1968 was a year of drought and scarce pasture resources. Rain was evenly distributed over the wet season in 1967, but in 1968, 50.2 mm. fell within six days at the end of April, and no more than 0.5 mm. fell on a single day in May. The 50.2 mm., therefore, was not only useless: it caused premature germination and sprouting of vegetation. This vegetation was then killed off by the lack of useful rain in May (8, P. 132).

Judging only from the monthly statistics presented in Table 18, 1972 and 1973 were both drastically bad years for total rainfall as well as for its distribution. In 1972, rainfall was particularly deficient during the peak months, even though it was close to normal at the beginning and end of the

rainy season. In 1973, the opposite distribution pattern occurred, but rainfall was well below normal in all months. However, since no data on useful rain is available, it is impossible to be any more precise about the extent to which rainfall distribution was detrimental.

Table 19 indicates that the areas most severely affected by the West African drought were the Sahel and Saharan zones (0 - 500 mm.). Even in 1974, rainfall was well below normal in these areas. As indicated in Section II, this is where the majority of the West African cattle population is maintained. Since such deficient rainfall would have destroyed both pasture and water resources, it is likely that herder populations were most severely hurt by the drought.

B. The History of Drought in the Sahel

The history of the Sahel is replete with accounts of droughts. The ancient empire of Ghana, which flourished in the early Christian era in the western Sahel, was supposed to have fallen as a result of drought, and the writings of the Islamic scholars of Timbuktu record droughts within each century in that area (41). Within this century alone, the Sahel zone has experienced several droughts. From 1910 to 1914, drought ravaged the entire Sahel, and localized droughts occurred during the years 1900-1903 and 1930-1931 (29; 38; 54).

C. Causes of the Recent Drought

Drought in the Sahel is caused when the Intertropical Convergence Zone (ITCZ) fails to advance as far north as usual. The ITCZ is a low pressure air system which travels in an annual cycle between the southern Atlantic and the southern edge of the Sahara Desert. This weather system brings with it the moist winds which carry the rain of the wet season and counteract the hot, dry winds blowing off the Sahara. However, when the low pressure system does not advance its usual distance north, the Sahel is deprived of what little rain it normally has.

In addition to fluctuations in rainfall caused by abnormal movements of the ITCZ, the most recent Sahelian drought may have been aggravated and prolonged by shortsighted and ecologically insensitive livestock development policies. Throughout the 1960's and, indeed, throughout the colonial period, the inputs which foreign aid contributed to the Sahelian livestock sector were primarily wells and veterinary services. In fact, veterinary services have been practically the sole government services extended to herder populations, which may explain the herders' reluctance to pay cattle taxes.

D. Implications for Livestock Sector Development Policy at the Level of the Ecosystem

Chapter II has indicated the important position of the livestock sector in the recent development plans of the Sahel states. These plans are based primarily on the exploitation of cattle as a source of meat for export and, as such, a source of foreign exchange earnings. The plans also are based on the assumption that there is a growing demand for cattle products in the livestock-deficient coastal states. Ivory Coast is cited as an example.

In addition to contributions to foreign exchange, livestock sector development offers the prospect of expanding the incomes of those inhabitants of the Sahelian nations who were probably most severely affected by the recent drought. Also, significant contributions may be made towards industrial development as leather and meat processing facilities expand, and agricultural modernization may be facilitated by increasing the number of animals which are available as sources of power.

However, the livestock sector offers little potential as a solution to nutrition problems. As many as 30% of the inhabitants of the Sahel states may base their diet on livestock as a main source of food, e.g., as providers of milk which they consume or which they trade for grain. However, grain is the major staple in the diets of the majority of the people of the Sahel countries, and where nutrition problems are concerned, efforts should be directed more towards increases in grain production.

This may be equally true for herder populations. At present, little information is available on the proportion of grain and milk in the herder's diet. In any case, providing better diets for herders depends more on milk and grain production than on the production of meat. Increasing meat supplies will be beneficial to the higher income groups in coastal areas, but meat is not an important element in the diets of lower income groups in the Sahel or along the coast.

It must be stressed that livestock sector development, and particularly the development of the international trade in livestock, is fundamentally an interim solution. The Sahelian economies cannot thrive on livestock alone, and future priorities should lay increasing emphasis on industrial expansion. Revenue derived from the livestock sector must be channeled towards this goal.

Given that sufficient demand exists to absorb expanded production in the livestock sector (an assumption which is verified by most of the recent studies), development of the sector could provide the benefits delineated above. Given the constraints of a fragile ecosystem and low carrying capacity of Sahelian rangeland, this may be the optimum time to proceed with a controlled rebuilding of herds. The decline in cattle populations as a result of the recent drought has alleviated some of the pressure on the environment, and as water and pasture resources are restored naturally, the herds can be reconstituted gradually. If surplus stock is marketed once carrying capacity is reached, range deterioration such as occurred in previous drought periods can be avoided. A few of the problems inherent to such a strategy are listed on the following page.

1. Location of interventions. As mentioned at the end of Chapter II, the Sahel is the optimum location for maintaining a breeding stock and the sourthern Guinea Savanna a prime locale for intensive forage production and fattening operations. This is roughly the system of "zonal stratification". Processing facilities might be established in any of these zones, although transportation problems at present dictate a location closer to the southern markets.

2. Transportation infrastructure. There are few paved roads in West Africa, and the ones that exist are poorly maintained and subject to rapid deterioration during the rainy season. Rail lines are even more scarce. As a result of the low freight volume of the rail and road networks, most of the cattle moving south are trekked, and weight losses are considerable. The quality and quantity of cattle and cattle products reaching southern markets could be vastly improved by expanding the transportation infrastructure and eliminating delays at customs and inspection posts. An improved transportation network might make refrigerated shipping economically feasible, thus avoiding the problem of exposure to Trypanosomiasis in southern zones.

3. Price policy. The current price ceilings on cattle and beef meat create disincentives to production. Herders are already reluctant to market their cattle, and a low producer price further inhibits them.

4. Limitations on herd size. This is a cumbersome issue. Since most rangeland in the Sahelian states is public, herders probably feel that the only effect of restricting herd size voluntarily would be that another herder expands his herd to take up the unused pasture area. Several schemes have been suggested to implement grazing controls. Ruthenberg suggests that when services are provided to herders, those herders should comply with contracts specifying herd size restrictions and marketing requirements (58). A more extreme solution would be to abolish the concept of public lands or to settle the nomads (cf. Somalia). In the long run, however, it is likely that herder education and the gradual improvements in the herders' standard of living which result from livestock sector development will enable the herders to adopt new sets of management decisions and to implement voluntarily restrictions on herd size. Short run solutions are much more difficult and drastic.

5. Dry season nutrition. As pasture and water resources become scarce during the harsh dry season, previous weight gains are sacrificed, and susceptibility to disease is increased. This is when feed supplements are essential. Three possible sources are: (1) forage shipped up from forage production centers in the south; (2) agro-industrial by-products, such as rice bran and cottonseed cake, sold at subsidized prices; (3) by-products of crops produced by sedentary farmers, such as millet stalks, which could be cut and stored in the ground after the harvest.

6. Intersectoral resource transfers. While it is desirable to transfer revenue produced in the agricultural sector to other sectors of the economy, equitable means are not always available. Land taxes are excluded by the system of public lands and the administrative problems involved in collecting such a tax. Cattle taxes were abolished in 1973 and have not

yet been re-instituted. The remaining alternatives at present are: (1) fees for land use and services; and (2) export-import taxes. Deriving further revenues from the livestock sector should be a result of expanding the revenue base rather than using taxes and fees in a regressive manner.

7. Dearth of information. There is a paucity of reliable information on West African livestock and a pressing need for further research. Effective communication between herders and government personnel is limited, and the amount that is known about the herder's basis for his management decisions is negligible. Micro-level surveys of herder economies are an essential input to the planning process.

V. SUMMARY AND CONCLUSIONS

This paper has drawn together some general information on the livestock sector in West Africa and has attempted to enumerate some of the problems involved in development of the livestock sector at the level of the major political units (Ch. II), the traditional herdsman (Ch. III), and the environment (Ch. IV). The evolution and implementation of successful livestock sector development policies hinges on successfuly coordinating the goals and the requirements of the above three groups. At the level of the environment, this may be an optimum time to act to restrict herd sizes, but the chief aim of the smallholder herder, who has been especially hard hit by the recent drought, may be to rebuild his herd. While the herder hopes to maintain increases within his herd, national governments aspire to putting additional animals on the market, and while those governments would prefer to see an increased quantity of meat marketed, most smallholder herders are more familiar with marketing milk.

An essential prerequisite for coordinating goals and requirements of governments, livestock producers, and the various environments of West Africa is effectively determining such goals and requirements and communicating them to the groups involved. Modern governments require more information concerning the objectives of smallholder livestock producers and the exigencies of their environment, and research capable of providing such information must receive a high priority in livestock sector development planning.

ANNEX

LIST OF ANNEX TABLES

Annex A. Chad

1. Domestic Meat Production and Consumption

With the exception of a ranch at Massakory and the cattle used as work animals in the southern cotton-growing regions, the mode of production is extensive. The Massakory ranch was established in 1953 and covers 15,000 hectares. Another ranch at Ouaddai-Rime (60 km. north of Ati) was closed in 1969 due to its distance from N'Djamena (the capitol, formerly Fort Lamy) and the infeasability of shipping the animals to that area for processing. However, it is planned to go back into operation (23).

The off-take rate from cattle herds outside of the ranches (estimated to be 11%) seems to have reached a critical level, since the mean carcass weight for controlled slaughters has decreased from 190 kg. to 160 kg. (23) This may, however, be an effect of the recent drought.

Total slaughters of cattle are estimated to be 250,000 head in 1971 and 1970 and 233,000 head in 1969. 110,000, or 44%, of the 1971 total were slaughtered in the central west region.

Currently, two large-scale slaughterhouses are operating in Chad at Farcha and at Sarh. The Farcha slaughterhouse has experienced decreases in production in recent years due to the decline in carcass weights: only 3,987 tons of meat were produced over the first six months of the previous year (6,369 tons). After an investment of 236 million CFA Francs (161 million of which was donated by FAC), remodeled installations were put in service in June 1973 (23). Production figures for the past decade illustrate the rapid advance up to 1971 and the recent decline in production:

TABLE A-1
Chad: Cattle Slaughters and Production of Beef Meat at the Farcha Slaughterhouse, 1960, 1964-72

Year	Cattle Slaughters (head)	Beef Meat (tons)
1960	34,340	6,102
1964	37,056	6,542
1965	38,111	6,774
1966	36,143	6,412
1967	42,560	7,180
1968	56,784	9,937
1969	77,587	13,071
1970[a/]	83,804	13,602
1971[a/]	88,850	14,291
1972[a/]	54,103	8,600

Source: Ediafric-Service, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974).

a/ Tonnage data less veal: 190 tons in 1970, 205 tons in 1971, 213 tons in 1972.

The Sarh slaughterhouse has not produced meat for export since August 1969 and activities are temporarily limited to local consumption. The following table shows that annual production figures for beef meat at Sarh have fluctuated over the past decade, with a general increase up to 1970 and a decline in production since then.

TABLE A-2
Chad: Beef Meat Production at the Sarh Slaughterhouse, 1960, 1962, 1964-72

(tons)

Year	1960	1962	1964	1965	1966	1967	1968	1969	1970	1971	1972
Beef Meat	713	692	595	735	1040	1122	1361	900	1793	1294	531

Source: Ediafric-Service, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974).

Inspected production (meat produced from animals slaughtered under government supervision) of beef and veal has progressed as shown in the following table:

TABLE A-3
Chad: Total Inspected Beef and Veal Production, 1961-65 (average), 1967-72 (annual)[a/]

(000 tons)

Year	1961-65	1967	1968	1969	1970	1971	1972
Total Production	25	32[b/]	32[b/]	32[b/]	32[b/]	34[b/]	25[b/]

Source: United Nations, Dept. of Econ. and Social Affairs, Stat. Office, Statistical Yearbook, 1973 (New York: UN, 1974).

a/ Meat from animals slaughtered within national boundaries, irrespective of animals' origin.

b/ FAO estimates.

2. Leather Production

Leather production is widely dispersed and comes mainly from family slaughters. It is estimated to be 250,000 cattle hides per annum.

3. Foreign Trade

Chad is the most important exporter of Francophone West Africa. 40,049 head of cattle were exported live on the hoof through official channels in 1971. However, 75% of actual exports of live cattle do not come under government control, so the actual number of cattle exports in 1971 is estimated to be 200,000 head (23) and around 240,000 head were exported in 1973.[1/] Approximately 75% of the cattle leaving the country in 1971 were destined for Nigeria, 30,000 went to the Central African Republic, and 15,000 to Cameroon (23).

Exports of refrigerated meat were up 10.4% in 1971, but down 83% in 1972 due to the difficulties at the Farcha slaughterhouse.

TABLE A-4
Chad: Refrigerated Meat Exports, Total and by Origin, 1962-72

(tons)

Year	Total Exports	From Farcha	From Sarh
1962	4155	3938	216
1963	4543	4387	156
1964	4433	4246	197
1965	4453	4315	138
1966	4627	4324	403
1967	5347	4884	463
1968	7916	7248	668
1969	10338	9959	379
1970	11744	10451	1293
1971	12235	11460	775
1972	6261	6261	-

Source: Ediafric-Service, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974).

In 1972, the principal clients for refrigerated meat exports were: Kinshasa (3519 tons), Brazzaville (2338 tons), Libreville (235 tons), and Bangui (150 tons) (23).

1/ Based on the figure of 59,100 head controlled exports from the Direction de la Statistique, Republic of Chad, for 1973. It is difficult to say whether the increase is due to more cattle moving south for sale or more cattle moving south for better pasture.

Exports of dried meat go essentially to Nigeria. Total production of dried meat was 794 tons in 1971, 869 tons in 1970, 1,038 tons in 1969, and 606 tons in 1968 (23).

Internal consumption (slaughters less exports) was estimated as 25,880 tons of beef meat in 1971. Out of this total, 2800 tons were consumed in N'Djamena, 520 at Sahr, 2560 at all other urban centers, and 20,000 in rural areas (23).

Controlled exports of hides have progressed as follows since 1965:

TABLE A-5
Chad: Controlled Exports of Hides, 1965-1971

Year	1965	1966	1967	1968	1969	1970	1971
Hides	53,822	55,285	72,926	76,528	104,523	116,262	129,447

Source: Ediafric-Service, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974).

573 tons of leather were produced within the country in 1971 and 568 tons in 1972. Europe buys most of Chad's leather exports (23).

Out of all export commodities, only cotton and livestock products account for more than 100 million CFA in value of exports. Controlled sales of livestock products (all animals) accounted for 21.9% of the total value of exports in 1972, 25.4% in 1971, 21.8% in 1970, 11.5% in 1969, and 18.3% in 1967. The breakdown of controlled exports of cattle and cattle products is given in table A-6.

Annex B. Mauritania

1. Domestic Meat Production

Controlled slaughters of cattle have been relatively stagnant over the past decade, as illustrated in table A-7. However, a SEDES study from several years ago evaluated actual slaughters to be 80,000 head, giving an off-take rate of approximately 4% (23).

2. Foreign Trade

Livestock exports are derived principally from the First and Fourth Regions (Nema and Kaedi). 71% of the cattle exported through official channels came from the First Region in 1972, and another 15% were from the Fourth Region. Data on controlled livestock exports (see Table A-7) show wide fluctuations over the past decade. The quantity of domestic slaughters has been approaching the quantity of controlled livestock exports in recent years.

Two export contracts were signed in 1973 by COVIMA (Meat Marketing Company of Mauritania - Compagnie de Commercialisation des Viandes de Mauritanie), one for the Antilles calling for an export of 2,000 tons per year for the next five years, and one with ibya, which asked for 1400 tons of meat per year (59).

TABLE A-6
Chad: Quantity and Value of Exports of Cattle and Cattle Products, 1969-72

(value in millions of CFA Francs)

Item	1969	1970	1971	1972
Live Cattle				
Quantity (head)	20,070	21,193	37,818	50,133
Value	120	195	279	374
Beef Meat				
Quantity (tons)	6,877	13,815	11,614	5,942
Value	651	1,401	1,476	904
Dried Meat				
Quantity (tons)	310	456	232	256
Value	32	49	25	27
Leather				
Quantity (tons)	574	746	573	568
Value	47	75	60	57
Total Value - Cattle and Cattle Products	850	1,720	1,840	1,362
Total Value of Recorded Exports[a/]	8,000	8,200	7,800	9,000

Source: Ediafric-Service, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974).

a/ From Direction de la Statistique, Republic of Chad, as recorded in Elliot Berg, The Recent Economic Evolution of the Sahel (Ann Arbor: Center for Research on Economic Development, mimeo., April 3, 1975), Annex B, Table III.

TABLE A-7
Mauritania: Controlled Slaughters of Cattle and Controlled Livestock Exports, 1965-72

(head)

Year	Slaughters	Exports
1965	17,022	33,066
1966	14,875	28,369
1967	15,430	19,172
1968	18,072	16,295
1969	16,219	22,455
1970	21,033	25,907
1971	17,584	11,643
1972	18,542	16,926

Source: Ediafric-Service, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974).

Annex C. Niger

1. Domestic Meat Production and Consumption

The mode of herding is extensive, with the exception of the Ekrafane ranching projects. The Ekrafane ranch is owned and managed by SONERAN (Niger Society for the Exploitation of the Animal Resources of Niger). At the end of 1971, it consisted of 110,000 hectares of enclosed range land equipped with five wells. The ranch contained 6000 head of cattle at the end of 1972. Its capacity in a normal year is estimated at 9,000-10,000 head, corresponding to 1200 tons of meat for slaughter in Niamey and export (23).

There is a refrigerated slaughterhouse at Niamey, the storage facilities of which have been filled to capacity in recent years. There are three other well equipped slaughtering centers (Tahoua, Maradi, and Zinder), but they lack refrigeration.

Controlled slaughters are thought to represent only one third of uncontrolled cattle slaughters. In recent years, slaughters at the Niamey slaughterhouses have accounted for close to half of the total for all seven government slaughterhouses (see Table A-8, following page). Controlled slaughter over the entire country and in the capitol declined over the period shown. Based on FAO estimates, controlled meat production for the entire country has also declined over the past few years, as indicated in Table A-9.

Given that the large portion of the national herd which is supposed to have emigrated south will return to Niger as normal rainfall patterns are resumed, the country will have a capacity for meat production which will

permit increased exports. With an estimated off-take rate for cattle of 12.5%, the quantity available for slaughter in 1972 would have been 525,000 head or the equivalent of 57,000 tons of beef meat, representing 60% of the total of 95,000 tons of animal meat estimated to be available for slaughter in 1972. Given that internal consumption, excluding local slaughters, is around 55,000 tons, this would leave 40,000 tons available for export (23). However, only 61,000 tons of beef meat were produced in 1972 (7, Annex B, Table II), and domestic consumption was 27,000 tons of beef meat (59, II-69).

TABLE A-8
Niger: Controlled Cattle Slaughters, 1970-72
(head)

Year	Niger Slaughters	Niamey Slaughters
1970	67,886	34,988
1971	60,892	32,403
1972	60,376	29,854

Source: Ediafric-Service, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974).

TABLE A-9
Niger: Inspected Beef and Veal Production, 1961-65 (average), 1967-72 (annual)[a/]
(000 tons)

Year	1961-65	1967	1968	1969	1970	1971	1972
Inspected Production	22	32[b/]	31[b/]	33[b/]	29[b/]	29[b/]	29[b/]

Source: United Nations, Dept. of Econ. and Social Affairs, Stat. Office, Statistical Yearbook, 1973 (New York: UN, 1974), Table 79.

a/ Meat from animals slaughtered within national boundaries, irrespective of animals' origins.

b/ FAO estimates.

2. Leather Production

Leather production is under the monopoly of the SNCP (Niger Society for the Collection of Leather and Skins), which was created in 1971. Production of cattle hides corresponding to estimated actual slaughters would be close to 295,000 hides, but controlled production in markets and

some 250 local slaughterhouses has been as follows:

TABLE A-10
Niger: Controlled Production of Cattle Hides, 1960, 1966, 1968-72

Year	1960	1966	1968	1969	1970	1971	1972
Hides	132,489	152,969	179,556	250,566	232,867	166,060	147,132

Source: Ediafric-Service, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974).

Two tanneries currently process only goat skins (23).

3. Foreign Trade

The number of cattle exported live on the hoof was estimated to be 230,000 head in 1972, 200,000-210,000 of which were destined for Nigeria and the remainder for other coastal countries. Meat exports are under the monopoly of SONERAN, with the exception of dried smoked beef. 605 tons of dried smoked beef were exported in 1966, 765 tons in 1970, 673 tons in 1971, and 563 tons in 1972. 498 tons of the 1972 total were exported to the Ivory Coast (23).

The value of controlled exports of live animals varied between 850 million and 1 billion CFA Francs up to 1970, when the value of live animal exports increased 56% over the previous year. Animal exports increased another 42% in value in 1971 and 21% in 1972. From 1967 to 1972, live cattle exports accounted for 82-90% of the total value of live animal exports, as shown in table A-11. Live cattle exports accounted for 16% of the total value of exports in 1972, and sales of all livestock products (including leather and skins, with an export value of 220 million, and meat) accounted for 21%.

Mineral sales (uranium concentrate), important since 1971, made up 19% of the total value of controlled exports in 1971, 18% in 1972, and 39% in 1973. Groundnut exports accounted for 44% in 1971, 45% in 1972, and 27% in 1973. The only other export of significant economic value is cotton, which accounted for 6% of total value in 1971, 1.5% in 1972, and less than 1% in 1973 (7, Annex B, Table III).

TABLE A-11
Niger: Value of Controlled Exports of Live Cattle and Live Animals and Total Value of Controlled Exports, 1964-72
(millions of CFA Francs)

Year	Live Cattle	Live Animals	Total Exports
1964	431	597	4700
1965	807	1025	...
1966	734	949	8600
1967	709	844	...
1968	778	862	7100
1969	731	890	6300
1970	1232	1389	8800
1971	1703	1973	10700
1972	2209	2511	13700

Sources: Ediafric-Service, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974); Elliot Berg, The Recent Economic Evolution of the Sahel (Ann Arbor: Center for Research on Economic Development, mimeo., April 3, 1975), Annex B , Table III.

Annex D. Upper Volta

Livestock production in 1971 included 5,752 million CFA Francs for the value of beef on the hoof, 1,772 million for 44,900 tons of cow milk and 26,000 tons of goat and sheep milk, and 218 million CFA for leather and skins. The off-take rate from the national herd is estimated to be 11.7%. The value added to the GDP by all livestock products was 8,645 million CFA in 1968, 8,170 million in 1970, and 8,192 million in 1971. Over 90% of this was derived from cattle and cattle products in 1971.

The share of livestock products in the GDP has diminished from 12.2% in 1968 to 10.1% in 1971. The stagnation of livestock production during these years has been attributed to: (1) the feeble financial resources of

the Service d'Elevage, which received an average of 1.4% of total government expenditures between the years 1966 and 1971; (2) the drought and the resultant lack of water and pasture; (3) traditional marketing patterns; and (4) price ceilings in external markets (23).

Beef production in the past has been as follows:

TABLE A-12
Upper Volta: Inspected Beef Production, 1961-65 (average), 1967-72 (annual)
(000 tons)

Year	1961-65	1967	1968	1969	1970	1971	1972
Production	11	17	16	17	21	22	22

Source: United Nations, Dept. of Econ. and Social Affaris, Stat. Office, Statistical Yearbook, 1973 (New York: UN, 1974), Table 79.

2. Foreign Trade

Livestock products accounted for 48.7% of the total value of exports in 1972, 44.3% in 1971, 36.7% in 1970, and 59% in 1967. Data on the quantity and value of livestock exports are given below:

TABLE A-13
Upper Volta: Controlled Cattle and Meat Exports, 1970-72

Year	Live Cattle (head)	Meat (tons)
1970	58,869	1,435
1971	58,008	1,715
1972	84,063	1,281

Source: Ediafric-Service, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974).

The increase from 1971 to 1972 in live cattle exports is partially due to imports of Malian cattle moving south due to the drought.

TABLE A-14

Upper Volta: Value of Controlled Exports of Selected Livestock Products, 1964-72
(millions of CFA Francs)

Year	Live Cattle	Meat[a/]	Leather & Skins[a/]	Total Exports
1964	1,090	68	276	3,300
1966	1,498	199	204	4,000
1968	1,588	277	72	5,300
1969	1,147	214	121	5,300
1970	860	204	74	5,100
1971	786	264	84	4,400
1972	1,063	193	214	5,100

Sources: Ediafric-Service, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974); Elliot Berg, The Recent Economic Evolution of the Sahel (Ann Arbor: Center for Research on Economic Development, mimeo. April 3, 1975), Annex B, Table III for total value of exports.

a/ From all animals.

73% of all exports in 1972 were destined for coastal nations within the Franc Zone, with Ivory Coast being the principal client.

BIBLIOGRAPHY

1 Ajayi, J. F. A. & Crowder, M., eds., History of West Africa, 2 vols. (New York: Columbia University Press, 1972).

2 Amin, Samir, Trois experiences africaines de developpement: le Mali, la Guinee et le Ghana (Paris: Presses Universitaires de France, 1965).

3 _____, Le developpement du capitalisme en Cote d'Ivoire (Paris: Les Editions de Minuit, 1967).

4 _____, Neo-Colonialism in West Africa, Trans. from the French (Middlesex, Eng.: Penguin Books, Ltd., 1973).

5 Baier, Stephen & King, David J., "Drought and the Development of Sahelian Economies: A Case Study of Hausa-Tuareg Interdependence" (reprint of an article obtained from the Land Tenure Center, University of Wisconsin, Madison, Wis.: 1974).

6 Barth, Fredrik, "Capital, Investment and the Social Structure of a Pastoral Nomad Group in South Persia" in Raymond Firth & B. S. Yamey, eds., Capital, Saving and Credit in Peasant Societies (Chicago: 1964).

7 Berg, Elliot, The Recent Economic Evolution of the Sahel (Ann Arbor: Center for Research on Economic Development, mimeo. draft report, April 3, 1975).

8 Bernus, Edmond, "Drought in Niger Republic," Savanna 2:2 (1973).

9 _____, & Savonnet, G., "Les problemes de la secheresse en Afrique de l'Ouest," Presence Africaine 88:4 (1973).

10 Bishop, Dwight R., "Livestock and Meat Marketing Patterns and Costs in the Entente and Adjoining Countries" (report submitted to US-AID, Ouagadougou, Upper Volta: Sept. 1972).

11 Brasseur, Gerard, Les Etablissements Humains au Mali (Memoires de l'IFAN no. 83, Dakar, Senegal: IFAN, 1968).

12 Bremaud, O. & Pagot, J., "Grazing Lands, Nomadism and Transhumance in the Sahel" in Problems of the Arid Zone: Proceedings of the Paris Symposium (UNESCO Arid Zone Research Series no. 18, Paris: 1962).

13 Cunnison, Ian, Nomads and the Nineteen-Sixties (inaugural lecture delivered in the University of Hull, Jan. 24, 1967).

14 Dupire, Marguerite, Peuls Nomades (Paris: Institut d'Ethnologie, 1962).

15 _____, "Trade and Markets in the Economy of the Nomadic Fulani of Niger (Bororo)" in Paul Bohannon & G. Dalton, eds., Markets in Africa (Chicago: Northwestern Univ. Press, 1962).

16 Dupire, Marguerite, Organisation Sociale des Peul (Paris: Librairie Plon, 1970).

17 Dyson-Hudson, Neville & Irons, William, eds., Perspectives on Nomadism (Baltimore: John Hopkins Press, 1972).

18 Dyson-Hudson, Rada, "Pastoralism: Self-Image and Behavioral Reality" in N. Dyson-Hudson & W. Irons, Perspectives on Nomadism (Baltimore: Johns Hopkins Press, 1972).

19 Dyson-Hudson, Rada & Neville, "Commentary" (draft manuscript).

20 Economist Intelligence Unit Ltd., Quarterly Economic Review, various West African countries, nos. 1-4 for 1974, nos. 1 & 2 for 1975 if available, Annual Supplements for 1974 & 1975 (London: Spencer House, 1974 & 1975).

21 Ediafric-Service, L'Economie des Pays d'Afrique Noire de la Zone Franc (Paris: Ediafric-Service, 1973).

22 _____, L'Economie Ivoirienne (Paris: Ediafric-Service, 1973).

23 _____, Memento de l'Economie Africaine (Paris: Ediafric-Service, 1974).

24 Eriksen, John H., "The Cattle Sub-Sector of the Malian Economy: Potential Contributions to the Country's Economic Growth" (term paper, Cornell University, April 1974, unpubl.).

25 Ferguson, Donald S., "The Nigerian Beef Industry" (Cornell Univ. Int'l Agr. Dev. Bull. No. 9, 1967).

26 _____ & Poleman, Thomas T., "Modernizing African Animal Production: The Uganda Tick Control Project" (Cornell Int'l. Agr. Mimeograph No. 42, January 1974).

27 Frederickson, Channing, et. al., "Appraisal of the Proposed Tse-Tse Fly Eradication and Land Use Development Project in the Haute Vallee (Siby-Narena)" (draft report submitted to US-AID, Washington, n.d., mimeographed).

28 Gallais, Jean, Le Delta Interieur du Niger (Memoires de l'IFAN no. 79, vols. 1 & 2, Dakar, Senegal: IFAN, 1967).

29 Grove, A. T., "A note on the remarkably low rainfall of the Sudan Zone in 1913," Savanna 2:2 (1973).

30 Haaland, Gunnar, "Nomadism as an Economic Career Among the Sedentaries of the Sudan Savannah Belt" in Ian Cunnison & Wendy James, eds., Essays in Sudan Ethnography (New York: 1972)

31 Held, Jean-Francis, "En attendant la pluie...," Le Nouvel Observateur no. 451 (July 2-8, 1973).

32 Hopen, C. Edward, The Pastoral Fulbe Family in Gwandu (London: Oxford Univ. Press, 1958).

33 Horowitz, Michael M., "Ethnic Boundary Maintenance Among Pastoralists and Farmers in the Western Sudan" in Neville Dyson-Hudson & William Irons, Perspectives on Nomadism (Baltimore: John Hopkins Press, 1972).

34 Ibrahim, Mustapha, "The Fulani - A Nomadic Tribe in Northern Nigeria," African Affairs, April 1966.

35 Imperato, Pascal James, "Nomads of the Niger," Natural History, December 1972.

36 IBRD, Project Agreement (Livestock Development Project) Between International Bank for Reconstruction and Development and Nigerian Agricultural Bank Limited, Loan Number 1091 UNI (Washington: IBRD, conformed copy dated March 20, 1975).

37 Johnston, B. F., The Staple Food Economies of Western Tropical Africa (Stanford: Stanford Univ. Press, 1958).

38 Jones, Brynmor, "Dessication and the West African Colonies," Geographical Journal 91:5 (1938).

39 Kamarck, A. M., The Economics of African Development (New York: Praeger, 1971).

40 Lele, Uma J., "African Rural Development Study" (draft manuscript).

41 Levtzion, Nehemiah, Ancient Ghana and Mali (London: Methuen & Co. Ltd., 1973).

42 Mali, Republique du, Enquete Budgetaire dans le Delta Central Nigerien (Bamako, Mali: Mission Socio-Economique du Soudan, 1961).

43 _____, Service de la Statistique, de la Comptabilite Nationale, et de la Mecanographie, Rapport Definitif de l'Enquete Agricole, 1964/65-1968/69 (Bamako, Mali: 1969).

44 _____, C.N.P.E.R., Secretariat, "Plan Quinquennal 1974-78: Programme Betail-Viandes" (draft manuscript, Bamako, Mali: June 1974).

45 May, Jacques Meyer, The Ecology of Malnutrition in the French Speaking Countries of West Africa and Madagascar (New York: Hafner Publishing Co., 1968).

46 McDowell, R. E., "Effective Planning to Increase Livestock Production in Developing Countries," Development Digest 10:2 (April 1972).

47 Mellor, John, The Economics of Agricultural Development (Ithaca: Cornell Univ. Press, 1966).

48 Monteil, Vincent, "Contribution a la Sociologie des Peulhs," Bulletin de l'IFAN 35:3-4 (July-Oct. 1963).

49 Montgomery, Roger, Personal narrative of trip to Sahel, Univ. of Michigan Cen. for Research on Econ. Dev., May 15, 1974.

50 Norris, H. T., "Sahel nomads' attitude to drought," Savanna 2:2 (1973).

51 Ogot, Bethwell A., "The Role of the Pastoralist and the Agriculturalist in African History" in T. O. Ranger, ed., Emerging Themes of African History (London: Heinemann Educational Books, Ltd., 1968).

52 Poleman, Thomas T., "The Food Economies of Urban Middle Africa: The Case of Ghana," Food Research Institute Studies 2:2 (May 1961).

53 _____, "Survey on Nutrition and Concomitants of Urbanization in Selected Countries of Sub-Saharan Africa" (Cornell Agr. Econ. Staff Paper No. 73-15, July 1973).

54 Renner, G. T., "A Famine Zone in Africa," Geographical Review vol. 16 (1926).

55 Rockefeller Foundation, "International Development Strategies for the Sahel" (working papers of a conference held Oct. 1974 at the Bellagio Study and Conference Center, Italy, publ. May 1975).

56 Rodney, Walter, How Europe Underdeveloped Africa (London & Dar-es-Salaam, Tanzania: 1972).

57 Rubel, Paula G., "Herd Composition and Social Structure: On Building Models of Nomadic Pastoral Societies," Man 4:2 (June 1969).

58 Ruthenberg, Hans, "Artificial Pastures and their Utilization in the Southern Guinea Savanna and the Derived Savanna of West Africa" (Tour d'Horizon of an Agricultural Economist, Stuttgart-Hohenheim, Ger., 1974, mimeographed).

59 Societe Africaine d'Edition, L'Economie Africaine en 1974, 3rd ed. (Dakar, Senegal: April 1974).

60 Stenning, Derrick J., Savannah Nomads (London: Oxford Univ. Press, 1959).

61 Sterling, Claire, "The Making of the Sub-Saharan Wasteland," Atlantic Monthly (May 1974).

62 Stryker, J. Dirck, "Livestock Production and Distribution in the Malian Economy" (supplementary report prepared for US-AID, Washington, Aug. 20, 1973, mimeographed).

63 Stryker, J. Dirck, "The Malian Cattle Industry: Opportunity and Dilemna," The Journal of Modern African Studies 12:3 (Sept. 1974).

64 United Nations, Department of Economic and Social Affairs, Statistical Office, Demographic Yearbook, 1973, ST/STAT/SER.R/2, (New York: UN, 1974).

65 _____, Statistical Yearbook, 1973 (New York: UN, 1974).

66 _____, Economic Commission for Africa, Survey of Economic Conditions in Africa, Parts I & II, E/CN.14/595 (New York: UN, 1973).

67 _____, Statistical and Economic Bulletin for Africa, nos. 3-6 (June 1973-March 1974).

68 _____, Statistical Yearbook, 1973, Part 2: West Africa (Addis Ababa, Ethiopia: UN-ECA, July 1974).

69 United States Agency for International Development, U. S. Overseas Loans and Grants and Assistance from International Organizations: Obligations and Loan Authorizations, July 1, 1945 - June 30, 1973 (Washington: US-AID, Statistics and Reports Division, Office of Financial Management, May 1974).

70 _____, Medium Term Sahel Design: Mali Livestock (Conceptual Paper for Program and Appraisal of Activities, Draft-PROP Format, Vols. I & II, June 1974).

71 _____, Medium Term Sahel Design: Mali Livestock (Conceptual Paper for Program and Appraisal of Activities, Draft for Discussion with Government of Mali, September 1974).

72 _____, Mali Livestock Sector Grant: Program Proposal (Working Draft, Jan. 1975).

73 United States Congress, Senate, Drought and Famine in West Africa (hearings before the Senate Subcommittee on African Affairs, Committee on Foreign Relations, Washington, June 15, 1973).

74 United States Congress, House of Representatives, The Drought Crisis in the African Sahel (hearings before the House Subcommittee on Africa, Committee on Foreign Affairs, Washington, July 16, 1973).

75 United States Department of Agriculture, Economic Research Service, "The Agricultural Situation in Africa and West Asia: Review of 1972 and Outlook for 1973," ERS-Foreign 354 (Washington: GPO, May 1973).

76 United States Department of Agriculture, Foreign Agriculture Service, "World Grain Trade Statistics, 1950-51/1972-73" (Washington; GPO, Sept. 1974).

77 _____, "World Agricultural Production and Trade" (Washington: GPO, May 1975).

78 Webster, G. M., "Customs and Beliefs of the Fulani," Man vol. 31 (Nov. 1931).

79 White, H. P. & Gleave, M. B., An Economic Geography of West Africa (London: 1971).

80 Zghal, Abdelkader, Modernisation de l'Agriculture et Populations Semi-Nomades (The Hague, Netherlands: Mouton & Co., 1967).