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**LIVESTOCK CONSUMPTION AND MARKETING IN NIGERIA:
A REVIEW OF THE AVAILABLE LITERATURE**

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PRELIMINARY DRAFT

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ABLE OF CONTENTS

	<u>Page</u>
Explanatory Note on Nigerian Statistics	1
I. INTRODUCTION	3
II. NIGERIA'S SUPPLY OF LIVESTOCK PRODUCTS	3
A. Domestic Livestock Production in Nigeria	3
1. Estimated Livestock Population	4
2. Estimation of the Offtake Rate	10
B. Imports of Livestock into Nigeria	19
C. Exports of Livestock	23
D. Updating Livestock Population Figures	24
E. Slaughter Weights	27
F. Nigeria's Foreign Trade in Meat	35
III. ESTIMATES OF PER CAPITA MEAT CONSUMPTION	36
A. Types of Meat Consumed	41
B. Variation in Meat Consumption	43
1. Seasonal Variation	43
a. Beef	43
b. Sheep and Goats	48
2. Trends in Meat Consumption Over Time	51
3. Urban-Rural, Geographical and Income-Related Differences in Consumption	51
a. Income and Urban-Rural Differences	52
b. Ethnic Influences	54
C. Predicting Future Trends in Demand for Meat	56

	<u>Page</u>
IV. DESCRIPTION OF THE MARKETING SYSTEM	60
A. General	60
B. Volume of Animals Marketed	62
V. MARKETING COSTS AND MARGINS	63
A. Types of Transport Used	64
1. Rail	64
2. Hoof	70
3. Truck Transport	72
4. Rail Transport of Chilled Meat	72
5. Rail Shipment of Dried Meat	73
B. Costs of Alternative Means of Transport	75
1. Hoof Transport	75
2. Rail Transport	83
3. Dried Meat Shipment	87
4. Truck Transport of Live Cattle	87
5. Rail Shipment of Chilled Meat	88
6. Other Means of Meat Transport	88
C. Estimates of Marketing Margins	89
VI. REGIONAL PRICE VARIATIONS FOR BEEF	96
VII. DIRECTIONS FOR FUTURE RESEARCH	100
A. Supply and Demand Forecasts	104
B. Livestock Flows into and within Nigeria	104
C. Transportation Costs	104
D. Seasonal and Spatial Price Differentials	105
APPENDIX	107
REFERENCES	125

LIST OF TABLES

TEXT TABLES

	<u>Page</u>
TABLE I	Estimates of the Nigerian Livestock Population 5
TABLE II	Estimated Offtake Rates of Nigerian Livestock 11
TABLE III	Nigeria: Trade Cattle Entering Northern Nigeria from Niger, Chad and North Cameroons, 1937 and 1950/51 - 1964-65 20
TABLE IV	Cattle Imports, Northern Nigeria, 1966 22
TABLE V	Imports and Exports of Live Animals, 1966 22
TABLE VI	Estimated Livestock Weights 28
TABLE VII	Estimates of Per Capita Meat Availability in Nigeria 37
TABLE VIII	Estimates of Per Capita Rural and Urban Meat Consumption . . 53
TABLE IX	Expenditures on Animal Protein by Income of Household, 1960 55
TABLE X	Demand Elasticities for Meat Used in Various Studies 57
TABLE XI	Age Groups of Slaughter Cattle 62a
TABLE XII	A. Estimates of the Number of Cattle Shipped by Rail from Northern Nigeria to Western Nigeria and Lagos, 1960-65 65
	B. Shipments from Northern Nigeria to Eastern Nigeria . . . 65
TABLE XIII	Estimated Rail Shipments of Small Ruminants Between Northern and Southern Nigeria 69
TABLE XIV	Movement of Slaughter Cattle from Northern to Southern States 1966/67 and 1969/70 71
TABLE XV	Hoof Transport: Specification of Transport and Marketing Charges 77

	<u>Page</u>
TABLE XVI	Transport Charges for Rail Shipment of Cattle, 1962 85
TABLE XVII	Estimated Margins for Beef Marketing System, Nigeria, 1960 92
TABLE XVIII	Estimates of Butcher's Margins, Ibadan and Kaduna, 1962 . . 95
TABLE XIX	Estimates of Marketing Margins for "Upper Half" of Cattle Marketing Chain, Nigeria, 1962 97
TABLE XX	Correlation Matrix: Quarterly Retail Beef Prices in Four Cities of Western Nigeria, 1958-71 98

APPENDIX TABLES

	<u>Page</u>
Appendix Table 1	Rail Exports of Livestock from Northern Nigeria to Western Nigeria and Lagos, 1967-71 108
Appendix Table 2	Exports of Small Livestock from Northern Nigeria to Eastern and Western Nigeria, 1962-65 109
Appendix Table 3	Trade Cattle Moving South on Hoof, by Control Station 110
Appendix Table 4	Transport and Marketing Charges on Rail Transport per Beast: Kano 111
Appendix Table 5	Transport and Marketing Charges on Rail Transport per Beast: Zaria 112
Appendix Table 6	Transport and Marketing Charge ^s on Rail Transport per Beast: Bukuru 113
Appendix Table 7	Transport and Marketing Charges on Rail Transport per Beast: Nguru 114
Appendix Table 8	Formulae for Estimating Transport Costs 115
Appendix Table 9	Estimate of Live Cattle Butchers' Costs and Margins . 116
Appendix Table 10	Rough Calculation of the Market Value, on Average, of one Beast (about 770 lbs.) 117
Appendix Table 10B	Computation of Butcher's Dressing and Marketing Expenditures 118
Appendix Table 11A	Estimated Distribution of Profits: Example I 119
Appendix Table 11B	Estimated Distribution of Profits: Example II 120
Appendix Table 12	Distribution of Marketing Margin: Example I 121
Appendix Table 13	Distribution of Marketing Margin: Example II 122
Appendix Table 14	Distribution of Marketing Margin: Example III 123
Appendix Table 15	Distribution of Marketing Margin: Summary 124

LIST OF FIGURES

	<u>Page</u>
Figure 1	Small Ruminants: Arrivals by Rail and Official Slaughter, Western Nigeria, 1963-69 14
Figure 2	Quarterly Indices of Fresh Boneless Beef Prices -- Western Nigeria, 1958-71 25
Figure 3	Monthly Livestock Slaughter, Nigeria, 1964-72 44
Figure 4	Marketing Channels for Dried Meat in Nigeria 74
Figure 5	Quarterly Retail Beef Prices, 4 Markets in Western Nigeria, 1958-71 99
Figure 6	Retail Boneless Beef Prices, Various Provinces, Nigeria, 1955-70 101
Figure 7..	Retail Price of Beef (Related to Distance from Lagos). . . 102

Explanatory Note on Nigerian Statistics.

Writing a paper which relies on official Nigerian statistics poses several problems. In addition to the normal types of problems one expects whenever using statistics from a developing country (questionable accuracy of many of the figures, lack of data on certain important parameters, etc.), one faces additional obstacles resulting from the Nigerian Civil War (1966 - 1969) and the subsequent reorganization of the federal structure of the country.

Basically, there are two major problems to be faced: 1) the lack of data for the eastern region of the country during the Civil War and, 2) the questionable usefulness of ^{much} each of the data that do exist for making predictions about Nigeria's future.

The disruption caused by the Civil War resulted in virtually no statistics being collected in the eastern part of Nigeria between 1966 and 1969, although they were collected in most other regions of the country during this time. The reorganization of the federal structure following the Civil War poses additional problems for anyone trying to write about Nigeria from afar. Prior to the war, the country was divided into four administrative regions (Northern Nigeria, Eastern Nigeria, Midwestern Nigeria, and Western Nigeria), plus the Federal District of Lagos. These regions were reorganized into twelve states following the War, each with its own statistical division. The establishment of these new statistical divisions not only has led to delays in the publishing of data (three year delays seem to be common), but also appears to have caused problems for Michigan libraries (University of Michigan and Michigan State University) which receive Nigerian statistics. These libraries have received statistical journals from only a few of these states; whether others were ever published is unclear. In addition, prior to 1964, data on livestock imports, the number of livestock shipped from the

(the)
producing areas in/north to markets in the south, etc. were collected by the
Veterinary Department of the Northern Region and were ~~established~~ published
in their Annual Report. These data collection duties were reportedly taken
over by the Federal Veterinary Services in 1966, but as far as can be determined,
the latter has not published any of these data since then. From the reports
I have consulted, it appears that while many data on livestock flows within
the country, marketings, etc. are collected and are available from various
agencies in Nigeria, few of them are published. Since the pattern of livestock
production in Nigeria corresponds to the old regional divisions of the country
and since most of the previous reports on livestock production and marketing
in Nigeria report their findings using these divisions, the terminology is
retained in this paper.

In addition to the dearth of reliable statistics on Nigerian livestock
production and marketing, one is faced with the question of whether those
statistics which are available can lend any insight into what the future
supply and demand for livestock products will be. The available statistics
from 1966 - 1970 probably should be considered "atypical" because of the
economic disruption which occurred during the Civil War and the immediate
post-war reconstruction period. Since the late sixties, the supply situation
has also been affected by drought in both the northern part of the country and
in the countries which export livestock to Nigeria. Meanwhile the demand
picture has been influenced by an inflationary spiral brought on in part by
the rapid inflow of petrodollars into the economy. This makes it difficult
to describe how the production and marketing systems work "normally" unless
one accepts these types of occurrences as normal. Nonetheless, certain patterns
are clear, and they are described below. When data are referred to as
"unavailable" in this paper, it means that they are not available at the
University of Michigan or at Michigan State University, not that they
necessarily have not been collected or published.

2'

I. Introduction.

Africa's most populous nation and the largest cattle-producing state in West Africa, Nigeria, plays a central role in the livestock economy of the region. Despite the large livestock population of northern Nigeria, the country does not produce enough livestock products to meet domestic consumption, and it must rely on imports of animals and meat from its neighbors to fill the shortfall in domestic production. Nigeria's position as the largest net importer of livestock products in West Africa makes it an important export market for the livestock-surplus countries to the north, especially Niger, Chad, Upper Volta, and Mali. Future trends in domestic production and the demand for livestock products in Nigeria will be important factors in shaping the export market for Sahelian livestock in the coming years.

NIGERIA'S SUPPLY OF LIVESTOCK PRODUCTS

II. A Domestic Livestock Production in Nigeria

Cattle production, and to a ^{much} lesser extent, production of goats and sheep, ^{are} ~~is~~ restricted in Nigeria to the northern savanna and semi-desert regions of the country which are free of tsetse fly infestation. Due to the highly seasonal rainfall pattern in these areas, adequate pasture is available for the animals only in the months surrounding the rainy season. (June-October); during the dry season, the semi-nomadic ^{Fulani} ~~Fulani~~ and Shuwa herders are forced to move their livestock south in search of adequate grazing lands. The details of the traditional production system are outlined in Ferguson (1, pp. 9-11; 2, 17-24), FAO (3, pp. 215-225), IBRD (4, Annex 7), Olayide (15, pp. 241-245), Van Raay (6), and FAO/ICA (7, pp. 125-149).

II.A.1 Estimated Livestock Population

Estimates of the livestock population of Nigeria vary widely, as no thorough livestock census ever has been conducted. Table I indicates the range of estimates made by various authorities over the last 25 years. The variation displayed in Table I is too great to be explained on the basis of year-to-year fluctuations in herd size; for example, the FOS estimate indicates a cattle population in 1968 that reportedly is 67% larger than reported by Oyenuga five years earlier. This implies an annual increase in herd size of nearly 11%, which is clearly unrealistic. Similarly, the 1966 FAO estimate, when compared with Oyenuga's figure, implies an annual increase in the cattle population in excess of 18%. Even the two figures for 1971 differ by nearly 17%, and both are markedly below the FAO and FOS estimates for 1966 and 1968. Estimates of the sheep, goat, pig, and poultry populations show considerable variation as well.

Part of the reason for the wide variation in the estimates of the livestock population is the variety of techniques used to arrive at these estimates. Up through the mid-1950s, official Nigerian government estimates of the cattle population were based on payment of the yearly cattle tax (Jangali), but recognition that evasion of this tax was widespread led to the abandonment of Jangali returns as a measure of the cattle production.¹ To quote Ferguson (1, pp. 15-16):

In most instances the tax collector is a local Fulani chief who receives a commission for his services. If he wishes to maintain his influence and his tax base, he allows as much tax evasion as possible or else the next year at tax collection time the herds will have moved to the district of a more "understanding" chief. In theory, all animals are taxable, but in practice calves are excluded by the collectors. Semi-settled herd owners pay on a fairly high percentage of their cattle, but the more nomadic owners are taxed on a catch-as-catch-can basis and often evade payment on part or all of their herds. There is also evidence that less than all of the tax revenue collected reaches the government treasury. This tax puts a definite premium on the nomadic way of life and helps explain the reluctance of herd owners to have their animals accurately counted.

Table I

Estimates of the Nigerian Livestock Population
(thousand head)

<u>Source</u>	<u>Date</u>	<u>Cattle</u>	<u>Sheep</u>	<u>Goats</u>	<u>Pigs</u>	<u>Poultry</u>
Commonwealth Development Commission ^{b/}	1971	8,243	--	---	--	--
National Livestock Development Committee ^{c/}	1971	9,619	6,025	17,000	300	38,000
Federal Office of Statistics ^{a/} (FOS)	1968	11,073	8,191	27,112	1,010	86,120
FAO ^{d/}	1966	10,859	7,235	21,206	680	66,040
Worhahn, et. al. ^{e/}	1963	7,063	--	--	--	--
Ferguson ^{f/}	1964	7,500	--	--	--	--
Oyenuga ^{g/}	1963	6,600	--	--	--	--
Mittendorf and Wilson ^{h/}	1958	6,600	8,000	14,000	1,045	--
Shaw and Colville ^{i/}	1950	7,000 - 8,000	--	--	--	--
S.E.D.E.S. ^{j/}	1966					
North		7,200 ^{k/}		20,000 ^{l/}	125 ^{m/}	46,000 ^{n/}
South		6,500		10,300	1,000	25,640
Total Nigeria		7,850		30,300	1,125	71,640
U.S.D.A. ^{o/}	1968	7,800	7,300	21,300	700	--
FAO ^{p/}	1962	10,600	6,500	18,833	628	63,000

Notes to Table I

- a/ Unpublished data, cited in S.O. Olayide, "Agricultural Productivity and Increased Food Production Under Economic Development in Nigeria," Rural Development in Nigeria (Proceedings of the 1972 Conference of the Nigerian Economic Society, Ibadan: Ibadan University Press, 1973)p. 70.
- b/ CDC, "National Livestock Development Proposals," (1971) cited in IBRD, Agricultural Sector Survey Nigeria (Washington, 1973), Annex 7, p.1.
- c/ NLDC report (Feb.,1971) cited in IBRD, Agricultural Sector Survey Nigeria (Washington, 1973), Annex 7, p. 1.
- d/ FAO, Agricultural Development in Nigeria 1965-1980 (Rome: 1966), p. 216.
- e/ Hans Werhahn, et. al., The Cattle and Meat Industry in Northern Nigeria (Frankfurt/Main 1964). Figure is estimated cattle population of Northern Nigeria only.
- f/ D.S. Ferguson, The Nigerian Beef Industry (unpublished Master's Thesis, Cornell University, 1967), p. 142.
- g/ V.A. Oyenuga, "The Contribution of Animal Products to the Diets of Nigerians," Proceedings of the Agricultural Society of Nigeria, 2, 1963, pp. 18-25, cited in Gerguson, op. cit.
- h/ H.S. Mittendorf and S.G. Wilson, Livestock and Meat Marketing in Africa (Rome: FAO, 1961), Appendix I.
- i/ Thomas Shaw and Gilbert Colville, Report of Nigerian Livestock Mission (London: H.M.S.O.,1950), pp. 62-7.
- j/ S.E.D.E.S., Approvisionnement en Viandes de l'Afrique de l'Ouest, (Paris: 1973), Vol. pp. 193-8.
- k/ Based on figure of Werhahn, et. al., for 1964 an an annual rate of herd increase of 0.75% (the rate of herd increase from 1953-63 as recorded by Jangali collectors).
- l/ Based on FAO figure for 1964 of 18.8 million and an annual rate of herd increase of 3% for 1964-66. Figure is considered the minimum population of small ruminants in Northern Nigeria.
- m/ Based on FAO figure for 1964 of 118,000 and an annual rate of herd increase of 7.2% (the rate of increase calculated from official figures for 1958-63).
- n/ Based on FAO figure for 1964 of 41 million and annual rate of increase of 5.6% (Figure given by FAO). Authors state that this figure was accepted with reservation.
- o/ U.S.D.A. cooperating with U.S.A.I.D., Range Management and Livestock Industry Chad Basin (by M.G. Carter and G.B. McLeroy) (Washington: August 1968) p. 59
- p/ FAO, Animal Production and Health Division, The Livestock Industry of Africa South of the Sahara, Vol. 2 (Tables of Production, Consumption, Trade and Value of Animal Products 1961/63), AN/IWP/AF/2, Feb., 1968, pp. 34, 37, 40,

¹ ~~As~~ An example of how widespread the evasion of the Jangali is was given by Shaw and Colvile, in ~~1950~~. Official Jangali returns for 1947 were 3,687,012 while they estimated the actual cattle ~~production~~ ^{population} in that year to be at least 7,000,000 (81, pp.62-67).

The coordinated international campaign to vaccinate West African cattle herds against rinderpest has provided another set of figures, generally considered superior to the Jangali returns, on which one can base estimates of the Northern Nigerian cattle population.² (The details of the rinderpest campaign are described by Ferguson (1, pp.22-25)). The dramatic reduction in reported occurrences of the disease in Northern Nigeria (from 490 outbreaks in 1959/60 to two outbreaks in 1964/65) indicate that the coverage was fairly complete (1, p.23); the veterinary personnel involved were careful not to associate their work in any way with the Jangali collection and thus reportedly ~~was~~ avoided losing the trust of the herders. The officials involved believed the coverage during the 1964-1965 campaign was in excess of 95% of the Northern Nigerian cattle ~~production~~ ^{population} (9, p. 195).

² Beginning in 1964/65 the campaign was extended to Southern Nigeria, but owing to the disruption caused by the Civil War, the coverage was not very extensive. Vaccination records therefore are not considered a good indication of the cattle ~~production~~ ^{population} of the South.

The number of cattle vaccinated during this year in Northern Nigeria was reported by Ferguson to be 6,794,000 (1, p.23)³ If the campaign actually did cover 95% of the cattle in Northern Nigeria, this would imply a northern cattle population of 7,152,000 in 1964/65. In general, the rinderpest vaccination records can be regarded as the most reliable primary data available on which one can base an estimate of the Northern Nigerian cattle ~~production~~ ^{population}.

3

SEDES reported that only 6,220,000 head of cattle were vaccinated in 1964/65. This total, however, excluded animals under six months old, which ~~reports were vaccinated with a new, safe tissue culture vaccine which did not give violent reactions sometimes seen with the vaccine used on older stock~~ Ferguson's total included ~~these young stock~~ (cf. 9, p. 194, 1, p.23). FAO reported that approximately 8,000,000 head were vaccinated in all of Nigeria in 1964/65; it is unclear where they obtained this figure; it implies a cattle population in southern Nigeria larger than is generally accepted (3, p. 223).

A technique which has been widely used to estimate the livestock population of Southern Nigeria is the sample survey. This technique involves selecting a sample of the population, determining the number of livestock owned per household in the sample, and then multiplying this figure times the total number of households in the region. For this method to give accurate results, one must select an appropriate sample and have accurate statistics on the number of households in the region. This has been difficult to do in Nigeria. "A random sample of farm households is seldom possible or practical even in Western counties because lists of farmers are not available and because identifying and interviewing a random sample are difficult. For this reason, usually a cluster sample of villages or huts is made." (1,p.19) These surveys, entitled Rural Economic Surveys of Nigeria, are carried out by the Federal Office of Statistics. In order to use their results to estimate the total livestock population of a region, one must rely on some very shaky census data ^{regarding} the number of households in the different regions of the country. The problems with both the 1952/53 and 1963 Nigerian censuses have been widely discussed in the literature, and Ferguson provides a summary of the salient points (1, Appendix). The 1952/53 census is generally considered fairly accurate; it showed a population of 30.4 million. The figures in the 196

census, which showed a population of 55.7 million, are considered to have been grossly inflated by various regional officials, each trying to increase the representation and influence of his region on the national assembly. Obviously both censuses cannot be accepted at their face values; they would imply an annual population growth rate in excess of 6.1%⁷ in a country which experienced no significant ~~imm~~ⁱⁿ⁻migration during this period.⁴ Nonetheless, some studies, most notably that~~s~~ of FAO, have accepted the 1963 figures and have used them along with the results of the sample surveys to obtain some of their livestock population estimates.⁵ Figures obtained in this manner using the 1963 census data ~~sh~~^sould be considered to be overestimated by roughly 25-30%.⁶

⁴ A third census was carried out in 1973, but the figures that emerged from it were considered to be so inflated that the Federal Government discarded the results and continues to accept officially the findings of the 1963 census.
(Personal communication from O. Orimalade)

⁵ While the FAO publication states that sample survey results were used to obtain some of its livestock population estimates, it does not specify ~~xxx~~ which estimates~~xxxx~~ were obtained in this manner (3,p.216). It appears, however, that this was the method used to estimate the number of smaller~~r~~ ruminants in the country and the number of cattle in the southern part of the country.

⁶ Based on a "true" Nigerian population in 1962/63 of from 42 to 45 million (1,p.80,12).

Another widely used method of estimating the livestock population of Nigeria . has been to work backwards from marketing figures, assuming an extraction (off-take) rate, and using this rate and the marketing figures to calculate the national herd size, after making allowances for net~~i~~ imports. This procedure has two

serious drawbacks: 1) estimates of the extraction rate vary widely and 2) there are few accurate figures on the number of livestock imported into Nigeria.¹ For example, SEDES estimated the extraction rate of Northern Nigerian cattle herds at 11% while Shaw and Colville put it at 5.2% (9,p.198; 8,p.63). Table II outlines the range of estimates of off-take rates for different types of Nigerian livestock.

II A.2. Estimation of the offtake rate.

There are two main ways in which offtake rates have been estimated for Nigeria. The first method entails using survey data which shows the birth rate, the mortality rate among young stock, and the adult mortality rate in a "typical" herd. This method was relied upon by Shaw and Colville (using data from a survey carried out in 1933 in Sokoto province) to obtain an offtake rate of 5.2% for the Northern Nigerian cattle population (8,p.63). The main problem with this method is selecting a survey sample which is "typical" and large enough to give statistically significant results.

The second common method of establishing an offtake rate is to ~~compare~~ compare the number of animals slaughtered in the region with the estimated livestock population. It is, of course, circular logic to cite an offtake rate obtained in this manner as "evidence" that the livestock population is a certain size; nonetheless, in comparing offtake rates found in different studies, this is sometimes done. This method of estimating the offtake rate was used by the

Marketing figures are also considered to be subject to errors, but not as great as those associated with the estimates of imports and the offtake rate.

Northern Nigeria Veterinary Department and by D.S. Ferguson to obtain their estimates of the offtake rate for cattle. (1,p.17-48). The difficulties inherent in this method are obvious: the data are weak with regard to the true number of livestock ⁱⁿ any one region and there is much uncertainty about the number of animals actually slaughtered. As pointed out earlier, estimates

of the Nigerian livestock

Table II

Estimated Offtake Rates of Nigerian Livestock
(Percent per annum)

<u>Source</u>	<u>Date</u>	<u>Cattle</u>	<u>Sheep</u>	<u>Goats</u>	<u>Pigs</u>	<u>Poultry</u>
Shaw and Colville ^{a/}	1950 ^{b/}	5.2	--	--	--	--
FAO ^{c/}	1965	10.7	45.0 ^{d/}	45.0 ^{d/}	171.1 ^{d/}	103.0 ^{d/}
Mittendorf and Wilson ^{e/}	1958	7.0	25.0 ^{f/}		75.0	--
W. Ferguson ^{g/}	1966	6 - 7	---	--	--	--
D. Ferguson ^{h/}	1966	8 - 9	--	--	--	--
S.E.D.E.S. ^{i/}	1966					
Northern		11.0	30		66	100
Southern		13.0	30		65	100
Ave. Nigeria		11.2	30		65.1	100
Northern Nigeria ^{l/}						
Veterinary Department	1964 - 65	8.9	--	--	--	--
USDA ^{k/}	1968	8.5	--	--	--	--
FAO ^{l/}	1962	10.0	30	35	120	100
National Agricultural Development Committee ^{m/}	1971	14.0	30	35	75	75
Commonwealth Development Corporation ^{n/}	1970	9.6	--	--	--	--

Notes to Table II

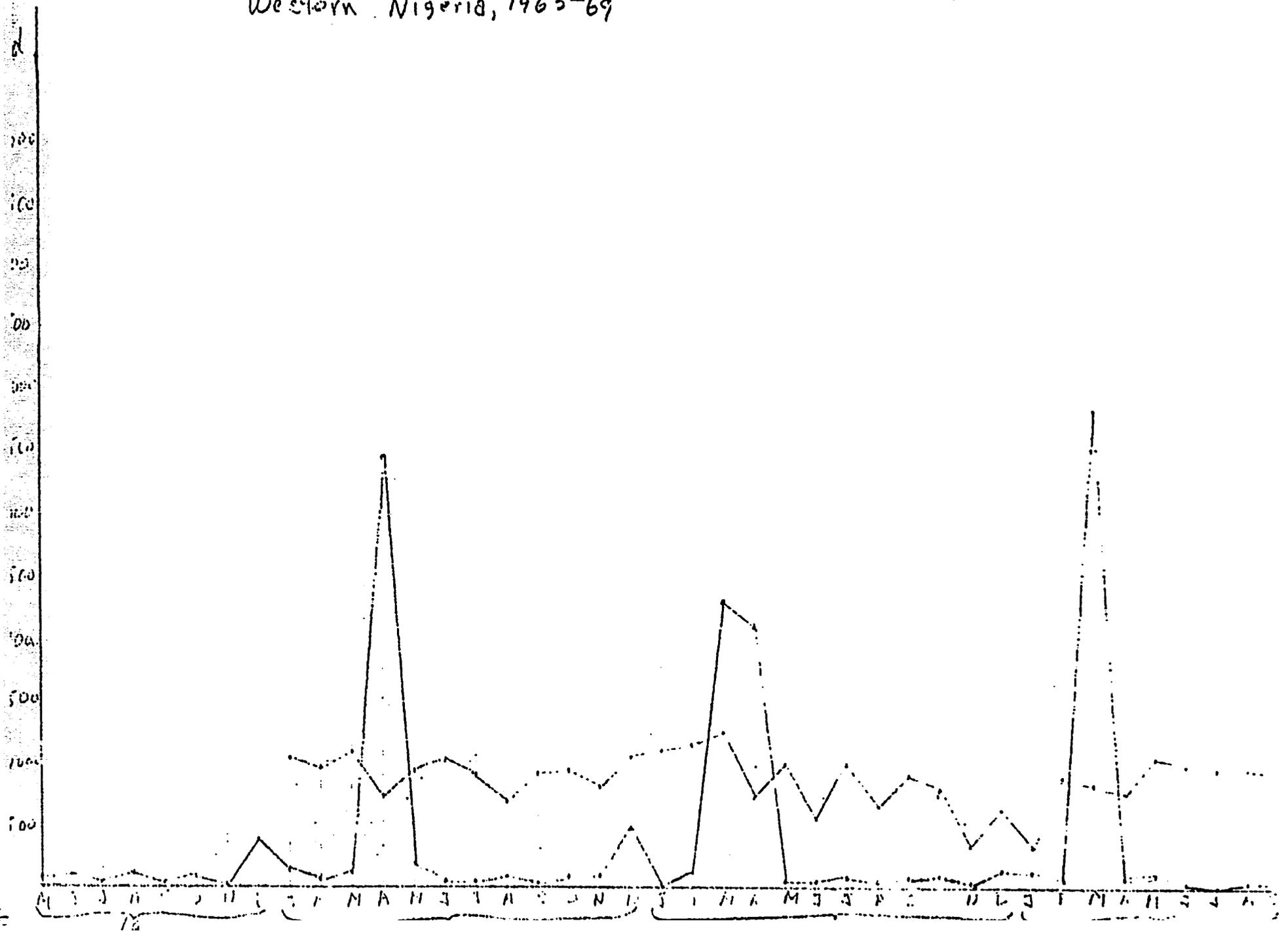
- a/ Thomas Shaw and Gilbert Colvile, Report of Nigerian Livestock Mission, (London: HMSO), 1950, p. 63.
- b/ Based on survey conducted in 1933 in Sokoto province.
- c/ Calculated from data in FAO, Agricultural Development in Nigeria, 1965-1980 (Rome: 1966) p 216-25. Cattle figure for Northern Nigeria only.
- d/ Figures apply only to Southern Nigeria.
- e/ H.J. Mittendorf and S.G. Wilson, Livestock and Meat Marketing in Africa (Rome: FAO, 1961), Appendix I.
- f/ Data for 1959.
- g/ W. Ferguson, "Nigerian Livestock Problems," Markets and Marketing in West Africa, (Proceedings of a seminar held at the Centre of African Studies, University of Edinburgh, April 29-30, 1966) p. 83.
- h/ D.S. Ferguson, "The Nigerian Beef Industry," Cornell International Agricultural Bulletin 9, p. 48.
- i/ S.E.D.E.S., Approvisionnement en Viandes de l'Afrique de l'Ouest, (Paris: 1973), Vol. pp. 198-99, 206.
- j/ Unpublished data cited in D.S. Ferguson, op. cit., p. 18. Figure applies only to Bornu Province of northern Nigeria.
- k/ U.S.D.A, cooperating with U.S.A.I.D., Range Management and Livestock Industry Chad Basin (by M.G. Carter and G.B. McLeroy), (Washington: August 1968) p. 8.
- l/ FAO, Animal Production and Health Division, Livestock Industry of Africa South of the Sahara, Vol. 2 (Tables of Production, Consumption, Trade and Value of Animal Products 1961/63), AN/IWP/ AF/2, Feb., 1968, pp. 34, 37, 40, 43, 46.
- m/ Nigeria National Agricultural Development Committee, Study Group on Food Crops and Pastures, Nigeria, A Quantitative Analysis of Food Requirements, p. 18. This group accepted FOS's livestock population estimates.
- n/ CDC, op. cit., p. 2.

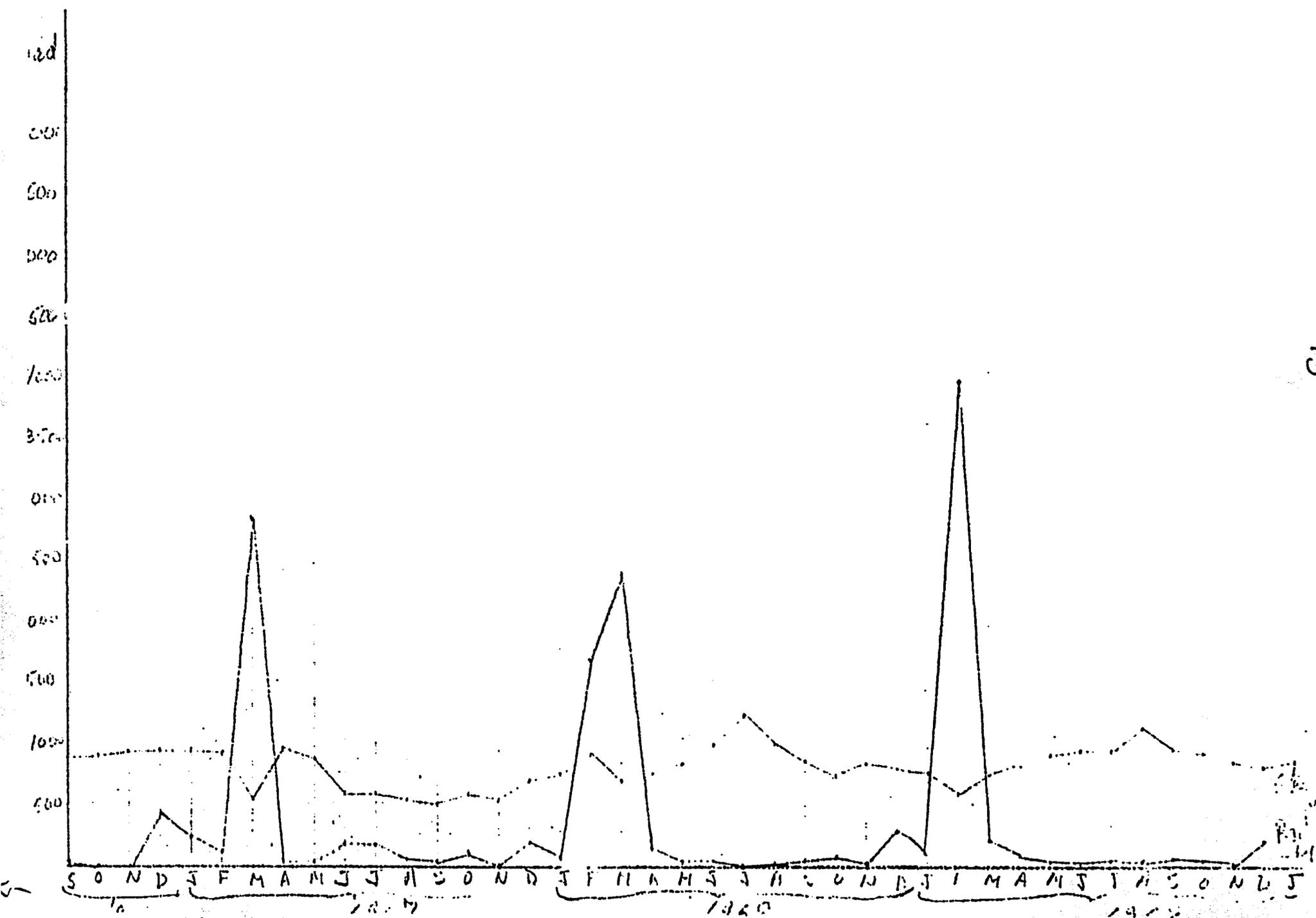
of the Nigerian livestock population vary widely, and using different population figures can lead to markedly different estimates of the offtake rate. Establishing the number of animals slaughtered also presents several problems. D.S. Ferguson found that ^{the} official recorded cattle slaughter accounted for between 70% to 95% of what he estimated to be the actual slaughter in the different regions of Nigeria during 1963/64 (1, p.48); there is some evidence that official statistics on the number of animals killed are not always so accurate however. This is particularly true in the case of small ruminants, where unrecorded slaughter (particularly of sheep) is very widespread during certain times of the year. This is clearly demonstrated in Figure I, which compares the recorded monthly slaughter of small ruminants (sheeps and goats) in Western Nigeria with the monthly arrivals of these animals into the region by rail from Northern Nigeria. Rail shipments are extremely seasonal, with a marked peak in the spring (March-April) and ^a lesser peak around December. These peaks correspond to periods of very heavy demand for sheep to be slaughtered in ceremonies which celebrate Mohammed's birthday (in the spring) and the end of a fasting period in December. Since the bulk of the animals killed during these periods are not slaughtered in abbat^{ions} or at official slaughter slabs, but in households, the official slaughter statistics do not show any such seasonality. They are thus a poor indicator of the actual slaughter taking place during certain times of the year.

One technique that has been widely used as a check on the numbers of animals slaughtered has been to compare the recorded slaughter with the number of hides exported from the country. This latter figure is calculated by dividing the total tonnage of hide exports by an average weight per hide, and deducting from this the total number of hides imported into the country. There are two problems with this method of establishing annual slaughter levels, however: substantial numbers of hides are imported illegally (and hence unrecorded) into Nigeria from Niger, Chad, and Cameroun and are then re-exported, and not all ~~hides produced in the country are exported,~~

Fig. 1.

Small Ruminants: Arrivals by Rail and Official Slaughter Western Nigeria, 1963-69





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Figure 1 (cont'd)

Sources of data: Slaughter data from Federal Office of Statistics,
Digest of Statistics, various issues.
Rail data from: Western Nigeria, Ministry of Economic
Planning and Community Development, Statistics
Division, Statistical Bulletin, various issues.

hides produced in the country are exported. S.E.D.E.S. estimated that in 1964 roughly 1.2 million hides of small animals were illegally imported into Nigeria (9,p.196), but whether even this figure is accurate is open to question. In anycase, the substantial illicit trade in hides means that actual Nigerian production of hides for export may be markedly below what official statistics indicate. Not all hides produced in the country are exported, however: a large number of cattle hides are consumed for food, some hides go into local manufacture and some simply are not recovered when the animal is slaughtered. While early investigators sometimes took hide export figures as an indication of the absolute level of the domestic livestock slaughter, it is now generally agreed that the export figures must be inflated by some factor to account for hides which are not exported. For example, S.E.D.E.S. assumes that the number of sheepskins and goatskins exported represents 50% of the ~~sum~~ small ruminants slaughtered in the country.⁸ There is no guarantee, however, that ^{aver} if one could empirically establish such an "inflation factor" ~~that~~ it would remain constant from year to year. Ferguson has shown that as the export price of cattle hides ~~has~~ varied in Nigeria, the number of hides exported fluctuated correspondingly (1,pp.31-34). This implies that when hide prices are high, cattle slaughterers are induced to take care in skinning the animal so that

⁸ They obtained this figure from a study carried out in Niger by A.H.Robinet (9,p.196).

the hide will be of export quality; when prices are low, such care often is not taken and many hides are either discarded or consumed as food. Hide exports therefore should be regarded as an unsatisfactory measure of the level and even the trend of livestock slaughterings.

Several of the offtake rates cited in Table II were apparently "questimated" or borrowed from neighboring countries where the data base was felt to be stronger than in Nigeria. S.E.D.E.S. for example, citing a study by Robinet in Niger which found the offtake rate for cattle varying between 8 and 11%, accepted

the 11% figure as being applicable to Northern Nigeria. They state, "In a country as populated as Northern Nigeria, we could not take an extraction rate for cattle less than that of Niger." (9,p.198) A similar logic was used by S.E.D.E.S. to obtain a 13% offtake rate for Southern Nigeria. "An offtake rate of 13% for this expanding herd of cattle is a minimum, because there is no reason to suppose that these cattle are exploited any less effectively than those in Mali, Ghana, or the Ivory Coast. Besides the level of management techniques employed, the selection that already has taken place and the density of the [cattle] population is higher than in these other countries." (9,p.206) S.E.D.E.S. also obtained its offtake rate for small ruminants from figures obtained in Niger (9,p.198). Other estimates of the offtake rate are apparently merely guesses based on some knowledge of existing management techniques. Mittendorf and Wilson, for example, applied the same cattle offtake rate (7%) to all countries of West Africa and the same offtake rates for small ruminants and pigs (25% and 75%, respectively) to all countries on the continent (10,Appendix I). W. Ferguson gives no basis for his estimate of the cattle offtake rate at 6-7% (11, p. 83), and I have not been able to determine the basis on which FAO established the offtake rates used in its report (3)⁹

⁹FAO used an offtake rate for cattle of 10.7% and slaughter statistics from Northern Nigeria to calculate the cattle population of this region. These calculations (3, p. 223) seem to be based on the false assumption that the number of male and female animals removed from the herd need to be equal. (This would be true only if the herd itself had equal numbers of male and female animals.) Furthermore, there seem to be some arithmetic errors in FAO calculations which slightly change their results.

C. Imports of Livestock into Nigeria

Substantial numbers of livestock are imported into Nigeria from Niger, Chad, and Mali, but published statistics on this trade tend to be scanty and inconsistent. For example, the official foreign trade statistics of Niger reported that in 1963 roughly 40,000 cattle were exported to Nigeria; in that same year, the Nigerian Board of Customs and Excise reported that 150,000 cattle entered the country from Niger (13). This inconsistency arises because Niger and other exporting countries impose export taxes on cattle leaving their territory, while Nigeria does not impose any taxes on imported animals. Furthermore, Nigeria strictly enforces its requirement that imported animals have a travel permit to travel along stock routes; thus, while herders have a strong incentive to avoid government control posts in the exporting countries, no such incentive prevails once they reach Nigeria. Statistics on importations of livestock from neighboring countries are collected by the veterinary services in the northern states of Nigeria. Unfortunately, these apparently have not been published since 1962/63, and even when they were published, they did not include the country of origin of the livestock, but merely denoted them as "French".¹⁰ Table III shows Ferguson's estimates of cattle imports through

¹⁰ This material was published in the Annual Report of the Veterinary Division of the Northern Nigeria Ministry of Agriculture and Forest Reserves. In 1963/64, data collection reportedly taken over by Veterinary Division of the ~~Forestry~~ Federal Ministry of Agriculture and Forest Resources, but these data apparently have not been published. Nigerian foreign trade statistics published by the Ministry of Trade exclude livestock imports from neighboring countries.

1964/65. In 1966, S.E.D.E.S., apparently using data from livestock inspection stations on the Nigerian side of the border, estimated livestock imports as shown

~~91~~

TABLE 7. ^{7.71} NIGERIA: TRADE CATTLE ENTERING NORTHERN NIGERIA
FROM NIGER, CHAD, AND NORTHERN CAMEROONS,
1937 AND 1950/51 - 1964/65 *

Fiscal Year	Total Entering	Source of Estimate
1937	120,000	West Africa Commission, 1938-39.
1950/51	160,381	Annual Report of the Veterinary Dept., 1950/51.
1951/52	(165,000)	Personal estimate.
1952/53	168,705	Annual Report of the Veterinary Dept., 1952/53.
1953/54	(145,000)	Personal estimate.
1954/55	(145,000)	Personal estimate.
1955/56	142,000	Nigerian Economic Survey, 1959.
1956/57	(160,000)	Personal estimate.
1957/58	(140,000)	Personal estimate.
1958/59	146,712	Veterinary Division, Annual Report, 1958/59.
1959/60	156,496	Veterinary Division, Annual Report, 1959/60.
1960/61	262,121	Veterinary Division, Annual Report, 1960/61.
1961/62	202,249	Veterinary Division, Annual Report, 1961/62.
1962/63	(260,000)	Personal estimate.
1963/64	291,351	Veterinary Division, Annual Report, 1963/64.
1964/65	(260,000)	Personal estimate.

* Estimates of the number of cattle imported are not included in the Veterinary Department reports for years between 1953/54 and 1957/58. For this period, estimates from other sources or personal estimates based on cattle marketing data have been included. Cattle entering the Eastern Region directly from the Cameroons are not included in this table but are included in Table XI. The fiscal year begins April 1.

Source: 1, p. 91

in Tables IV and V. It is reassuring to note that Ferguson's and SEDES estimates are not ~~at~~ terribly disparate; imports into Nigeria were reportedly increasing throughout the mid-sixties due partly to the diversion of animals away from the Ghana market, which was plagued by import restrictions and ~~the~~ periodic non-convertibility of the Ghanaian currency. ^{In} ~~For~~ 1970, ^{the} Commonwealth Development Corporation estimated total cattle imports at 279,000 (4, Annex 7, p. 3); ^{this is} ~~these~~ ^{are} below SEDES estimate for 1966 and may reflect worsened supply conditions in the exporting ^{countries} ~~countries~~ because of the drought. In general, the SEDES figures for cattle imports appear to be based on fairly complete veterinary statistics. Official veterinary statistics as ^{given in} ~~shown on~~ Table V show 335,000 small ruminants were imported from Niger in 1966 (150,000 sheep ~~and~~ 185,000 goats). SEDES does not report ^{the} ~~an~~ official statistics on ~~the~~ importations of small ruminants from Chad, relying instead on a study by Sarniguet showing 60,000 of these animals ^{entered} ~~entering~~ Nigeria from Chad in 1966. No reason is given for preferring this figure to ^{the} ~~that~~ official veterinary statistics, but lacking any other data on this trade, the Sarniguet figure must be accepted at this time.

In general, both SEDES and Ferguson seem to regard the official veterinary statistics ~~on the number of animals entering the country~~ as being fairly accurate. The main drawback of the veterinary statistics ~~of course~~ is that they haven't been published in over ten years, even though they apparently are still collected. I am not sure whether these statistics are available at the headquarters of the Veterinary Division ~~of the Federal Ministry of Agriculture and Forest Resources~~, or whether they would have to be collected at the individual veterinary control stations along the border. (SEDES provides a list of these stations (9, pp. 212-3)). In either case, I believe they can only be obtained in Nigeria.

T.C. Exports of Livestock

Exports of livestock from Nigeria are minimal, consisting primarily of a small number of cattle which are exported from Lagos to Accra. The top grade animals which arrive in Lagos by rail from the North are transported by truck and boat to Accra. While this trade was quite important in the late fifties and early sixties with up to 35,000 head per year being exported, it has dropped off sharply ~~ever~~ since the closing of the Ghana-Togo frontier in 1964. In 1966 only 2,500 head were shipped to Ghana, (9, p. 214).

Once the offtake rate, net imports and marketings have been estimated one can use the formula procedure to estimate the livestock population of the country. Given the variation in the preceding estimates, it comes as no surprise that formula estimates of the population vary considerably. In general one should regard such estimates with suspicion unless they are thoroughly cross-checked with other data, as was the case with D.S. Ferguson's study.

Updating Livestock Population Figures

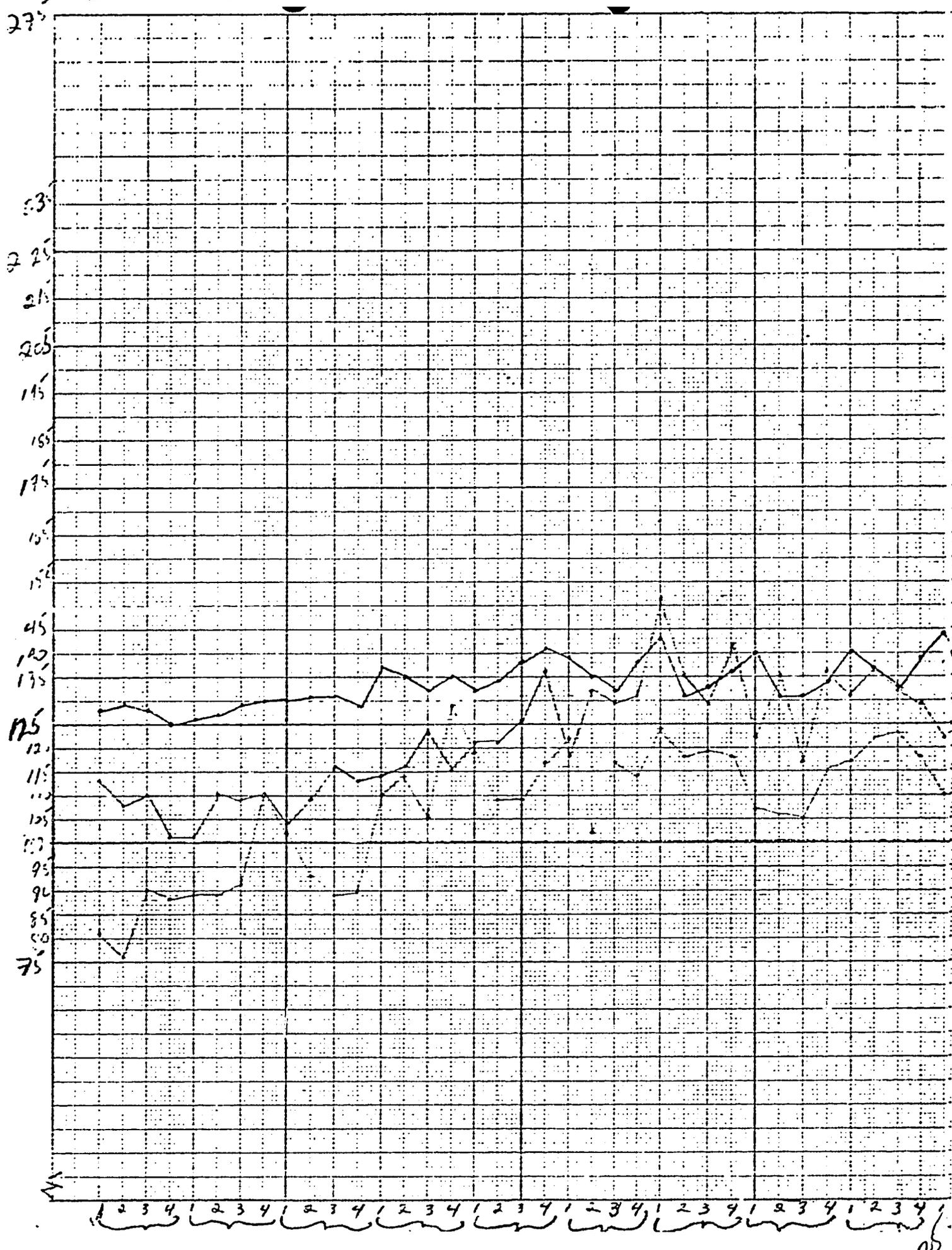
Once one has settled on a set of figures for the livestock population in a given year, obtaining updated figures on the population involves multiplying the base year statistics by the annual growth rate of the national herd. This presents a problem for several reasons. While some growth rates have been calculated, they have been based almost entirely on data from the fifties and early sixties: it is questionable whether these rates are appropriate for the late sixties and early seventies. The Nigerian Civil War, which raged from 1966 through 1969, probably created conditions which altered livestock ^{production} population (particularly small animals' production) in southern Nigeria and lowered the rate of growth of the herds.¹¹ In addition, by the mid-sixties most

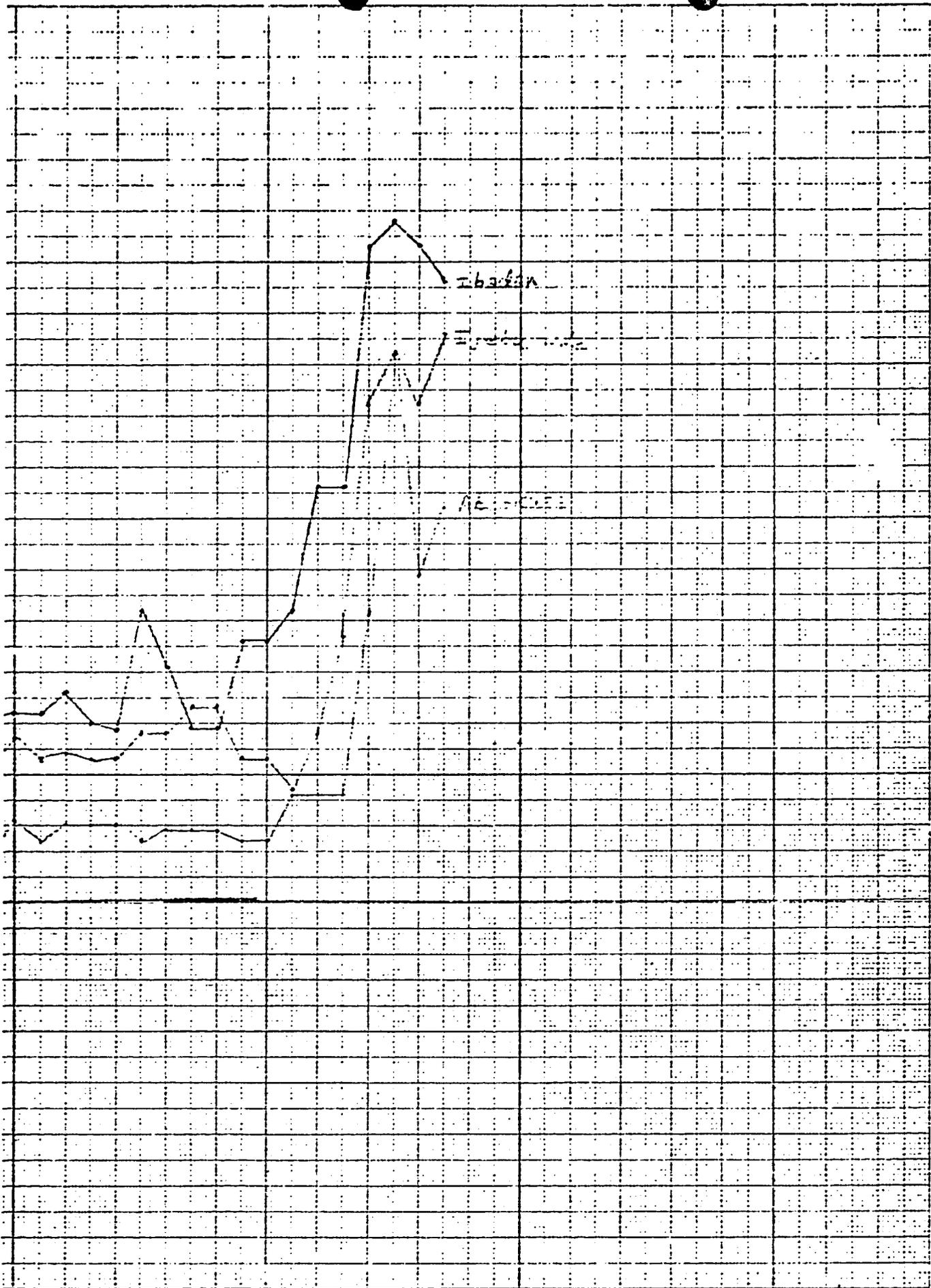
observers were stating that Nigerian ranges were already stocked to capacity or were overstocked (1, p.30), and that further expansion of the livestock population, particularly ^{of} the cattle population,

¹¹The disruption caused by the Civil War leads one to suspect that all Nigerian livestock statistics for the mid-sixties ~~do not~~ reflect ~~"best"~~ conditions.

could take place only at the expense of severe overgrazing. It is possible, therefore, that ecological constraints have slowed the rate of growth of the livestock population. A third factor which may have reduced the rate of growth is the drought which plagued northern Nigeria from 1968 to 1974 and reduced the amount of grazing and water available for livestock. This may have been offset, however, by herders moving their animals south from Niger and Chad to avoid the worse drought conditions in those countries. A final factor which may have reduced the growth rate is the rapid increase in meat prices which coincided with the inflow of petrodollars into the Nigerian economy beginning in the last half of 1969 (Fig. 2). This may have induced

2. Quarterly Interest on Fresh Deposits 1927, 1928, 1929





3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4

Figure 2 (cont'd)

Source of data: Western State of Nigeria, Ministry of Economic
Planning and Reconstruction, Statistics Division,
Statistical Abstract, (Ibadan), various issues.

producers to increase the offtake rate from their herds, and thus reduce the rate of growth, ~~of their herds.~~

II, E, Slaughter Weights

In order to determine the available meat supply, one must have figures on carcass weights and slaughtering percentages so that the number of animals slaughtered can be expressed in terms of their meat equivalent. Like all other statistics on Nigerian livestock, estimates of the carcass weights and slaughtering percentages vary considerably. Table VI outlines the available estimates for different types of livestock. ~ A\$

As can be seen in Table VI, a wide variety of estimates for cattle slaughter weights have been made, ranging from 80kg in the South to 202kg in Ibadan. In part, this is explained by regional differences in the type of animals slaughtered. In the North, almost all the cattle are zebu, primarily the large White Fulani variety, while in the South, the smaller humpless N'dama, ^{Muturu} ~~Muturu~~ and Ketkuri are raised. Markets in the South which ^{primarily} slaughter ~~primarily~~ locally produced cattle therefore tend to record lower slaughter weights than those in the North. This is not a universal pattern, however, as certain markets cater to different types of animals. Ibadan, for example, receives a large number of high-quality animals railed in from the North, and hence tends to have higher slaughter weights for cattle than most other markets in the country. Similarly, certain markets in the North specialize in low-weight cattle too weak to be shipped or walked south. Thus, slaughter weights in the cities which specialize in dried meat production (e.g., Nguru and Maɗduguri) and in Kano, where there is a cannery, tend to be lower than in other sections of the country.

Slaughter weights of livestock other than cattle also vary regionally. This is true for small ruminants because dwarf varieties of sheep and

Table VI
Estimated Livestock Weights (Kg)

Source	Date	Live	Carcass (Slaughter)	Edible Offals	
A. CATTLE					
S.E.D.E.S. ^{a/}				% of slaughter wt.	Kg.
Domestic (North)	1966				
Adult Male			180 kg.	25%	45 kg.
Sterile cows			140 kg.		
Cull cows			100 kg.		
Young bulls			80 kg.		
AVE (all)			129 kg.		
White Fulani					25 kg.
Adult male			250+kg.		20 kg.
Adult female			170 kg.		32.25 kg.
South					
Young bulls			60 kg.	25%	15 kg.
Adult male			115 kg.		
AVE (all)			80 kg.		
Northern Nigeria Ver. Divn. ^{b/}	1960	279 ^{c/} 264 ^{d/} 296 ^{e/}	148 ^{c/} 141 ^{d/} 155 ^{e/}		
Oyenuga ^{f/}	1966				
White Fulani			150 kg.		
N'Dama			100 kg.		
FAO ^{g/}	(1962)		181 kg.		
National Agricultural Development Committee ^{h/}	1971				
Domestic			114 kg.	20%	22.8 kg.
Imported			114 kg.	20%	22.8 kg.
G.I. Jones ^{i/}	1945				
at Kano			182 kg.	--	--
at Ilorin			109 kg.	--	--
at Umuahia			82 kg.	--	--
Arthur D. Little, Inc. ^{j/}	1964				
Ibadan		341 kg.	164 kg.	19%	31.1 kg.
Mittendorf and Wilson ^{k/}	1958		140 kg.		

CATTLE (cont'd)

Source	Date	Live	Carcass	Edible Offals	
				% of carcass wt.	Kg.
Shaw & Coluile ^{l/}	1950		114 kg.		
FAO ^{m/}	1959-62				
Northern Nigeria		226.8	Lean 71.6 meat Fat 14.7 Bone 24.9 Total 111.3	41% ^{n/}	45.4 kg.
Eastern Nigeria		213.6	Lean 69.4 kg. meat Fat 25.1 Bone 19.7 Total 114.3	37% ^{n/}	42.7 kg.
Western Nigeria		252.5	Lean 82.0 meat Fat 34.0 Bone 21.9 Total 136.6	37% ^{n/}	50.5 kg.
D. Ferguson ^{o/}	1964	318	Lean 100.5 meat Fat 20.7 Bone 35.0 Total 156.2	41% ^{n/}	63.6
Prest & Stewart ^{p/}	1950		Lean 114 kg. meat	—	—
Okigbo ^{q/}	1957		Lean 114 kg. meat	—	—
Oyenuga ^{r/}	1963		Lean 114 kg. meat	—	—
Olayide ^{s/}	1973		128.2	—	—
B. SMALL RUMINANTS					
S.E.D.E.S. ^{a/}	1966				
Domestic (North)					
All Small Ruminants (ave)			12.5 kg.	15%	1.875 kg.
(South)					
All Small Ruminants			10 kg.	15%	1.5 kg.
National Agricultural ^{h/} Development Committee	1971				
Goats			12.7 kg.	20%	{ 2.54 kg. 1.9 kg.
Sheep			9.5 kg.		

SMALL RUMINANTS continued

Source	Date	Live		Carcass (Slaughter)	Edible Offals	
					% of carcass wt.	Wt. kg.
Shaw and Colvile ^{1/}	1950					
Goats				12.8 kg.		
Sheep				12.8 kg.		
Mittendorf and Wilson ^{k/}	1961			10.0 kg.		
FAO ^{m/}	1959-62					
Northern Nigeria						
Goats		23.1 kg.	Lean meat	6.9 kg.	44% ^{n/}	4.6 kg.
			Fat	1.5		
			Bone	2.1		
			Total	10.5		
Sheep		27.2 kg.	Lean meat	10.1	39% ^{n/}	5.4 kg.
			Fat	1.4		
			Bone	2.4		
			Total	13.9		
Eastern Nigeria						
Goats	1959-62	16.1 kg.	Lean meat	4.8	44% ^{n/}	3.2 kg.
			Fat	1.0		
			Bone	1.4		
			Total	7.2		
Sheep		17.3	Lean meat	6.4	39% ^{n/}	3.5 kg.
			Fat	.9		
			Bone	1.6		
			Total	8.8		
Western Nigeria						
Goats	1959-62	16.1	Lean meat	4.8	44% ^{n/}	3.2
			Fat	1.0		
			Bone	1.4		
			Total	7.2		
Sheep		17.9	Lean meat	6.6	39% ^{n/}	3.6
			Fat	.9		
			Bone	1.6		
			Total	9.1		
Olayide ^{s/}						
Sheep				11.4	--	--
Goats				9.1	--	--

Source	Live	Carcass (Slaughter)	Edible Orfals	Wt. kg.
			% of carcass wt.	
C. SWINE				
S.E.D.E.S. ^{a/}	1966			
<u>North</u>				
"Large White"		80 kg.	} 10%	} 8.0 kg.
Traditional		30 kg.		
Ave.		49.3 kg.		
<u>South</u>				
Improved & Semi-Improved		55 kg.	} 10%	} 5.5 kg.
Traditional		25 kg.		
Ave.		33.1 kg.		
National Agricultural ^{h/} Development Committee	1971	44.5 kg.	4%	1.78 kg.
FAO ^{m/}	1959-62			
Northern Nigeria	90.7	Lean meat 36.3 kg Fat 15.4 Bone 13.6 Total 65.3	28% ^{n/}	18.1 kg.
Eastern Nigeria	54.3	Lean meat 21.7 Fat 5.5 Bone 8.1 Total 35.3	31% ^{n/}	10.9 kg.
Western Nigeria	59.1	Lean meat 23.7 Fat 6.9 Bone 8.9 Total 39.5	30% ^{n/}	11.8
Olayide ^{s/}		44.5 kg.	—	—
D. POULTRY				
S.E.D.E.S. ^{a/}	1966			
Domestic (North)		.7 kg.	—	—
(South)		.7 kg.	—	—
National Agricultural ^{h/} Development Committee		.8 kg.	—	—
FAO ^{n/}	1959-62			
Northern Nigeria	1.09	Lean meat .54 kg Bone .16 Total .71	7.7%	.05
Eastern Nigeria	1.09	Lean meat .54 Bone .16 Total .71	7.7%	.05

POULTRY continued:

Source	Date	Live		Carcass (Slaughter)	Edible Offals	
					% of carcass wt.	Wt. Kg.
Western Nigeria		1.25	Lean meat	.62	7.7%	.06
			Bone	.18		
			Total	.81		
Olayide ^{s/}				.8	--	--

Notes on Table VI

- a/ S.E.D.E.S., op. cit.
- b/ Northern Nigeria, Ministry of Animal Health and Forestry, Veterinary Division, Annual Report 1961-2 (Kaduna, 1964), p. 10, cited in D.S. Ferguson, op. cit., p. 51. Data are result of monthly random weighings of 70 cattle at the Maiduguri abattoir.
- c/ Average weight for entire year.
- d/ Minimum average weight for the year recorded in July, August and September before they had the benefit of the rains.
- e/ Maximum weight for the year recorded in January, February, and March, "after six months of good grazing."
- f/ V.Q. Oyenuga, "The Level of Nigerian Livestock Industry," World Review of Animal Production, 1966 - 1 (January - March, 1966), pp. 91-104.
- g/ FAO, The State of Food and Agriculture (Rome: 1962) cited in Oyenuga, op. cit.
- h/ Nigeria, National Agricultural Development Committee (NADC), Study Group on Food Crops and Pastures, Nigeria, A Quantitative Analysis of Food Requirements, p. 18.
- i/ G.I. Jones, "The Beef - Cattle Trade in Nigeria," Africa, XVI, 1 (January, 1946), pp. 36-7. Data refer to trekked cattle only.
- j/ Arthur D. Little, Inc. Analysis of Ibadan Meat Slaughter and Market Requirements and Feasibility of a Central Abattoir (1964), p. 43.
- k/ Mittendorf and Wilson, op. cit., Appendix I.
- l/ Shaw and Colvile, op. cit. p. 72.
- m/ Calculated from slaughter data given in FAO, Agricultural Development in Nigeria, 1965-1980 (Rome: 1966), pp. 223-5.
- n/ Equivalent to 20% of live weight.
- o/ Calculated from data given in D.S. Ferguson, op. cit., p. 52. Ferguson assumed an average live weight of 700 lbs. (318 kg.) and accepted the slaughter percentages given in the FAO study.
- p/ A.R. Prest and I.G. Stewart, The National Income Accounts of Nigeria, 1950-51, (HMSO, 1953), p. 38, cited in D.S. Ferguson, The Nigerian Beef Industry, (unpublished Master's Thesis, Cornell University, 1967), p. 42.
- q/ P.N.C. Okigbo, Nigerian National Accounts, 1950-1957 (Enugu, 1962) p. 75, cited in Ibid.
- r/ V.Q. Oyenuga, "The Contribution of Animal Products to the Diets of Nigerians," Proceedings of the Agricultural Society of Nigeria 2, 1963, pp. 18-25, cited in Ibid.
- s/ S.O. Olayide, "Agricultural Productivity and Increased Food Production Under Economic Development in Nigeria," Rural Development in Nigeria, (Proceedings of the 1972 Annual Conference of the Nigerian Economic Society, Ibadan: Ibadan University Press, 1973), p. 68.

goats tend to be raised in the tse-tse infested forest zones of the South, while larger varieties are produced in the North. Slaughter weights of pigs tend to be higher in the North because a larger proportion of the swine raised in the North are improved varieties produced under modern management practices. Because the majority of the population of Northern Nigeria is moslem, pigs are not widely raised in the North (only 9.4 percent of Nigeria's pig population was $\frac{1}{2}$ in the North in 1966 according to S.E.D.E.S. (9, pp. 197,205)) and those that are raised tend to be produced in a small number of modern facilities near the major cities. Kano, for example, has one of the largest piggeries in the world. In contrast, unimproved varieties of pigs are widely held by non-moslem farmers in the South, living primarily as scavengers. Because of their small genotype and poor nutrition, their slaughter weights tend to be low.

Poultry slaughter weights reportedly do not vary markedly by region, but it is not clear from the various sources whether the slaughter weights of poultry listed in Table VI were obtained by surveys or were just assumed.

Even after allowance has been made for regional differences in the types of animal slaughtered, the differences in slaughter weights seem very large, particularly for cattle. Averages for the whole country range from 114kg (National Agricultural Development Committee) to 181kg (FAO-1962), while averages for Southern Nigeria vary between 80kg (S.E.D.E.S.) and 128kg (FAO, 1966 - weighted average of Eastern and Western Nigeria slaughter weights). Unfortunately, many of the sources give no basis for their estimates, which suggests they may be only guesses. Generally, an average carcass weight for cattle of somewhere between 120-130kg seems to be most frequently mentioned, with some regional variations.¹²

35

A word should be said about the estimates of edible offal production. In West Africa, almost the whole animal is eaten (the only exceptions being the hooves, horns, and rumen) and offals sell for only slightly less than
12

The S.E.D.E.S. estimate of a slaughter weight of 80kg for cattle killed in Southern Nigeria appears to be too low. This slaughter weight might be appropriate ^{for} to N'dama cattle raised in the South; the bulk of the cattle slaughtered in the South, however, are gi zebu cattle imported from the North.

the meat itself. Edible offal is therefore an important component of the meat supply of West Africa. Offal production is generally estimated at between 20-25% of the slaughter weight of most livestock (except poultry), although FAO estimated it at 20% of the live weight of the animal, which corresponds to from 28% to 44% of the slaughter weight, depending on the species and variety involved. This percentage (which Ferguson also accepted) seems very high, even given the "rangy" frame of Nigerian cattle, and it probably overstates edible offal production.

II.F. Nigeria's Foreign Trade in Meat

Although Nigeria produces the bulk of its meat itself (S.E.D.E.S. estimated that in 1966 about 83% of the nation's meat consumption was met through domestic production (9,p.214)), Nigeria is by far the largest importer of livestock and meat in West Africa. As pointed out earlier, the bulk of the importations are in the form of live animals, with S.E.D.E.S. estimating that 310,000 cattle and 395,000 small ruminants were imported in 1966. Very high ad valorem taxes (67% in 1968) effectively excluded imports of fresh and chilled meat from Mali, Chad, and Niger, although relatively small amounts were imported from Europe for the high-priced market for chilled meat in Lagos and a few other

cities (14,p.17). There is a substantial trade in dried meat, however, with S.E.D.E. estimating that 5400 metric tons (roughly the equivalent of 54,000 head of cattle) were imported from neighboring countries in 1966. It is not clear what duties, if any, these imports are subject to.

III. Estimates of Per Capita Meat Consumption

Per capita meat consumption is estimated by dividing the total meat supply by the estimated population. As we have just seen, there is little agreement in the literature about most of the figures that are used to estimate the meat supply (i.e. the figures for the livestock production, the offtake rate, the slaughter weights, and the amount of offal production). As has also been mentioned, there is considerable disagreement about the size of the human population of Nigeria. It therefore should come as no surprise that estimates of per capita meat consumption in Nigeria vary. What is surprising is that most of them do not vary a great deal. Table VII outlines some of these estimates. Estimates of per capita national meat and offal consumption vary from 6.0kg to 16.1kg per year; however it should be noted that the latter figure is somewhat suspect.¹³ With the

¹³The meat consumption figures presented in the National Agricultural Development Committee's food balance sheets seem suspect for several reasons. They accept the very high official government figure on the cattle population (over 11,000,000), the weight of offal as a percentage of slaughter weight is very high for the national food balance sheet (67%) and very low for some of the regional tables (e.g. about 4% in Midwest Nigeria) and there is a very high consumption of bush meat reported which was calculated on the basis of some unspecified consumption studies.

exception of the NADC figures, beef consumption reportedly constitutes between 55% and 70% of the total red meat consumption for the country as a whole, although it apparently does not supply this high a percentage of ~~meat consumption~~

- VII -
Table IV

Estimates of Per Capita Meat Availability in Nigeria
(Kg./capita/year)

<u>Source</u>	<u>Year</u>	<u>Beef</u> ^{a/}	<u>Goat</u> ^{a/}	<u>Mutton</u> ^{a/}	<u>Pork</u> ^{a/}	<u>Other</u> ^{a/}	<u>Total</u> ^{a/}	<u>Poultry</u>	<u>Fish</u> ^{b/}
I. National Estimates									
FAO ^{c/}	1964/66	3.5	1.6	0.5	0.4	--	6.0	1.0	2.0
U.S.D.A. ^{d/}	1959/61	4.2	1.8		<u>e/</u>	--	6.0	0.6 ^{e/}	4.0
Ferguson ^{f/}	1964	3.3	--	--	--	--	--	--	--
National Agricultural Development Committee (NACD) ^{g/}									
	1968/69	3.4 ^{h/} (5.6) ^{i/}	1.8 (3.1)	.4 (.7)	.5 (.8)	3.5 ^{l/} (5.9)	9.6 (16.1)	.8	13.4
S.E.D.E.S. ^{k/}	1966	4.2	2.8		.7 ^{l/}	<u>l/</u>	7.7	1.1	--
Oluyide ^{z/}	1968/69	3.4	1.5	0.5	0.4	--	5.8	0.8	--
II. Regional Estimates									
<u>Northern Nigeria</u>									
S.E.D.E.S. ^{k/}	1966	3.8	3.6		0.1 ^{l/}	<u>l/</u>	7.5	1.3	--
F.A.O. ^{m/}	1963	4.3 ^{h/} (6.2) ^{i/}	2.5 (3.6)	1.0 (1.5)	0.3 (0.4)	--	8.1 (11.7)	1.1	0.8
Ferguson ^{n/}	1964	3.3	--	--	--	--	--	--	--
<u>Western Nigeria</u> ^{p/}									
S.E.D.E.S. ^{k/}	1966	5.1	1.3		1.3 ^{l/}	<u>l/</u>	7.7	0.6 ^{o/}	--
F.A.O. ^{m,o/}	1963	3.2 ^{h/} (4.3) ^{i/}	0.6 (0.8)	0.4 (0.6)	2.2 (3.0)	--	6.4 (8.7)	0.7	15.0
Ferguson ^{q/}	1963	5.4	--	--	--	--	--	--	--
Rural Economic Survey (Rural Areas Only) ^{r/}									
	1966						8.0	--	8.5
Collis (Ilesha Cocoa Farmers) ^{s/}									
	1962						9.2	--	2.6
Galletti (Yoruba Cocoa Farmers) ^{t/}									
	1951						18.1	---	6.1

MIDWEST NIGERIA

S.I.D.E.S.	1966	2.9	2.1		2.4 ^{1/}	1/	7.4	0.9	---	
National Agricultural Development Commit- tee (NACD) ^{sl/}	1968/69	6.7 ^{h/} (6.9) ^{1/}	.7 (.7)	negl. (negl.)	.3 (.3)	8.0 ^{1/} (8.2)	15.7 16.1	.5	41.3	
Ferguson ^{ii/}		1.7	--	--	--	--	--	--	--	
<u>Eastern Nigeria</u>										
S.E.D.E.S. ^{k/}	1966	3.6	2.4		1.0 ^{1/} ^{a/}	1/	7.0	1.0	--	
F.A.O. ^{m/}	1963/64	1.7 ^{h/} (2.4) ^{1/}	1.3 (1.8)	0.6 (0.9)	0.8 (1.1)	--	4.4 (6.2)	0.8	8.2	
Ferguson ^{r/}	1963	1.5	--	--	--	--	--	--	--	
Rural Economic Survey (Rural Areas only) ^{t/}	1966						4.3	--	10.6	
Nicol - (Mbanegge- Rain forest area) ^{u/}	1955						3.8		.7	
<u>Lagos</u>										
S.E.D.E.S. ^{k/}	1966	20.9	0.6		2.6 ^{e/}	1/	24.1	--	--	
Ferguson ^{n/}	1963	14.9	--	--	--	--	--	--	--	
National Agricultural Development Commit- tee ^{sl/}	1968/69	5.8 ^{h/} (6.5) ^{1/}	negl. (negl.)	negl. (negl.)	.6 (.7)	2.4 ^{1/} (2.7)	8.8 (9.9)	0.2	20.3	
<u>Ibadan</u>										
Arthur D.Little, Inc ^{y/}	1964	6.4 ^{w/}	0.5			3.5 ^{x/}	10.4	0.5	1.4 ^{z/}	

VII
Notes on Table IV

- a/ Including edible offals unless otherwise stated.
- b/ Fresh weight equivalent. Includes crustaceans.
- c/ FAO, Food Balance Sheets, 1964-66 Average (Rome: 1971) pp. 419-20.
- d/ U.S.D.A., ERS. Food Balances for 30 Countries in Africa and West Asia 1959-61 (ERS - Foreign - 119), 1965.
- e/ Total for poultry includes small amount of "other red meat, mainly pork.
- f/ D.S. Ferguson, The Nigerian Beef Industry (unpublished Master's Thesis, Cornell University, 1967), p. 135.
- g/ Nigeria, National Agricultural Development Committee, Study Group on Food Crops and Pastures, Nigeria, A Quantitative Analysis of Food Requirements (1971), pp. 21ff.
- h/ Top figure in this row does not include offals.
- i/ Offal consumption was listed separately in this report. The figures in parentheses represent consumption of both meat and offals, estimated by allocating total offal consumption in proportion to the quantities of different types of red meat consumed.
- j/ Bush meat.
- k/ S.E.D.E.S., op. cit. pp. 234-9.
- l/ Pork total includes small amount of "other meat" (mainly camel).
- m/ FAO, Agricultural Development in Nigeria 1965-1980 (Rome: 1966), pp. 392-4.
- n/ Ferguson, op. cit., p. 135.
- o/ Average for Western Nigeria and Lagos.
- p/ Includes Midwest unless otherwise noted.
- q/ Excludes Midwest.
- r/ Average of results from surveys conducted by the Federal Office of Statistics in different regions of Nigeria, presented in D.C. Carney, "A Report on the Nutrition of Southern Nigerians," (unpublished paper, Stanford University, 1971).
- s/ Collis, Dema and Omulya, "On the Ecology of Child Health and Nutrition in Nigerian Villages," Tropical and Geographical Medicine XIV (1962), p.202 cited in Carney, op. cit. pp. 29-30.
- t/ Galletti, Baldwin and Dina, Nigerian Cocoa Farmers: An Economic Survey of Yoruba Cocoa Farming Families (Oxford: Oxford University Press, 1956), p. 237 cited in Carney, op. cit.
- u/ B.M. Nicol, "The Calorie Requirements of Nigerian Peasant Farmers," British Journal of Nutrition XIII, 1969, p. 297, cited in Carney, op. cit. pp. 33, 48.

VII

Notes on Table IV continued:

v/ Arthur D. Little, Inc. op. cit., p. 46

w/ Locally slaughtered animals only.

x/ Includes dried and fresh meat imported from other areas of Nigeria and from foreign countries, broken down as follows:

Nigerian meats and products from other areas	0.7 kg.
Dried meats from the North	2.3 kg.
Imported meats	0.5 kg.

y/ Also includes consumption of dairy products.

z/ Olayide, op. cit.

meat consumption in the Midwestern and Eastern sections of the country.¹⁴

14

IBRD reports that on a carcass weight basis, the percentage distribution of the Nigerian red meat supply is as follows: beef 51%; goat 25%; sheep 10%; pig 13%; other (mainly camel) 1%. (4, Annex 7, p.2)

Consumption of sheep and goat's meat accounts for most of the rest of the red meat eaten in the North, with pork being consumed in relatively large amounts only in the midwestern and western parts of the country and in Lagos. Per capita poultry consumption is estimated on a national basis at roughly one kg per year, although it must be remembered that the figures on which this estimate is based are extremely rough. Fish is an important source of animal protein in the diet, particularly in the southern parts of the country, where it is generally estimated to exceed red meat consumption. It is reasonable to expect that fish acts as a substitute for meat in the diet.

III.A. Types of Meat Consumed

As in most of West Africa, meat is generally consumed in Nigeria as part of a stew, after having been cooked for several hours. This method of preparation results in consumers putting a premium on meat which will retain its flavor and identity after a long period of cooking -- i.e. relatively tough, fat-free meat. There is only a limited market (among the urban elite and expatriate populations) for what a European would call "choice cuts"; meat with a large amount of marbling may even sell at a discount in some markets, as West Africans tend to regard fat in meat as waste. The bulk of the meat consumed is "hot", i.e. from animals killed that same day and which has not been refrigerated. Consumers compensate for a lack of refrigeration by buying meat in the morning soon after the animal has been killed and by cooking it almost immediately.

Besides fresh meat, a significant amount of dried meat is also consumed. Dried meat is manufactured in the North by slaughtering cull and underweight cattle, boiling the meat, and then drying it over fires, and then shipping the meat South (usually by rail) with no refrigeration being needed. Dried meat sells as a substitute for fresh meat in the South, costing more than fresh meat on a weight basis but slightly less than fresh meat on a meat-equivalency basis.¹⁵ Canned and chilled meats are consumed in much smaller amounts than ~~are~~ fresh and dried meats. There is a meat cannery in [^]Kano (the only one in Nigeria) which in 1966 produced 2,960 metric tons of canned meat (of which 150 tons were exported) using 27,000 head of cattle. In addition, 700 tons of canned meat were reportedly imported during that year. Thus, total domestic canned meat consumption was 3,510 tons in 1966, or roughly 0.8kg per capita per year.¹⁶

¹⁵In 1963, dried meat wholesaled in Ibadan for roughly 56¢/lb, compared with a retail price for fresh beef of ^{about} ~~roughly~~ 27¢/lb (1, pp.35,66).

Since it takes approximately three pounds of flesh to produce one pound of dried meat (1, p.36), the wholesale price for dried meat implies an equivalent fresh meat price of roughly 19¢/lb at the wholesale level.

¹⁶Assuming a population of 45 million.

In contrast, only about 500 metric tons of chilled meat were produced in Nigeria in 1966, in addition to ⁶4,000 metric tons which were imported. This chilled meat was consumed almost entirely in Lagos and the urban areas of Western Nigeria (9, pp.225-228).

Footnote 15 cont'd.

If the wholesale/retail markup were 20%, this would result in an equivalent fresh meat retail price of 24¢ per lb.

III. C. Variation in Meat Consumption

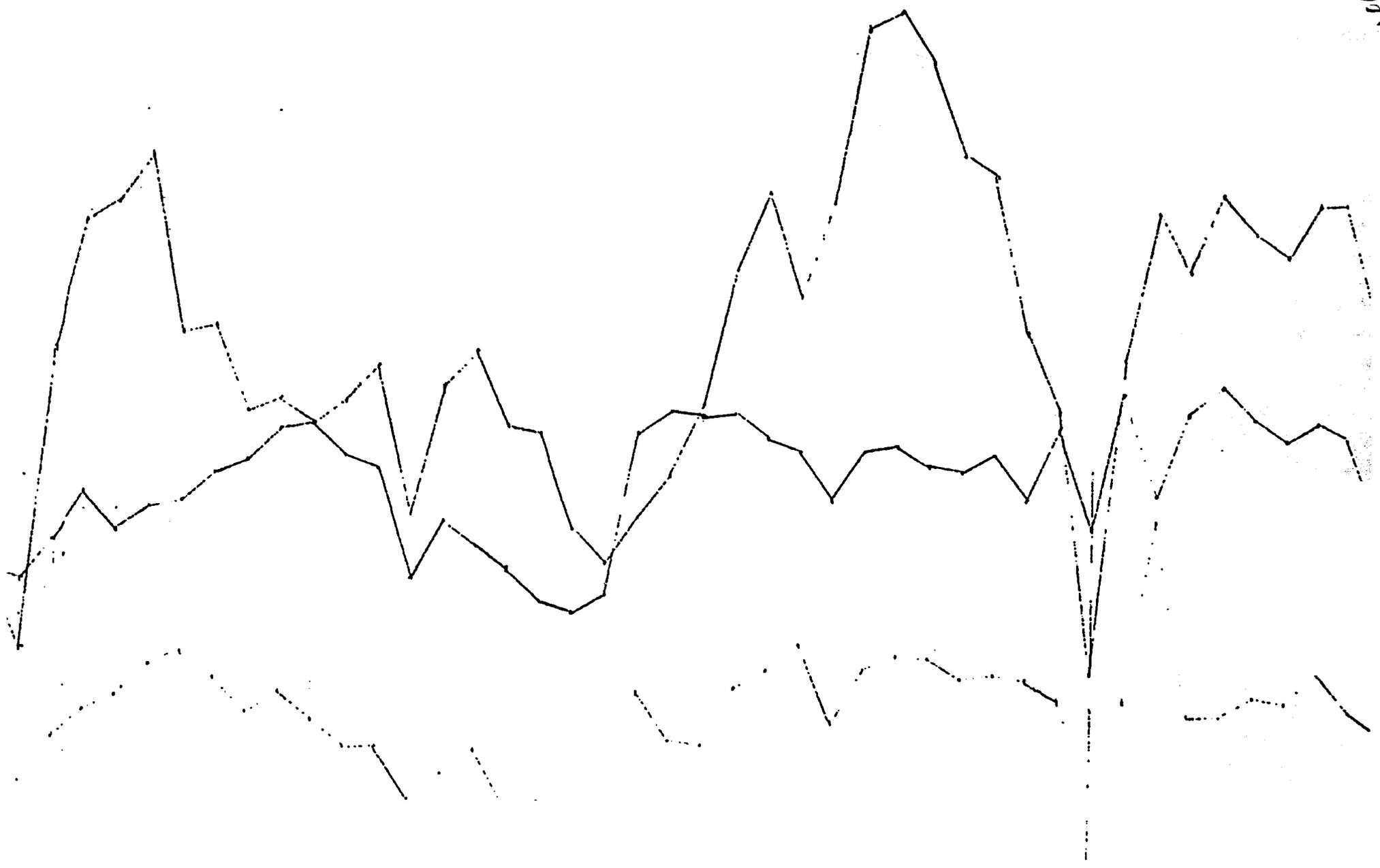
III. B. 1 Seasonal Variation.

There is some seasonality in meat consumption in Nigeria, and this seasonality appears to be related to both supply and demand factors.

III. B. 1. a. Beef.

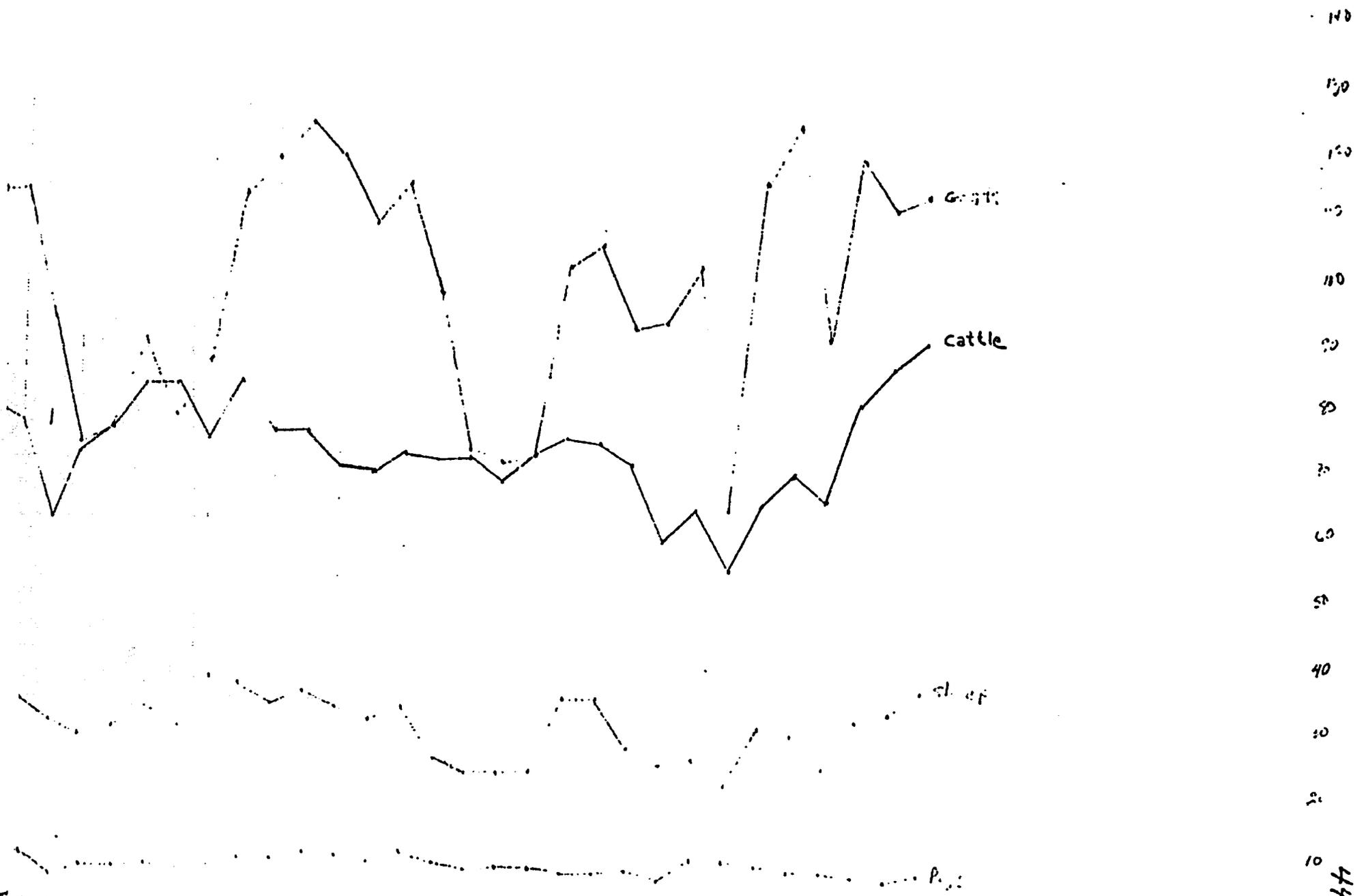
Recorded slaughter of cattle has been generally accepted as an accurate indicator of the seasonal pattern of actual (recorded and non-recorded) slaughter of cattle (1, pp.48-9; 9, pp.230-4). The monthly recorded slaughter of cattle from 1964 to 1972 is graphed in Figure 3. Although there is some year-to-year variation, a distinct seasonal pattern can be seen. Slaughterings reach a seasonal peak in December and January, fall in February or March, usually rise again in April and then fall to a seasonal low in early summer (June-July). Around September, cattle slaughter picks up again and builds to the yearly peak in December-January. Several factors help explain this pattern.

On the supply side, the pattern of slaughter corresponds with the availability of grazing in the producing areas of the North. Producers typically are semi-nomadic and move their herds northward during the rainy season to take advantage of the improved grazing and water supply which results from the rains. The rainy season in the North typically begins in May-June and herders begin to move their herds North at that time in search of improved pastures. By July, most of the herds have moved into the northern regions and the beef slaughter has reached its low point of the year. Sales for slaughter remain low throughout the rainy season for three reasons. First, since the grazing is good, it is generally in the herder's interest to let the animals regain the weight they have lost during the dry season; this allows them to be sold at a higher price later in the year.¹⁷ Secondly, there are difficulties in



Monthly Livestock Slaughtering, Nigeria 1964-70

Thousand Head



1/1

Figure 3 (cont'd)

Source of data: Federal Office of Statistics, Digest of Statistics
(Lagos), various issues.

¹⁷ Mittendorf and Wilson (18, p.18) provide the following example of seasonal weight changes of a steer over a two-year period in an African savanna area:

Liveweight at the end of the first dry season	= 250kg
Liveweight at the end of the following rainy season	= 350kg
Liveweight at the end of the second dry season	= 255kg
Liveweight at the end of the following rainy season	= 382kg
Liveweight at the end of the third dry season	= 307kg

transporting cattle to market during the rainy season, as roads and trek routes are often in poor condition. Finally, there is no demand for slaughter animals for dried meat production during this period of the year, as dried meat production comes to a halt in the rainy season (1, p. 65). For these reasons, most of the cattle remain in the north throughout the rainy season. At the end of the rainy season in October, sales begin to pick up, as producers are eager to sell their animals while they are in their best condition (18, p. 19). Sales also reportedly increase during this time because the herders need cash to pay the annual cattle tax in October (2, pp.181-2). In response to the increasing supply, cattle prices fall to their seasonal lows during September and October, although fresh beef prices reportedly are more stable (1, pp.65-6).^{18/}

^{18/} In 1963, prices for live cattle in Ibadan fell from roughly £45 per head in August to £20-£25 per head in October. By January, they had recovered to their previous level (19, p.21).

Several demand factors reinforce this seasonal supply pattern. In the northern part of the country, demand for beef begins to build with the harvesting and selling of the peanut crop in October/November, and the grain crops in August through December. The cocoa ^cdrop begins to be harvested in the South during October, although receipts from cocoa reach a peak around December and January (20, p.246; 21, p.20). The increased cash flowing into the economy at this time combines with religious holidays (e.g. Christmas) to boost the demand for beef at the same time the supply of slaughter cattle is reaching its peak.¹⁸ As a result, cattle prices

¹⁸An extreme example of this seasonality of effective demand for meat was seen by H.A.Oluwasami and I.S.Dema during a nutritional study of Uboma, a palm-oil producing area in Eastern Nigeria. Per capita daily meat consumption reportedly varied from 2 grams during the "hungry season" of April-May to 198 grams in November-December, when farmers were being paid for their palm-oil crop (22,p.41).

are reportedly at their high point for the year during the period of peak agricultural trade (November-February) despite the fact that this is the time of the year when the supply of slaughter cattle is the greatest (20,pp.246-7).¹⁹

20 19 The volume of the cattle trade (and the trade in small ruminants) also appears to fluctuate from year to year in conjunction with the moslem feast month of Ramadam (which is based on a lunar calendar, and hence varies from year to year). Olayide states that the cattle trade reaches its yearly peak during Ramadam (20, p.246), but this does not seem to be borne out by either the slaughter data or rail shipment data.

III B.1.b. Sheep and Goats

It is more difficult to assess the seasonality of consumption of sheep and goat meat in Nigeria than it is for beef because official slaughter statistics for small ruminants are generally considered to cover a much smaller percentage of the total slaughter than is the case with cattle. For example, S.E.D=E.S. estimated that in 1966 the official slaughter statistics of northern Nigeria accounted for only 17% of the estimated total slaughter of small ruminants in that region (9, p.230). As already shown in Figure 1, there is serious question whether official slaughter statistics even reflect the pattern of total slaughter of sheep and goats. These problems notwithstanding, a few observations regarding the seasonality of consumption of meat from small ruminants can be made with the aid of Figures 1 and 3.

Looking first at pattern of recorded goat slaughter in Figure 3, a distinct seasonal pattern can be seen. A seasonal peak usually occurs in early to mid-summer (June-July), and slaughterings fall off sharply from July-August to a low (usually the seasonal low) around November. Slaughterings pick up again around December to February, fall once more in March and April and then build up to the seasonal peak during the summer. Recorded sheep slaughterings show no distinct seasonal pattern, but as

pointed out earlier with respect to Figure 1, rail shipment data (as well as comparative data from Ghana) lead us to expect a sharp seasonal increase in sheep slaughterings during the spring (March and April).

Sheep and goats are much more evenly distributed throughout the country than are cattle; therefore, one would expect pasture conditions in the North to exert a much smaller effect on the seasonality of consumption of sheep and goat meat than they do on beef consumption. The small size and low cost of these animals relative to cattle also would lead on² to expect that demand factors would influence the consumption pattern more than supply factors. The data, incomplete as it is, seems to bear this out. Recorded goat slaughter is highest in the rainy season of mid-summer, when one would expect (from a supply point of view) for sales to be low. During the period under examination (1964-72), however, the end of the Islamic festival month of Ramadan, which is a time of feasting, fell between June and the beginning of September.^{2φ} This is exactly the

^{2φ} Ramadan is the ninth month on the Islamic lunar calendar. Since the Islamic year contains only 354 days, Ramadan falls between different dates on the Roman calendar every year.

~~the~~ period when recorded slaughter of goats ^{was} ~~were~~ ^{at} ~~their~~ ^{its} high point. As pointed out earlier, rail statistics (Figure 1) suggest an increase in the consumption of meat from small ruminants around December (possibly related to the Christmas trade and the demand factors mentioned for beef) and a sharp increase in the spring, which is probably related to celebration of the Prophet's birthday.

The only other livestock for which monthly slaughter data are available are swine. Pork is a rather minor component in the Nigerian meat supply and pig slaughter does not seem to exhibit induced seasonality in ~~the consumption of other meats seems to be related to Moslem holidays, this~~

any marked seasonality. Since most of the demand-induced seasonality in the consumption of meat from other small animals seems to be related to Moslem holidays, this lack of seasonality in pork consumption is not surprising.

Prophet's birthday

The only other livestock for which monthly slaughter data are available are swine. Pork is a rather minor component in the Nigerian meat supply, and pig slaughter does not seem to exhibit any marked seasonality. Since most of the demand-induced seasonality in the consumption of other meats seems to be related to Moslem holidays, this lack of seasonality in pork consumption is not surprising.

III.B.2. Trends in Meat Consumption Over Time

Given the weakness of the data, it is ~~not~~ extremely difficult to measure changes in per capita meat consumption over the past decade. Furthermore, given the abnormal circumstances of the previous ten years (the Nigerian Civil War, the drought in the North beginning in 1968, and the rapid inflow of petrodollars into the economy in the late 1970s), it is questionable whether any trends that could be seen would be of help in predicting what future trends might be. For what it is worth, Figure 3 indicates a very slight rise in the average monthly cattle slaughter over the period 1964-72 and a more marked increase in the slaughter rate for goats. Sheep slaughter seems to have increased slightly from 1964 through the first two months of 1970, and then declined to approximately its 1964 level.

III.B.3 Urban-Rural, Geographical, and Income-Related Differences in Consumption

As seen in Table VII, ~~meat~~ per capita meat consumption varies among regions, with consumption being highest in the Western and Northern regions of the country and somewhat lower in the East. While the differences in total consumption among regions are not great, the relative importance of different types of meats does differ widely. These differences are based largely on income, demographic and ethnic factors.

III. E. 3. Income and Urban-Rural Differences.

The impact on meat consumption of urbanization and the higher average incomes available in the cities can be seen by comparing the estimated per capita meat consumption in Ibadan and Lagos shown in Table VII with those for other regions of the country. For each region of the country, S.E.D.E.S. has estimated rural and urban meat consumption. These estimates are shown in Table VIII.

Several factors stand out in Table VIII. In all regions except the West, per capita consumption of meat is much greater in urban areas than in rural areas; in Lagos, where the forces of urbanization presumably are quite strong, the annual per capita meat consumption is in excess of 24 kilos.²²

22

Annual per capita meat consumption was estimated to be in excess of 20kg in five northern cities as well: Kano (21.9kg), Maiduguri (26.9kg), Jos-Bukuru (29.5kg), Sokoto (28.9kg), and Kaduna (30.8kg). (9, p.231)

In western Nigeria, per capita consumption of meat in rural areas reportedly ~~was~~^{is} slightly above that in urban areas. S.E.D.E.S. attributes this to the high incomes in the rural areas of the West, the widespread production of small ruminants in this area, and the difficulty ~~is~~^{is} expanding the meat marketing system fast enough to keep pace with the very rapid rate of urbanization in the western region. (9, p.238) In the northern region, on the other hand, per capita meat consumption in rural areas is reportedly less than 30% of that in the cities. This low meat consumption in rural areas is believed to be partially offset by the substantial quantities of milk consumed by livestock herders: for example, the Fulani of Niger (both herders and cultivators) reportedly consume an annual average of 327 kg of milk per capita, the equivalent of over 50kg of beef. (9, p.239)

The composition of the meat supply is also quite different between urban and rural areas. In the urban areas as a whole, beef reportedly accounts for

Table VIII

Estimates of Per Capita Rural and Urban Meat Consumption, 1966

(Kg./yr.)

<u>Region</u>	<u>Beef</u>		<u>Small Ruminants</u>		<u>Pork</u>		<u>Total</u>	
	<u>Kg.</u>	<u>% of total</u>	<u>Kg.</u>	<u>% of total</u>	<u>Kg.</u>	<u>% of total</u>	<u>Kg.</u>	<u>% of total</u>
North (Ave.)	3.8	51	3.6	48	0.1	1	7.5	100
Urban	13.7	80	3.2	19	0.2	1	17.1	100
Rural	1.1	22	3.7	77	0.04	1	4.8	100
West (Ave.)	5.1	66	1.3	17	1.3	17	7.7	100
Urban	6.0	79	0.7	9	0.9	12	7.6	100
Rural	3.1	40	2.5	31	2.3	29	7.9	100
Midwest (Ave.)	2.9	39	2.1	28	2.4	32	7.4	100
Urban	8.0	73	0.7	6	2.3	21	11.0	100
Rural	1.0	16	2.6	43	2.4	41	6.0	100
East (Ave.)	3.6	51	2.4	34	1.0	14	7.0	100
Urban	6.9	72	1.5	16	1.1	12	9.5	100
Rural	2.6	42	2.6	42	0.9	15	6.1	100
Lagos	20.9	87	0.6	3	2.6	11	24.1	100
Total South (Ave)	4.7	60	1.9	24	1.3	17	7.9	100
Urban	7.6	79	0.9	9	1.2	12	9.7	100
Rural	2.5	39	2.6	40	1.4	21	6.5	100
Total Nigeria (Ave.)	4.2	55	2.8	36	0.7	9	7.7	100
Urban	9.8	79	1.7	14	0.8	7	12.3	100
Rural	1.6	30	3.3	60	0.6	10	5.5	100

Source: 9, pp. 234-9.

79% of the total meat supply, small ruminants for 14%, and pork 7%. In the rural areas, 60% of meat supply is provided by small ruminants, while beef only accounts for 30% and pork 10%. These percentages vary among regions somewhat, but the pattern remains the same -- small animals supply the bulk of the meat in the rural areas while beef is more important in the cities. This may be because the demand for meat in many rural villages is not great enough to warrant slaughtering a steer; what demand there is for meat is met through the slaughter of smaller animals. Since refrigeration is not available in villages, all the meat must be cooked and consumed shortly after the animal is killed; it is probable that in many villages, killing a steer would result in more meat being available than could be profitably disposed of.

Budget studies have indicated that meat consumption within Nigerian cities is strongly correlated with income levels. Table IX illustrates how expenditures on animal protein varied with household income in 1960. The correlation is striking and consistent; for example, expenditures on animal protein increased ten times between the lowest and highest income class in Enugu. While this may be partially explained by the fact that higher incomes tended to be correlated with larger families in these studies, (22, p.56), it is nonetheless obvious that income is a prime determinant of the level of meat consumption in an urban setting.

III. B. 3. 4. Ethnic influences.

Ethnic differences in the population play an important role in the type of meat consumed. This can be seen clearly in Table VIII: practically no pork is eaten in predominantly Islamic northern Nigeria, while pork is an important source of meat in the southern parts of the country, particularly the Midwest region. As mentioned before, religious celebrations also result in very heavy mutton consumption during certain parts of the year.

Table IX

Expenditures on Animal Protein by Income of Household

1960 (shillings per months)

<u>Monthly Income in Shillings</u>	<u>Enugu</u>	<u>Lagos</u>	<u>Ibadan</u>
Under 100	17.4 (26.6)	--	--
100-149	24.6 (28.0)	25.3 (31.6)	--
150-249	29.4 (28.8)	34.2 (33.7)	--
250-650	44.8 (32.6)	58.0 (37.5)	--
500-599	101.2 (31.1)	--	77.7 (26.1)
600-799	105.9 (32.6)	124.4 (38.0)	78.6 (28.3)
800-999	121.7 (36.1)	142.3 (40.5)	97.0 (29.6)
1000-1199	138.7 (33.6)	135.1 (37.6)	140.0 (36.4)
1200-1399	131.7 (32.7)	142.9 (39.2)	143.9 (35.8)
1400-1799	142.4 (39.4)	--	160.4 (35.6)
1800 -	176.0 (36.2)	--	173.6 (41.5)

Figures in parentheses are percentage of total food expenditure.

Source: 17 , pp. 121-2.

SB

III.C. Predicting Future Trends in Demand for Meat

Any attempt to make an accurate forecast of the demand for meat in Nigeria for the coming years is hampered by several factors. The normal "first step" in forecasting demand is to use the equation:

$$\Delta D = \Delta P + \Delta Y \cdot E_y$$

where ΔD is the percentage change in demand, ΔP is the population growth rate, ΔY is the rate of growth of per capita income and E_y is the income elasticity of demand.

The problems of determining the population growth rate have already been mentioned. Forecasting the growth of per capita income in Nigeria is also difficult, especially in light of the rapid inflation brought on by the flow of oil money into the country. Attempts to determine the income elasticity of demand for meat in Nigeria have not been very successful either. A few attempts have been made to statistically estimate the demand schedule for various types of animal protein in Nigeria. These studies have been hampered by a weak data base, and the results vary widely. Since the data base is so shaky, other studies have not attempted to statistically estimate elasticities and have simply assumed or "guesstimated" values for these parameters. Table X summarizes the elasticity estimates that have been made (or assumed) in various studies. Given the poor statistical results of the empirical studies, one probably has to rely on some assumed elasticities if he wants to try to project future demand in the customary fashion.²³

²³The poor statistical results (e.g. low R^2 s, autocorrelation of residuals) seem to result from limitations in the type of data available. The choice of functional forms, however, also seems open to question. USDA has reviewed the problems of statistically estimating the demand for meat in Nigeria. (17, pp.42-67).

Table X. Demand Elasticities for Meat used in various studies ^{a/}

Source	Commodity	Location	Date	Method ^{b/}	Direct Price Elasticity	Cross-Price ^{c/} Elasticity	Income Elasticity
Olayide and Oni ^{d/}	Fresh Beef	Lagos	1964-67	TS-M ^{e/}			
A.					-0.56	+0.06	+0.92
B.					-0.65	-0.28	+1.20
C.					-2.80	-1.19	+1.94
Olayide and Oni ^{f/}	Fresh Beef	Western State	1961-67	TS-M	-0.51	-0.60	+2.80
Anthonio ^{g/}	Animal Protein	Enugu, Eastern Nigeria	1955	CS	-----	-----	+0.70 ^{h/}
Federal Office of Statistics ^{i/}	Meat, Fish, and Eggs	Enugu	1961-62	CS	-----	-----	+0.69 ^{h/}
		Kaduna	1962-63		-----	-----	+0.45 ^{h/}
		Ibadan	1961-62		-----	-----	+0.64 ^{h/}
Okuwosa ^{l/}	Beef, Sheep, and Goat Meat Per k	Nigeria	1971	A ^{k/}	-----	-----	+0.9
		Nigeria	1971	A ^{k/}	-----	-----	+0.6
IBRD ^{l/}	Beef	Northern Nigeria	1973	A	-----	-----	+1.2
		Southern Nigeria			-----	-----	+1.3
		Urban					+1.3 - 1.5
		Rural					+0.9 - 1.1
		Average			- 0.9	-----	+1.1 - 1.4
FAO ^{m/}	Total Meat and Offal		1963				
		Northern Nigeria			---	----	+0.75
		Western, Midwestern and Lagos			----	----	+0.85
		Eastern Nigeria			----	----	+0.85

Notes to Table X

- a/ Income-quantity and Price-quantity elasticities unless otherwise noted
- b/ TS-M = Time series, monthly data
CS = Cross sectional survey, using budget study data
A = Assumed value
- c/ Cross elasticity, where shown, is cross-price elasticity between fresh beef and dried fish.
- d/ S.O.Olayide and S.A.Oni, "Statistical Analysis of the Demand for Beef in Lagos," Bulletin of Rural Economics and Sociology, 7, 1, (1972), 103-25
- e/ The three sets of parameters are from 3 "lead equations" which Olayide and Oni present as equally plausible demand equations. All are quantity-dependent equations; the first is a double-log function with a trend variable, the second is a linear equation with seasonal dummy variables, and the third is double log with seasonal dummy variables.
- f/ S.O.Olayide and S.A.Oni, "Short Run Demand for Beef in Western Nigeria," Nigerian Journal of Economics and Social Studies, 11, 2 (July, 1969); 165-72
- g/ Q.B.O.Anthonio, "Food Consumption and Income Relationships in Nigeria: Engel's Curves Functions," Bulletin of Rural Economy and Sociology, 2, 1, (1966), pp.52-67. Elasticity estimate based on double-log Engel's curve.
- h/ Income-expenditure elasticity
- i/ Federal Office of Statistics, "Expenditure Elasticities of Demand for Household Consumer Goods," Lagos, February 1966, FOS, 1966 $\theta(1)$. Elasticity estimates based on linear Engel's functions.
- j/ E.A.Okwuosa, "The Problem of Demand in Relation to Policy for Agricultural Development," Factors of Agricultural Growth in West Africa (Legon: ISSER,1973), pp.20-25.
- k/ Okwuosa states (p.23) that these elasticities were derived from log functions, but earlier (p.21) he states they are "guesstimated". He provides no details of statistical estimations.
- l/ IBRD, Agricultural Sector Survey, Nigeria (1973), Annex 2, pp.8-10
- m/ FAO, Agricultural Development in Nigeria 1965-1980, (Rome:1966), p.398.

Even the assumed values range considerably, however (from 0.75 to 1.4), so ~~that~~ the potential range for error is huge.

Actually, the rate of growth of meat consumption most likely will be constrained by the available supply, not demand, (see below). It is therefore likely that prices will rise somewhat and this will tend to slow the growth of demand somewhat. As mentioned earlier, the rate of growth of the meat supply in Nigeria probably has been decreasing in recent years due primarily to the drought in the producing areas. One would expect beef production to have been affected more than that of small ruminants, as goats and sheep can forage more effectively in marginal areas than cattle.

Before the drought (in 1966), S.E.D.E.S. forecast that Nigerian beef production to 1980 would increase only at the rate of one per cent per annum, and ^{total} total red meat production would increase at slightly under three per cent per year (9, pp.245-6). S.E.D.E.S., along with FAO, forecast that the demand for meat would increase at a rate of 4.2%, thus increasing Nigeria's dependence on imports during a time when exports from Nigeria's traditional supplies were expected to fall (9, p.240; 3, p.229). This obviously would put pressure on meat prices as well as leading to some substitution of other protein foods (poultry, fish, legumes) for meat in the diet. It should be emphasized that S.E.D.E.S.' projections were made before both the drought and the rapid infusion of oil money into the economy and were based on conservative assumptions regarding the economic recovery of eastern Nigeria following the end of the Civil War. One would therefore expect the supply-demand situation prevailing since 1966 to result in an even greater upward pressure on meat prices than anticipated by S.E.D.E.S., and price statistics seem to bear this out (Figure ² ~~W~~). The outlook for the foreseeable future is for Nigeria to be a seller's market, particularly for beef. One can also anticipate a shift in consumption patterns towards more goat, mutton, poultry, and, in non-Moslem areas, pork, as the supply of these meats increases at a more rapid rate than beef.

62

IV . . . DISCRIPTION OF THE MARKETING SYSTEM

A. General

The basic organization of the livestock trade has been described by Cohen (15), Werhahn, et al. (16), FAO (3), and Ferguson (1); only a few important points are repeated here.

The marketing system, which arose entirely indigenously, historically has faced two major problems: 1) the common shortage of working capital among most of the traders involved; and 2) the high risks connected with the marketing and transport of animals which are shipped ~~long~~^{long} distances under unfavorable conditions (16, p. 145). These problems have been dealt with by breaking up the marketing system into a chain of ~~many~~ intermediaries. In this way, the risks borne by any one person are reduced and the return on an individual's capital is speeded up. Generally, the smaller the intermediary's function, the smaller is his required capital outlay and the quicker the return on his investment. When animals are ~~trekked~~ trekked to market, the large number of intermediaries also reduces the risks involved by allowing ~~the~~ maximum use of local expertise with regard to both trekking conditions and the local market situation.

The glue which holds this ~~system~~ system together is mutual indebtedness. Seminomads apparently are often in debt to cattle traders who have previously sold ~~them~~^{them} ~~their~~ consumer goods on credit, butchers owe money to middlemen who have financed their purchases of meat, etc. (16, pp. 141 ff). Whether this leads to price manipulation is a debated issue; the Nigerian Livestock Mission and Werhahn et al. both refer to groups of powerful intermediaries in the North whom

they claim manipulate prices (8, pp. 86,ff., 16, pp. 141, 149 - 52); ~~while~~ Ferguson claims that the marketing system is quite competitive (1, pp. 25 - 33). Clearly these various intermediaries serve some important functions, such as allocating different types of animals between markets, guaranteeing the credit of different buyers, and supplying northern producers with various consumer goods. More information is needed, however, before we can ~~xxx~~ say whether these functions justify the various intermediaries' charges.

Another point of debate concerns the degree to which Fulani headers are "market-oriented". Much of the earlier anthropological literature stressed the Fulani's attachment to their cattle, and ~~it took~~ the low off-take rate ^{was taken} as evidence that the Fulani herder's main concern was with increasing the size of his herd (with no regard to the quality of the animals), rather than managing ~~x~~ his animals in some commercially rational manner. Considering the environment in which the Fulanis operate, however, their management methods do make commercial sense. It is important to remember that the Fulani consider themselves primarily dairy rather than beef producers, with much of their cash income coming from the sale of sour milk and butter, not beef (33, p. 67). One would normally expect the ~~off-take~~ ^{off-take} rate from a dairy herd to be less than that of a beef herd, as the management objectives are quite different. In addition, cattle are not only a productive asset in Fulani society, but they also serve as one of the few means of savings available to the semi-nomadic herders. This ^{may} ~~tend~~ to reduce the off-take rate, as the herders ^{may} manage their herds as a capital rather than a consumption good~~s~~. Furthermore, there is a ~~xx~~ strong incentive to keep older animals in the herd as a hedge against disease and

drought (2, p. 22). In spite of this, there is evidence that cattle herders do dispose of truly "excess" animals from ~~their~~ their herds. For example, of 135,604 cattle slaughtered in nine main markets of Nigeria between January and November, 1963, 81% were bulls (see Table XI). Furthermore, the cows that were slaughtered tended to be old and probably unproductive (70% were at least seven years old) compared to a somewhat smaller percentage of over-age bulls (60% were at least seven years old). This implies that despite all the incentives to keep older animals, Fulani herdsmen are not prone to keep large numbers of genuinely unproductive animals in their herds.

IV.8. Volume of Animals Marketed

According to SEDES, the following quantities of meat and offal were marketed in Nigeria in 1966:

~~TABLEAU N° 158~~ **DISPONIBLE GLOBAL DU NIGERIA EN VIANDES ET ABATS POUR L'ANNEE 1966**
Unité : Tonnes de viandes et abats

REGIONS	Tonnes de viandes et abats disponibles pour la consommation locale					
	Bovins	Ovins-Caprins	Porcins	Camelins	Volailles (1)	Total général
Nord	92.125	88.816	1.947	1.575	32.200	216.663
Ouest	42.550	10.537	11.220	-	5.600	69.907
Centre-Ouest	6.025	4.212	4.995	-	1.850	17.082
Est	38.150	24.767	9.993	-	10.500	83.410
Territoire de Lagos	16.075	448	2.059	-	-	18.582
Total zone Sud	102.800	39.964	28.267	-	17.950	188.981
Total Nigeria	194.925	128.780	30.214	1.575	50.150	405.644
Repartition par espèce	48,1%	31,7%	7,4%	0,4%	12,4%	100%

(1) En ce qui concerne la volaille, les transferts régionaux n'ont pu être évalués, on peut cependant affirmer que des expéditions importantes existent et que le territoire de Lagos doit recevoir d'importants tonnages en provenance du Nord et de l'Ouest.

Table No. XI
29

AGE GROUPS of Slaughter Cattle

Total Number of Slaughter Cattle in the following Markets:

Rukuru - Jos - Kaduna - Kano - Maiduguri - Potiskum - Zaria - Ibadan - Lagos

January - November, 1963

Total : 135,604

<u>B u l l s</u>			<u>C o w s</u>		
80.08 %			19.92 %		
<u>Age</u>	<u>Number</u>	<u>Percentage</u>	<u>Age</u>	<u>Number</u>	<u>Percentage</u>
2	508	0.47%	2	25	0.09%
3	3,822	3.52%	3	890	3.30%
4	8,666	7.98%	4	1,362	5.04%
5	13,732	12.65%	5	2,319	8.58%
6	16,175	14.89%	6	3,423	12.67%
7	22,119	20.37%	7	5,705	21.12%
8	24,210	22.29%	8	7,009	25.94%
9	13,395	12.34%	9	3,802	14.07%
10	5,702	5.25%	10	2,263	8.38%
11	192	0.18%	11	216	0.80%
12	67	0.06%	12	2	0.01%
<hr/>			<hr/>		
	108,588	100.00%		27,016	100.00%
<hr/>			<hr/>		

Source: ib, p. 190

The number of live animals reportedly marketed in that year was (9, pp.225-8)²⁴

Cattle	1,193,000
Small Ruminants	9,485,000
Swine	737,000
Camels	9,000
Poultry	71,640,000

24/

Marketings defined as domestic production plus net imports.

As pointed out earlier, the volume of animals marketed varies seasonally in response to changes in supply and demand. This fluctuating volume may in part explain the large number of people involved in the marketing system; several authorities have asserted that there is an "excess" number of middlemen, butchers, etc. in most markets and that this results in inefficient marketing (cf. 3, p. 354). It is possible, however, that many intermediaries may be needed to handle the large volume of animals entering the marketing system during certain times of the year. While this may mean that some butchers and middlemen suffer seasonal under- or unemployment in the market places, the marketing system may thereby gain the flexibility it needs to handle the widely varying numbers of animals. Clearly this is an area that warrants further investigation.

Marketing Costs and Margins

Marketing costs for livestock in Nigeria are very high, with producers often receiving only one-third of the final sale price of the animal. Many authors have asserted that this large price differential is primarily due to two factors -- collusion among cattle dealers who allegedly restrict the volume of animals going to certain consuming markets in order to maintain high prices, and inadequate and expensive transportation for livestock

between producing and consuming centers. While there is considerable controversy about the competitiveness of the Nigerian livestock trade (for example, cf. 1, pp. 25-33, and 8, pp. 86ff), there is general agreement that the existing transport system for livestock is a prime factor in keeping consumer prices for livestock relatively high and producer prices low. Some authors have suggested that where collusion occurs, it is largely a function of the long distances and poor transportation system between the Sahelian and coastal areas:

The difficulty of cattle marketing mainly brought about by the great distance involved between producer and consumer areas is responsible for the fact that the marketing of live animals is mainly controlled by dealers, which means that cattle owners cannot benefit by the advantages normally associated with brisk demands...This means that an association composed of such influential dealers is in a position to manipulate prices. (16, p. 141)

Clearly, any study of marketing costs must focus very strongly on transportation costs. A few studies on transport and other marketing costs have been made in Nigeria and will be reviewed below: one must remember, however, that these studies are dated, especially in light of the rapid increase in petroleum prices since 1973.

V. A. Types of Transport Used

Most livestock in Nigeria travel from producing areas to market areas in one of two fashions -- by rail or on hoof. Smaller numbers of animals are shipped at least part of the way to market by truck. There is also a substantial rail traffic in dried meat between northern and southern Nigeria, and smaller shipments by rail of chilled and frozen meat. Air and truck transport of chilled meat, which have been used to a limited extent in other parts of Africa, have not been relied upon in Nigeria.

V. A. 1 Rail. All livestock imported into Nigeria enter the country on hoof. A large number of them, along with many of the locally produced livestock, are trekked to the main railheads in the North (Maiduguri, Nguru, Kano, and Kaura

Namoda) where they board trains for the trip south. Data on the rail shipment of livestock from northern to southern Nigeria are available from two different sources: the veterinary services of the northern states, which issue travel permits to the animals (reported in 23) and the Nigeria Railroad Corporation, which actually transports them (eg. 24). The veterinary data reportedly shows the number of animals leaving the North for different southern markets, while the railway data reportedly documents the tonnage of animals actually shipped to various areas of the south. In addition to these two sets of figures, Ferguson has also reported unpublished data from the Western Region and Lagos Veterinary Departments which show the number of animals unloaded from rail cars in these regions. Unfortunately, these three sets of figures are inconsistent with ^{one or} ~~each~~ other, as outlined in Table XII.

Table XII.A. Estimates of the Number of Cattle Shipped by Rail from Northern Nigeria to Western Nigeria and Lagos, 1960-65

Year ^{a/}	Rail Permits	Railway Records ^{b/}	Reported Arrivals
1960-61	147,935	200,637	146,000
1961-62	160,571	195,933	149,000
1962-63	145,092	171,046	130,000
1963-64	147,598	152,160	127,000
1964-65	108,327	195,437	n.a.
1965-66	140,418	344,342	n.a.

B. Shipments from Northern Nigeria to Eastern Nigeria

Year	Rail Permits ^{a/}	Railway Records ^{c/}	Reported Arrivals ^{c/}
1960	49,494	n.a.	44,342
1961	43,351	n.a.	48,405
1962	54,730	26,330	41,935
1963	53,389	70,019	45,236
1964	48,391	67,962	43,668
1965	63,473	80,192	n.a.

^{a/} Year running April - March

^{u/} Railway records reported in tons. Numbers estimated assuming an average live weight of 700 pounds.

^{c/} Railway records and reported arrivals for Eastern Nigeria are for calendar year.

Sources: Western Nigeria and Lagos: Rail permit data reported in Northern Nigeria, Ministry of Economic Planning and Development, Statistical Yearbook 1965, p. 89. Railway records reported in Western Nigeria, Ministry of Economic Planning and Development, Statistical Bulletin, various issues. Reported arrivals from Ferguson, op cit, p. 40. Eastern Nigeria: Rail permit data from same sources as for Northern Nigeria; railway records and reported arrivals from Eastern Nigeria, Ministry of Economic Planning and Development, Annual Statistical Digest 1965, pp. 60, 82.

While for Western Nigeria the number of rail permits issued for the first two years correspond closely with the reported arrivals in that region, these two sets of figures start to diverge widely after that. Throughout the period the railroad's figures for Western Nigeria are much higher than either set of statistics based on the veterinary records, and during the last two years of the table, this divergence becomes huge. In Eastern Nigeria this is also the case with the exception of 1962. Ferguson, apparently not having the rail statistics available, explained the divergence between the ~~number rail permits issued~~ *and the number of animals reportedly arriving in the South;* by saying that some of the animals which were issued rail permits experienced long delays at railheads and eventually were trekked south. If one is to believe the railway statistics, however, this explanation does not seem feasible; the latter seem to indicate that veterinary coverage was incomplete and that a large number of animals were shipped without permits. It is disquieting to note that the railway statistics do not even vary in the same direction as the other figures. For example, between 1963/64 and 1964/65, the number of rail permits issued for Western Nigeria fell from 147,598 to 108,327, while the rail system reported that shipments jumped from 152,160 to 195,437. Ferguson reports that unpublished rail statistics put the 1964/65 shipments to Western Nigeria and Lagos at 92,366 head (1, p.40); why this figure should differ so markedly from the published

figure is not clear.^{25/} It should be mentioned that most investigators have felt that the veterinary services do a fairly complete job of recording the flow of cattle southward; whether their figures should be accepted in preference to the rail statistics remains an open question and an area for further investigation. This might be resolved by comparing data on livestock arrivals which apparently are now being collected by the Ministries of Agriculture in

25/

There are two possible explanations. One is that Ferguson's figure is a tonnage figure, rather than the number of animals actually shipped. (The reported tonnage of cattle shipments in 1965 was 97,598). The other possibility is that his figure represents the actual number of animals shipped and that the published figures are grossly inflated for some reason (e.g., they might represent the gross tonnage of the rail cars). Ferguson mentions that comparable rail statistics were unavailable prior to 1964/65 (1, p.40).

each of the southern states. For example, the East Central State has published data on the number of cattle arriving in that state by hoof and rail for 1970 (25, p.41); it is likely that similar information is collected and published by other states, although these data are not available at the University of Michigan or Michigan State University.

Apparently both the absolute number and the percentage of total animals travelling to market by rail has fallen ~~off~~ in recent years. IBRD reports that the number fell from 175,623 head in 1966/67 (46% of all cattle moved south) to 82,392 in 1970/71 (24% of the total). Unfortunately, IBRD does not ~~say~~ ^{it} where ~~they~~ ^{it} obtained ~~their~~ ^{its} figures, but they appear to be consistent with the rail permit data. ^{IBRD attributes.} ~~the decline in rail shipments is attributable to~~ "unsatisfactory rail ~~service~~ ^{service}". (4, Annex 7, p.4) Railway records show a decline in shipments to Western Nigeria from 130,125 head in calendar year 1967 to 25, 315 head in calendar year ~~1969~~ ¹⁹⁷¹. (see appendix Table ~~f~~).^{26/}

Since the main rail lines run north-south, and since sheep and goats are more evenly distributed throughout the country than are cattle, a much

smaller percentage of the total number of small ruminants marketed in the country travel by rail. ~~than do cattle~~ Apparently rail permits are not issued for

26/

Appendix Table 1 reveals that the drop was very dramatic in 1971. Probably some factors in addition to unsatisfactory rail service were also at work (e.g. a rail strike).

small ruminants, and published veterinary records from Northern Nigeria are incomplete, consisting only of figures on rail exports of sheep from Kano to Western Nigeria (26, p. 93). (Official data on total northern exports, both by railroad and on hoof, are available, ~~however~~, for the period 1962-1965^{however}. See Appendix Table 2). Railway records are available on the tonnage of small ruminants shipped, but unfortunately there are no other figures available against which these data can be checked (see Table XIII). It is clear, however, that the data for shipments to Eastern Nigeria are incomplete.

Table XIII indicates that the number of small ruminants shipped south by rail fell rather steadily from 1960 to 1970, and then dropped precipitously in 1971, as did all rail traffic. There are not enough data available to state clearly whether this decline in rail traffic reflects a general decline in exports of small stock from the North or a shift from rail to other means of transport. SEDES predicted that the demand for small ruminants in the North would grow faster than the supply between 1966-70 (9, p.246); this projection was made prior to the drought and would tend to support the former hypothesis. IBRD, on the other hand, pointed out that there was a general shift from rail to ^{hoof} ~~leg~~ transport of cattle during the period 1966-71 (4, Annex 7, p.4); this suggests that unsatisfactory rail service may also have been a factor in explaining the decline in small ruminant shipments.

The north is a net exporter of pork (owing to the low per capita consumption among the predominantly Muslim population), and almost all the pigs exported are shipped by rail. Rail records indicate that between 1967

Table XIII. Estimated ~~of~~ Rail Shipments of Small Ruminants Between Northern and Southern Nigeria.

<u>Year</u>	<u>To Western Nigeria and Lagos</u>		<u>To Eastern Nigeria</u>	
	<u>Long tons</u>	<u>Number</u>	<u>Long tons</u>	<u>Number</u>
1960	9464	385,443	n.a.	—
1961	8395	341,905	n.a.	—
1962	6096	248,273	124	5050
1963	5579	227,217	366	14906
1964	4728	192,559	91	3706
1965	4944	201,356	205	8349
1966	4529	184,454	n.a.	—
1967	3873	157,737	n.a.	—
1968	4663	189,911	n.a.	—
1969	4822	196,387	n.a.	—
1970	4506	183,517	n.a.	—
1971	74	3,014	n.a.	—

Note: Numbers estimated assuming average liveweight per animal of 55 lbs. (25 Kg.)

Sources: Western Nigeria, Ministry of Economic Planning and Development, Statistics Division, Statistical Bulletin, various issues; Eastern Nigeria, Ministry of Economic Planning and Development, Statistics Division, Annual Statistical Digest 1965.

and 1970 an average of from 2,200 to 2,800 tons (live weight) were exported from the North, the equivalent of from 25,000 to 31,500 head (Appendix Table 1).

V.A.2 Hoof

Data on the number of cattle moving from north to south on hoof is collected by the veterinary services, although much of this information is not locally available. When the North constituted one administrative region, several control posts were maintained by the Northern Region Veterinary Department, which recorded how many animals left by hoof for each region of the south. (It is believed that the Federal Veterinary Service has taken over control of these posts following the administrative reorganization of the country.) The major posts are located at river crossings: at Jebba, Lokoja, Okuta, Kaiama, Makard^ui, ~~Ago~~^{Ago}-Are, Ogoja, and Katsina Ala. The Jebba bridge crossing, lying on the main trek route between the North and the major markets of Ibadan and Lagos, is by far the most important of these, handling over half the total number of cattle trekked to market during the early sixties (the only years for which published data are available - see Appendix Table 3). Unfortunately, despite the fact that trade cattle can move along the trek routes only under license and that their movements are closely recorded by the veterinary services, little of the data on cattle movements has ever been analyzed or even published:

it might be supposed that with this efficient system of control, under which stock on their way to market are confined to approved cattle routes, each owner or dealer moving only by license bearing his name, the number of cattle, the date of their inoculation, their point of origin and their ultimate destination, the Veterinary Department at its headquarters in Vom would have in possession of complete records of the weekly marketing movement along the trade routes. With such records, we should have been able to obtain valuable and indeed essential evidence of the seasonal flow of livestock for slaughtering, its variation weekly and monthly, the losses incurred in individual dealers' lots between one Control Station and another, the purchases and sales made enroute, the relationship of the final marketing to the number of original purchases, the relevant usage of dry and wet season routes and so forth. Unfortunately, despite the fact that full records are kept at the various control points, and that these are,

in fact, periodically returned to the headquarters at Vom, they have never been submitted to statistical analysis, nor has their great intrinsic value as data for the study of the marketing problem been recognized. (8, p.82)

As mentioned earlier, the IBRD noted an increasing reliance on hoof transport during the late sixties, which apparently reversed the long-term trend towards shipping more cattle by rail.

Table XIV. Movement of Slaughter Cattle from Northern to Southern States, 1966/67 and 1969/70

	1966/67		1969/70	
	Number	%	Number	%
Hoof	199,366	52	214,153	63
Rail	175,623	46	82,392	24
Lorry	8,409	2	45,091	13
Total	388,398	100	341,636	100

Source: IBRD, Agricultural Sector Survey, Nigeria, (Washington, 1973) Annex 7,p.4

In addition to the decline in the number and percentage of animals shipped by rail, Table XIV also points out the increasing role that trucks are playing in livestock transport, a point which is discussed later.

Information on the number of small ruminants being trekked to market is very scanty, and it is not clear that complete records are kept by the Veterinary Services on the movement of small stock to market. In the late fifties, the Northern Region Veterinary Department did report both rail and hoof exports: for 1958/59 they indicated that of a total of 34,412 sheep exported from the North, 8,149, or only 24% were trekked south, the remainder being railed. For goats, the figure was 12,249 out of 14,502, or 84% (27, 1958-59,p.13). It is not clear whether these records are complete, however, and the actual percentage of ^{animals} ~~animals~~ trekked to market may have been higher in both cases. I have not been able to locate any published data on the number of small livestock trekked to market after the late fifties. Like other Nigerian livestock data, they

may have been collected but not published.

V.A. 3, Truck Transport. Until recently, truck transport was not widely used in the livestock trade in Nigeria. During the mid-sixties truck transport reportedly cost more than rail shipment, both because of higher freight charges and greater shrinkage and mortality losses enroute (2, p. 110). It was therefore relied upon only when market conditions made it advantageous to move animals more quickly than could be arranged by rail or hoof or when rail service was ^{temporarily} unavailable (e.g. during the general strike of January and February, 1965). Out of a total of 268,475 head of cattle which moved from northern to southern Nigeria between April 1965 and March 1966, only 2,836 (slightly over 1%) travelled by truck (26, p.89). Table XIV reveals that there has been an increasing reliance placed on truck transportation of cattle in recent years; whether this is a result of improved truck transportation (e.g., because of road improvements which reduce travel time and losses) or whether it reflects a deterioration in the alternative of rail shipment is unclear. Trucks of between five and fifteen tons are used, often being driven non-stop from the north to the southern markets. While still reportedly a high-cost method of transport "it continues to be used as a means of reacting quickly to favorable short-run price conditions that develop in the southern markets". (20, p.245) I have been unable to find any data on the shipment of small livestock by truck in Nigeria.

V. A. 4. Rail Transport of Chilled Meat. Very little chilled meat is shipped from north to south; that which is shipped goes almost exclusively by rail. There are several modern abattoirs in the North (at Kēno, Maiduguri, Sokoto, Nguru, Kaduna, and Baŋchi), most of them equipped with cold storage facilities. In 1966 approximately 500 metric tons of chilled meat, all of

it beef, was reportedly shipped by rail from North to South. This was complemented by roughly 600 metric tons which were imported from overseas (in spite of 67% ad valorem tariffs) (9, pp. 225-8). A lack of transport facilities probably is not the main reason why domestic production has not replaced these imports; as of 1960, the Nigerian Railway Corporation owned three refrigerated cars which theoretically could carry 50 tons of meat per week between Kano and Lagos (28, p.20). Mechanical breakdowns^w and irregular service may have substantially reduced this theoretical capacity; it is likely, however, that quality differences also in part explain the continued importation of chilled meat. The total amount of chilled meat consumed in the country is small, ~~xx~~ however, and is unlikely to increase markedly in the near future.

F.A.S. Rail Shipment of Dried Meat. Substantial amounts of dried meat are produced in the North (particularly ~~xxx~~ around Nguru) and shipped south by rail in twenty pound crates without refrigeration. The quantities shipped between 1967 and 1971 are shown in Appendix Table 1. Approximately 90% of the dried meat is beef, and it is wholesaled primarily through the Ibandan market, from there being distributed to the other markets in the western part of the country. The producing and marketing systems for dried meat involve only a few intermediaries, in contrast with the cattle marketing system (Figure 14). Ona Komalya states that ^{the} production and trade are concentrated in a few hands because of the large capital outlay required and because certain groups have developed a technological monopoly in dried meat production (35, pp. 71-73). As mentioned earlier, most of the animals slaughtered to produce dried meat would be too weak to make the

Figure 4

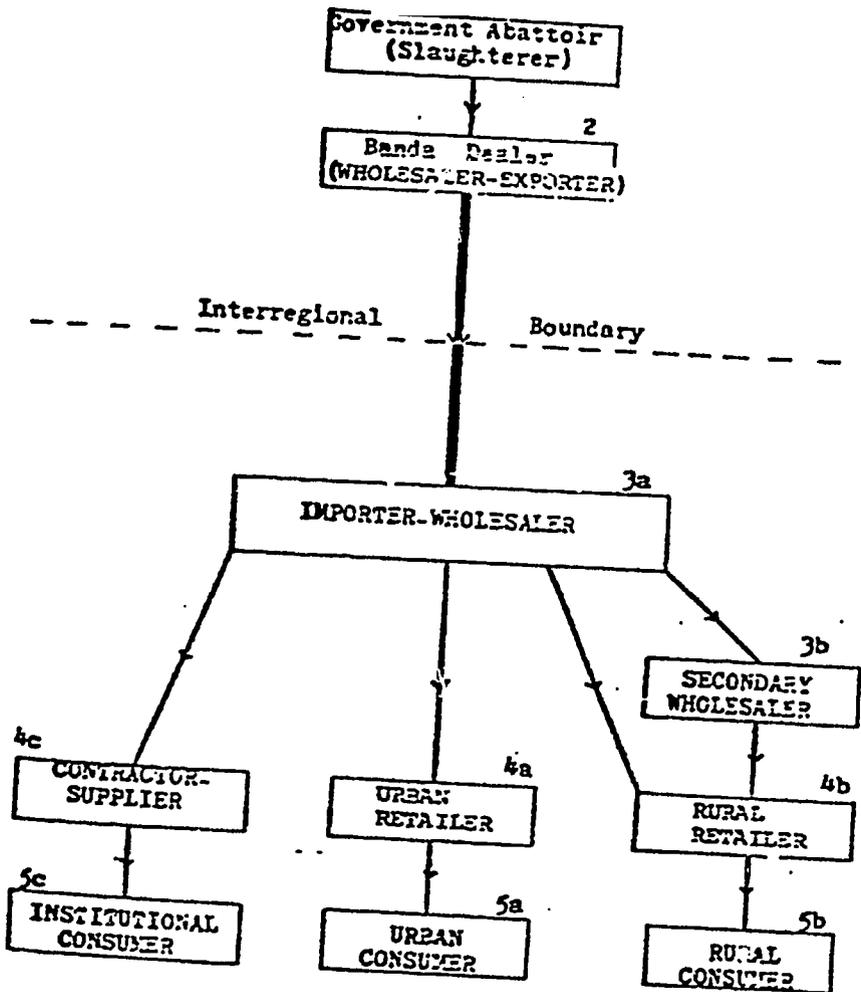


Figure 3. 5. Marketing Channels for Dried Meat in Nigeria

Source: 35, p. 70.

trip ~~west~~ south by rail or on hoof.

V.B. Costs of Alternative Means of Transport. Studies of the cost of livestock transportation in Nigeria apparently have been carried out only for cattle, so the following discussion will be restricted to cattle transport costs.

V.B.1. Hoof Transport. The direct costs of trekking cattle to market include the watering and supplementary feeding fees incurred en route (during the dry season), ~~the~~ ^{the} wages of the drovers, the weight and mortality losses which the cattle suffer, and the cost of the capital tied up in the animals for over a month. Negative externalities include the disease spread by the cattle and the age constraint placed on the herds when animals are trekked to market.

The most thorough examination of the direct costs of hoof transport in Nigeria ^{was} is a study carried out in 1963 by Werhahn, et al. (16, pp. 163-7). While the costs they documented are now out of date, they are worth reviewing, as it may be possible to update them. Werhahn et al. obtained their data by interviewing cattle dealers and middlemen, and in doing their calculations, they made the following assumptions:

A. Cost of Drover (paid by the cattle dealer)

1. Daily wages for drover ^{of} about 15 animals: 4/5d (63¢)
2. Daily shopping money per drover: 2/- (28¢)
3. Return fare to point of departure: price of a Nigerian Railways 3rd class ticket from the point of destination, or the corresponding charge for transport by lorry.

B. Weight and Mortality Losses: ~~were assumed to be~~

1. 5% of animals ^{were assumed to be} sold as "salvage" animals en route at an ~~xxxx~~ average price of £ 7/head (\$19.60), compared to the "normal" price in Ibadan of roughly £23/head. (\$64.60).

2. Tissue shrinkage was assumed to be 20% of ^{the} live weight ^{of the animal} ~~for~~ for the trek from Kano to Ibadan (630 miles).

Table XV summarizes the results of this study. The costs shown in Table XV include both marketing charges and supplementary watering and feeding charges; the latter would not be present during the wet season, and ~~the transport costs during that time of the year would be~~ ^{by} corresponding ~~less~~. Two facts stand out in Table XV. First, it is clear that given the assumptions used by Werhahn et al; disease and shrinkage losses are by far the largest cost involved in trekking cattle to market. Only in the ~~the~~ shorter journeys did ~~the~~ shrinkage and disease losses account for less than 50% of the total marketing ~~and~~ costs. (They were 46% of the total costs for the Patiskum-Wudil trek (12 days), and 19% of the total ~~costs~~ for Kaugama-Kano ^{to} (4 days)). For the longest trek (Maiduguri - Zaria - Abeokuta - 45 days) they accounted for 67% of the total costs. The second point ~~to be made~~ is that the cost per pound of transporting large animals is less than that for small animals. This is because certain marketing costs are fixed per animal, and shrinkage was assumed to exact the same percentage loss from both large and small animals. Overall, the average cost of hoof transport was found to be 3.3 pence per animal per mile, of which 1.5 pence were attributable to transport charges and 1.8 pence to shrinkage and mortality. It ~~must be~~ must be remembered that these

HOOP TRANSPORT
SPECIFICATION OF TRANSPORT AND MARKETING CHARGES

	Number of trek days	Average expenditure for one beast for the trek time 1) £	Market fee p. beast in the market of destination s	Commission for middleman in the market of destination s	Watering fee if any in the dry season s	Estimated losses due to diseases and tissue shrinkage £	Expenses f. supplementary feeding if any in the dry season s	other expenditures not specified elsewhere s	Expenses in total about £	Transport and marketing charges per lb. liveweight for lbs.		
										500 d	600 d	700 d
in	10	.. 6. 6	2/-	15/-	-	1.10. 6	-	-	2.14. -	1.3	1.1	0.9
Bida	27	..16. 1	1/-	30/-	6/-	4.10. 2	10/-	6/-*2/-+	8. 1. 3	3.9	3.2	2.7
	24	..15. -	1/-	30/-	6/-	3.16. 2	10/-	6/-*2/-+	7. 6. 2	3.4	2.9	2.5
aria	4	.. 2. -	1/-	20/-	-	.. 6. 8	-	6/-*	1.15. 8	0.8	0.7	0.6
	45	1. 9.10	2/-	15/-	6/-	7.10. -	12/-	6/-*2/-+	11. 2.10	5.3	4.4	3.8
ru	20	..12. 6	1/-	20/-	4/-	3. 1. 8	-	6/-*	5. 5. 2	2.5	2.1	1.3
ia	18	- 12. -	1/-	30/-	4/-	3. - -	-	6/-*	5.13. -	2.7	2.2	1.9
	16	..10. 4	0/6	10/-	-	2. 6.10	-	6/-*	3.13. 8	1.7	1.5	1.2
ill	12	.. 8. -	1/-	20/-	2/-	1.11. 8	-	6/-*	3. 8. 8	1.6	1.4	1.2
	20	..13. -	1/-	30/-	-	3. 1. 8	-	6/-*	5.11. 8	2.6	2.2	1.9
ina	40	1. 5.10	0/6	10/-	8/-	5. 8. 4	10/-	6/-+	8. 8. 8	4.0	3.3	2.8
	18	..12. -	1/-	20/-	2/6	2.18. 4	-	6/-*	4.19.10	2.4	1.9	1.7
	16	..10. 4	1/-	20/-	2/6	2.13. 4	-	6/-*	4.13. 2	2.2	1.8	1.6

* return fare for drover if any

* trade cattle tax
+ Jebba bridge

shrinkage and disease losses are based on assumed rates which should be ~~xx~~ verified empirically if possible.

A number of studies have made estimates of the shrinkage and mortality losses resulting from trekking cattle to market under West African conditions. One would expect these losses to be ~~m~~ heavy, as the distances travelled are great and the times involved long. The distance between Kano and Lagos is 678 miles, while that between Sokoto and Lagos is 631 miles; assuming that herds travel between 14 and 20 miles per day, this implies a trek of between 31 and 48 days. (Many of the cattle are railed the last ~~100~~⁵⁰ miles between Ibadan and Lagos, however). Forage and water are scarce along the trek routes, especially during the dry season, and a large percentage of the animals contract trypanosomiasis, helminthiasis, and other diseases which lead to further weight losses. A.S.B. Wilson has estimated ~~the~~^{that} weight loss during a trek of 1100 Km (688 miles) under West African conditions ~~to~~ range from 12% to 24% of the liveweight of the animal, depending on the season. This ~~translates to~~^{implies} ~~xxxx~~ a loss of from 84 to 168 lbs. for an animal which weighed 700 lbs. at the start ~~f~~ of the journey (29, p. 57).

Other estimates of shrinkage and mortality losses in trekking indicate a substantial cost as well. The Nigerian ~~Livestock~~ Livestock Mission assumed a total ~~x~~ wastage (shrinkage plus mortality)^{of 33% for cattle,} of which over half could be attributed to emergency ~~z~~ slaughter and mortality^{27 (next page)} (8, pp. 82, 88). G. I. Johnson, writing in 1946, reported an even higher shrinkage for cattle trekked from Kano to the Eastern Nigerian market of Umuahia. He estimated that a steer which yielded 400 lbs. of meat in Kano would only produce 240 lbs. by the time it reached Florin and 180 lbs. if trekked all the way to Umuahia (30, pp. 36-7).

The trek routes have improved somewhat since then, and one would expect the losses now to be lower than those Jones estimated. Dansmann and Messerschmidt estimated the shrinkage for a 650 mile trek at between 10 and 15% of liveweight, while Saager put the loss for cattle trekked between Northern and Southern Nigeria at between 15 and 20%. (Quoted in 16, p. 231). It should be remembered that if most of the weight loss represents actual tissue shrinkage (rather than loss of fill and dehydration), the percentage meat loss would be greater than ~~the~~ percentage loss of liveweight.

The only actual experiment ~~(17) the Livestock Mission conducted~~ ~~that~~ designed to measure the mortality and shrinkage losses involved in trekking that I have seen reported is one carried out in 1963 by Godfrey, ~~K~~ Killick-Kendrick, and W. Ferguson (reported in 11, pp. 85-7). Thirty oxen in a "good state of health" were purchased in April in ~~Jibya~~ ^{Jibya} and trekked the 415 miles (28 days) to Ilorin. Weight losses were very small due to good grazing en route, averaging only 9 Kg per head.²⁸ Two of the oxen had to be slaughtered after 18 days of trekking because of severe lameness, however, and all the animals were suffering from trypanosomiasis and helminthiasis by the time they

²⁷ The Livestock Mission reported that no mortality figures were available for cattle trekked to market in Nigeria. They quoted a study from Ghana which showed a 20% mortality rate for imported cattle trekked in that country, and stated that the rate for Nigeria was probably similar to that figure. They also reported that herders crossing the Jebba Bridge ~~a~~ had lost or sold between 10% and 25% of their original herds by that point (8, pp. 82, 87).

²⁸ Unfortunately, the original weight of the animals was not reported.

arrived in Ilorin. Mortality and weight losses were extremely heavy after the animals had arrived in Ilorin, despite the fact that pasturage was provided. After ten days, only nine of the 28 animals that had arrived in Ilorin were still alive, and eight of these were in dying condition. After two ~~x~~ weeks in Ilorin the surviving animals had lost an average of 49.5 Kg. This implies that had the distance travelled been much longer, the losses en route would have been very high. From these results, W. Ferguson concludes (11, p. 86):

Practically all trade cattle arriving at Ilorin in May and June will be suffering from clinical trypanosomiasis, and perhaps, acute helminthiasis. Many of them will, in fact, have only a matter of days to live. If the main southern markets were some 100 miles further south, then this system of movement of trade cattle would prove impracticable because of prohibitive losses in terms of actual mortality and forced sales occurring before the main markets were reached.

S.O. ~~Ekxt~~ Olayide states that for the year as a whole, approximately 50% of the trade cattle arriving in Ilorin by hoof are infected with trypanosomiasis (20, p. 245). One suspects that such a high incidence of disease could put the cattle drovers in a very weak position vis à vis the buyers in the southern markets; the former are under strong pressure to sell their animals quickly before they die, and thus may have to accept whatever price is offered.

Other evidence also supports the view that losses during the latter stages of the trek are very heavy. W. Ferguson reports that there is a large difference between the number of animals crossing the Jebba Bridge and the number that actually arrive in Ilorin, despite the fact that there are no major retail markets in between. There are, however, a large number of dried meat units operating along this stretch of the route, which "could be the sequel to ^{the} availability of cheap slaughter cattle, i.e. forced sales of sick animals" (11, p. 86).

D.S. Ferguson also reports that retail beef prices in Ilorin in 1963 were lower than those in Kano, despite the fact that Ilorin is only 90 miles from Ibadan. He attributes the depressed prices in Ilorin to the "distress sales" of many animals too weak to travel on to Ibadan (1, p. 67).

There is a large ~~in~~ differential in wages paid to drovers in Kano, which W. Ferguson attributes to the fact that a good drover becomes familiar with the behavior of the individuals in his herd, so that in the final stages of the trek he can detect early signs of illness. He is then able to weigh each ~~animal's~~ animal's chances of reaching the main markets in reasonable condition against its realized value if sold earlier (11, p. 87). While the ~~existing~~ ~~existing~~ evidence is ~~s~~ strong that losses in trekking are heavy, there is clearly room for better ¹quantification of these losses, especially in light of the increasing reliance placed on trekking during the early seventies. Most evidence seems to indicate that Werhahn's assumption of a 5% mortality/emergency slaughter for the trek from Kano to Ibadan is conservative, but that his ~~fx~~ figure for tissue shrinkage (20% of liveweight) ~~is~~ may be somewhat high. W. Ferguson's figure of a 49.5 Kg loss for ~~th~~ his animals after two ^{weeks} ~~weeks~~ in Ilorin implies a 16% ~~weight~~ loss, if we assume an initial weight of 700 lbs.²⁹

²⁹ Don Ferguson points out that not all the shrinkage that takes place should be classified as an economic loss. "The first and largest loss in weight is from a decrease in fill; and later, it is from dehydration and catabolism of fat and muscle glycogen. The butcher compensates for the dehydration by soaking the meat in water a few minutes before he sells it." (1, pp.50-1)

I have not been able to find data more recent than Werhahn's ~~xxxx~~ ^{of the} on the direct costs of trekking (drovers' wages, pasture fees, etc.), but this information must be fairly easy to obtain in Nigeria.

~~The final~~ ^{Another} major direct cost of ~~the~~ trekking is the cost of the capital tied up in the animals as they walk to market. As pointed out earlier, the journey on hoof may take up to two months, and this means that a substantial amount of ~~the~~ money is "sunk" into these animals during this time. The risks and cost of that capital are borne for a longer period than is the case with more rapid means of ~~a~~ transport, and these costs are reflected in the margins demanded by traders who transport livestock between markets. (See below).

The major indirect cost incurred in trekking is the age structure imposed on the producing herds. Because of the rigors involved in trekking, animals younger than six years old are seldom walked to market. This means that scarce range and water resources ~~must~~ ^{must} be used to maintain older animals which might otherwise be marketed. This in turn has an impact on the nutrition of the herd, milk production, and hence calf mortality, all of which tend to lower the herd's productivity. The Nigerian Livestock Mission estimated that a one-year reduction in the average marketing age of cattle in the country would increase the national herd output by 10 - 15%; these figures take into ~~the~~ account only the increased number of animals that could be marketed, and do not reflect any gains from ~~a~~ improved nutrition (8, p. 84).

Applying these percentages to ^{the} SEDES ~~figures~~ figures for the value of beef production in 1966 (9, p. 199, 207) results in an implied cost to the country of ~~trekking~~ ^{this equivalent} of between \$4,059,000 and \$6,089,000 per year.

30
 30 Assuming a constant price for cattle and an exchange rate of 220 CFA'S.

66'

The ~~xxxxx~~ second major negative externality which results from trekking is the spread of disease by the trade cattle to livestock belonging to farmers along the trade ^{routes} ~~centers~~. These costs may be high and should not be ignored; they would be extremely difficult to quantify, however.

There is one major positive externality associated with trekking -- the supplying of "upcountry" villages along the trade routes with meat. Most of these villages obtain their meat by buying trade cattle which are too weak to continue on to the coastal markets; consumers in these villages enjoy a relatively cheap source of meat as a result. The volume of animals involved is apparently large; Werhahn et al. found that in 1962/63, nearly 25% of the cattle passing through Ilorin on their way ~~west~~ south were sold to local markets in the area. (16, p. 146). This point should be kept in mind when considering alternatives to trekking livestock to market.

V.B.2. Rail ~~xxxxx~~ Transport

Werhehn et al. also investigated the cost of transporting cattle by rail. Their estimates of ~~xxx~~ mortality and ~~shx~~ shrinkage losses again had to be based on certain assumptions, as no reliable field surveys had been made. Mortality losses were determined by an examination of statistics from the Federal Veterinary Department. These statistics indicated that of 252,763 slaughter cattle railed to Apapa (Ibadan) between 1960 and 1962, 153 died en route and 1002 never reached their destination; Werhahn et al. assumed that these ~~xxx~~ latter animals were sold for emergency slaughter (16, pp.167,172).³¹

³¹ It is possible that some of these 1002 animals were granted rail

These statistics imply a mortality rate of .06% for the Western rail-lines, and an emergency slaughter rate of 0.4%. This mortality rate is consistent with the figure of one per thousand reported by Jones for the Western part of Nigeria in the mid forties, although he reports a much higher rate (3-5%) for the Makurdi-Umuahia rail ^{line} ~~trip~~ in ~~the~~ Eastern Nigeria (30, p.33). Werhahn et al. assumed shrinkage losses in transit were equivalent to ~~a~~ 5% of the live^vweight (7% of the carcass weight)(16, Vol. II, pp. 35-36).³²

The other costs of transport which Werhahn considered were the railway freight charges, the trade cattle tax, loading charges, attendant charges (one attendant accompanies each train ~~xx~~ car of approximately 22 head of cattle), unloading charges, one week's grazing charges at the point of destination and, for cattle loaded at Kano, charges for three weeks grazing at the point of departure. (It is not clear why the latter were not included in the charges for cattle shipped from other ~~x~~ departure points.) The rail transport costs are summarized in Table XVI. Details are provided in Appendix Tables 4 - 7. Table XVI clearly shows that the charge per ~~xxx~~ mile decreases as the

32 They cite a study by L.L. Larson and U. Ndanako ("Report on Nine Cattle Fattening Trials in the Provinces of Sokoto, Katsina, Kano, Ba^uvelri and Bornu (rimeo), 14pp., Report no. a-13 to Ministry of Animal and Forest Resources of the Northern Region, 1962) which showed that live^vweight losses for cattle shipped ~~xx~~ from Kano to Lagos ^{was} 41 lbs per 1000 lbs shipped. Tests confirmed that the losses were due to tissue shrinkage; since the slaughtering percentage was 53.2%, this implied a 7.7% loss of meat. A similar experiment between Gusa^u and Lagos/Apapa resulted in a loss of 56 lbs per 1000 lbs shipped, or a 10.7% meat loss. Since the Kano-Lagos journey reportedly took 50 hours and the Gusa^u-Lagos trip was 66 hours, ~~xx~~ weight loss ~~xxxx~~ appeared to be roughly proportional to distance travelled (16, vol. II, p. 37). (Losses ran about .15% of the carcass weight per hour ~~xxx~~ in transit.)

Table XVI. Transport Charges for Rail Shipment of Cattle, ~~Excluding Mortality and Shrinkage Losses,~~ 1962. (Pence per Animal)

<u>DESTINATION</u>	<u>PLACE OF LOADING</u>											
	<u>Kano</u>			<u>Zaria</u>			<u>Bukuru</u>			<u>Nguru</u>		
	<u>Distance</u>		<u>Freight</u>	<u>Distance</u>		<u>Freight</u>	<u>Distance</u>		<u>Freight</u>	<u>Distance</u>		<u>Freight</u>
	<u>(mi)</u>			<u>(mi)</u>			<u>(mi)</u>			<u>(mi)</u>		
	<u>total</u>	<u>per mi.</u>	<u>total</u>	<u>per mi.</u>	<u>total</u>	<u>per mi.</u>	<u>total</u>	<u>per mi.</u>	<u>total</u>	<u>per mi.</u>		
Ibadan	583	1053 ^a	1.81	493	837	1.70	606	1051	1.73	722	1175	1.75
Abeokuta	643	1118	1.74	553	914	1.65	666	1056	1.59	782	1252	1.60
Appa	703	1212	1.72	615	1000 ^g	1.64	726	1135	1.56	842	1246 ³	1.60

^a Arthur D. Little, Inc. reported that the freight charge per head from Kano to Ibadan in 1964 was only about 48 shilling (576 pence); they give no source for this figure, however. (19, p. 15)

Source: 16, pp. 168-71.

distance traveled increases, as would be expected. Similarly, Appendix Tables 4 - 7 show that transport costs per pound are less for large animals than for small ones. In addition to the charges shown in Table XVI, Werhahn et al. added a cost of .04 pence per mile for shrinkage and mortality losses (16, p. 172).

Four main factors determine the amount of shrinkage suffered in rail transit: the season, the distance travelled, the number of times the animals are handled ⁱⁿ transit, and the duration of any lairage (8, p. 89). Since these factors vary, it is not surprising that estimates of the shrinkage suffered in rail transit also vary. The Nigerian Livestock Mission estimated shrinkage at a minimum of 10% of liveweight in 1950,³³ while the Federal Veterinary Department put it at between 10 - 15% at that time (8, p. 89). Cattle cars have been improved since 1950 (e.g. by covering them), so that shrinkage now should be somewhat less. W. Ferguson agrees with Werhahn that shrinkage losses en route average about 5%. The German team (Werhahn, et al.) did not take account of ~~wink~~ weight ~~is~~ losses suffered by the animals while waiting at the railheads for shipment, however. These losses could be substantial, as three to four week delays are ~~said~~ said to be common.³⁴ Dannsmann and Messerschmidt estimated that shrinkage for the entire rail trip (including the trek to the railhead, the wait for rail cars, and the shipment south) ran about 10% of liveweight in the early ~~x~~ sixties. (16, p. 233).

³³ Shrinkage among small ruminants was put at twice this figure (8, p. 90).

³⁴ Cattle apparently are assigned rail ~~x~~ cars in the north based upon their condition, with the best-quality animals being shipped first. This ~~z~~ means that herders with weaker animals may literally wait months for their animals to be shipped (8, p. 92).

V.8.3. Dried Meat Shipment

The only figures available on the cost of dried meat shipment are those presented by Werhahn et al. They report that the transport price per long ton (including packing) from Nguru to Ibadan was 334/-, or 1.84d per pound, the equivalent 0.43d per lb live weight (8, p. 173). While the transport cost is low, it should be remembered that in the process of drying meat some of its nutritive value is lost, and this wastage should be noted in any estimate of the cost of producing and shipping dried meat.

V.8.4. Truck Transport of Live Cattle

Truck transport is of small but growing importance in Nigerian livestock marketing. To date, I have found only one estimate of freight rates for truck transportation of cattle, that being Werhahn's figure of ₦7.10.0 per head for the Kano-Lagos journey in 1962 (16, p. 234). This is equivalent to a rate of 2.6 d/mile, roughly 50% higher than the prevailing rail charges at the time (cf Table XVI). Truck freight charges reportedly vary, however, depending on the availability of backhaul cargoes. Nonetheless, truck transport was regarded as a ~~ix~~ high-cost means of livestock shipment throughout the sixties, particularly because of substantial mortality losses which resulted from poor roads and bad treatment of animals in transit. "When large numbers of cattle are moved by lorry, it is not uncommon to see dead cattle along the highway. The death losses in shipments by lorry are very high because of the rough roads" (2, p. 110).

V.B.5. Rail Shipment of Chilled Meat

In 1950, the Nigerian Livestock Mission recommended a changeover from present methods of livestock marketing to the establishment of "factory abattoirs" in the northern producing areas of the country and the shipment of chilled meat by rail to the southern consuming centers. The Mission made no cost estimates for rail shipment of chilled meat, but because of their recommendations, others have made such estimates. The P.E. Management Group study conducted in 1960 found that the freight ^{rate} for chilled meat was 9.25 d per ton-mile from Kano to Lagos (700 miles) and 8 d per ton-mile from Nguru to Lagos (843 miles). It therefore cost 2.9 d/lb to ship chilled meat from Kano to Lagos and 3.0 d/lb to send it from Nguru to Lagos. These charges, when expressed in terms of the cost per animal equivalent, were approximately 2.05 pence/mile or slightly more than Werhahn's figures for the freight charges for live animals (roughly 1.7 pence/mile) (28, Appendix X). These figures do not take account of the shrinkage of the meat during shipment (largely from evaporation); Werhahn et al. estimated this shrinkage at a maximum of 3% (16, Vol II, p. 36). Railway data were not made available to Wehrhan et al. and they had to estimate the cost of rail transport of chilled meat solely on the basis of published freight rates. By 1962, these had risen to ₦40.10.0 per ton for Kano - Lagos, or 13.8 d per ton-mile (16, vol I), p. 7). This implies a live-animal equivalent charge of 3.06 d/mile, considerably above the cost of shipping live animals.

V.B.6. Other Means of Meat Transport

Both the P.E. Management Group and Werhahn's team investigated

the economics of truck and air shipment of chilled meat. ~~Neither~~ ^{Neither} ~~method~~ method is widely used in Nigeria presently. Air transport was ~~was~~ found to be quite expensive and impractical (freight cost were estimated to run 16 d per ton-mile in 1960), but truck transport of chilled meat generally compared favorably with alternative methods. The Management Group estimated that ~~the~~ ^{the} cost ~~x~~ of truck transport of chilled meat would be slightly less than that of ~~xxx~~ refrigerated rail transport (28, pp. 19 - 20); the German team, assuming a less ~~sophisticated~~ sophisticated trucking system (using insulated rather than refrigerated trucks) found that it ~~was~~ would be more economical to ship meat ~~this way~~ ^{by truck} than it was to transport live animals by ~~xxx~~ rail (16, Vol. II, pp. 38 - 46). If this were so, one wonders why such a system has not been instituted. Perhaps one reason is the limited demand for chilled meat in Nigeria.

One contribution of the German team was to develop formulae to estimate transport costs. These formulae are shown in Appendix Table 8.

V.C. Estimates of Marketing Margins

In conjunction with some of the previously-cited cost studies, ~~some~~ estimates have been made of marketing margins for various intermediaries engaged in the cattle trade. It is difficult to estimate margins in Nigeria, as the sale price of an animal is generally considered confidential information by the parties involved. Investigators therefore have had to try to estimate marketing margins by indirect methods, ~~etc.~~ ^{e.g.} by inferring the price of an animal from the retail price of meat (which can be directly observed) or by asking panels of

butchers and/or cattle dealers to estimate the value of given animals. Such methods have their hazards; for example, it appears that published retail price series for ~~xxx~~ fresh meat may not always be reliable.³⁶ Nonetheless, it appears that care was exercised to avoid gross errors in these studies. ^PThe P.E. Management Group identified the following seven major groups of intermediaries (excluding drovers) involved in the marketing of fresh beef in ~~Nx~~ Nigeria. (28, pp.6-7);

1. Northern Middle Man

He vouches for the vendor's title to the cattle and arranges the sale between the owner and the trader's purchasing agent. The agent, together with his drovers, is fed and accommodated by the middle man.

2. Trader's Purchasing Agent

This man bargains and undertakes extensive travelling on behalf of his principal, to whom he is responsible for the movement of cattle to a railhead in the North or to a southern market. Several drovers may be employed by the purchasing agent. It is common for him to work exclusively for one trader, who may be his father or another relative

3. The Trader

The trader's function is to finance and organize the distribution

³⁶ The reported "annual ~~xx~~ average" retail prices of fresh beef, fresh mutton, dried fish, eggs and sour milk were exactly the same (to two decimal points!) for ~~A~~ Zaria and Kaduna for every year from 1961 to 1969. One can only regard such figures with great suspicion ~~xxx~~ Cf 31, pp. 94, 96.

of cattle from North to South. He may buy and sell 300 beasts annually, or more than 10,000. Most traders are Hausas and are based on large Northern centres, such as Kano. Some live in southern towns and undertake their own selling.

4. ~~The~~ Trader's Selling Agent

He may travel to the South with the cattle or be stationed permanently there. In any event, the selling agent must secure the optimum price for each animal and he has temporary custody of the money obtained.

5. Southern Middle Man

His task is to establish contact between the wholesale butcher and the trader's selling agent. Like his ~~own~~ counterpart in the North, the southern middle man supplies food and lodging for an indefinite period to agents and drovers. A middle man in the Lagos district ~~may~~ employ herdsmen to graze the cattle until they are sold.

6. Wholesale or Master ~~Butcher~~ Butcher

This man arranges sometimes for a lairage. He slaughters the cattle, quarters them and distributes to ~~the~~ retail butchers.

7. Retail Butcher

He buys quarters of animals or smaller amounts from the wholesale butcher, often on credit, and sells to the public.

The distinctions between these roles are by no means clear-cut, with one individual of ten performing more than one function (e.g. he may be both a wholesale and a retail butcher).

Through interviews, the P.E. Management team determined how much various intermediaries claimed to earn per animal; from this information, one can calculate marketing margins. It should be noted that the study's sample was small, owing to refusal of many intermediaries to divulge this type of information. This lead one to suspect that the margins found by the study may have been underestimated. Furthermore, the marketing chain was traced ^{back} ~~back~~ only as far as the Northern middleman; it did not take into account the margins of various intermediaries who buy directly from the ~~nomadic herders~~ nomadic herders. The question of whether these intermediaries ~~who buy directly from the nomadic herders~~ make excessive profits cannot be answered on the basis of this study.

Margins were estimated for cattle shipped by rail ~~from~~ from Kano to Ibadan in 1960. An "average" animal bought by a middleman in Kano for £ 20.5.9 yielded £ 31.10.0 for the retail butcher in Ibadan. There was thus a gross mark-up for this part of the marketing chain of 55%. The gross and net margins for each of the intermediaries are shown in Table XVII.

Table XVII. Estimated Margins for Beef Marketing System, Nigeria, 1960.

	Gross Margin		Net Margin	
	Pence	%	Pence	%
Northern Middleman	240	4.9	240	4.9
Trader's Purchasing Agent	120	2.3	120	2.3
Trader	1348	22.1	480	7.9
Trader's Selling Agent	120	1.8	120	1.8
Southern Middleman	120	1.8	84	1.2
Wholesale Butcher	359	5.2	296	4.3
Retail Butcher	384	5.4	384	5.4

(cont. from Table XVII)

Gross margin equals difference between buying and selling price.

Net margin equals the return to labor and capital.

Margins are expressed as a percentage of the intermediaries' total costs (i.e., they represent the ~~per~~ percentage return to the intermediary's capital).

Source: Calculated from data in 28, Appendixes ~~ix~~ IV and VI.

The margins indicated in Table XVII are quite modest. ~~The~~ The largest gross (and net) margins went to the trader, who took the major risk of shipping the animals south and had to pay the cost of shipment out of his gross margin (62% of the gross margin went to pay ~~the~~ the cost of railing the animals from Kano to Lagos). The combined gross margin for wholesale and retail butchers was 10.9%, which seems low compared with the other studies cited below. The middlemen's margins seem very low, however Polly Hill has discussed how middlemen in the West African cattle trade sometimes earn considerably more than is commonly admitted (see 32, pp. 8ff).

Two other attempts to estimate butchers margins have been made. The first, conducted by Arthur D. Little, Inc. ~~in~~ in Ibadan in 1962. (19, pp. 27 - 37), found that the "typical" wholesale ~~butcher~~ butcher had a gross margin of approximately 12.7% and a net margin of 8.4%. (See Appendix Table 9). The retail margin was more difficult to calculate, as there ~~were~~ ~~xxxx~~ are three types of retail butchers in Ibadan.³⁷ Overall, the average retail profit margin was 14.3%. These

³⁷ 1) Meat hawkers; 2) contract buyers, representing institutions such as universities, hospitals, and large department stores; and 3) registered sub-butchers, who maintain stalls in one of the meat markets.

figures indicate that a live animal which would sell in Ibadan for ₦ 32.0.0 would ~~yield~~ ^{offal} meat and ~~offer~~ retailing for ₦ 42.6.0; the total value-added by Ibadan butchers was therefore 29% of the cost of the live animal (See 19, pp. 27 - 37 for the details of the margin calculations.)

Werhahn et al. made ~~some~~ ^{retail} estimates of wholesale and ~~retail~~ butcher margins, which were somewhat lower than those of the Arthur Little study. Estimates of margins were ~~made~~ made for two "typical" enterprises: a) one carcass butcher and three retailers in Ibadan; and b) a joint venture of four butchers (one of whom acted as the carcass butcher) in Kaduna, Northern Nigeria. The margin estimates for these two enterprises are summarized in Table XVIII. It should be noted that while the figures on gross margins were based on interviews and direct observation, the actual distribution of that margin among the wholesale and retail butchers had to be based on certain assumptions (see Appendix Tables 10 and 11 for details). Even so, the margins are reasonably close to those found in the Little ~~study~~ study.

These studies do ~~not~~ not seem to indicate excessive margins, at ~~least~~ least in the final stages of the marketing systems. It must be stressed however, that it is very difficult to estimate such margins, because cattle and wholesale meat prices are generally considered confidential information. (Traders and dealers usually exchange bids in whispers). Therefore, these estimates are based on limited ~~samples~~ samples and certain assumptions, the validity of which are hard to test.

Table XVIII. Estimates of Butchers Margins, Ibadan and Kaduna, 1962.

	Total Operation		Carcass Butcher		Retail Butcher	
	<u>Pence</u>	<u>%</u>	<u>Pence</u>	<u>%</u>	<u>Pence</u>	<u>%</u>
Ibadan						
Gross Margin	1668	22.8	995	13.6	673	8.5
Net Margin	1316	18.0	643	8.8	673	8.5
Kaduna						
Gross Margin	1507	26.2	a)		a)	
Net Margin	1285	22.4	522	9.1	763	12.2

a) Since the Kaduna operation was a joint venture, the financing of the operation (i.e. the gross margin) was presumably equally distributed among the carcass and retail butchers.

b) Gross and net margins defined as in Table XVII. Since the capital outlay was different for the retail and wholesale operations, percentage margins are not additive across rows.

Source: 16, pp. 202-3.

Werhahn et al. also attempted to estimate marketing margins in the upper end of the marketing chain. These estimates again had to be based on certain assumptions, particularly regarding the price paid to the cattle producer. Table XIX summarized the margin estimates for a "typical" animal produced in Borⁿu province, trekked to Kano and then railed to Ibadan. Appendix Tables 12 - 15 provide details on these and other margin estimates made by the German team.

Table XIX reveals fairly large gross margins, but net margins which do not seem terribly excessive considering the risks involved. Transport costs account for much of the markup: 42.3% of the final wholesale price of the animal in Ibadan went to the producers, 32.9% went to pay transport costs, and 24.7% represented intermediaries' margins (see Appendix Table 15). It should be emphasized that the petty-trader's margin was estimated on the basis of an assumed price paid to the producer; clearly further investigation is needed to check this estimate. Given the isolation of the semi-nomads, one might expect the margins involved at this end of the trade to be quite high.

VI

Regional Price Variations for Beef

As mentioned earlier, Nigerian price statistics for meat are of questionable quality. Monthly, quarterly and yearly prices for beef are reportedly collected, but it is not exactly clear how these prices are defined (e.g. whether they are end of the period figures, averages over a certain number of days, etc.) In Michigan, only yearly figures and quarterly price indices for beef were available; the latter were converted into price figures by determining the "base" of the index using annual price and index figures. Unfortunately,

Table XIX. Estimates of Marketing Margins for "Upper Half" of Cattle Marketing Chain. Nigeria, 1962 a)b)

	Gross Margin		Net Margin	
	<u>Pence</u>	<u>%</u>	<u>Pence</u>	<u>%</u>
Petty Trader, Bornu (Buys from Producer)	855	26.3	480	14.8
Wholesaler's Agent (at Potiskum, Northern Nigeria)	688	16.4	240	5.7
Wholesaler's Agent at Ibadan	1776	30.4	360	6.2
Wholesaler	600	9.7	600	9.7

a) Steer produced in Bornu province, trekked to Kano via Potiskum and Wudil, and railed from Kano to Ibadan

b) Margins defined as in ^{Table} XVII

Source: Calculated from data in 16, p. 207.

the quarterly figures were only available for four towns in Western Nigeria -- Ibadan, Abeokuta, Ijebu-Ode, and Ondo -- and the figures for Ondo were somewhat questionable.³⁸ These prices are ^{grouped} grouped in Figure ⁵ 3.

In an attempt to see how ~~we~~ well arbitragers ~~were~~ react^{ed} to intermarket price differentials, these prices were correlated with one another.³⁹ This correlation measured the degree to which prices in these ^{four} markets moved in concert. Unfortunately for the sake of this analysis, these four markets are relatively close together (the greatest ⁵ distance involved is between Abeokuta to Ondo, which is roughly 130 miles by road). One would therefore expect prices to move together in ^{the} ~~two~~ markets. This is what happened, as illustrated in the following table.

Table XX. Correlation Matrix: Quarterly Retail Beef Prices in Four Cities of Western Nigeria, 1958-71.

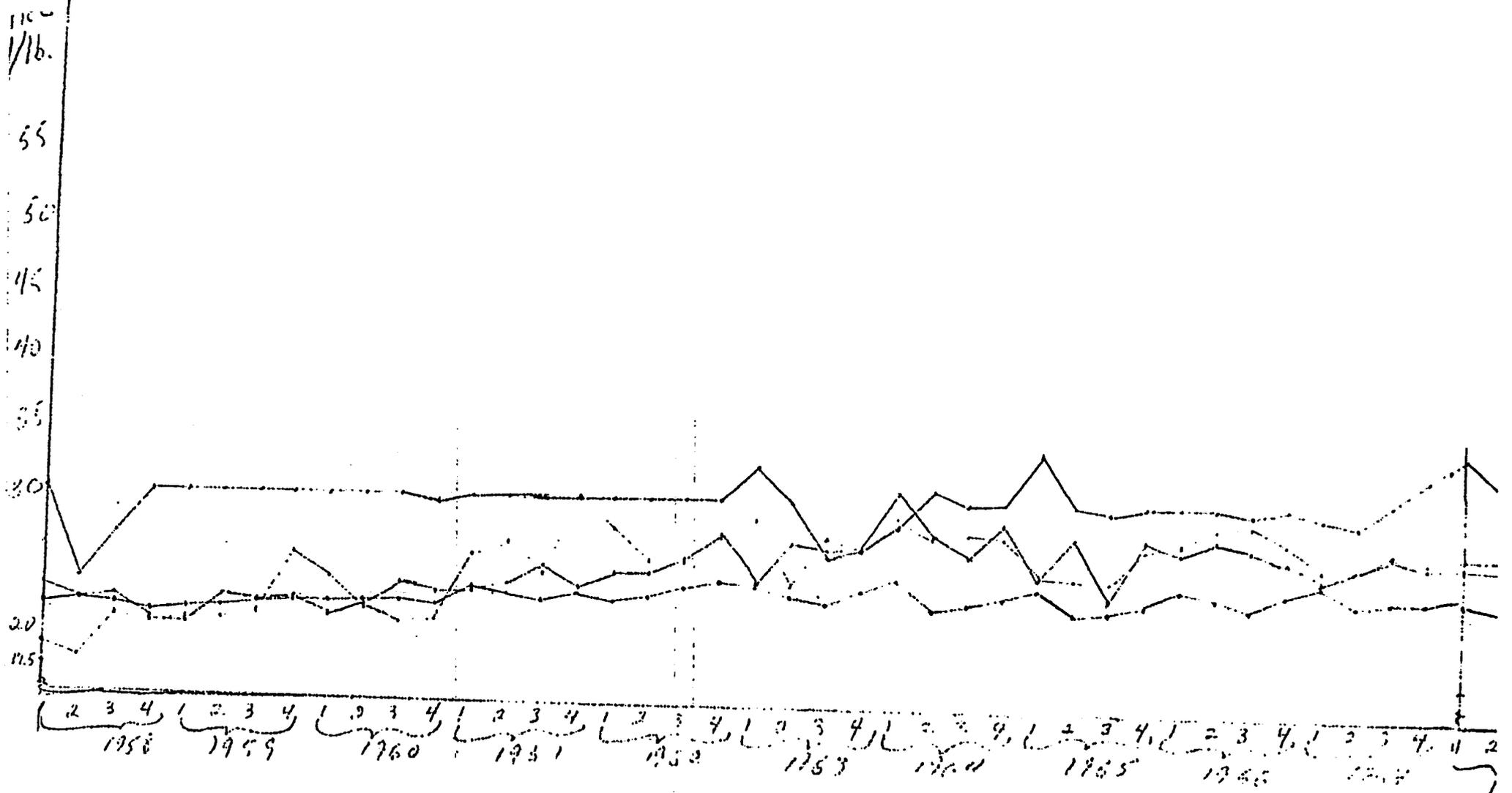
IBADAN	1.0000			
ABEOKUTA	.8356	1.0000		
IJEBUDE	.8935	.8814	1.0000	
ONDO	.9398	.7938	.8196	1.0000
	IBADAN	ABEOKUTA	IJEBUDE	ONDO

Source: Western State of Nigeria, Ministry of Economic Planning and Reconstruction, Statistics Division, Statistical Abstract (Ibadan), various issues.

³⁸ The implied base price for the Ondo index varied considerably depending on the year selected.

³⁹ Although annual price data were available for many cities throughout the country, there were insufficient observations to allow statistical analysis of these data.

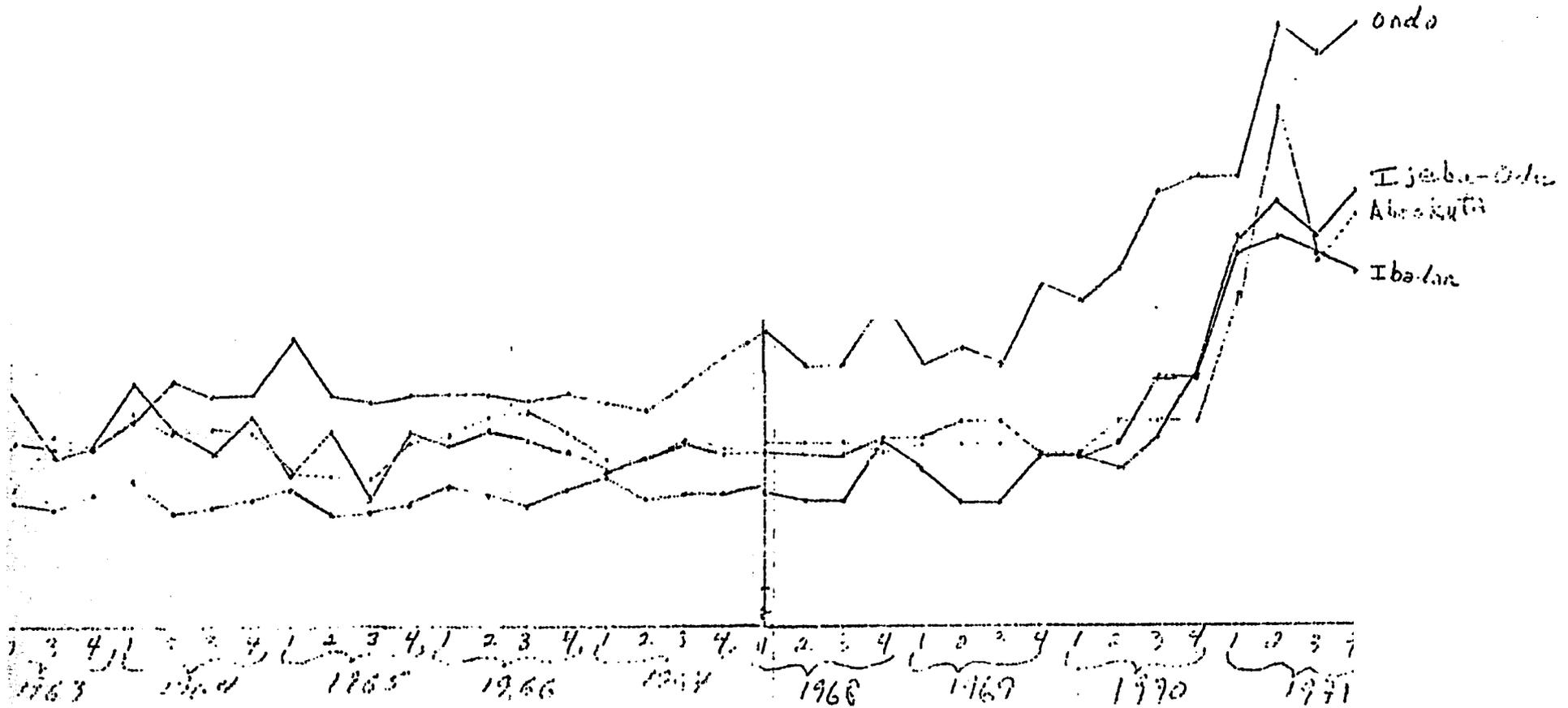
Figure 5 Quarterly Retail Beef Prices, 4 Markets in Western Nigeria, 1958-61 (Pence/lb)^{a)}



a) Prices for Ondo of questionable quality (see text).

Sources: Calculated from price indices in Western Nigeria, Min. of Economic Planning and Development, Statistics Division, Statistical Bulletin and annual prices in Federal Office of Statistics, Digest of Statistics, various issues.

Udang perikanan 1963-71 (Rencel/26) ²



Min. of Economic Planning and Development, Statistics
 Federal Office of Statistics, Digest of Statistics.

As can be seen, all the correlations were .79 or ^{higher} above. The correlation was lowest between Ondo and Abeokuta, the two markets farthest apart, ~~and~~ and was highest between Ondo and Ibadan, which are relatively close together and are directly connected by a major highway. It is unclear, ~~how~~ however, why this latter correlation was higher than that between ~~Abeokuta~~ Abeokuta and Ibadan, which are close together and are connected by rail. It would have been very interesting to correlate prices between Northern and Southern markets had sufficient data been available. Annual price data indicate that the retail price ~~is~~ spread for meat between Northern and Southern markets is considerable (Figure ⁶ 5), and IBRD has shown that for 1969 these price differentials were roughly proportional to the distance between the consuming markets ⁷ and the northern producing areas (See Figure 6).

VII ^{Steps} Directions for ~~Future~~ Future Research

This paper has suggested several areas in which further research is needed. Among the most important information needed are updated ~~supply~~ demand and supply forecasts, improved time-series on the pattern ~~and~~ and seasonality of both livestock imports and the flows of trade cattle within the country, improved data on transportation costs, and information on seasonal and spatial variation in livestock and meat prices.

VII A, Supply and Demand Forecasts

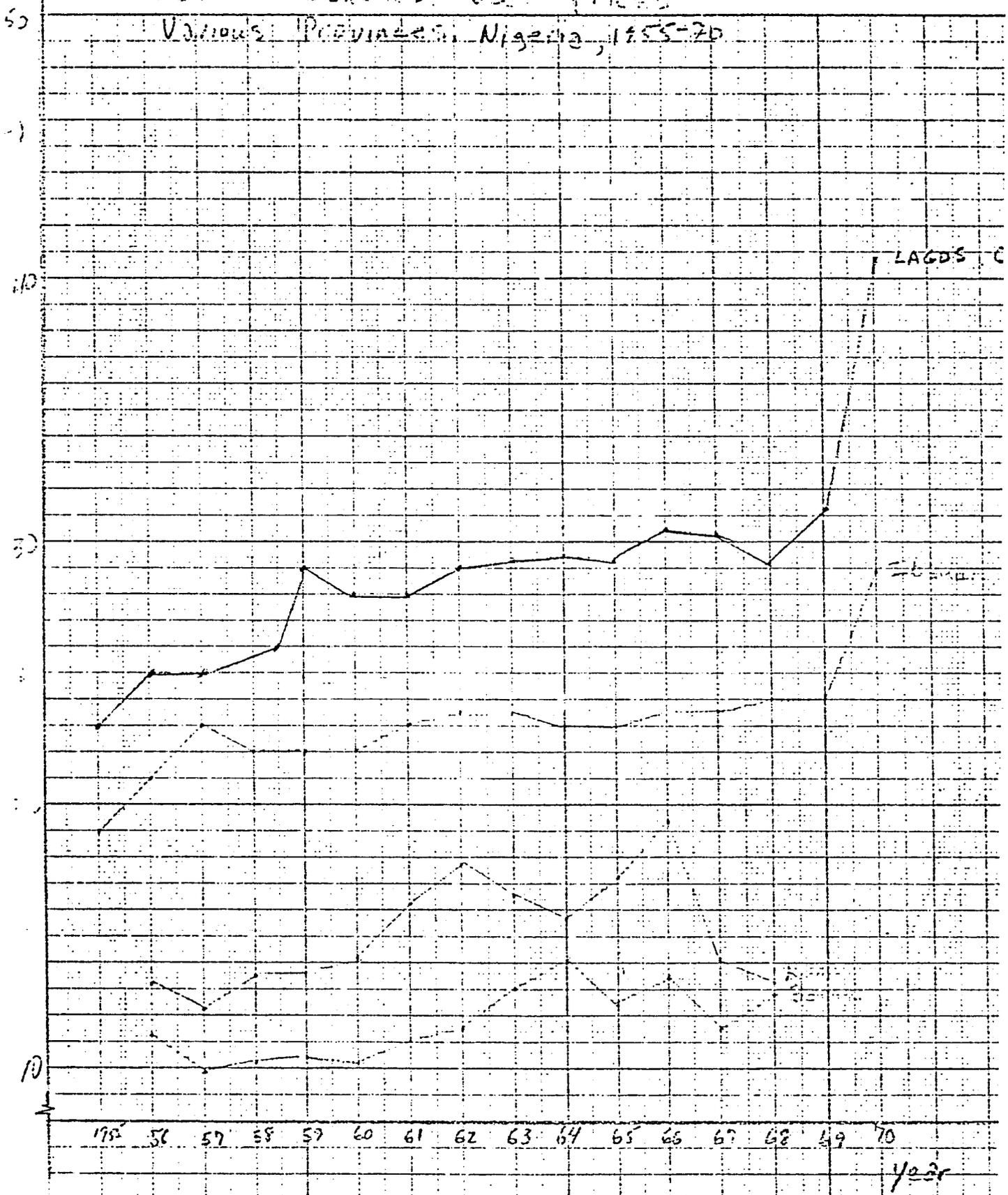
Almost all of the supply and demand forecasts available locally were made prior to the drought and before Nigeria's emergence as a

Figure 6

Retail Bondless Sales (Trends)

Various Provinces, Nigeria, 1955-70

(mln)

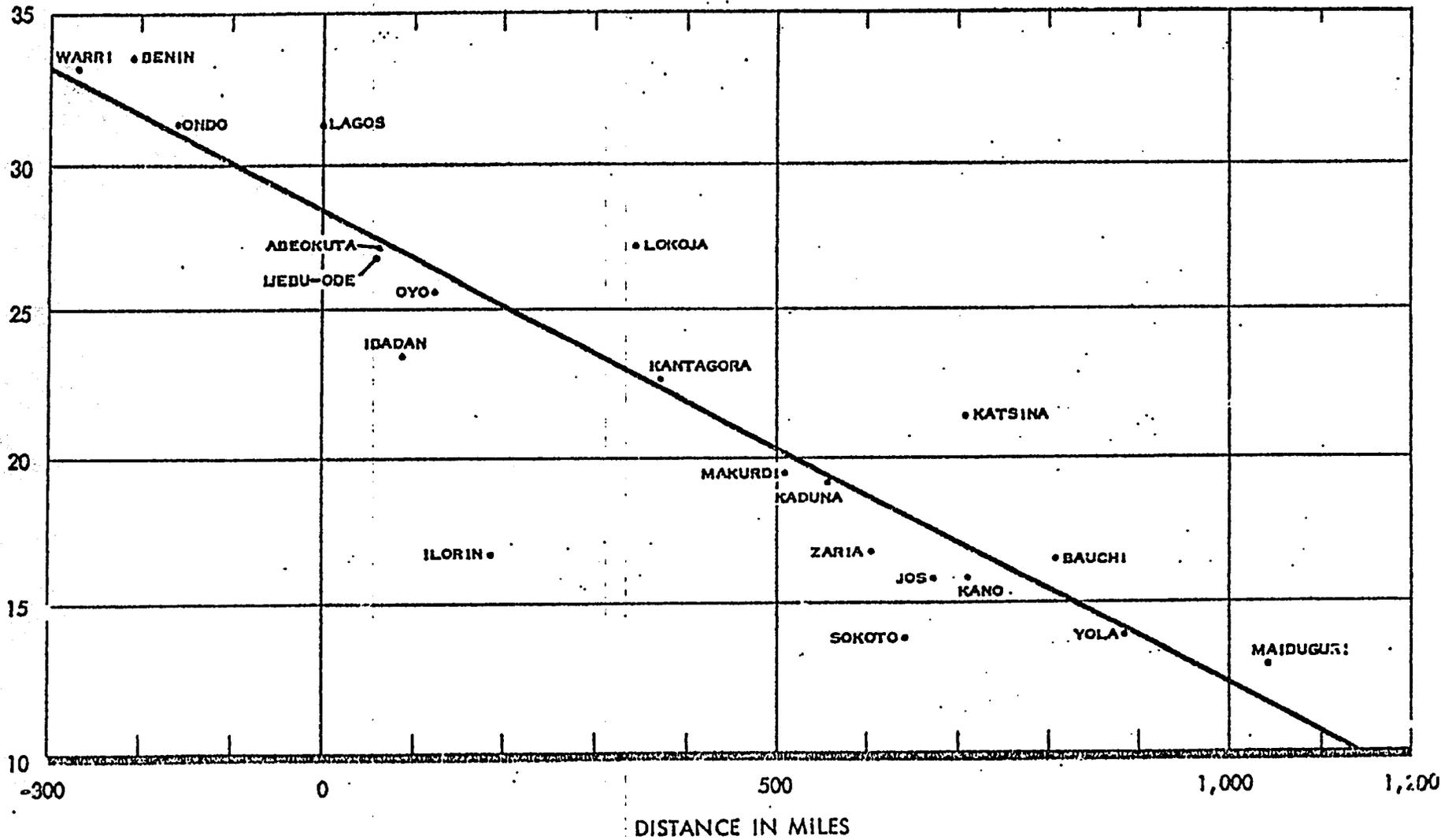


Source: Federal Office of Statistics, Annual Abstracts of Statistics, various issues

Figure 7

NIGERIA AGRICULTURE SECTOR SURVEY RETAIL PRICE OF BEEF (RELATED TO DISTANCE FROM LAGOS)

PENCE PER LB.



SOURCE: ANNUAL ABSTRACT OF STATISTICS,
FEDERAL SURVEYS ROAD MAP OF NIGERIA, 1969

IBRL 6020

major petroleum exporter. ^UBIRD has listed a large number of factors which have affected both ^{the}~~the~~ supply and the demand for beef since the late sixties, but ~~xxx~~ these factors have not been rigorously analyzed as yet (4, Annex 7, pp. 6-7):

(a) affecting supply

- (i) lower value of Nb relative to CAF;
- (ii) drought, and consequent pressure on grazing, in Niger and Chad;
- (iii) alternative markets in Niger and in Ivory Coast, Ghana, and other West African countries;
- (iv) outbreaks of pleuropneumonia;
- (v) civil disturbances in Chad;
- (vi) drought in northern Nigeria, and pressure on grazing from increased crop agriculture;

(b) affecting demand

- (i) population and per capita income growth;
- (ii) creation of a large army with regular meat rations, consuming between 50,000 and 90,000 head of cattle per annum;
- (iii) increasing urbanization;
- (iv) banning of stock fish imports causing switch to other forms of protein, but this effect is modified by a reduction in demand due to (v) and (vi);
- (v) substitution of goat and mutton for beef;
- (vi) a temporarily reduced demand from the war-ravaged areas of East Central State;

(c) other influences on price are:

- (i) general inflation; and

Inclined
and
single
space

Given the state of the data, future demand and supply projections probably will not be econometric in nature. Nonetheless, some attempt should be made to take account of the factors listed above in assessing Nigeria's future role as a market for Sahelian livestock.

VII, B. Livestock Flows into and within Nigeria

The Veterinary Services apparently collect detailed statistics on the number of livestock entering Nigeria, their countries of origin, their destinations, etc. Analysis of these statistics could yield valuable information about several factors which influence Nigeria's meat supply, e.g. the seasonality of exports from various countries, the allocation ^{of} ~~to~~ different markets among suppliers, etc. In addition, data on the flows of trade cattle within Nigeria could provide information on the numbers of intermediaries involved, the distribution of ~~sales~~ ^{sales} between markets in the south ~~and~~ and in the hinterland, the losses incurred in trekking, etc. Apparently there are many such data to be analyzed, but they seem to be available only in Nigeria.

VII, C. Transportation Costs

Transportation costs lie at the heart of most of the controversies surrounding livestock marketing in Nigeria. A thorough investigation of transport costs could help resolve many of these controversies. ~~Comparing~~ ^{Comparing} ~~marketing~~ total transport costs between regions with interregional price differentials, for example, could yield information on various intermediaries' ^a profit margins and could help determine whether large livestock dealers restrict the flows of livestock ^{into} to certain markets in order to maintain high prices. Such a study could deal with a

number of related issues as well, e.g. do livestock importers take low margins or even ~~loss~~ losses in order to obtain import licenses and business connections in the cattle-exporting countries which allow them to deal in other lucrative export ventures? (This apparently occurs to some degree in Mali -- see 34, p.2). If so, does this result in the private cost of capital and other resources used in cattle marketing being substantially below the public cost? Another issue to be dealt with is how the relative costs of alternative transport methods have been affected by ~~the~~ the increase in petroleum prices, ~~and~~ and how traders have reacted to these changes (e.g. ~~how~~ has there been an increased use of trekking as a result?).

VII.D. Seasonal and Spatial Price Differentials

Collecting monthly price data for cattle and meat from several markets throughout Nigeria would allow one to make a much more detailed analysis of how and ^{why} these prices vary seasonally and between markets. Seasonal price fluctuations could be related to factors affecting both demand and supply, for example, receipts from cash-cropping ~~x~~ in the south and varying grazing conditions in the ~~n~~ north. Spatial price fluctuations could be related to regional differences in income and the cost of transporting livestock between markets. These latter factors could be expected to vary seasonally ~~x~~ as well, depending on the harvesting seasons in different regions and the condition of the ~~xxxx~~ transport routes during different times of the year. Such information ~~xxxxxx~~ would be extremely valuable in analyzing the efficiency of arbitragers in the livestock ~~marketing~~ marketing system. While it might be difficult to collect ~~pure price~~ ~~xxxxx~~

statistics on the livestock themselves, monthly price statistics for several types of meat are already collected for several major markets in Nigeria.

APPENDIX

Appendix Table 1. Rail Exports of Livestock from Northern Nigeria to Western Nigeria and Lagos, 1967-71.

<u>YEAR</u>	<u>CATTLE</u>		<u>SHEEP AND GOATS</u>		<u>PIGS</u>		<u>DRIED MEAT</u>	
	<u>Tons</u>	<u>Head</u>	<u>Tons</u>	<u>Head</u>	<u>Tons</u>	<u>Head</u>	<u>Tons</u>	<u>Head</u>
1967	40,664	130,125	3,873	157,737	2,597	29,380	1,193	36,441
1968	29,362	93,958	4,663	189,911	2,205	24,945	1,730	52,844
1969	31,282	100,000 ¹⁰²	4,822	196,387	2,431	27,502	1,252	38,243
1970	30,955	99,056	4,506	183,517	2,787	31,530	1,135	34,669
1971	7,911	25,315	74	3,014	422	4,774	668	20,404

Notes: Animal Equivalents calculated assuming the following live weights:
 Cattle - 700 lbs; sheep and goats - 55 lbs; pigs - 198 lbs (90 Kg).
 Dried meat expressed in terms of equivalent head of cattle assuming meat yield per animal of 220 lbs and that 3 lbs of fresh meat yields ~~one~~ one lb. of dried meat.

Source: Western ~~State~~ ^{State} of Nigeria, Ministry of Economic Planning and Reconstruction, Statistics Division, Statistical Abstract, Vol XIV, No. 1 and 2 (June and December, 1972), p. 49.

Appendix Table 2. Exports of Small Livestock from Northern Nigeria to Eastern and Western Nigeria. 1962-65. (head)

	<u>YEAR</u>	<u>TO EAST</u>	<u>TO WEST</u>	<u>TOTAL</u>
SHEEP	1962	22,764	45,927	68,691
	1963	6,393	39,445	45,838
	1964	284	54,898	55,182
	1965	n.a.	n.a.	110,868
GOATS	1962	39,841	18,642	58,483
	1963	9,168	16,890	26,058
	1964	642	17,714	18,356
	1965	n.a.	n.a.	124,041
PIGS	1962	9,532	15,879	25,371
	1963	8,245	15,710	23,955
	1964	9,238	14,609	23,937
	1965	n.a.	n.a.	5,706

Note: Year runs April 1 - March 30

Sources: Northern Nigeria, Minister of Economic Planning, Statistical Yearbook 1966 (Kaduna, 1967), p. 93; Northern Nigeria Ministry of Animal Health and Forest Resources, Veterinary Division, Annual Report 1962-63 (Kaduna, Government Printer, 1965) p.22.

Appendix Table 3. Trade Cattle Moving South on Hoof, by Control Station.

Year	Total	Jebba (W. Nigeria)	Katsina Ala (E. and Midwestern Nigeria)
1953	n.a.	n.a.	41,113
1954	171,960	n.a.	41,690
1955	156,275	n.a.	38,933
1956	157,007	n.a.	38,615
1957	137,053	89,767	32,488
1958	141,548	76,396	43,794
1959	155,262	n.a.	45,147
1960	165,769	n.a.	48,798
1961	161,603	89,459	48,860
1962	172,534	92,829	48,256
1963	n.a.	n.a.	48,931
1964	n.a.	n.a.	45,162
1965	n.a.	n.a.	37,137
1966	199,366	n.a.	24,128
1967	n.a.	n.a.	17,552
1968	n.a.	n.a.	36,337
1969	214,153	n.a.	11,251
1970	n.a.	n.a.	6,719
1971	n.a.	n.a.	6,789

Note: Years runs April 1 - March 31.

Sources: N. Nigeria, Annual Report on the Veterinary Division of the Ministry of Animal Health and Forestry of the Northern Region of Nigeria, 1957-58, 1958-59, 1961-62, 1962-63 Benue-Plateau State, Military Governor's Office, Economic Development and Reconstruction Division, Statistics Section; Statistical Yearbook 1971 (Jos, 1972), p. 92; IBRD, Agriculture Sector Survey, Nigeria (Washington, 1973) Annex 7, p. 4.

115

4
 Appendix ~~Table No. 16~~

Transport and Marketing Charges on Rail Transport
per Beast

<u>Place of loading</u> K a n o	<u>Place of unloading</u>		
	Ibadan	Abeokuta	Apapa
Railway siding	3	3	3
Railway mileage in total	583 <i>d/mi</i>	643 <i>d/mi</i>	703 <i>d/mi</i>
<u>1. Transport charges</u>	sh d	sh d	sh d
Railway freight	56/-	61/-	67/-
Trade cattle tax	6/-	6/-	6/-
3 weeks grazing at Kano	6/-	6/-	6/-
Loading charges	-/9	-/9	-/9
Attendant charges	12/8	13/1	13/6
Unloading charges	-/4	-/4	-/9
1 week grazing at place of destination	6/-	6/-	7/-
Transport charges per beast in total	¹⁰⁵³ 87/9 1.81	¹¹¹⁸ 93/2 1.74	¹²¹² 101/- 1.72
<u>2. Marketing charges</u>			
Commission for middleman	20/-	20/-	20/-
Market fee payable to Local Authorities	2/-	2/-	6/-
Marketing charges per beast in total	22/-	22/-	26/-
Expenditures for transport and marketing in total:	109/9	115/2	127/-
= £	5.9.9	5.15.2	6.7.-
<u>3. Transport and marketing charges per lb. live weight</u>			
600 lbs. live weight	2.2d	2.3d	2.5d
700 " " "	1.9d	2.0d	2.2d
800 " " "	1.6d	1.7d	1.9d
900 " " "	1.4d	1.5d	1.7d
1000 " " "	1.3d	1.4d	1.5d

Appendix Table No. 5-17

Transport and Marketing Charges on Rail Transport
per Beast

Place of loading Z a r i a	Place of unloading		
	Ibadan	Abeokuta	Apapa
Railway siding	2	2	2
Railway mileage in total	493	553	615
<u>1. Transport charges</u>	sh d	sh d	sh d
Railway freight	47/-	53/-	59/-
Trade cattle tax	6/-	6/-	6/-
Loading charges	-/4	-/4	-/4
Attendant charges	10/1	10/6	10/11
Unloading charges	-/4	-/4	-/9
1 week grazing	6/-	6/-	7/-
Transport charges per beast in total	69/9 1.70	76/2 1.65	84/- 1.54
<u>2. Marketing charges</u>			
Commission for middleman	20/-	20/-	20/-
Market fee payable to Local Authorities	2/-	2/-	6/-
Marketing charges per beast in total	22/-	22/-	26/-
Expenditures for transport and marketing in total:	92/9	98/2	110/-
= £	4.11.9	4.18.2	5.10.-
<u>3. Transport and marketing charges per lb. live weight</u>			
600 lbs. live weight	1.8d	2.0d	2.2d
700 " " "	1.6d	1.7d	1.9d
800 " " "	1.4d	1.5d	1.7d
900 " " "	1.2d	1.3d	1.5d
1000 " " "	1.1d	1.2d	1.3d

Appendix Table No. 6
~~18~~

Transport and Marketing Charges on Rail Transport
per Beast

<u>Place of loading</u> B u k u r u	<u>Place of unloading</u>		
	Ibadan	Abeokuta	Apapa
Railway siding	1	1	1
Railway mileage in total	606	666	726
<u>1. Transport charges</u>	sh d	sh d	sh d
Railway freight	58/-	64/-	69/-
Trade cattle tax	6/-	6/-	6/-
Loading charges	-/5	-/5	-/5
Attendant charges	10/10	11/3	11/5
Unloading charges	-/4	-/4	-/9
1 week grazing	6/-	6/-	7/-
Transport charges per beast in total	105/11 4/3 81/7	105/6 88/-	113/5 1/5 94/7
<u>2. Marketing charges</u>			
Commission for middleman	20/-	20/-	20/-
Market fee payable to Local Authorities	2/-	2/-	6/-
Marketing charges per beast in total	22/-	22/-	26/-
<u>Expenditures for transport and marketing in total:</u>	103/7	110/-	120/7
= £	5.3.7	5.10.-	6.-.7
<u>3. Transport and marketing charges per lb. live weight</u>			
600 lbs. live weight	2.0d	2.2d	2.4d
700 " " "	1.8d	1.9d	2.1d
800 " " "	1.6d	1.7d	1.8d
900 " " "	1.4d	1.5d	1.6d
1000 " " "	1.2d	1.3d	1.4d

Appendix Table No. 19

Transport and Marketing Charges on Rail Transport
per Beast

<u>Place of loading</u>	<u>Place of unloading</u>			
	N g u r i	Ibadan	Abeokuta	Apapa
Railway siding	-	-	-	-
Railway mileage in total	722 d/mi	782 d/mi	842 d/mi	
<u>1. Transport charges</u>	sh d	sh d	sh d	
Railway freight	69/-	75/-	81/-	
Trade cattle tax	6/-	6/-	6/-	
Loading charges	-/5	-/5	-/5	
Attendant charges	13/4	13/9	14/2	
Unloading charges	-/4	-/4	-/9	
1 week grazing	6/-	6/-	7/-	
Unloading charges incl. loading and unloading at Zaria for 2 - 3 days	2/4	2/4	2/4	
Transit charge paid to Northern Authority Zaria	-/6	-/6	-/6	
Transport charges per beast in total	¹¹⁷⁵ 97/11 ¹¹⁵³	¹²⁵² 104/4 ¹¹²⁰	112/2	
<u>2. Marketing charges</u>				
Commission for middleman	20/-	20/-	20/-	
Market fee payable to Local Authorities	2/-	2/-	6/-	
Marketing charges per beast in total	22/-	22/-	26/-	
<u>Expenditures for transport and marketing in total:</u>	119/11	126/4	138/2	
= £	5.19.11	6.6.4	6.18.2	
<u>3. Transport and marketing charges per lb. live weight</u>				
600 lbs. live weight	2.4d	2.5d	2.8d	
700 " " "	2.0d	2.1d	2.4d	
800 " " "	1.8d	1.9d	2.0d	
900 " " "	1.6d	1.7d	1.8d	
1000 " " "	1.4d	1.5d	1.7d	

Appendix Table 2 - Formulas for Estimating Transport Costs

40

<u>Index</u>		<i>Fluctuation Rail Transport of Cattle in 1950-52</i>
a	= slaughter weight in lbs.	fluctuating
b ₁	= shrinkage during livestock transport by rail	7% of a
b ₂	= shrinkage during carcass transport by road	3% of a
c ₁	= freight charges livestock transport per animal	1,140.00 d
c ₂	= freight charges carcass transport per lb.	3.43 d
d ₁	= marketing and handling charges livestock transport per animal	312.00 d
d ₂	= marketing and handling charges carcass transport per lb.	0.14 d
e	= freight proportion of offal (carcass transport)	12% of a
f	= meat price per lb.	21.00 d
g	= reduction for bones (carcass transport deboned)	25% of a
h	= wages for deboning per lb.	0.07 d
x ₁	= total cost livestock transport per lb.	
x ₂	= total cost carcass transport (quarters) per lb.	
y ₁	= total cost livestock transport per head	
y ₂	= total cost carcass transport per head	
z ₁	= total cost carcass transport deboned per lb.	
z ₂	= total cost carcass transport deboned per head	

Formulas

$$x_1 = \frac{b_1 f + c_1 + d_1}{a - b_1}$$

$$x_2 = \frac{ac_2 + ad_2 + c_2 e + b_2 f}{a - b_2}$$

$$y_1 = ax_1$$

$$y_2 = ax_2$$

$$z_1 = x_2 - \frac{c_2 g - ah}{a - b_2}$$

$$z_2 = ax_2$$

Source: 16, Vol 2, p. 40

Appendix TABLE 9

ESTIMATE OF LIVE CATTLE BUTCHERS' COSTS AND MARGINS

	Estimated Weight in Lb.	Price		
		£	s	d
<u>Purchase Price of Live Cattle</u>	800	32	0	0
(1) Non Salable Items				
Blood	40			
Feces and Waste	176			
(2) Salable Items (Wholesale Cuts)				
(A) Foresection (Shoulder-Brisket-Ribs-Neck-Hump)	176	12	0	0
(B) Hind Section (Loin-Rump-Round-Flank-Kidney)	193	15	0	0
(C) Hide	60	1	0	0
(D) Head (Feet-Tongue)	67	2	5	0
(E) Offal (Stomach-Tripe-Pluck-Intestines)	80	5	10	0
(F) Butcher Boys' Take (Caul Fat-Tail-Hide Scrapings-Part of- Intestines)	<u>8</u>	<u>0</u>	<u>10</u>	<u>0</u>
Total	800	36	5	0
(3) Cost of Slaughter				
(a) Cost of Slaughter License			10	0
(b) Cost of pre-Slaughter Inspection			2	0
(c) Cost of moving cattle to slab from Market			<u>7</u>	<u>0</u>
Total			19	0
(4) Butchers' Margin				
Salable Items		36	5	0
Cost of Live Cattle	£32- 0-0			
Cost of Slaughter	0-19-0			
Butcher Boys' Take	<u>0-10-0</u>	<u>33</u>	<u>9</u>	<u>0</u>
Profit on Operation		<u><u>2</u></u>	<u><u>16</u></u>	<u><u>0</u></u>

Source 19, p.28

Appendix Table 10 A
~~Table No. 35~~

Rough Calculation of the Market Value, on Average,
of one beast (about 770 lbs.)

Item	Average Quantity in lbs.	Ibadan Average Price		Kaduna Average Price	
		in d per lb.	in total	in d per lb.	in total
Head	37	15.0	2. 6. 3	12.0	1.17.-
Legs	17	11.0	-.15. 7	9.0	-.12.9
Hide	65	5.0	1. 7. 1	3.5	-.19.-
Tongue	3	26.0	-. 6. 6	30.0	-. 7.6
Tail	3	14.0	-. 3. 6	12.0	-. 3.-
Heart	4	20.0	-. 6. 8	16.0	-. 5.4
Liver	8	28.0	-.18. 8	25.0	-.15.4
Lungs	8	14.0	-. 9. 4	12.0	-. 8.-
Kidney	2	26.0	-. 4. 4	20.0	-. 3.4
Viscera	38	15.0	2. 7. 6	12.0	1.18.-
Spleen	3	15.0	-. 3. 9	12.0	-. 3.-
Boneless Flesh	266	23.0	25. 9.10	19.0	21. 1.2
Bones	115	1.1	-.10. 4	1.0	-. 9.5
Hoof and Horns	30	1.3	-. 3. 3	1.1	-. 2.9
Blood	30	2.5	-. 6. 3	-	-
Proceeds in Total			35.18.10		29. 5.7

Source: 16, p. 199

Appendix Table 10 B
~~Table No. 36~~

Computation of Butchers' Dressing and Marketing
Expenditures

Item	Ibadan	Kaduna
	₦	₦
Average slaughtering fees incl. extra charges per beast	-.11.6	-. 3.6
Wages for 2 boys per day	-.10.0	-. 9.0
Renting fees for meat stalls (3 retailers for one beast) per day about	-. 1.4	-. 1.0
Losses due to trimmings estimated per beast at	6.6	-. 5.0
Dressing and marketing expenditures about	1. 9.4	-.18.6

Source: 16, p. 201

Appendix Table 11A
 Table No. 37

Estimated Distribution of Profits

EXAMPLE I

1 Carcass butcher and 3 retailers at Ibadan

Gross margin	£ 35.19.0d
Total expenditures	£ 30. 9.4d
Net proceeds	£ 5. 9.8d

I t e m	Expenses £	Specification of proceeds		Net proceeds	
		Gross proceeds £	£	Carcass Butcher £	Retailers £
Purchase price of the beast	29.--				
Dressing and marketing expenses (Table 36)	1.9.4				
A Total expenses	30.9.4				
Gross proceeds (Table 35)		35.19.--			
Less total expenses (A)		30.--9.4			
B Gross margin			5. 9.8		
Taking for hide		1. 7.3		1. 7.3	
Taking for bones		-.10.4		-.10.4	
C Unedible offal		1.17.7			
D Gross margin for flesh and edible offal (B less C)			1.17.7		
Profit of the carc. butcher between 20-25% of the gross margin (D) for flesh and edible offal, i.e. on average			3.12.1		
					-.16.--
E Average profit of the carc. butcher				2.13.7	
Average profit of the 3 retailers (B less E)					2.16.1
F Average profit of each retailer					-.18.8

Source: 16, Table 202

Appendix Table 11 B
~~Table No. 38~~

Estimated Distribution of Profits

EXAMPLE II

Joint venture of 4 butchers at Kaduna

Gross margin	£ 29. 5.7d
Total expenditures	£ 23.18.6d
Net proceeds	£ 5. 7.1d

I t e m	Expenses	Specification of proceeds			
		Gross proceeds	Net proceeds		
	£	£	£	Carcass butcher (Foreman)	Retailers (Other butchers)
				£	£
Purchase price of the beast	23.--				
Dressing and marketing expenses (Table 36)	-.18.6				
A Total expenses	23.18.6				
Gross proceeds (Table 35)			29. 5.7		
Less total expenses (A)			23.18.6		
B Gross margin			5. 7.1		
Taking for hide		-.19.-			
Taking for bones		-. 9.5			
C Total proceeds for unedible offal		1. 8.5	1. 8.5		
D Gross margin for flesh and edible offal (B less C)			3.18.8		
E Amount (C) to be shared between the 4 butchers					
(a) foreman				-.12.-	
(b) other butchers					-.16.5
F Amount (D) to be shared between the 4 butchers:					
(a) foreman abt. 40% of amount (D)				1.11.6	
(b) other butchers					2. 7.2
G Margins in total				2. 3.6	3. 3.7
H Average profit of each retailer about					1. 1.2

Appendix Table 12

Table No. 39

Distribution of Margins: Example I
 Estimation of the approximate share in the profits of
 some commercial groups participating in the
 marketing of a slaughter beast of abt. 750 lbs. liveweight

EXAMPLE I

Petty trader
 (Bornu Province) - Potiskum - Wudil Kaduna

I t e m s	Amounts £	Sub- Totals £	Grand Total £
Average purchase price of the petty trader is said to amount to	12.		
Transport and marketing charges are calculated at a flat rate of 2.5d per trek mile. The distance between the grazing area and Potiskum is supposed not to exceed 150 miles in this example	1.11.3		
Profit margin of the petty trader	2. --		
A Expenses in total for the first stage of marketing	15.11.3	15.11.3	
Purchase price for the intermediary I or for the wholesaler's agent at Potiskum	15.11.3		
Transport and marketing charges for abt. 250 miles Potiskum to Wudil	2.12.3		
Profit margin of the intermediary I	1. --		
B Total expenses for the second stage of marketing	19. 3.6	19. 3.6	
Purchase price for the intermediary II at Wudil	19. 3.6		
Transport and marketing charges for 170 miles Wudil to Kaduna	1.15.5		
Profit margin of the intermediary II	2. --		
C Total expenses for the third stage of marketing	22.18.11	22.18.11	22.18.11

Distribution of Margin Margin : EXAMPLE II

Petty trader
(Northern Katsina) - Wudil - Kaduna

I t e m s	Amounts		Grand Total £
	£	£	
Average purchase price of the petty trader is said to amount to	15. --		
Transport and marketing charges for about 150 trek miles from Northern Katsina to Wudil market	1.11.3		
Profit margin of the petty trader.	2.10.--		
A Total expenses for the first stage of marketing	19. 1.3	19. 1.3	
Purchase price for the intermediary I at Wudil market	19. 1.3		
Transport and marketing charges for about 170 trek miles from Wudil to Kaduna	1.15.5		
Profit margin of the inter- mediary I	2. --		
B Total expenses for the second stage of marketing	22.16.8	22.16.8	22.16.8

Appendix Table 14
 Table No. 41

EXAMPLE III

Petty trader (Bornu Province) - Potiskum - Wudil - Kano (on hoof)
 Kano - Ibadan (by rail)

I t e m s	Amounts £	Sub- Totals £	Grand Total £
Purchase price of the petty trader according to example I	12. --		
Transport and marketing charges (Example I)	1.11.3		
Profit margin of the petty trader	2. --		
A Total expenses for the first stage of marketing	15.11.3	15.11.3	
Purchase price for the wholesaler's Agent at Potiskum	15.11.3		
Transport and marketing charges for abt. 280 trek miles Potiskum-Wudil-Kano calculated at flat rate of 1.6d per mile (no commission for middleman to be taken into account at Wudil since beasts are bound for railhead Kano)	1.17.4		
Average purchasing commission for wholesaler's agent at Potiskum is said to amount to	1. --		
B Total expenditure up to railhead Kano	18. 8.7	18. 8.7	
Costprice at railhead Kano	18. 8.7		
Expenditures for transport and marketing at rail transport calculated in total	5.18.--		
Sale commission for wholesaler's agent at Ibadan	1.10.--		
Wholesaler's margin	2.10.--		
C Total expenses up to the lairage Ibadan	28. 6.7	28.6.7	28.6.7

Appendix Table 15
Table No. 42

Comparison of the Specifications elaborated in
Examples I - III

	Cattle owner's proceeds £	Total transport and marketing charges £	Total trading profit £	Grand Total £
EXAMPLE I				
Petty trader from Bornu Province via Potiskum - Wudil to Kaduna	12.--	5.18.11	5.--	22.18.11
EXAMPLE II				
Petty trader from Northern Katsina via Wudil to Kaduna	15.--	3. 6. 8	4.10.--	22.16. 8
EXAMPLE III				
Petty trader from Bornu Province via Potiskum - Wudil to rail- head Kano on hoof, from Kano to Ibadan by rail	12.--	9. 6. 7	7.--	28. 6. 7

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