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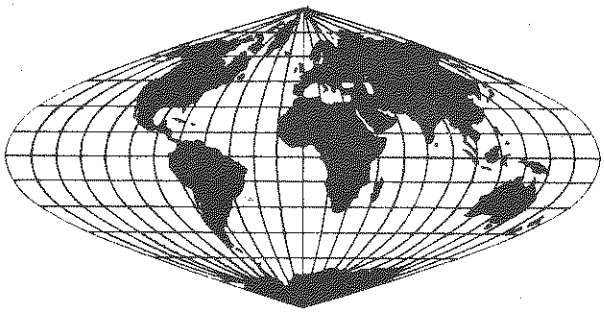
CORNELL/INTERNATIONAL AGRICULTURAL ECONOMICS STUDY

THE DEMAND FOR OILSEEDS IN WEST AFRICA

Carol Tuszynski



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West Africa has played a long and colorful role in the world oilseed economy. One of the few economic justifications for the 19th century "Scramble for Africa" was the need for palm oil and peanuts from which to make the soap to clean the faces blackened by the Industrial Revolution, and for almost 100 years West Africa was Europe's principal supplier. This is no longer the case. Production has faltered in Nigeria and domestic demand there and in neighboring countries has risen. Whether the region can continue to export is an open question and is the subject of Carol Tuszynski's paper.

The paper was prepared at the request of the U.S. Department of Agriculture and is an abbreviation of the author's MS thesis. Ms. Tuszynski spent the summer of 1982 with the USDA's International Economics Division and we are grateful for the assistance and guidance extended her by the staff of the Africa/Middle East Branch, particularly Cheryl Christensen and Brian D'Silva. Dr. Patrick M. O'Brien, Deputy Associate Administrator of the Economic Research Service, kindly arranged this collaborative effort.

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Mrs. Lillian Thomas prepared a number of the tables and charts and saw the manuscript through the press.

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I. INTRODUCTION

West Africa has a long history in the international oilseed market. Exports of palm oil and peanuts began in the early 1800s and grew markedly up to World War II. The destination of these products was Europe, where the Industrial Revolution had sparked demand for products such as soap, margarine and table oils, all of which utilize oilseeds and vegetable oils. In the post World War II period, oilseed production in West Africa has stagnated and exports have declined sharply. The principal destination of these exports continues to be Europe, but the European oilseed market has come to be dominated by demand for oilseed meals for use as animal feedstuffs. West Africa faces, in addition, increased competition from other developing countries, particularly Malaysia.

The role West Africa will play in the international oilseed market in the future will depend upon the balance it strikes between production and consumption. A major question is whether the region will be able to accelerate production to match increases made by competitors. Complicating this is the fact that the products produced from oilseeds are ones for which demand generally rises as incomes rise; therefore, as West Africa itself develops, domestic demand for oilseeds will grow.

This study analyses the significance of economic development and rising incomes in West Africa on the region's oilseed economy. The study incorporates an historical background of the West African oilseed trade and information on the dietary role of these commodities in the region into an analysis of future demand. Three countries, Nigeria, Cameroon and the Ivory Coast, serve as case studies because of their positions as leaders in the region in the rate of growth of GNP and in its absolute per capita level. Nigeria and the Ivory Coast have also been important suppliers of vegetable oils in the world market, while Cameroon's production has typically been sufficient to allow for exports as well. Demand projections are made for oilseeds and vegetable oils in these three countries to 1990 and the levels so obtained are examined for their impact on 1) oilseed self-sufficiency within these countries and 2) the level of international trade in oilseeds expected from these countries. The study finds that Cameroon and the Ivory Coast have the best prospects to continue to be self-sufficient in oilseeds and to export them and their products into the next decade. To do so, however, both will have to continue to increase oilseed production. Nigeria, barring a major reversal in its agricultural sector, will continue to be an importer of oilseeds, exporting only palm kernels.

II. OILSEED AND VEGETABLE OIL PRODUCTION IN WEST AFRICA

West Africa's oilseed trade developed in the early 19th century. The combination of increased demand for oilseeds in Europe and the decline of the African slave trade helped to make oilseeds the premier export of the region and triggered a tremendous expansion in production. While British traders focused on palm oil producing regions, French traders sought areas where peanuts could be produced as peanuts could be processed into soaps with the qualities desired by French consumers, while palm oil could not. Trade was carried out in the region through middlemen enlisted by European trading houses. These middlemen were given credits, initially in European manufactured goods and other commodities, such as cotton, arms, salt, stockfish and alcohol and later in money for future delivery of a quantity of product (82, p.287, 110, p.51). With the exception of set backs during both World Wars and the Depression, West African oilseed production and exports expanded rapidly until the post-World War II era. Since World War II production growth for the region as a whole slowed markedly and exports declined.

Regional Production Trends, 1960-1980

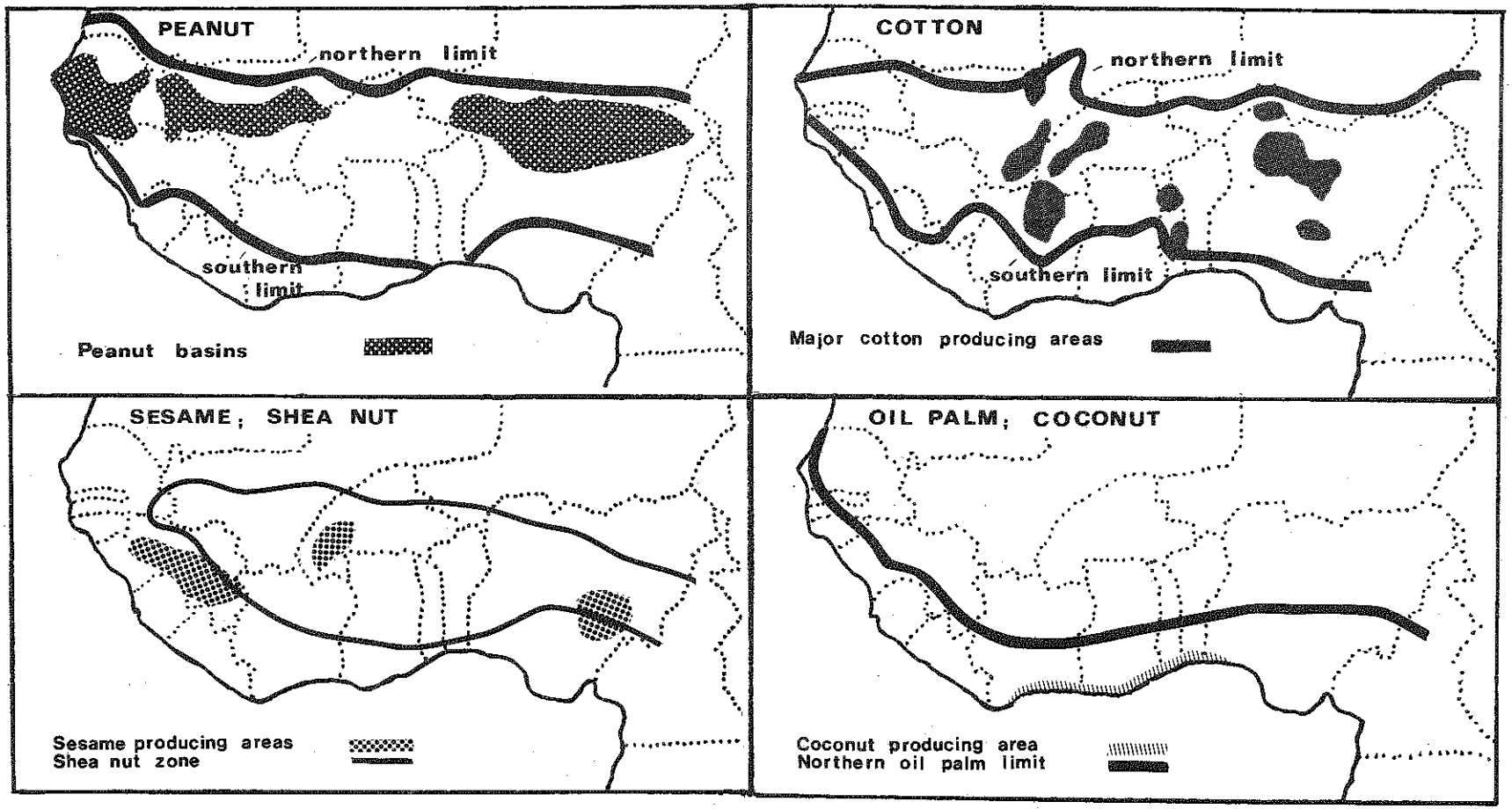
The principal oil-bearing crops in West Africa are the tree crops, oil palm, coconut and shea and the annual crops, peanut, cotton, sesame and soybean. Map 1 indicates the distribution of most of these crops throughout West Africa. The oil palm and coconut are associated with the coastal areas, while the others predominate in the middle and northern areas.

This distribution has implications for the stability of production throughout the region. In general, countries lying in the coastal zone rely on permanent tree crops, while countries in the interior rely on annual crop production, the yields of which might be expected to flucuate to a greater extent. Such a result is indeed indicated in Figure 1 (fold out at the end of the Chapter) showing regional production for the period 1960-80. This difference is particularly evident if one compares production in what is termed the Southern zone to production in the Northern zone.

There are a number of other important features of West African oilseed production to be gleaned from this figure. Overall, the production of peanuts in the region fell during the 1960-80 period. The best performance attained in any of the zones was stagnation, while production in others fell markedly. For oil palm products, total regional production has increased modestly. This is due principally to increases in a few countries. However, the rate of growth in production is far below that attained by competing countries, notably Malaysia.

MAP 1

DISTRIBUTION OF SELECTED OIL-BEARING CROPS IN WEST AFRICA



Source: Y. Pehaut, Les Oleaginaux (University of Lille, 1974), pp.6,111,148.

Nigeria is the region's single most important producer and also the producer with the most diversified portfolio of oil-bearing crops. These features reflect Nigeria's great size and its spanning virtually all of the climatic zones in the region. Nigerian production has, however, not been steady over the period, showing sharp declines in the late 1960s, when the Civil War disrupted oil palm cultivation, and in the early/mid-1970s, when drought and disease struck the peanut basin. Overall production in 1980 stood at roughly 70 percent of peak levels.

Finally, the recent production history of the Ivory Coast and Cameroon is noteworthy. Ivorian oilseed production has increased dramatically in the 1970s and stood in 1980 at roughly four times its earlier levels. Cameroon, which entered Independence with a higher level of oilseed production than did the Ivory Coast, has expanded production somewhat more modestly, but its production remains more diversified than that of the Ivory Coast.

Regional Production Systems

Oil palm production systems in the region range from the collection of fruits and nuts from wild trees to plantation agriculture. For peanuts, smallholder production is the rule.

Oil Palm

Nigeria. Nigeria has the largest natural stand of oil palms and traditionally has relied on the collection of palm fruits and nuts from wild trees and on smallholder cultivation. British colonial policy contributed to this result as it was British policy that there be no major change in the local system of production (110, p.35). Plantation agriculture was not encouraged, as the British followed a policy of indirect rule in which local land tenure systems were untouched (110, pp.37-38).

In the pre-World War II era, Nigerian production grew as traders moved into interior regions and offered incentives for farmers to collect palm fruits and kernels from wild trees. This increased penetration of the interior can be attributed to improved transportation and political stability.

In the post-War period, the oil palm industry in Nigeria began to change. In 1949 the British government created the Nigerian Oil Palm Produce Marketing Board (later split into regional organizations and reorganized) charged with the development and improvement of marketing, price stabilization, economic development and research (110, p.76). Shortly after its inception, however, its primary objective became the raising of funds for development programs. To accomplish this objective, the Board sought to increase export production via improvements in marketing organization and in processing.

Innovations in marketing were twofold. Firstly purchasing arrangements were changed. The Board began to license buying agents, many of them former middlemen, with the purchases of these agents transferred to the Board which made all sales to foreign merchants. Secondly, the Board altered the oil palm price structure. Producer prices were announced early in the season and these prices were communicated directly to the farmers. There were also differential prices accorded to different grades of palm oil in order to encourage production of higher quality oil (110, pp.77-84).

To improve oil palm processing, hand presses were encouraged and oil palm mills established. The new mills accounted, however, for only a fraction of the total palm oil purchased by the Marketing Board, due to managerial inefficiency, maintenance problems, and inadequate fruit supplies, and many of the mills built in the 1950s were closed in the 1960s (110, pp.90-91).

Since 1960 palm oil production in Nigeria has grown by 36 percent (Figure 1). This rate of growth represents a slowdown from pre-war growth and also falls short of the growth rates achieved by Malaysia and the Ivory Coast. There are three categories of factors accounting for this relative slowdown. Firstly, innovations enacted for marketing did not achieve their objectives; rather than acting as an incentive to producers, the policies of the Marketing Board have, particularly in the post-Independence era, acted as a constraint to production. It is unfortunately not possible to compare producer prices offered by the Marketing Board to those producers were receiving from middlemen in the pre-war period, but producer prices for palm oil and kernels, as a percent of world prices, consistently fell from 1949. This was particularly true after Independence when prices for palm oil were cut from 60 percent of the world price to 44 percent (Table 1). This sort of price trend indicates a desire on the part of the Marketing Board to utilize its price policy as a means of generating revenue and not as an incentive for producers. In recent years this trend has been changed and in the 1979/80 and 80/81 seasons, the producer price for palm oil was raised to 110 and 100 percent of the world price and for palm kernels to 67 and 82 percent.

The second determinant of this relative slowdown, is the minor emphasis accorded to plantation development in Nigeria. Plantation development has been the main method of increasing production in Malaysia and the Ivory Coast, but was undertaken in Nigeria only in the 1960s through State Development Agencies and was never emphasized. Due to managerial and other problems, established plantations have accounted for only a fraction of total production. Related to this lack of plantation development is a critical lack of rehabilitation of existing oil palm groves.

A final group of factors contributing to the inhibition of oil palm production increases in Nigeria, are political crises and petroleum development. The major share of Nigeria's oil palm production is obtained in the Eastern portion of the country and when that region was torn by the Civil War in the 1960s, production fell sharply. The Eastern region is also the location of petroleum discoveries and petroleum development may be drawing laborers away from the agricultural sector.

TABLE 1. NIGERIA: PRODUCER PRICES AS A PERCENTAGE OF WORLD PRICE FOR SELECTED OIL-BEARING CROPS, 1949-67

(percent)

Year	Palm Oil	Palm Kernel	Peanut
1949-52 average	61.8	60.9	35.1
1953-57 average	62.0	59.2	47.8
1958-62 average	52.1	53.3	62.3
1963-67 average	44.4	50.2	67.8

Source: Olayide and Olabutunbosun, Trends and Prospects of Nigeria's Agricultural Exports (Nigeria, 1972), p. 77.

Ivory Coast. The Ivory Coast entered Independence with fairly well developed cocoa and coffee industries. The country's oil palm industry was not sufficient to meet domestic consumption. Since the 1960s, the government has organized and implemented an oil palm development program which has made the country West Africa's second largest producer.

The government's oil palm project was begun in 1962. It consisted of the development of oil palm plantations and associated mills, and the State agency SODEPALM (Society for the Development and Exploitation of the Oil Palm) was put in charge. In 1969 SODEPALM's responsibilities were divided between itself and two additional state agencies, PALMIVOIRE and PALMINDUSTRIE. SODEPALM has responsibility for smallholder oil palm plots and all joint coconut/oil palm plantations, while PALMIVOIRE has responsibility for large plantations, and PALMINDUSTRIE covers processing and marketing (13, p.174).

The plantations developed under the Ivorian oil palm project are of two types, industrial and village. The major difference between the two is in landholdings, with the village type consisting of groups of smallholders working their fields and industrial plantations being worked by salaried workers. The village plantations form a sphere of 20 kilometers around the industrial plantations with a mill located at the center. The basic size of the plantation is planned to be 4500 hectares (67, p.6), with smallholders working roughly 4 hectares each (82, p.1145).

Virtually all oil palm production in the Ivory Coast is under the administration of the three companies and the growers and agencies have specific duties. The government, for example, provides fertilizers, seedlings, pesticides and technical help, while the growers are responsible for the actual planting and upkeep of the trees.

From the start, recruitment of laborers for the industrial plantations posed a problem for the Ivorian government. For the village plantations the financial arrangement was favorable to the farmer, with up to 50% of the costs of investment, including the cost of preparation for planting, extension workers and overhead, being essentially free to the smallholder (13,p.175,177). Workers on the industrial plantations, however, have typically had to be recruited from neighboring countries as few Ivorians were interested in this type of employment. In the early 1970s some 80 percent of the plantation workers with PALMIVOIRE were immigrants (13, p.178).

By 1970 industrial plantations covered over 36,000 hectares and village plantations over 17,000 hectares, for a total of 53,000 hectares. This is a substantial increase from the 10,000 hectares planted in the early 1960s (82, p.1132). The future of the Ivorian oil palm industry will largely depend on the rehabilitation of existing plantations and further plantings. In 1980 palm oil production estimates stood at 170,000 metric tons (Figure 1).

Cameroon. Cameroon probably had some of the earliest plantation development in the West African region. From the time it was made a German colony in 1884, private German companies began to establish plantations

which grew principally cocoa, oil palm and rubber (65, pp.256-57). After World War I, when German Cameroon was divided between Britain and France, the British at first confiscated the plantations and then sold them back to virtually the same owners in the 1920s (65, p.259). These plantations were again seized in World War II and after the war entrusted to the Cameroon Development Corporation (CDC), a company formed in 1947 for that purpose.

Despite this early plantation development, the major share of Cameroonian oil palm products at Independence were derived, as in the other countries in the region, from smallholder gathering operations. The CDC until 1966, when it received a substantial sum of money from the World Bank and other agencies, lacked the financial wherewithal to undertake large scale oil palm development. The Cameroonian government took a late interest in oil palm production and in 1968 formed the state company SOCEPALM to develop oil palm in Eastern Cameroon. The government also became the major shareholder in CDC in a reorganization in 1973. Since 1966 CDC oil palm estates have doubled in planted area to almost 17,000 hectares and SOCEPALM has planted some 17,000 hectares as well. Products from plantations accounted, in the late 1970s, for over one-half of all of the palm oil produced in Cameroon (96, May 1982). Total palm oil production in 1980 was estimated at 79,000 metric tons.

Benin. While Benin's total palm oil production in 1980 was estimated at just 28,000 metric tons, the country earns a substantial amount of its foreign exchange from oil palm products (67, p.15). The importance of oil palm products as an export for Benin began in the mid-1800s when the King of Dahomey made harvesting of palm fruits an obligation of tenured farmers (82, p.404). Like other countries in the region, the oil palm industry, until Independence, relied on the harvesting of wild trees.

In 1962 the state company SONADER was established to develop oil palm in southern Benin (13, p. 163). The oil palm plantations established by SONADER differ in organization from those established in the Ivory Coast. Benin's plantations are cooperative enterprises in which the producers are members; the state, however, continues to own the land (13, p.164). In addition, for each block of oil palms planted, there is an equal area provided for food crop production (67, p.5). At Independence only about 2,000 hectares were planted in oil palm plantations, but by 1971 this had increased to 27,000 hectares (67, p. 18). Benin's oil palm production is constrained by its less than ideal climatic conditions; it suffers from low and poorly distributed rainfall (67, p.18).

Peanuts

Nigeria. The peanut trade in Nigeria was established in 1912/13 upon the completion of the Lagos-Kano railway. While British railroad developers expected to reap cotton from Northern Nigeria for British textile mills, the price of peanuts and their suitability to the northern Nigerian climate made them the choice of smallholders. Major constraints to peanut expansion in Nigeria have been labor (the crop competes directly with food

crops) and transportation (although such services have been greatly extended) (50, p.104). Land has been less of a constraint as peanuts are generally grown in mixtures with other crops, such as guinea corn and millet (50, p.105).

As with the Nigerian oil palm industry, a Marketing Board was established for peanuts in the post World War II years. This Marketing Board licensed buying agents and established producer prices (50, p.142). Producer prices for peanuts, like those for oil palm products, have, until recently, been substantially below world prices, as shown in Table 1 . The share received by peanut producers has, however, been rising. For 1979/80 and 1980/81 producer prices on peanuts were raised to 120 and 110% of world prices.

Nigeria's boom peanut years came in the mid-1960s (Figure 1). During those years, increasing amounts of peanuts were planted compared to other crops and increases in sole-cropping of peanuts were achieved (50, pp.134-135). Such cropping patterns became possible largely due to improved transportation, which reduced the reliance of producers on own production of foodstuffs to feed their families (50, pp.134-135). Also during these years, local processing of the seed became important and exports from Nigeria were more and more in crushed form.

In the early 1970s a drought, the worst since 1913/14, struck the Sahel and northern Nigeria, devastating the peanut crop. Since that time peanut production in Nigeria has failed to recover (Figure 1). A number of factors are offered as explanations for this failure. In the two seasons following the peak of the drought in 1973, the region was plagued with Rosette virus transmitted by aphids. Due to the drought and the aphids, seeds were in short supply and hence were being used for 6-7 seasons and were therefore low in both disease resistance and yield potential. Returns for cash food crops, including maize, have perhaps of late been better than returns for peanuts and producer prices for cotton may also be more favorable than those for peanuts (50, pp.148-149, 97). Peanut production in 1980 was estimated at 570,000 metric tons unshelled.

Senegambia. As in Nigeria, it was railroad development coupled with favorable climatic conditions which led to the establishment of the peanut trade in Senegal. French railroad building in the late 1800s into the interior of West Africa mightly expanded production. In addition the Senegalese Wolof aristocracy supported peanut production and encouraged their subjects to produce the crop (82, p.321). The quality of Senegalese peanuts and Senegal's proximity to France also allowed the region to withstand the early challenge of Indian production which became readily available to Europe with the opening of the Suez Canal (82, pp.344,352).

The peanut in Senegal is a smallholder crop and farmers in Senegal face the same constraints as do those in Nigeria. Senegalese farmers have handled the labor constraint in a way different from their Nigerian counterparts and also tend to plant more of their fields in peanuts (50, p.135). For most of the history of the Senegalese peanut trade, migrant workers have accounted for an important share of production. These workers, termed Strange farmers, come from Mali, Upper Volta and Guinea.

It was estimated that some 100,000 of such farmers were employed in Senegambia early in the 20th century and in the Gambia alone, in the 1980s, there are an estimated 20 to 40,000 (92, p.102). Generally these farmers are unmarried men or men considering marrying for a second time who come into the region searching for a producer who will take them in. This local producer then provides them a piece of land on which to cultivate peanuts in exchange for both a share of the production and also several days of labor a week on the producer's own fields.

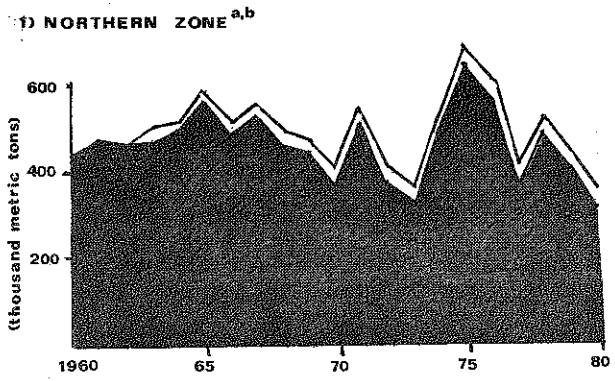
In the post Independence period, the Senegalese government has come to control farming within the country (19, p.555). Socialism and the collectivisation of farming were viewed as the best ways to promote the welfare of the masses (82, p.978). In addition, production was to be increased through improved productivity. For the peanut these two elements have meant that grower cooperatives have been formed which are obliged to sell to the government and which obtain, in turn, seeds and other inputs.

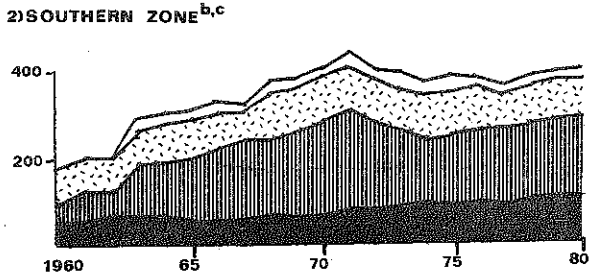
Peanut production in Senegal was estimated in 1980 at 500,000 metric tons unshelled, only about one half of a normal Senegalese crop due to bad weather. Future production increases in Senegal are likely to be tempered by the country's need to reduce its large and growing food import bill.

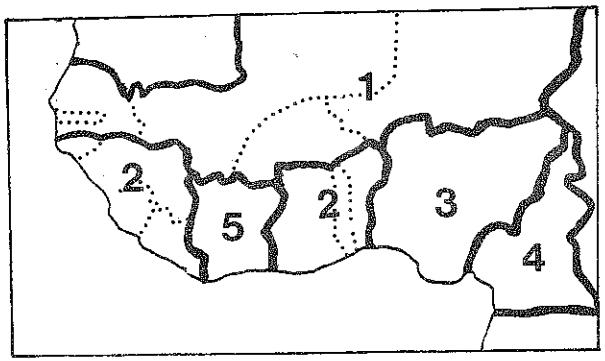
FIGURE 1

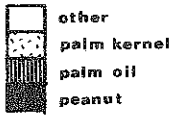
PRODUCTION OF OIL-BEARING CROPS IN WEST AFRICA, 1960-80

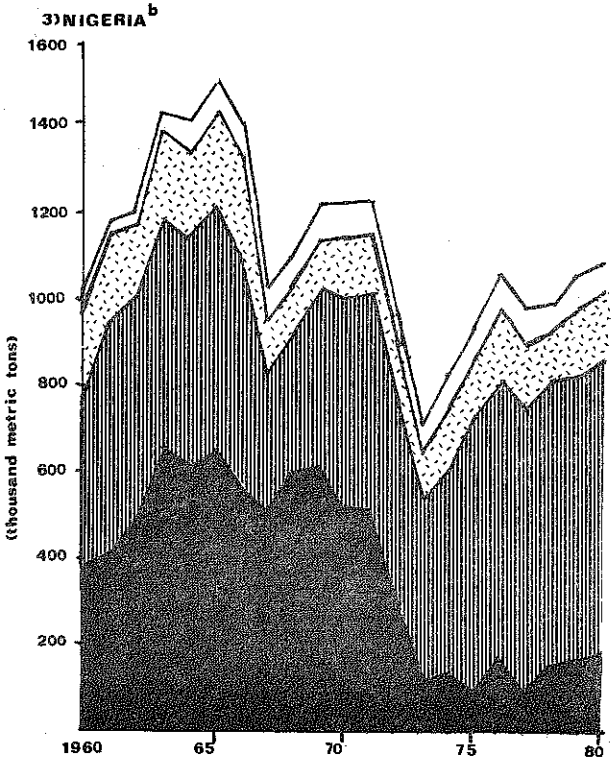
(vegetable oil equivalents)

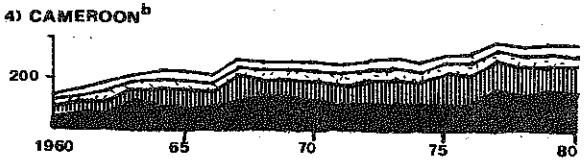


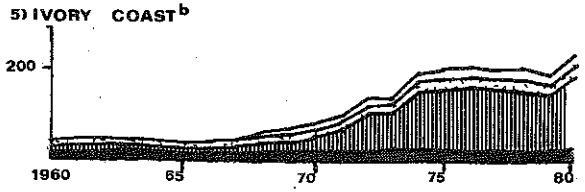












[a] Includes: Gambia, Mali, Niger, Senegal and Upper Volta.

[b] Copra and sesame data unavailable for 1960-62.

[c] Includes: Benin, Ghana, Guinea, Guinea-Bissau, Liberia, Sierra Leone and Togo.

Source: FAO, Production Yearbook, various issues

III. UTILIZATION OF OILSEEDS IN WEST AFRICA

Oilseeds can be utilized in three general ways: 1) for direct human consumption, 2) for livestock feedstuffs, and 3) for industrial (nonfood) uses. Historically, oilseed utilization in developed countries has changed from an emphasis on use for human consumption and soap manufacture to an increased emphasis on use for livestock feedstuffs. To effectively analyze demand prospects for oilseeds in West Africa, the usage pattern for the region must be delineated. Overall, it appears that food is the overwhelming use to which oilseeds are put in West Africa, use for livestock feedstuffs and industrial products is relatively minor.

Oilseeds in the West African Dietary

> "So Elijah went off to Sidon. And when he reached the city gate, there was a widow gathering sticks; addressing her he said, 'Please bring me a little water in a vessel for me to drink.' She was setting off to bring it when he called after her. 'Please,' he said,'bring me a scrap of bread in your hand.' 'As Yahweh your God lives,' she replied,' I have no baked bread, but only a handful of meal in a jar and a little oil in a jug";...(I Kings 17: 10-12)

A dough or paste made from the staple cereal or tuber and fried in oil, or alternatively, served with a sauce containing legumes, green leaves, oil and sometimes meat or fish, serves as the mainstay of populations throughout the world including those of West Africa (12, p. 86). Table 2 indicates the heavy reliance, greater than 50 percent, of diets in West Africa on starchy staples, with the staple varying from millet in the north to cassava and yams in the south and to rice along the western coast.

In addition to this heavy reliance on starchy staples, diets in West Africa contain only moderate levels of fats vis-à-vis consumption levels in more developed regions. Food balance sheets for West Africa indicate that fats, in 1975-77, provided no more than 25 percent of total calories (Table 3). As a comparison, in the United States fat accounts for some 40 percent of total calories (86, p.59), a level which is considered detrimental to health. One would expect thus that, as incomes rise in West Africa, fats consumption will also increase.

Table 3 indicates that oilseeds typically provide 60-80 percent of total fat calories. Mali, Niger and Upper Volta are exceptions to this, having, in general, total fats consumption levels on the low side and obtaining much of this fat from the staple cereals, sorghum and millet. This result may indicate a preference for selling oilseeds for cash rather than using

TABLE 2. STARCHY STAPLE RATIO IN WEST AFRICA

(percent)

	Percent of Calorie Ration
NORTHERN ZONE	
Gambia	65
Mali	78
Niger	74
Senegal	65
Upper Volta	75
SOUTHERN ZONE	
Benin	71
Cameroon	53
Ghana	63
Guinea	74
Guinea-Bissau	65
Ivory Coast	64
Liberia	68
Nigeria	73
Sierra Leone	64
Togo	77

Source: FAO, Food Balance Sheets, 1975-77 (1980).

TABLE 3. CONSUMPTION OF FATS IN WEST AFRICA

	Percent of Total Calories Derived from Fat	Percent of Total Fat Derived from Oilseeds	Oilseed Consumption (Oil Equivalents)
			(kg./year)
NORTHERN ZONE			
Gambia	25	76	17.9
Mali	17	49	7.4
Niger	13	35	3.9
Senegal	23	67	13.9
Upper Volta	15	39	4.7
SOUTHERN ZONE			
Benin	23	74	15.0
Cameroon	23	72	16.3
Ghana	16	69	9.1
Guinea	17	68	8.9
Guinea-Bissau	22	74	15.7
Ivory Coast	18	70	12.9
Liberia	20	83	16.1
Nigeria	18	67	10.9
Sierra Leone	24	87	17.7
Togo	16	60	8.0

Source: FAO, Food Balance Sheets, 1975-77 (1980).

them for own consumption. Associated with the overall fat consumption patterns in the region are apparent oilseed consumption levels ranging from 4-18 kg/year of oil equivalents.

Food balance data are typically crude estimates of food availabilities. Error can easily enter into their calculation at almost every step, particularly when they are calculated for developing countries. Moreover, they provide no information on the distribution of food availabilities across geographical areas, between urban and rural areas and within households. Such information can only come from food consumption and nutritional surveys. While data from these surveys have their problems as well, they can complement the food balance findings, serve as a check on them, and when judiciously used in conjunction with them can flesh out a picture that would otherwise be sketchy.

Findings of Food Consumption Surveys

For the purposes of this study only a relatively small number of food consumption surveys were usable. Firstly, surveys were sought which had a fairly widespread coverage. Secondly, information on oilseed consumption, not simply information on starchy staple consumption, had to be included in the survey results. Unfortunately many of the surveys with widespread coverage are rather old, while those giving quantitative data on oilseeds consumption cover somewhat scattered population groups.

Two large food consumption surveys provide a picture of total caloric intakes and total fats consumption in West Africa. One study was done in Nigeria in the 1960s, the other in French West Africa in the late 1940s. Apparent total calories consumed per day ranged from 1000-4000, with a heavy concentration in the 1500-2500 range. Of these total calories, it was rare to find more than 20 percent of them being supplied by fat; a 10-20 percent of total calories as fat consumption level being far more common and more in line with the food balance sheet data when allowance is made for the time difference in the data.

Nigeria. In 1965 the U.S. Department of HEW undertook a nutrition survey in Nigeria which covered a civilian population of over 400 persons as well as some military and educational facilities (only the results for the civilian populations will be discussed here) (107). In the dietary survey, food for each meal was weighed before and after preparation and left overs were also weighed. An analysis was then performed on these foods to determine their chemical content. Results from the survey were expressed as total grams of fat/person/day. Total caloric intake was also provided and from these two figures, a percentage of total calories consumed as fat was calculated (each gram of fat containing approximately 9 calories). Included in the U.S. HEW report was a presentation of results from a study done in the 1950s of food consumption in rural Nigeria by Nicol and measuring food consumption during various seasons of the year. The presentation of Nicol's results was in the form of grams/person/day of fat and total calories/person and calculations again were performed on these data to determine the percentage of calories consumed as fat.

The U.S. HEW study of Nigeria indicates total caloric intakes ranging from 1200-2600 while Nicol's survey indicates total caloric intakes of 2000-3000 for men and 1500-2600 for women. Fat consumption as a percentage of total calories ranged from 7-31 percent in the U.S. HEW study and from 6-16 percent for men and 6-17 percent for women in the Nicol study. Some of the higher figures obtained by Nicol were obtained in Northern Nigeria where milk is consumed, resulting in a higher fat consumption, whereas some of the higher figures obtained for the HEW study occurred in urban areas. This information is summarized in Figures 2 and 3 .

French West Africa. In the 1940s the Anthropological Mission of France conducted a consumption survey in West Africa (72). This study examined consumption in a number of locations in French West Africa, both urban and rural, stretching from the western Sudan (Mali) to western Guinea. In the rural areas 127 families were surveyed for a total of 1250 persons. In Dakar and Bamako 5050 persons were surveyed (excluding those surveyed on military bases). The time of the year at which the surveys were conducted varied, with all but one of the rural surveys being conducted during the dry season. The Bamako surveys took place at the end of the rainy season and the surveys done in Dakar were carried out throughout the course of one year. The results of all were reported as a percentage of total calories consumed as fats with no individual commodity breakdown disclosed.

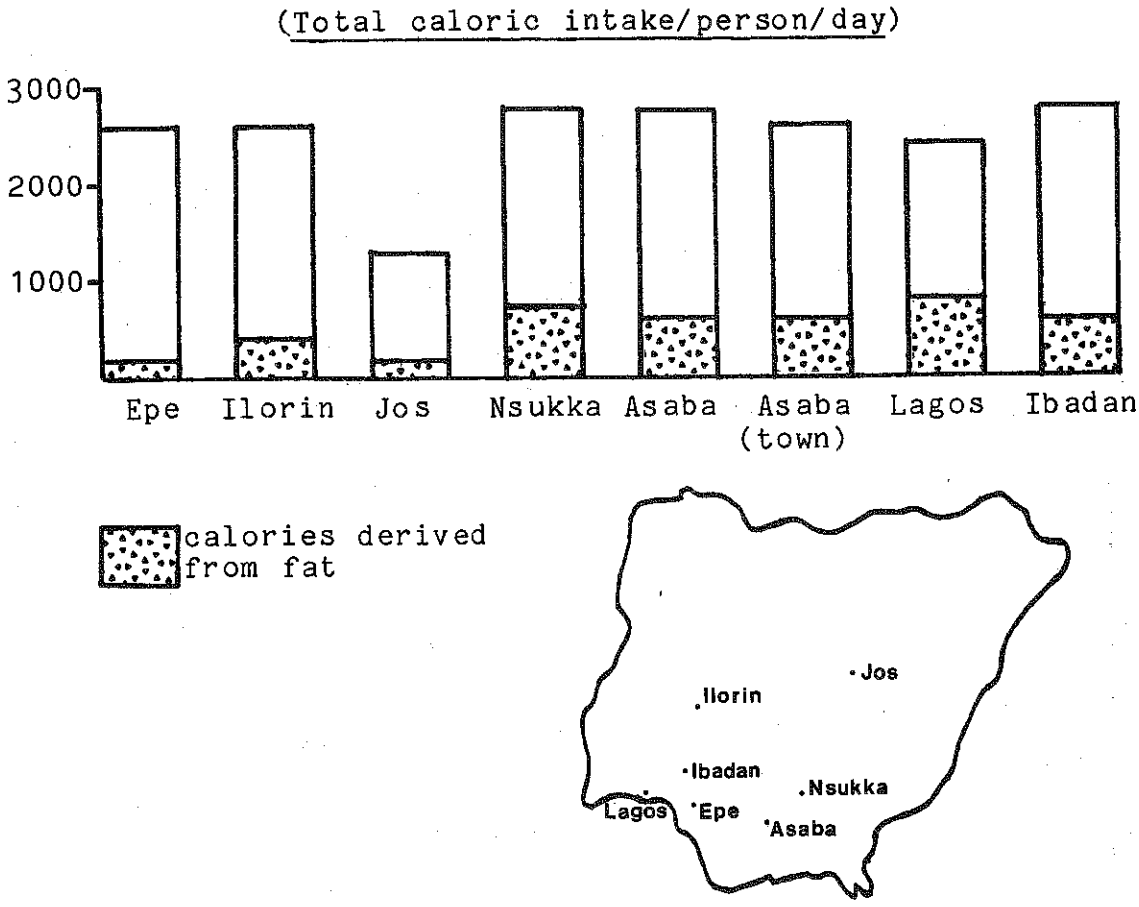
Figure 4 presents results from these surveys. The chart shows the pecentage of persons in each village obtaining a specific range of total calories, with the most common caloric ranges being 1000-2000 and 2000-3000. Urban intakes were in general higher than rural intakes, but the seasonal differences between the studies discussed above may be an important factor explaining these results. The range in the proportion of total calories provided by fats was from 1-35.6 percent with most persons obtaining 10-25 percent of their calories as fat.

The remaining studies to be discussed, unlike those just considered, included a breakdown of consumption by products. These studies give consumption figures, in oil equivalents, for oilseeds and their products ranging from 5-20 kg/person/year, with a 10-15 kg/person/year intake being typical. (The food balance sheet estimates compare well with these consumption levels). These studies covered smaller subgroups of the population than the did the two discussed above. A hypothetical diet constructed by SEDES (Institute for the Study of Social and Economic Development) for use in projecting food needs for urban West Africa was also utilized and listed two alternative diets. One diet postulated that 20 percent of total calories would come from fat, the other 30 percent of total calories. The study assumed that some 70-80 percent of total fat calories would be obtained from oilseeds and their products. Under the first hypothesis consumption of 15 kg of oilseeds was indicated, under the second 25 kg.

Data from these consumption surveys appear to indicate both an urban/rural difference in consumption patterns and a positive relationship between income and fats consumption. Urban intakes were somewhat higher than rural intakes.

FIGURE 2

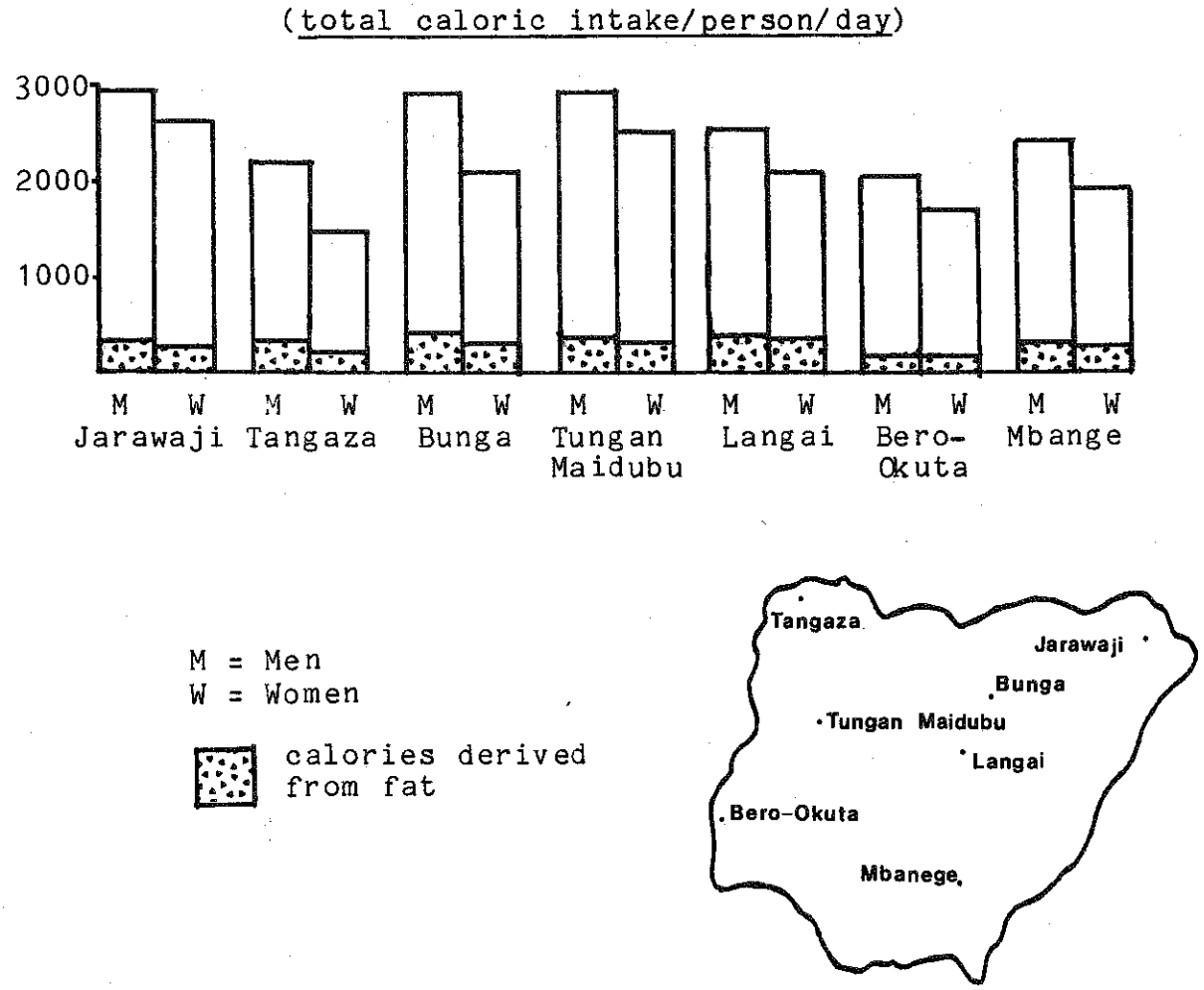
RESULTS OF U.S. HEW REPUBLIC OF NIGERIA NUTRITION SURVEY



Source: U.S. Department of Health, Education and Welfare, Republic of Nigeria Nutrition Survey (Washington, 1967), pp.15-86.

FIGURE 3

RESULTS FROM NICOL CONSUMPTION SURVEY IN RURAL NIGERIA

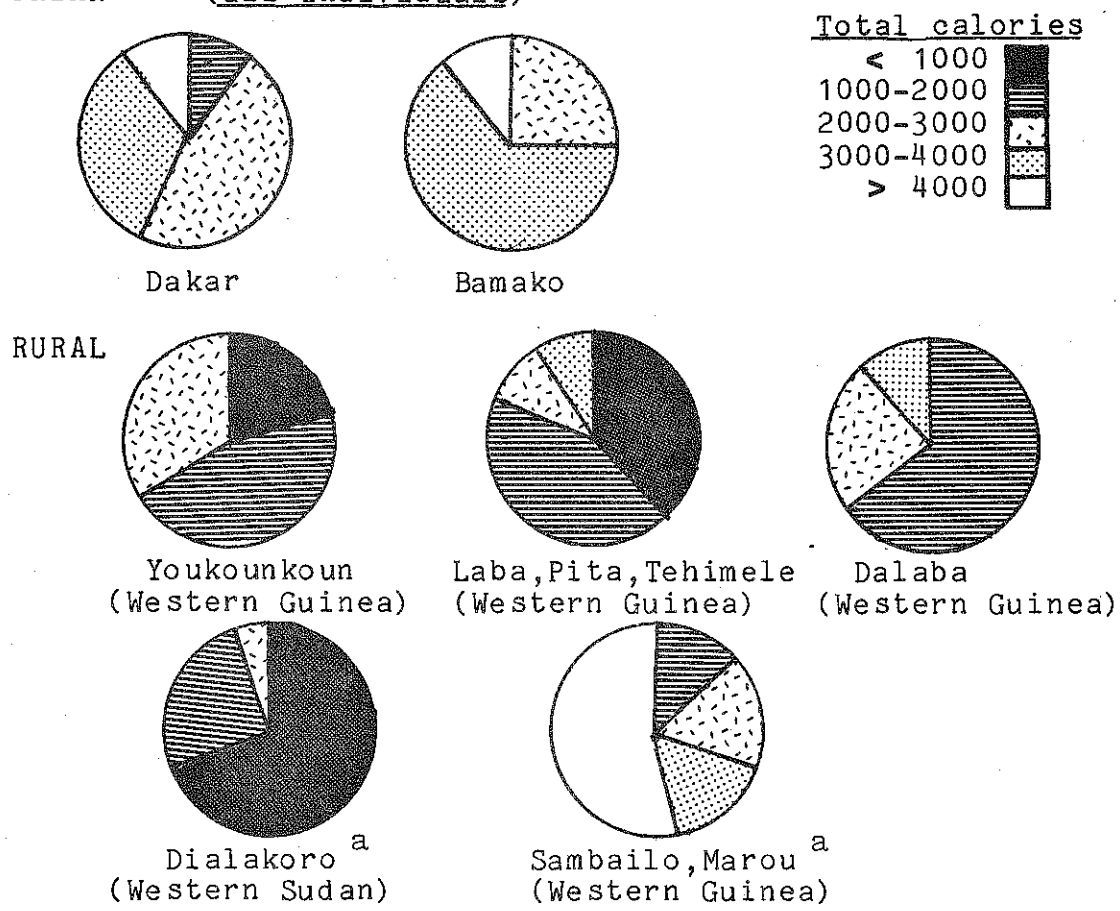


Source: U.S. Department of Health, Education and Welfare, Republic of Nigeria Nutrition Survey (Washington,1967), pp.14-15.

FIGURE 4

RESULTS OF A.O.F. CONSUMPTION SURVEY

A) Distribution of Total Caloric Intake



B) Range in Calories Derived From Fat

	(percent)
URBAN	
Dakar	34.0-35.6
Bamako	12.0-22.0
RURAL	
Youkounkoun	6.5-14.2
Laba, Pita, Tehimele	2.9-17.0
Dalaba	18.6-22.5
Dialakoro	15.0-22.5
Sambailo, Marou	7.5-24.0

a Results suspected by authors to be unrepresentative of 'normal' conditions.

Source: Mission Anthropologique, L'Alimentation en A.O.F. (Dakar, 1954), pp.144, 150, 162, 167, 169, 171, 172.

Mali. A consumption survey was done in 1977-78 by the OECD in Mali (73). This study examined food consumption by compound in a number of villages spread throughout the country and also in the cities of Bamako and Segou. Consumption was examined both in the dry and wet seasons for most villages and in the dry season for the urban areas. The total rural population surveyed was over 1500 persons and the total urban population over 600 persons. Each meal was weighed and analyzed separately and then the meals for each day were totaled and an average per capita consumption figure calculated for each compound; individual intakes could not be directly calculated as members of the family consumed their meals directly from the same pot. Oilseed consumption and total fat intake were reported in grams/person/day and the percentage of total calories consumed as fat was also reported. Each of these figures was disclosed for each compound.

Some of the results of the Malian study are aggregated in Figure 5 . In the rainy season, when only two rural zones were covered, reported consumption of unshelled peanuts ranged from 0-158 grams, while consumption of shea butter ranged from 0-47 grams. Only one compound had a significant consumption of peanut oil and that was at 53 grams or approximately 3.75 tablespoons (14 grams per tablespoon). In the dry season, when all of the rural areas were studied as well as all of the urban areas, consumption in the rural areas ranged from 0-122 grams for unshelled peanuts, 0-24 grams for shea butter and no higher than 3 grams for peanut oil. In the urban areas consumption ranged from 8-57 grams, 0-32 grams and 0-40 grams, respectively.

The aggregated data presented in the first pie chart in the figure indicate that, in general, fats (total dietary fat) provide a higher percentage of total calories in urban areas than in rural areas, with the percentage being above 10 percent in all urban compounds. Furthermore, the second set of pie charts indicate that on a kg/person/year basis, total oilseed consumption was higher in urban areas, where most compounds showed a per capita consumption of 5-15 kg(approximately 1-3 tablespoons of oil per day), than in rural compounds where the majority of compounds reported per capita consumption levels below 5 kg or less than 1 tablespoon of oil per day. Overall, consumption was no higher than 20 kg per year or roughly 4 tablespoons of oil per day. The last pie chart indicates that the proportion of peanuts consumed as a processed product, i.e., as oil, was also higher in urban areas than in rural areas.

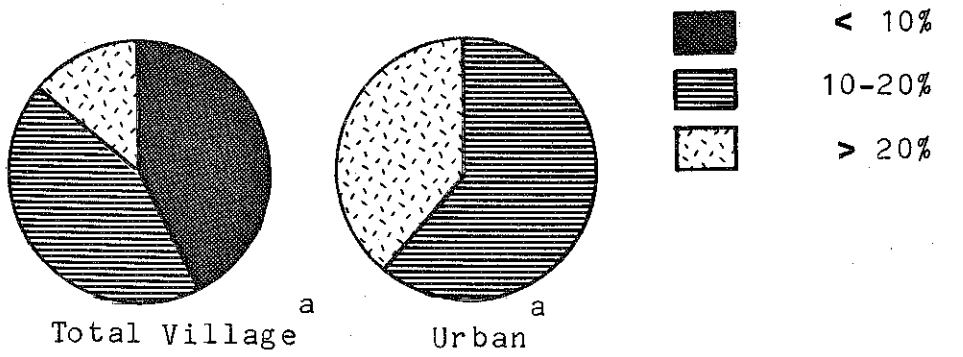
Nigeria and Cameroon. The other surveys utilized covered selected populations in Nigeria and Cameroon. Some the the findings of the largest of these were reported by Güsten in his work on the marketing of staple foodstuffs in Western Nigeria (42). Güsten reports the percentage of total calories consumed as a fat or oil product and also the grams/person/day quantities of fat and oil products obtained by the Nigerian Federal Office of Statistics in its Rural Consumption Enquiry undertaken in 1963/64. In the FOS study, consumption in 30 villages throughout the country was monitored for one year, with food consumed by each family being weighed for one week each month. Güsten also reports figures from a study done by Dema of consumption in various employment groups in Ibadan. The results of both studies are reported in terms of the percentage of total calories obtained from fat and oil products and a

FIGURE 5

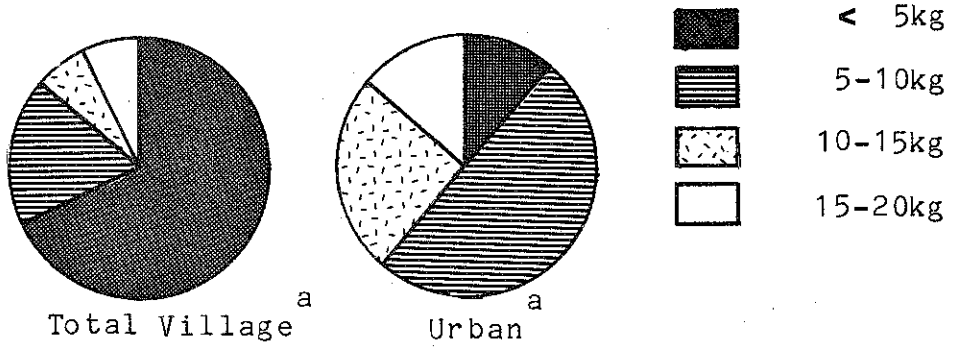
SUMMARY OF SELECTED RESULTS FROM MALI CONSUMPTION SURVEY, 1977-78

(all compounds)

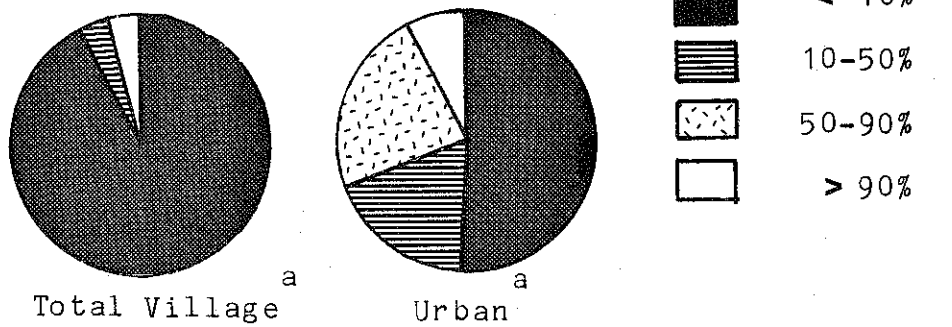
A)Percentage of total calories derived from fat



B)Kg/person/year consumption of oilseeds in oil equivalents



C)Percentage of peanuts consumed as seed



a Dry season data only

Source: J. Mondot-Bernard, Satisfaction of Food Requirements and Agricultural Development in Mali (Paris,1980),pp.42-46, 56-66.

calculation was made from these figures to determine an implied kg/person/year figure.

Smith et al, present food availability data for farm households in Northern Nigeria (90). These availability measurements were obtained from the flow of food into and out of the household with no actual direct observations of food eaten being made. A flaw in this methodology is that consumption of own peanut production is uncounted. Results were presented in kg/household/year for each oilseed product for both a small and a large sample, where average household size was 7.2 in the small sample and 6.7 in the large sample.

A final study available for Nigeria was one conducted in 1964 in Lagos by McFie (70). Foods consumed by the small sample of lower class families included in the survey were weighed for seven consecutive days. His results were reported in grams/person/day by commodity.

A small unpublished study was available for the Northwest province of Cameroon (48). This study included 45 rural households and results were reported as the percentage of total calories consumed as vegetable oils.

Table 4 summarizes the results of these smaller consumption surveys. The Güsten and McFie studies show implied kg/person/year fat and oil intakes as high as 17 only for Senior Civil Servants; consumption generally rising as incomes increase for the urban consumers. In most cases the percentage of total calories derived from fats and oils (not total dietary fat) was well below 20 percent. Figures given by Smith et al., which as mentioned excluded consumption of own peanuts, are 28.4 and 26.7 kg/household/year when totaled for the small and large samples, respectively. On an individual basis this would translate into 3.9 and 4.0 kg/year. The Cameroon study also reports a percentage of total calories derived from fats and oils below 20 percent and an implied kg/year intake no higher than 15 kg.

SEDES. In 1972 the Institute for the Study of Social and Economic Development (SEDES) of the University of Paris made a study whose purpose was to examine the problem of providing urban areas in French speaking West Africa with adequate food supplies to 1985 (53). In the study a hypothetical series of diets were generated using a number of different assumptions. These assumptions involved, particularly, the percentage of calories derived from fats (ranging in these diets from 20-30 percent) and the source of dietary protein (vegetable versus animal sources). Only locally available foods were considered. The resulting dietaries shed light on what patterns may develop in the region as incomes increase and thus offer a standard to which to compare the oilseed consumption levels revealed by the other surveys.

Table 5 presents the diet constructed for Abidjan to serve as an example of the Institute's projections. Under the assumption of 30 percent of total calories derived from fat, approximately 28 kg/person/year of oilseeds, in oil equivalents, are indicated. Under the 20 percent assumption, 15 kg/person/year of oilseeds total fat. These consumption levels translate into approximately 5 and 3 tablespoons of oil per day,

TABLE 4. IMPLIED ANNUAL PER CAPITA CONSUMPTION FIGURES FROM SELECTED NIGERIAN AND CAMEROONIAN CONSUMPTION SURVEYS

	Implied kg./ Person/Year	Percent of Calories from Fats and Oils
A) NIGERIA		
Rural (from Gusten)		
West	12.3	13.0
East	9.5	12.0
North	5.7	6.0
TOTAL	8.6	9.5
Urban (from Gusten)		
Petty traders	7.6	13.0
Civil Servants		
Junior	13.8	17.0
Intermediate	16.3	17.0
Senior	17.5	19.0
Low Socioeconomic Class--Lagos (from McFie)		
Men	10.4	13.0
Women	7.2	12.0
Northern Nigerian Villages (from Smith, et al.)		
Small sample	3.9	
Large sample	4.0	
B) CAMEROON		
Rural (from Heffron)		
Low income	6.5	9.3
Middle income	5.6	8.3
High income	14.9	17.6
TOTAL	10.8	12.6

Sources: R. Gusten, Studies in the Staple Food Economy of Western Nigeria (Munich, 1968), pp. 58, 60. J. McFie, "Nutrient Intakes of Urban Dwellers in Lagos, Nigeria," British Journal of Nutrition (1967), p. 267. V. Smith, et al., Food Consumption Behavior in Three Villages of Northern Nigeria (Michigan State University, 1982), pp. 8-11. K. Heffron, "Consumption and Expenditure in Rural Northwest Province, Cameroon," (unpublished paper), p. 51.

TABLE 5. HYPOTHETICAL DIETS FOR ABIDJAN

(vegetable oil equivalents)

Oilseed or Vegetable Oil	Grams/Day	Kg./Year
30 Percent of Calories as Fat		
Peanuts (Shelled)	16.7	6.1
Peanut Oil	8.1	2.9
Palm Oil	46.0	16.7
Shea Butter	5.0	1.8
TOTAL	75.8	27.5
20 Percent of Calories as Fat		
Peanuts (Shelled)	16.7	6.1
Peanut Oil	5.0	1.8
Palm Oil	18.2	6.5
Shea Butter	3.0	1.0
TOTAL	42.9	15.4

Source: Institut d'etude du developpement economique et social, L'approvisionnement des Villes dan les Etats Africains et Malgache Horizon 1985 (Paris, 1973), pp. 128-131.

respectively, with a 2600 average total caloric intake being used. The upper figure is clearly well above consumption levels revealed by the food consumption studies with the lower figure being on the upper bound of actual consumption data.

Findings of Nutritional Surveys

Nutritional surveys done within the last decade in West Africa continue to indicate problems of malnutrition which may be related to the apparent low consumption of fats and oils in West Africa. Problems of malnutrition persist, particularly for children. A clearer understanding of the nature of food and nutritional problems in the region can be obtained through examination of the results of four nutrition surveys conducted in the late 1970s. Three of these surveys were conducted by AID, the fourth by the OECD. The AID funded studies covered Cameroon, Sierra Leone and Togo, while the OECD study covered Mali. The AID studies, in addition to encompassing substantially larger populations than OECD's study, dealt specifically with children (ages 3-59 months), while the Mali study included village populations, i.e., adults as well as children (ages 6-71 months) (2, 3, 4, 73).

The results of these studies indicate that chronic undernutrition may be a problem among children in the region. While weight for height measurements, which provide an indication of current nutritional status, were less than 80 percent of standard for less than 3 percent of the sample children in Cameroon, Sierra Leone and Togo and for 10 percent of the children in Mali, the height for age measurements obtained were less favorable. Height for age figures indicate long term nutritional status and measurements below 90 percent of standard suggest a state of chronic undernutrition. Prevalences of measurements below 90 percent in the children studied by these four surveys ranged from a low of 19.1 percent in Togo to a high of 34 percent in Mali. These studies found, in addition, significant prevalences of anemia in the populations surveyed. In Mali, anemia rates were reported by village and urban area and by seasons and prevalences ranged from 20-40 percent, while the prevalence was 38.1 percent in Cameroon, 58.1 percent in Sierra Leone and 58.6 percent in Togalese children and 32.1 percent in their mothers.

There are a number of possible factors accounting for these nutritional results including: 1) the presence of intestinal parasites (the Sierra Leone survey found Ascaris infestation in 20 percent of the children surveyed), 2) the type and quantity of foods available and 3) feeding practices. For this study the type of foods available and feeding practices are of particular importance. Diets in the region, being so heavily dependent on starchy staples, offer a nutritional problem for children. Due to the bulk of the staples presented to a child, he/she is often unable to consume sufficient quantities. Researchers have shown beneficial effects in combatting PEM of increasing the caloric density of foodstuffs offered to children by increasing the fat content of the diet. In one such study, a child would have had to consume over 700 grams of the home based, traditional diet to equal the caloric supply of 478 grams of a milk based, high fat diet (85, p.267).

Oilseeds can provide a number of nutrients (Table 6). While supplying chiefly calories in the form of fat, oilseeds also provide protein when the seeds are eaten whole and vitamin A when palm oil is consumed. Palm oil, in fact, is the principal source of vitamin A within the West African region. In relation to the nutritional results shown for the region, it would appear that the high caloric content of oilseeds is of prime importance.

Despite the widespread availability of oilseeds in West Africa, problems of chronic malnutrition continue to exist. Figure 6 presents qualitative data on the consumption of oils by children in Cameroon and Sierra Leone which may explain this result. The figure indicates that, particularly for children under 12 months of age, few are offered oils. This pattern could result from a number of factors. Child feeding practices may restrict the feeding of children with foods cooked in oils and oilseeds. Also oilseeds are valuable cash crops and may be sold rather than utilized for own consumption.

Oilseeds as Livestock Feedstuffs in West Africa

The demand for animal feedstuffs is a function of two factors, the demand for meat and animal products for human consumption and the appropriateness of supplemental feeding in a given production system. The demand for oilseeds, one small portion of all potential livestock feedstuffs, depends on the adequacy of oilseeds in meeting the needs of a particular livestock type. Supplemental feeding of livestock in West Africa has generally been limited with only poultry receiving much emphasis. The oilseeds produced in West Africa are, however, of limited use for poultry feeding.

Livestock Production Systems

Livestock production in West Africa continues to be carried out largely by traditional methods. Such traditional production patterns rely on pastures, grazing, and scavenging rather than on the feeding of the animal with a prepared feedstuff. Reliance on such a feeding regime constrains potential production levels. Livestock production in West Africa has, in addition, a particular geographical spread determined by the distribution of the tsetse fly. Cattle production is constrained to the northern, drier regions where crop production is inhibited and grazing is one of the few productive alternatives for the land (89, p.5). In the southern zones, some special varieties of cattle do exist, however. Sheep, goats, pigs and poultry are spread throughout villages in the region.

Cattle are perhaps the single most important livestock activity in the region and their production is almost exclusively in the hands of Fulani pastoralists. Cattle raising in the region is a part of a complex social order and the Fulani gain from their cattle both economic and social value. The cattle, for example, provide a source of nourishment for the Fulani in the form of dairy products and are also a source of manure for their fields

TABLE 6. NUTRIENT COMPOSITION OF SELECTED OILSEEDS AND THEIR PRODUCTS

(per 100 grams)

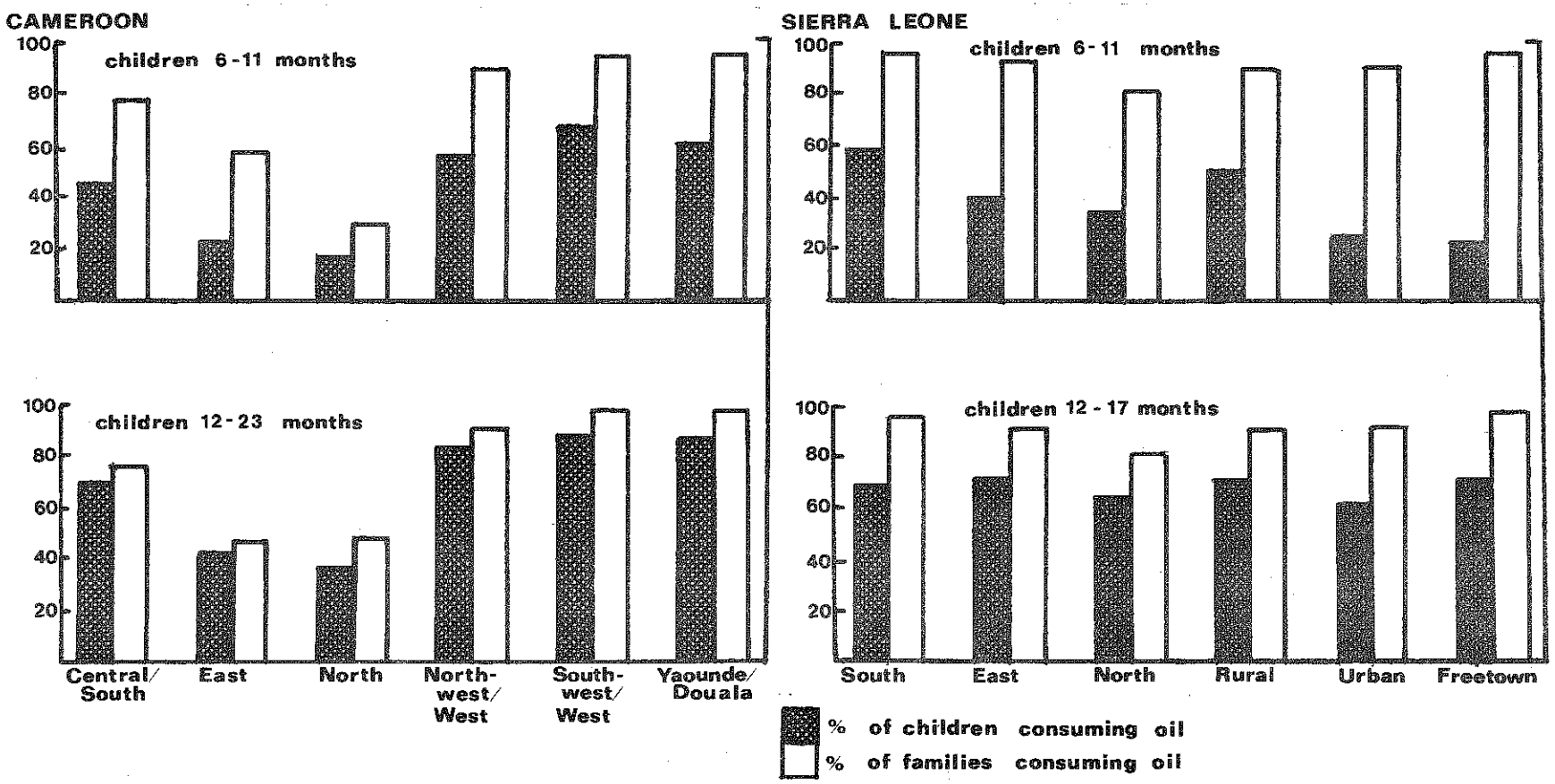
	Calories	Percent Protein	Percent Fat	B-carotene (equiv. μ)
Peanut, dried, shelled	549	23.2	44.8	15
Peanut oil	884	--	99.9	--
Shea nut, dried	579	6.8	49.0	--
Shea butter	868	1.0	96.0	--
Cottonseed, dried	437	20.2	21.2	--
Cottonseed oil	857	--	99.9	--
Sesame seed, dried	558	17.9	48.4	--
Sesame oil	857	--	99.9	--
Soybean, dried	405	33.7	17.9	--
Soybean oil	857	--	99.9	--
Palm kernel	587	6.6	55.3	--
Palm oil	875	--	98.9	37,000-128,700[a/]

a/ Values vary greatly due to the color of the fruit pulp used and the method of extraction employed.

Source: FAO, United States Department of Health, Education and Welfare, Food Composition Table for Use in Africa (1968).

FIGURE 6

PERCENTAGE OF FAMILIES AND CHILDREN CONSUMING ANY OILS BY REGION, CAMEROON AND SIERRA LEONE



Source: Agency for International Development, United Republic of Cameroon National Nutrition Survey, p.180; Agency for International Development Sierra Leone National Nutrition Survey, p.119.

as well as for the fields of other farmers who allow the cattle to graze on their crop stubble. The cattle, in addition, are a form of investment, a store of wealth which is readily converted into cash and is portable (89, p.42). Finally, they are also a source of social value as bridewealth and gifts.

The Fulani typically raise their cattle under a transhumanance system with the length of the annual trek varying widely depending on the availability of water, grazing land, minerals, etc. (89, pp.12-13). Little supplemental feeding of the animal is engaged in. Farmers in the region also tend to entrust their cattle to the Fulani, rather than feed them themselves on their own farms (89, p.24).

A variety of fattening schemes have been proposed for the region with some having been adopted in the wake of the devastating drought in the mid-1970s. The approach of such plans calls for a stratification of cattle production in the region with birthing and the first two years of the cattle's lives taking place as now in the north. These two year old cattle would then be transferred south to be grown out to maturity. Cattle, being ruminants, can utilize a wide variety of feedstuffs and thus, under these schemes, a market for a number of feedstuffs would be created. There are, however, a number of questions surrounding the viability of such schemes, including: what has been preventing such a system from arising prior to now, and will there be sufficient demand for this fattened meat within the region? Due to the intricate nature of the cattle system in West Africa, its social and economic relations, large scale changes are not expected in the near future.

Poultry, pigs, goats and other small livestock animals have traditionally been scavengers in West African villages. These animals consume what they can find and are slaughtered for meat when they are mature. Village poultry produce few eggs and consumption of eggs is generally low in rural areas. Modern commercial facilities for poultry and swine have been developed in the region, particularly in Nigeria and the Ivory Coast, in response to rising meat demand and these facilities rely on compound feedstuffs. In feeding both poultry and swine care must be taken as both have definite feeding requirements. Poultry require a relatively high quantity of protein/energy with the protein being of high quality, i.e., providing all of the essential amino acids (83, p.356). Due to this requirement, fish meal and meals of other animal sources are often utilized in poultry rations to compensate for the amino acid deficiencies of meals of vegetable origin. Of the oilseed meals, soybean is the best for supplying the needed protein, peanut meal utilization is complicated by the possible presence of aflatoxin.

For optimal performance the pig must be fed the essential amino acids at the proper level, ratio and time (83, p.p.343-344). Proteins of vegetable origin need to be supplemented in swine rations with high quality proteins. The fat portion of the ration is also important as the type of fat consumed by the pig will determine the fat content of the carcass. Finally, care must be taken in that pigs are susceptible to gossypol and aflatoxin poisoning thus restricting the use of cottonseed and peanut meal.

Demand for Livestock Feedstuffs

Demand for oilseed meals or cakes is derived from the demand for meat. Meat has traditionally been utilized in West Africa as a component of the sauce prepared to accompany the starchy staple (89, p.201). As lifestyles change, due to urbanization and increases in income, one would expect more and more meat to be consumed as a separate product and this may mean a willingness to pay a premium for tender, more finished meat products. Aside from qualitative changes in meat demand, the total quantity of meat demanded is likely to increase as incomes rise, which will put a strain on current livestock production systems in the region if supplemental feeding is not engaged in.

Oilseeds for Industrial Uses

Oilseeds are utilized in the manufacture of number of industrial products. Oils from oilseeds were important in the Industrial Revolution in Europe and North America as lubricants for machines and also for illumination and soap manufacturing. Mineral oils and synthetics have become important for machine lubrication and other functions and, for a number of industrial products, the oilseeds produced in West Africa are not as appropriate as are other oilseeds such as linseed and castor. In addressing industrial usage of oilseeds in West Africa, soap is perhaps the most significant product to consider.

Soap can be composed of a number of constituents with each of these constituents affecting the properties of the soap. Table 7 indicates the properties given to soap by various ingredients including the oilseeds. Coconut oil, for instance, produces a hard, brittle soap with good lathering qualities, while cottonseed oil will render the soap softer with medium foaming qualities. Consumers tend to have very definite preferences in regard to the soap which they utilize, but unfortunately data were not available on soap composition in West Africa. Given local resources one would expect palm oils and coconut oils to be the prime ingredients, however. In general, a soap with typical lathering, solubility and slushing qualities will have a tallow to vegetable oil ratio of 85/15 or 75/25 (91, p.157a).

TABLE 7. SOME FATS AND OILS AND CHARACTERISTICS OF THEIR SODIUM SOAPS

Soap	Color	Consistency	Odor	Foam
COCONUT	white to yellowish	very hard, brittle	practially odorless	quick, big bubbles short lasting
PALM KERNEL	yellowish	very hard brittle	similar to oil; violet	slow, small bubbles
OLIVE	yellowish to drab green	hard	weakly like oil	fairly good
PEANUT	light yellow to green	hard	practically odorless	mediocre
COTTONSEED	gray white to dirty yellow	fairly soft	like the oil	mediocre lasting
TALLOW	white to yellowish white	very hard	practically odorless	very small bubbles lasting
LARD	white	hard soft	odorless	quick, small bubbles lasting

Source: N. Sonntag, "Current Future Fat-based Raw Material for Soap Manufacture," Journal of the American Oil Chemist Society (February 1981), p. 158A.

IV. ECONOMIC DEVELOPMENT IN NIGERIA, CAMEROON AND THE IVORY COAST

Oilseed consumption grew in the now developed world as a result of the rise in incomes and in urbanization accompanying the Industrial Revolution. In West Africa three countries, Nigeria, Cameroon and the Ivory Coast, stand out in terms of their economic growth and thus are the most likely to be undergoing an increase in oilseed consumption.

Socioeconomic Development in West Africa

Table 8 illustrates the leadership position, in West Africa, of Nigeria, Cameroon and the Ivory Coast in economic growth. The Ivory Coast, Nigeria and Cameroon were in 1979 numbers 1, 2 and 3, respectively, in per capita GNP, with the Ivory Coast having a per capita figure 35 percent higher than second ranked Nigeria. All three were also among the top five countries in the region in the rate of growth of GNP over the 1960-1979 period. Rates ranged from 3.7 percent/year for Nigeria to around 2.5 percent/year for the Ivory Coast and Cameroon. These GNP figures and rates of growth would be modified if a correction were made for the high rates of inflation experienced by these countries; inflation was, however, high throughout the region.

Nigeria is by far the most populous country in West Africa. Though precise population data are impossible to obtain, its population appears to be around 7 times larger than that of Ghana, the region's second most populous country (Table 9). Cameroon and the Ivory Coast follow as third and fourth. In terms of population growth, the Ivory Coast and Nigeria are again frontrunners, Cameroon's population growth being somewhat more modest. The high population growth rate in the Ivory Coast is due largely to the high immigration the country has experienced (116, p. 20). For Nigeria the high rate of growth may be the result of poor statistics.

Urbanization has been occurring rapidly throughout West Africa (Map 2). In 1980 the Ivory Coast and Cameroon were among the most urbanized in the region with approximately 35 percent of the Ivory Coast's population living in urban areas and 35 percent of Cameroon's (113, p.179). Approximately 20 percent of the population of Nigeria was living in urban areas in 1980 (113,p.179).

TABLE 8. COMPARISON OF ECONOMIC DATA IN WEST AFRICA

GNP per capita (1979 dollars)		Average Annual Growth in GNP, 1960-1979 (percent)		Average Annual Rate of Inflation, 1970-1979 (percent)	
Ivory Coast	1040	Nigeria	3.7	Ghana	32.4
Nigeria	670	Togo	3.6	Nigeria	19.0
Cameroon	560	Gambia	2.6	Ivory Coast	13.5
Liberia	500	Cameroon	2.5	Sierra Leone	11.3
Senegal	430	Ivory Coast	2.4	Niger	10.8
Ghana	400	Liberia	1.6	Cameroon	10.3
Togo	350	Mali	1.1	Togo	10.3
Guinea	280	Benin	0.6	Upper Volta	9.8
Niger	270	Sierra Leone	0.4	Mali	9.7
Benin	250	Guinea	0.3	Liberia	9.4
Gambia	250	Upper Volta	0.3	Benin	9.2
Sierra Leone	250	Senegal	-0.2	Senegal	7.6
Upper Volta	180	Ghana	-0.8	Guinea	4.4
Guinea-Bissau	170	Niger	-1.3		
Mali	140				

Source: World Bank, Accelerated Development in Sub-Saharan Africa (Washington, 1981), p. 143.

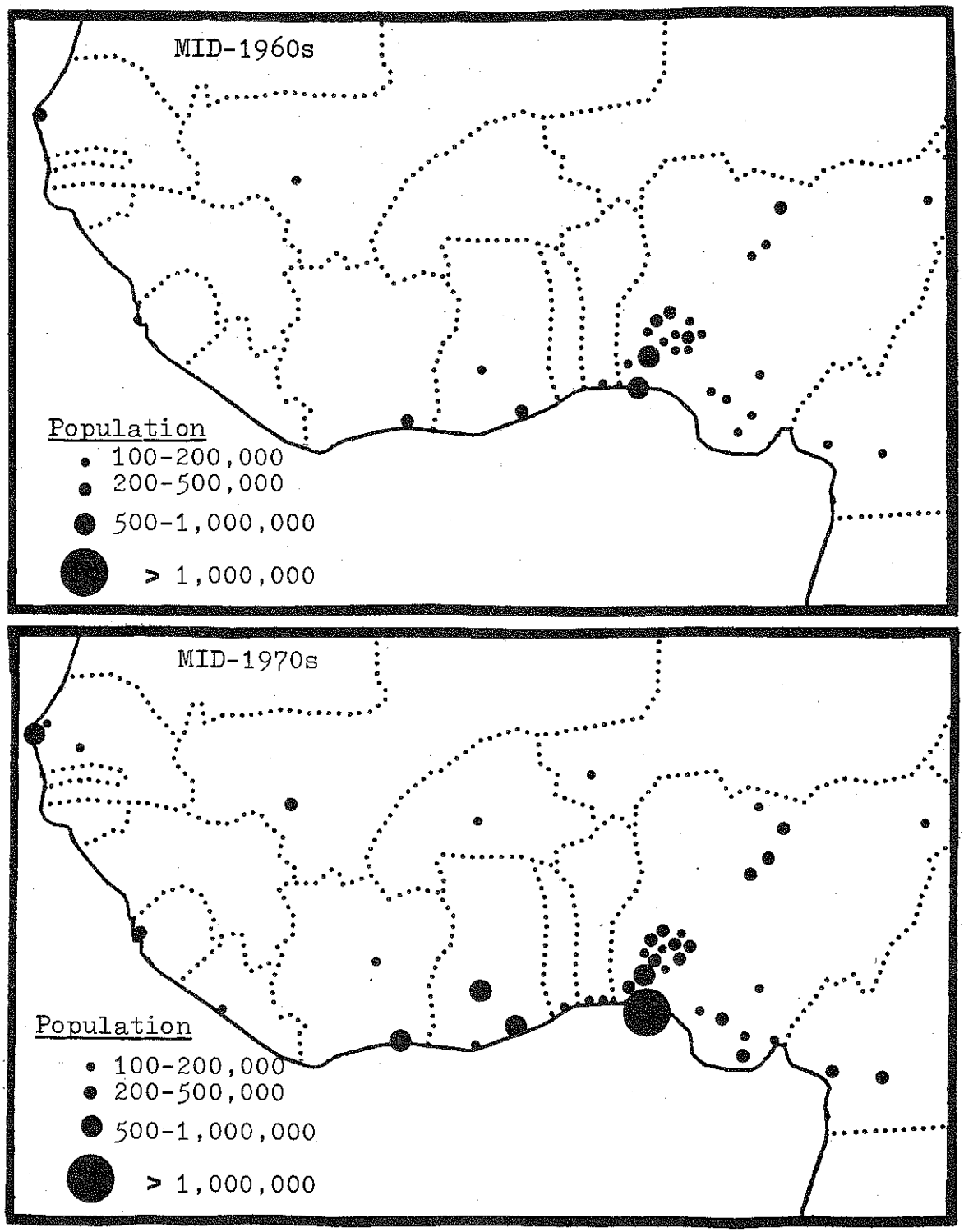
TABLE 9. COMPARISON OF POPULATION DATA FOR WEST AFRICA

Total Population, 1980 (millions)		Average Annual Rate of Growth, 1975-80 (percent)	
Nigeria	77.08	Ivory Coast	3.5
Ghana	11.45	Liberia	3.3
Cameroon	8.50	Nigeria	3.3
Ivory Coast	7.97	Ghana	3.0
Upper Volta	6.91	Niger	2.9
Mali	6.91	Benin	2.8
Senegal	5.66	Gambia	2.8
Niger	5.30	Sierra Leone	2.7
Guinea	5.01	Guinea	2.6
Benin	3.57	Mali	2.6
Sierra Leone	3.47	Senegal	2.6
Togo	2.70	Togo	2.6
Liberia	1.87	Upper Volta	2.6
Gambia	.60	Cameroon	2.5
Guinea-Bissau	.57	Guinea-Bissau	1.8

Source: United Nations, Demographic Yearbook, various issues.

MAP 2

URBANIZATION IN WEST AFRICA, 1960s and 1970s



Source: United Nations, Demographic Yearbook, various issues.

Sources of Economic Growth in Nigeria, Cameroon and the Ivory Coast

Economic growth in Nigeria, Cameroon and the Ivory Coast has been achieved under fundamentally capitalistic systems. Per capita income growth, as approximated by Private Consumption Expenditure (PCE), has increased in the last two decades despite high inflation and high population growth (Figure 7). All three have experienced similar rates of growth, with both Nigeria and the Ivory Coast experiencing a downturn in the late 1970s.

Figure 7 includes three income scenarios to 1990 for the three countries. The high income projection suggests a 50 percent increase in per capita PCE over average 1975-1979 levels or a rate of growth somewhat higher than that attained by the three countries over the 1965-79 period. The moderate projection assumes a 25 percent increase by 1990 or approximately the same level of growth attained from 1965 to 1979. The low projection assumes constant 1975-79 levels.

Utilization of per capita PCE as a proxy for income suggests an equal distribution of income. This is never consistent with reality and Table 10 presents some fragmentary data comparing rural and urban incomes, firm data on income distribution being unavailable. Nominal per capita PCE is given as a point of comparison and the data suggest a considerable discrepancy in rural and urban incomes in Nigeria, a similar, though more modest gap, in the Ivory Coast and a somewhat lesser gap in Cameroon. For Cameroon, however, considerably less information was available. These income distribution patterns reflect differences in the emphasis accorded to various sectors in the economies of the three countries.

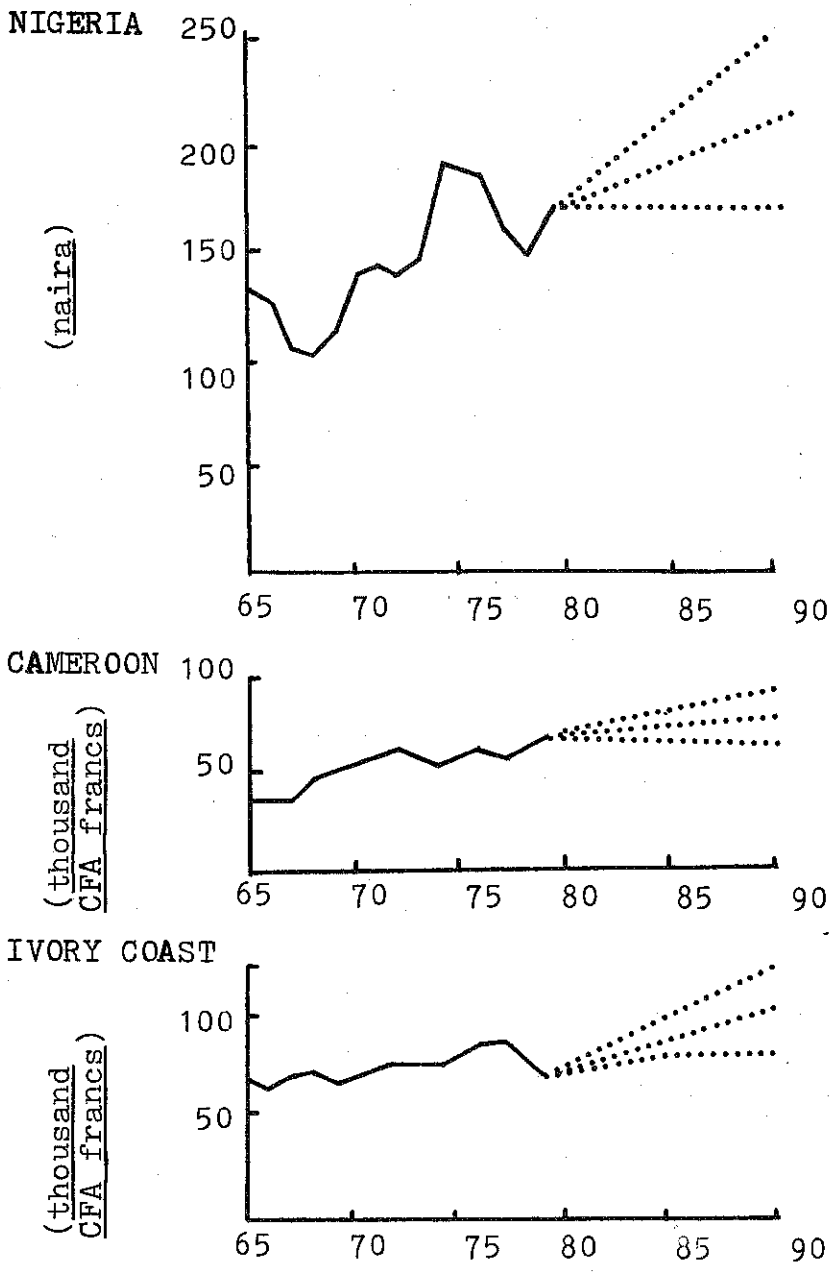
Petroleum Sector

The petroleum price hike of the 1970s disturbed the economies of countries the world over. For some it provided a destabilizing boom, for others a drain on foreign exchange reserves. Nigeria fell into the first of these categories, Cameroon and the Ivory Coast into the second. Figure 8 indicates this pattern showing petroleum in the exports and imports of these three countries.

Nigeria has by far the largest known deposit of petroleum in West Africa, estimated at 16,500,000,000 bbls by the Oil and Gas Journal, (December 1981). Production reached two million barrels per day in the late 1970s and it is estimated that Nigeria could sustain such a production level into the 1990s, with production dropping from that level into the early decades of the next century (104, p.9). In addition to its overwhelming share of exports, petroleum in Nigeria has come to provide the greater share of government revenue. This preeminence has subjected Nigeria to the vagaries of the world petroleum market. When petroleum prices fell sharply in 1981, Nigeria's economy faced a crisis. Petroleum production dropped sharply and, consequently, so did government revenue. The Nigerian government is trying to shield the country from shocks caused by the petroleum market through the development of other sectors, but this effort will take years. Economic growth in Nigeria will thus in the

FIGURE 7

REAL PER CAPITA PCE: NIGERIA, CAMEROON AND THE IVORY COAST, 1965-79 WITH PROJECTIONS TO 1990



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

TABLE 10

COMPARISON OF INCOME DATA FOR URBAN AND RURAL AREAS IN NIGERIA, CAMEROON AND THE IVORY COAST

	NIGERIA (naira)			CAMEROON (thousand CFA francs)			IVORY COAST (thousand CFA francs)		
Year	PCE/ capita	Rural income	Urban income	PCE/ capita	Rural income	Urban income	PCE/ capita	Rural income	Urban income
1965	52.8			35.7			18.3		
1966	56.2			36.7			19.2		95[h]
1967	45.6	44.2[a]		39.0			20.7		24-48[i]
1968	43.0			41.8		134.3[f]	23.6		
1969	53.0			41.7			25.5		
1970	73.5			46.4		167.9[f]	30.0		
1971	87.6			47.9			33.7	15-17.5[g]	
1972	88.0			49.1		210.2[f]	37.5		
1973	97.5			55.3	48[f]		40.5		
1974	143.1			65.0	60[f]		43.4		
1975	188.5	51.8[b]	1117.3[d]	77.1			54.2		
1976	225.3	139.3[c]	3939.4[e]	90.8		331.2[f]	62.5		
1977	235.8			116.1			68.9		
1978	253.2			123.0			80.7		
1979	327.6			129.8			94.4		

a
D. Norman, Technical Change and the Small Farmer in Hausaland, Northern Nigeria (Michigan State University, 1979), p.65.

b
P. Matlon, Income Distribution Among Farmers in Northern Nigeria (Michigan State University, 1979), p.28. average farm.

c
ibid., p.33. elite farm

d
H. Bienen, Income Distribution in Nigeria (New York, 1981), p.52. average industrial wages

e
ibid., p.54 mean urban incomes

f
Business International, Ivory Coast Strategic Base for Developing West Africa (1977), p.51. minimum wages for agricultural plantation workers and industrial workers

g
K. Heffron, "Consumption and Expenditure in Rural Northwest Province Cameroon" (Unpublished paper), p.6.

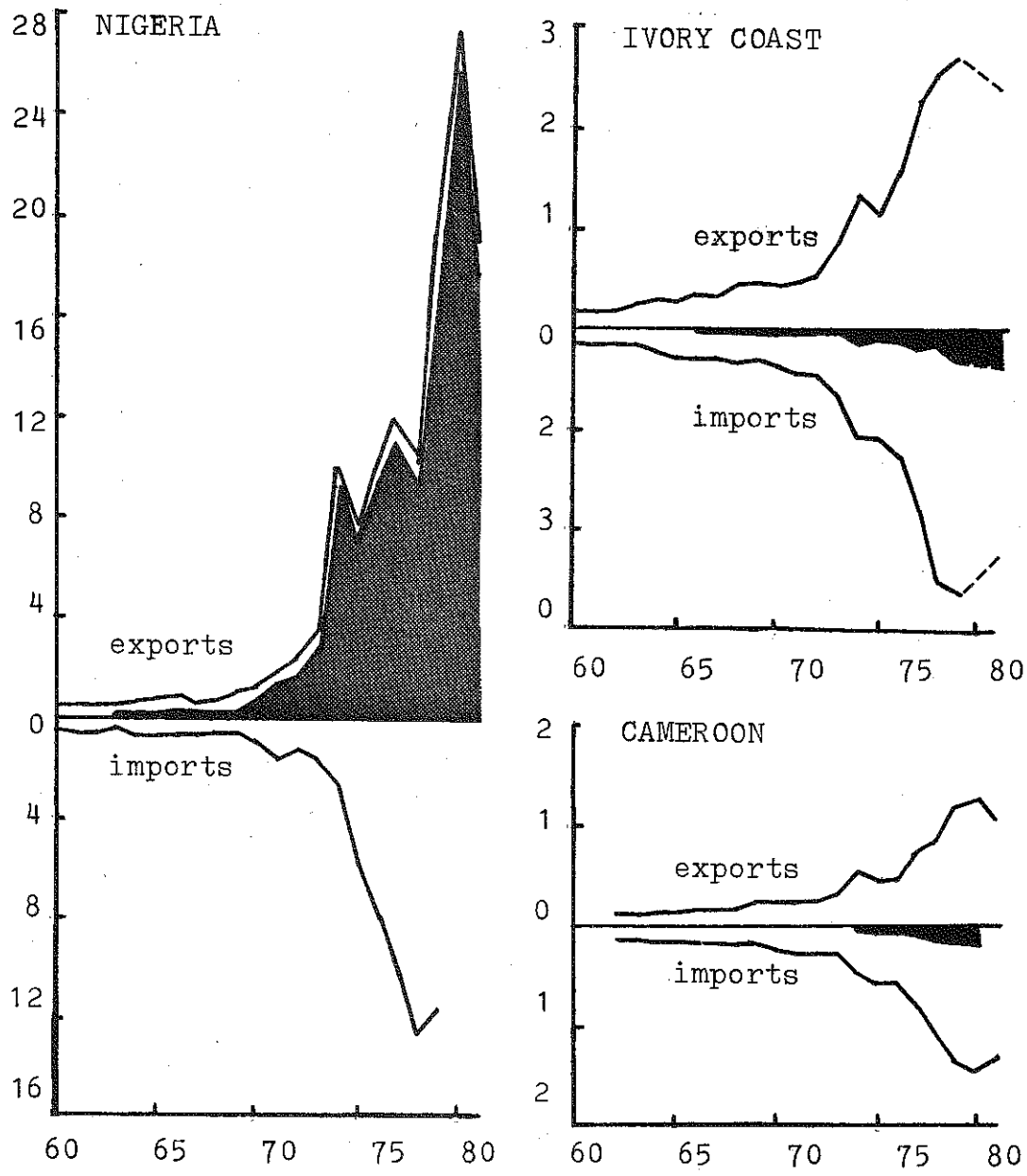
h
Cameroon Department of Statistics, Result of the Industrial and Commercial Census of West Cameroon (1968), p.4. average wage in the modern sector

i
ibid., p.18. salaries for handicraft traders

FIGURE 8

PETROLEUM IN THE EXPORTS AND IMPORTS OF NIGERIA, CAMEROON AND THE IVORY COAST, 1960-80

(billion U.S. dollars)



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

immediate future depend largely on events in the international petroleum market.

The development of petroleum industries is underway in both the Ivory Coast and Cameroon. Crude reserves in the Ivory Coast are estimated at 314,000.000 bbl (78, December 1981) and in 1981 the Ivory Coast was pumping 7,000 barrels per day. In Cameroon deposits of 480,000,000 bbls are estimated (78, December 1981) and Cameroon was pumping 87,000 barrels per day in 1981. Petroleum is expected to make both of these countries self-sufficient and allow for some exports during the 1980s, thereby reducing their import bills and providing an extra source of earnings. Leaders in both have stated that they are determined to prevent petroleum from coming to the level of dominance in their economies it has in Nigeria and will utilize petroleum revenues for agricultural development.

Agricultural Sector

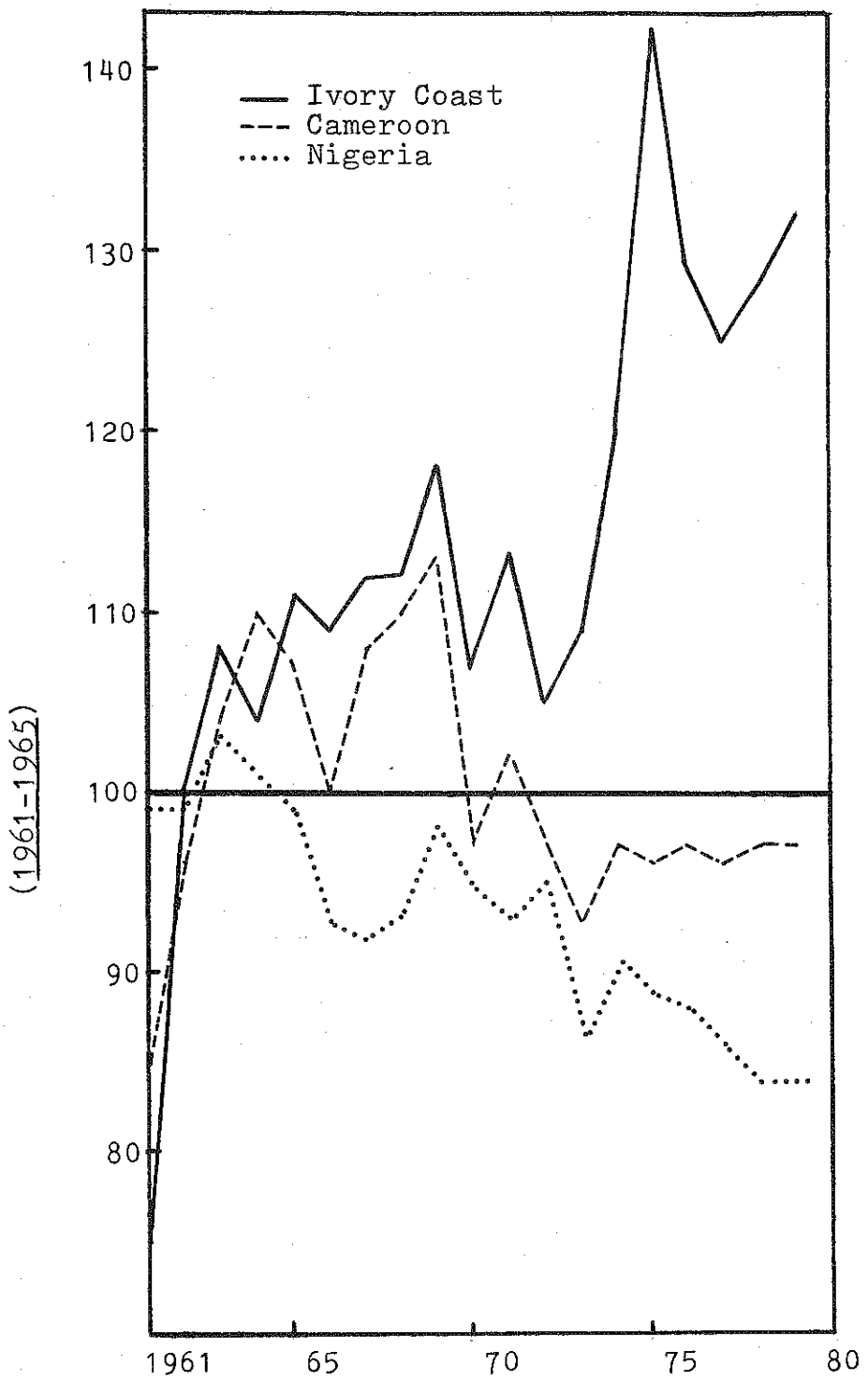
A view of the relative performance of the agricultural sector in these three countries can be obtained by examination of the per capita food production data presented in Figure 9 . The Ivory Coast has achieved a marked increase in food production peaking in 1975 at a level 42% higher than 1961-65 levels. (The Ivory Coast was virtually the only country in West Africa to have per capita food production in 1979 above 1961-65 levels). Cameroonian agricultural production held at 95% of earlier levels while Nigerian production dropped steadily to 83%.

Agriculture is the main source of export earnings in the Ivory Coast and Cameroon. Both of these countries have actively developed their agricultural sectors, emphasing export production. The Ivory Coast has tried, in addition, to diversify its agricultural production. Oil palm, bananas and coconut were developed to complement the traditional coffee and cocoa sectors, although, as of the late 1970s, over 80 percent of agricultural export earnings continued to be supplied by coffee and cocoa (31). In Cameroon, coffee and cocoa are the major agricultural export crops.

The stature of Nigeria's agricultural sector has diminished since Independence. The country is no longer self-sufficient in food production nor does it export the large levels of agricultural products it once did. This decline has occurred largely due to neglect. Nigeria has, however, enacted in recent years a number of schemes designed to reverse this trend. The viability of such plans as Operation Feed the Nation and the Green Revolution is not yet known.

FIGURE 9

PER CAPITA FOOD PRODUCTION INDICES, 1961-79



Sources: FAO, Production Yearbook, various issues; United States Department of Agriculture, Food Problems and Prospects in Sub-Saharan Africa (Washington, 1982), p.3.

V. DEMAND PROSPECTS FOR OILSEEDS AND THEIR PRODUCTS IN NIGERIA, CAMEROON AND THE IVORY COAST TO 1990

Demand for oilseeds is a function of demand for the products which they are used to produce. These products include a variety of foods, animal feedstuffs, and industrial products. Little data exist on oilseed utilization in Nigeria, Cameroon and the Ivory Coast specifically, and so reliance must be made on data for West Africa as a whole. West African data indicate that food products are the major use to which oilseeds are put and data from other developing countries, notably India, suggest that this is true in those countries as well (81, p.14).

Demand for Food Uses

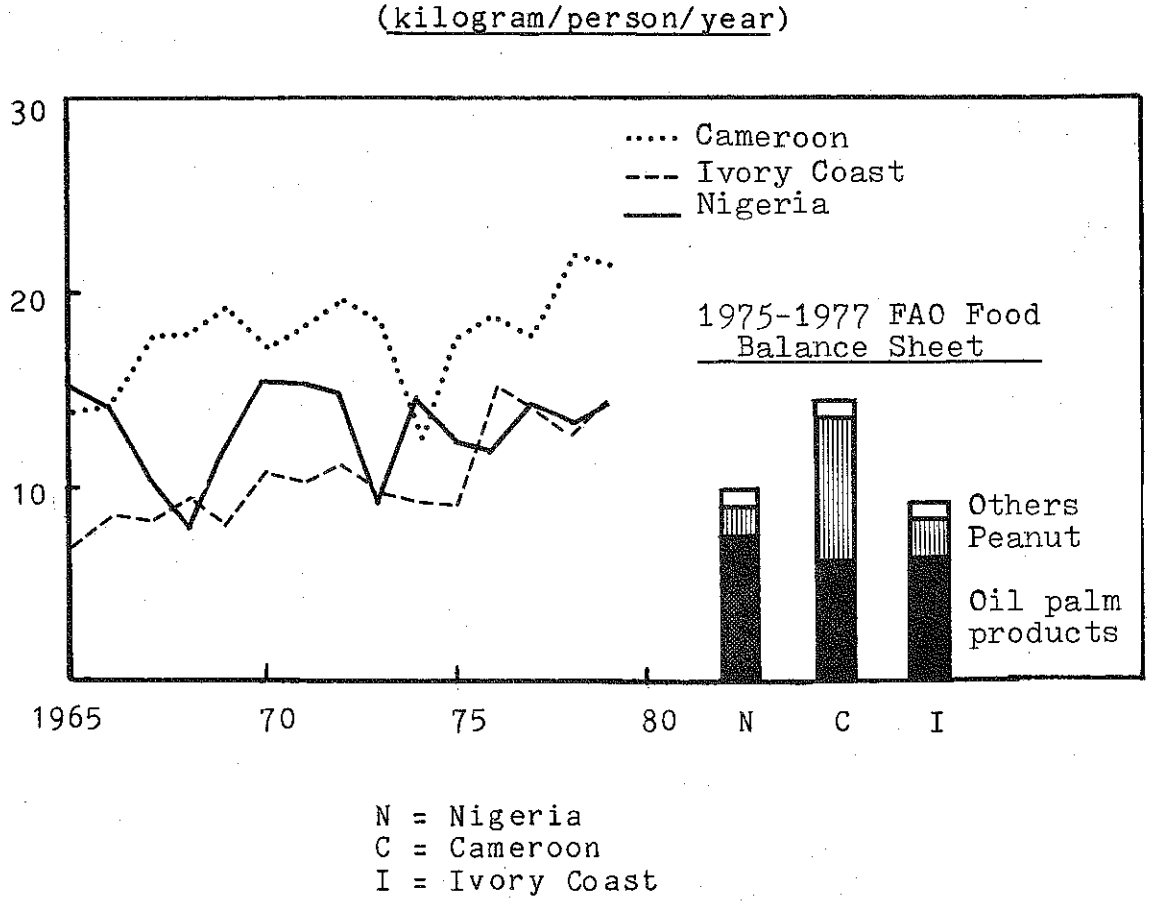
The only data available for oilseed utilization over time in Nigeria, Cameroon and the Ivory Coast are availability data. Figure 10 presents these data giving two sets of estimates. Firstly, per capita availabilities (production - exports + imports) for 1965-79 are plotted. These figures were calculated from FAO production and trade data and the calculations made to obtain them are given in Appendix A. Also presented are average per capita oilseed availability figures taken from the 1975-77 FAO Food Balance Sheet. The food balance estimates attempt to separate food use from total use and thus make adjustments for stocks, seed use, waste and industrial usage. These estimates are therefore somewhat lower than the other figures, although the margin is small, indicating the importance of the use of oilseeds for food in these countries. Overall, for the 1965-79 period, Cameroon and the Ivory Coast have shown increases in per capita availabilities. Nigeria's performance has been eratic due to the Civil War and the drought, and per capita availabilities show virtually no increase over the period. Cameroon also has a significantly higher per capita availability than Nigeria and the Ivory Coast.

Methodology

There are two major ways in which the demand for oilseeds for food use can be forecast. One method is to obtain an estimate of per capita consumption and utilize that estimate to make projections. For example, one could take current per capita consumption and multiply it by projected population to obtain an estimate of demand. Alternatively, one could choose some increased consumption level and multiply it by projected population levels to account for future increases in consumption. Such methods, however, are not directly linked to economic growth. It has previously been postulated that demand for oilseeds is a function of income

FIGURE 10

PER CAPITA OILSEED AVAILABILITIES: NIGERIA, CAMEROON AND THE IVORY COAST, 1965-79



Sources: FAO, Production Yearbook, various issues; FAO, Trade Yearbook, various issues; FAO, Food Balance Sheet, 1975-77.

and, therefore, a method which takes account of income growth would allow a statement of how much of an increase in consumption there is likely to be within the next decade. Specifically, while one could project demand using a consumption figure associated with 30 percent of total calories consumed as fat, to be better able to state how likely it is that there will be sufficient economic growth to obtain such a consumption level, one needs to relate consumption to income.

Both of these types of projections were made for each of the three focus countries. Under the first method, four consumption levels were utilized. First, constant, per capita 1979 consumption was projected to 1990 with 1979 per capita availabilities being used as a proxy for 1979 consumption. Since this estimate is based on availabilities it includes a factor for industrial usage. Next a 15 kg/person/year estimate was employed. This consumption level is derived from the consumption surveys previously discussed and is considered to be consistent with consumption of 20 percent of calories as fat. Thirdly a 25 kg/person/year figure, consistent with consumption of 30 percent of calories as fat, was utilized. Lastly a calculation was made to account for possible higher consumption levels in urban areas than in rural areas. Under this calculation, the 15 kg consumption figure was applied to projected rural population estimates and the 25 kg consumption figure to urban population. The two estimates were then summed to equal total demand.

The population figures utilized for these projections were the low, median and high variant estimates of the United Nations. Figure 11 provides these figures as well as the crude birth and death rates upon which they are predicated. The only significant difference between the three occurs in 1990 between the low and other estimates.

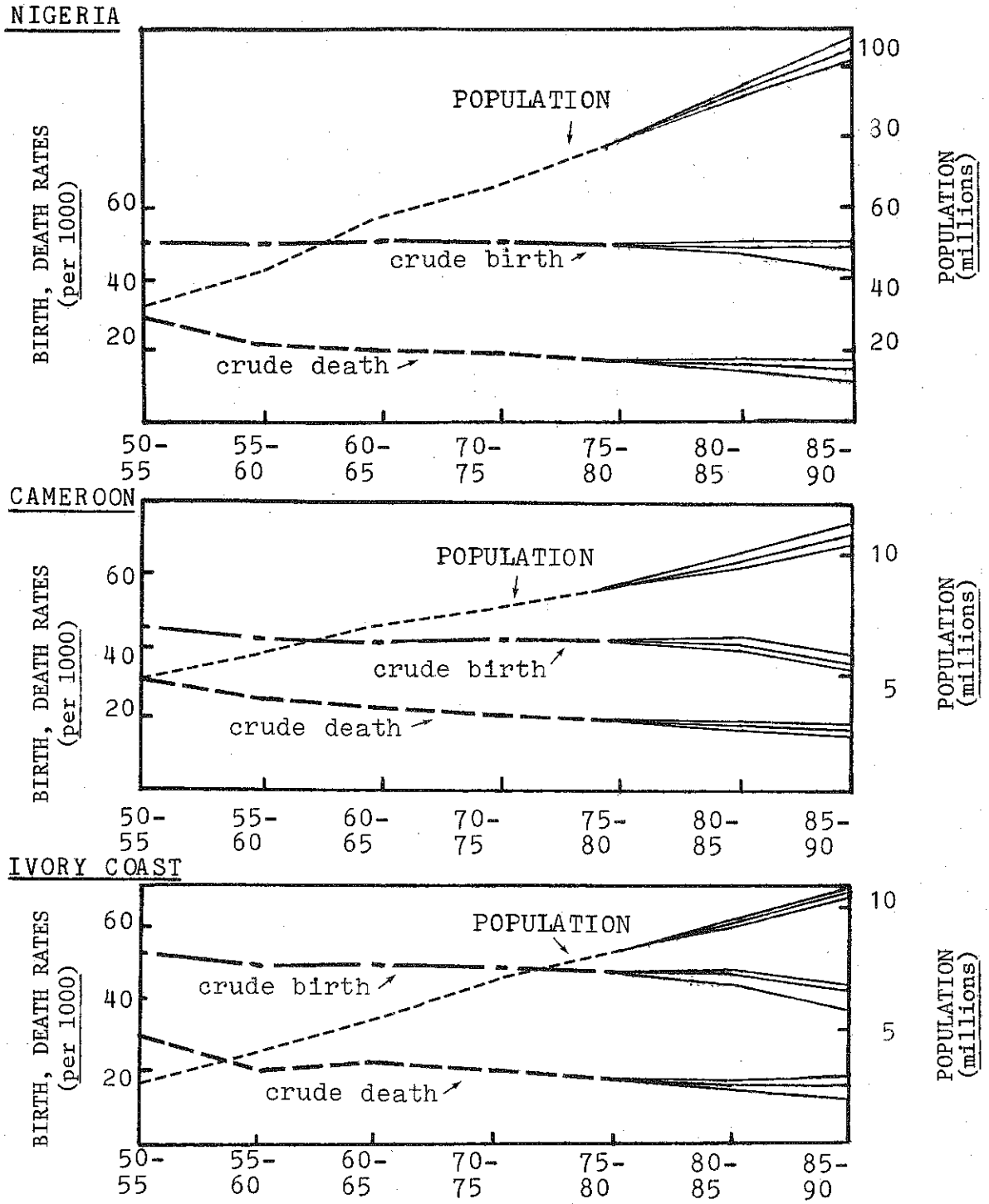
In order to relate demand to income, an econometric analysis was performed with something akin to a demand function being calculated for oilseeds and their products. Data constraints severely restricted the manner in which these functions were estimated and the margin for error and bias is probably considerable. Projections from these estimated equations, therefore, were utilized only to choose between the calorie based figures obtained under the first method.

A demand function, in general, contains the following elements: the price of the good in question, the price of substitutes and income (56, p.218). It is further typically assumed in economic theory that, as incomes increase, the percent of income spent on a particular good with each equal percentage increase in income will fall, i.e., the good will have a declining income elasticity. Data constraints compromised the specification of the variables included in the model, as will be discussed below, while a linear form was fit to comply with the elasticity assumption. It was, unfortunately, not possible to consider rural and urban demand separately in this analysis, although they are likely to differ.

Prices, retail or wholesale, were unavailable for this analysis. The use of producer prices to serve as a proxy (had a complete series been available) would likely have contained considerable specification error

FIGURE 11

POPULATION IN NIGERIA, CAMEROON AND THE IVORY COAST, 1950-80, WITH PROJECTIONS TO 1990



Source: United Nations, Demographic Indicators, various issues.

which would lead to potentially as large a bias as results from excluding these prices altogether. In Nigeria, for example, producer prices have shown little relationship to market prices, at least to those on the international level, and in the Ivory Coast and Cameroon producer prices may not reflect the actual value obtained by farmers for these goods due to government subsidies on the inputs used to produce them. The bias imposed by excluding these prices is probably lessened, however, by the treatment of the oilseeds as a group. Such an aggregation also renders as substitutes only oils of animal origin and butter, both of which are consumed in West Africa in negligible quantities. The bias imposed by not having prices for these substitutes either, is thus also potentially minor. It is conceivable that a distinct consumer preference exists for red palm oil in West Africa as that oil has a distinctive, strong flavor, but, given the data constraints, it was not feasible to explore this possibility.

There are a number of possible measures which can serve as a proxy for income. For this study, Private Consumption Expenditure, reported by the IMF, was used. This figure is considered a better approximation of consumer income than GNP and was deflated in order to be in real terms. The income figures used are shown in Chapter 4 in Figure 7 and the set of three possible income scenarios given in that figure were used in the demand projections.

To complete the econometric analysis, the 1965-79 oilseed availability figures discussed earlier were used as estimates of oilseed consumption. Production and trade data for West Africa are of dubious quality and no concrete data exists for industrial usage of oilseeds. It was felt, therefore, that any attempt to adjust for such usage would be arbitrary and would further undermine the validity of the data. The projections made from these regression equations, therefore, include a factor for industrial usage. A conservative adjustment can easily be made for stocks by calculating a moving average from the availability data and a three year moving average was calculated for each of these countries, but proved to be a problem in the Nigerian analysis and was dropped in favor of no averaging in that case. The Nigerian case differs from the Cameroonian and Ivorian cases due to sharp production declines, resulting from the Civil War (1968-69), the drought (1973-74) and the aphid problems (1975-76), and it makes less sense to assume that stocks would be held of the same magnitude in years of such sharp declines as in other years. Rather than make an arbitrary stock estimate, a dummy variable was employed for these years.

The results obtained under the various projections will be discussed for each country separately below. In Appendix B the regression equations obtained for each are presented.

Nigerian Projections

The projections made for Nigeria are given in Table 11 . The only difference among the various population estimates occurs between the low and other estimates in 1990 and since it is small the median population estimate will be used throughout for comparison. Demand under the high

TABLE 11. DEMAND PROJECTIONS TO 1990: NIGERIA

1977-79 Average Availability: Total 1011 (1000 MT)
Per Capita 14.0 (kg.)

Population	PROJECTIONS 1985 Low	1985 Median	1985 High	1990 Low	1990 Median	1990 High
TOTAL			(thousand metric tons)			
Constant 1977-79	1270	1275	1280	1450	1510	1530
20% of calories	1360	1370	1370	1550	1620	1640
Urban 30% of calories/ rural 20%	1570	1575	1580	1820	1900	1920
30% of calories	2270	2280	2285	2585	2700	2730
High income	1375	1380	1380	1715	1775	1790
Moderate income	1285	1285	1290	1500	1550	1560
Low income	1190	1195	1195	1295	1330	1340
PER CAPITA			(kg./year)			
Constant 1977-79	14.0	14.0	14.0	14.0	14.0	14.0
20% of calories	15.0	15.0	15.0	15.0	15.0	15.0
30% of calories	25.0	25.0	25.0	25.0	25.0	25.0
High income	15.1	15.1	15.1	16.6	16.4	16.4
Moderate income	14.2	14.1	14.1	14.5	14.3	14.3
Low income	13.1	13.1	13.1	12.5	12.3	12.3

income scenario is estimated at 1,775,000 metric tons or 16.4 kg/person/year in 1990, a marked increase over average 1977-79 figures. Some of this demand represents industrial usage, however. This high income figure is well below the figure obtained if all consumers were to consume oilseeds at the rate associated with 30 percent of total calories as fat. Therefore, from this analysis, it appears that Nigeria would not, even under very favorable income growth, approach such a high consumption level by 1990. Under the moderate income projection, demand would rise to 1,550,000 metric tons which would fall short of the 20 percent of total calories estimate. Under the low income projection, total demand would rise to 1,330,000 metric tons, but on a per capita basis would fall revealing the crudeness of the methodology employed.

Cameroonian Projections

Cameroon, in 1979, had the highest oilseed availability level of the three countries under study, already at some 20 kg/person/year. As for Nigeria, the results of the demand projections are not significantly different under the various population scenarios. Under the high income projection (median population), demand levels would approach the 30 percent of calories level, even with an adjustment made for industrial use, 250,000 metric tons indicated in total (Table 12). At the more moderate income level, demand would be 215,000 metric tons (19.8 kg/person/year) which would be a slight increase over 1979 consumption levels. Under the low income projection total demand would rise, but demand would fall on a per capita basis.

Ivorian Projections

Apparent consumption of oilseeds in the Ivory Coast has shown a tremendous increase in recent years and this trend continues in the demand projections shown in Table 13 . The projections were approximately the same for all of the population scenarios and under the high income projection demand would fall below the 30 percent of calories level and on a per capita basis would be 21.9 kg/year. This includes some factor for industrial usage, but remains a very substantial increase over 1977-79 levels. Under the moderate income increase, demand would be higher than that needed to supply the entire population with the 15 kg/year level associated with the 20 percent of calories as fat projection and would be very close to the estimate made in which rural and urban consumption levels are split, even with adjustments made for industrial usage.

TABLE 12. DEMAND PROJECTIONS TO 1990:
CAMEROON

1977-79 Average Availability: Total 155 (1000 MT)
Per capita 19.2 (kg.)

Population	PROJECTIONS 1985 Low	1985 Median	1985 High	1990 Low	1990 Median	1990 High
TOTAL			(thousand metric tons)			
Constant 1977-79	185	185	185	200	210	210
20% of calories	145	145	145	160	160	160
Urban 30% of calories/ rural 20%	180	185	185	205	215	215
30% of calories	240	240	240	260	270	275
High income	195	195	195	245	250	250
Moderate income	180	180	180	210	215	215
Low income	165	165	165	175	180	185
PER CAPITA			(kg./year)			
Constant 1977-79	19.2	19.2	19.2	19.2	19.2	19.2
20% of calories	15.0	15.0	15.0	15.0	15.0	15.0
30% of calories	25.0	25.0	25.0	25.0	25.0	25.0
High income	20.5	20.4	20.4	23.5	23.0	22.8
Moderate income	18.9	18.8	18.8	20.1	19.8	19.6
Low income	17.3	17.3	17.2	16.8	16.6	16.9

TABLE 13. DEMAND PROJECTIONS TO 1990:
IVORY COAST

1977-79 Average Availability: Total 98 (1000 MT)
Per capita 13.0(kg.)

Population	PROJECTIONS 1985 Low	1985 Median	1985 High	1990 Low	1990 Median	1990 High
TOTAL			(thousand metric tons)			
Constant 1977-79	120	125	125	140	145	145
20% of calories	140	140	140	160	165	165
Urban 30% of calories/ rural 20%	180	180	180	210	215	215
30% of calories	235	235	235	265	275	280
High income	160	160	160	230	240	240
Moderate income	145	145	145	185	195	195
Low income	120	125	125	140	150	150
PER CAPITA			(kg./year)			
Constant 1977-79	13.0	13.0	13.0	13.0	13.0	13.0
20% of calories	15.0	15.0	15.0	15.0	15.0	15.0
30% of calories	25.0	25.0	25.0	25.0	25.0	25.0
High income	17.1	17.0	17.0	21.9	21.9	21.7
Moderate income	15.5	15.4	15.4	17.6	17.8	17.6
Low income	12.8	13.3	13.2	13.3	13.7	13.5

Demand for Industrial Uses

The only industrial use for which any data were available was soap manufacture. Figure 12 presents industrial soap and detergent manufacture figures for Nigeria, Cameroon and the Ivory Coast for 1965-79, indicating a sharp rise in all three in the late 1970s. On a per capita basis, these figures indicate availabilities of 2.5 kg/year for Nigeria in 1978, 6.3 kg/year for the Ivory Coast in 1979 and 2.3 kg/year for Cameroon. It is likely that these three figures do not represent total soap consumption, as soap is a product often manufactured at home, industrial production dominating in the developed countries only with the Industrial Revolution. The high figures for the Ivory Coast may indicate a more established soap industry, but this is purely speculation.

In the absence of firm information on soap consumption and composition in these three countries, to make projections of future demand, a number of assumptions must be made. Figure 13 details the procedure and assumptions used to obtain a very crude estimation of industrial demand for oilseeds, an estimation which takes no account of home soap manufacture or of other industrial uses. The key assumptions made are that per capita soap manufacture will double by 1990, as it had done from 1965 to 1979, and that each ton of soap will be 25 percent vegetable oil, a typical soap being 75 percent tallow and 25 percent vegetable oil (Chapter 3).

There is no significant difference in the results obtained amongst the various population estimates. The demand levels indicated for 1990 are 135, 13, and 34 thousand metric tons for Nigeria, Cameroon and the Ivory Coast, respectively. These vegetable oil demands are insignificant,except for the Ivory Coast, when compared to the demand levels obtained for food uses in the previous section.

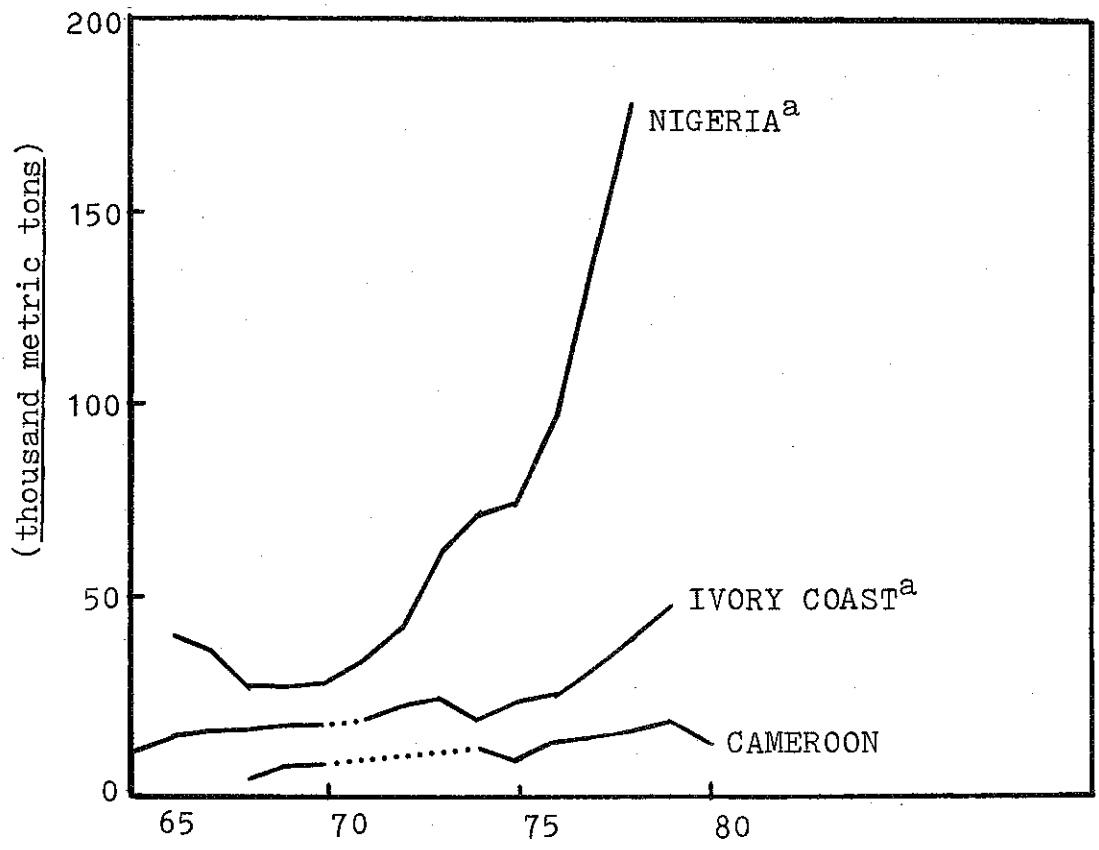
Demand for Livestock Feedstuffs

It is difficult to make estimates of the demand for oilseeds as livestock feedstuffs. No data exist on current consumption levels of these products in Nigeria, Cameroon and the Ivory Coast and export and import figures are the only figures available. Figure 14 shows the balance of trade in oilseed meals of these three countries. In that figure it can be seen that imports of oilseed meal, of any variety, have been negligible during the past 15 years. This suggests that these three countries are more than self-sufficient in oilseed meals. If one examines the value of feedstuff imports during the 1970s, however, as shown in Figure 15 , one sees a tremendous increase in feedstuff imports, particularly for Nigeria and the Ivory Coast. This increase is correlated with an expansion in poultry production.

A very crude estimate for oilseed meal demand can be obtained by examining increases in the demand for meat and applying a number of heroic assumptions akin to those used above in projecting industrial demand. In this regard, the demands for poultry and beef are probably the most interesting as some use of supplemental feeding is currently undertaken in the region and they are both important sources of meat in the diet.

FIGURE 12

SOAP MANUFACTURE IN NIGERIA, CAMEROON AND THE IVORY COAST, 1965-80



... data unavailable

[a] Includes both soap and detergent

Source: United Nations, Yearbook of Industrial Statistics, various issues.

FIGURE 13

FLOWCHART FOR OILSEED USE FOR SOAP MANUFACTURE

SCHEMA:

1979 kg/person soap availability × 1.5[a] = 1985 per capita soap availability
1979 kg/person soap availability × 2.0[a] = 1990 per capita soap availability
× Population (low, median, high) = Total 1985 soap requirement / Total 1990 soap requirement × 25%[a] = Implied 1985 oilseed requirement / Implied 1990 oilseed requirement

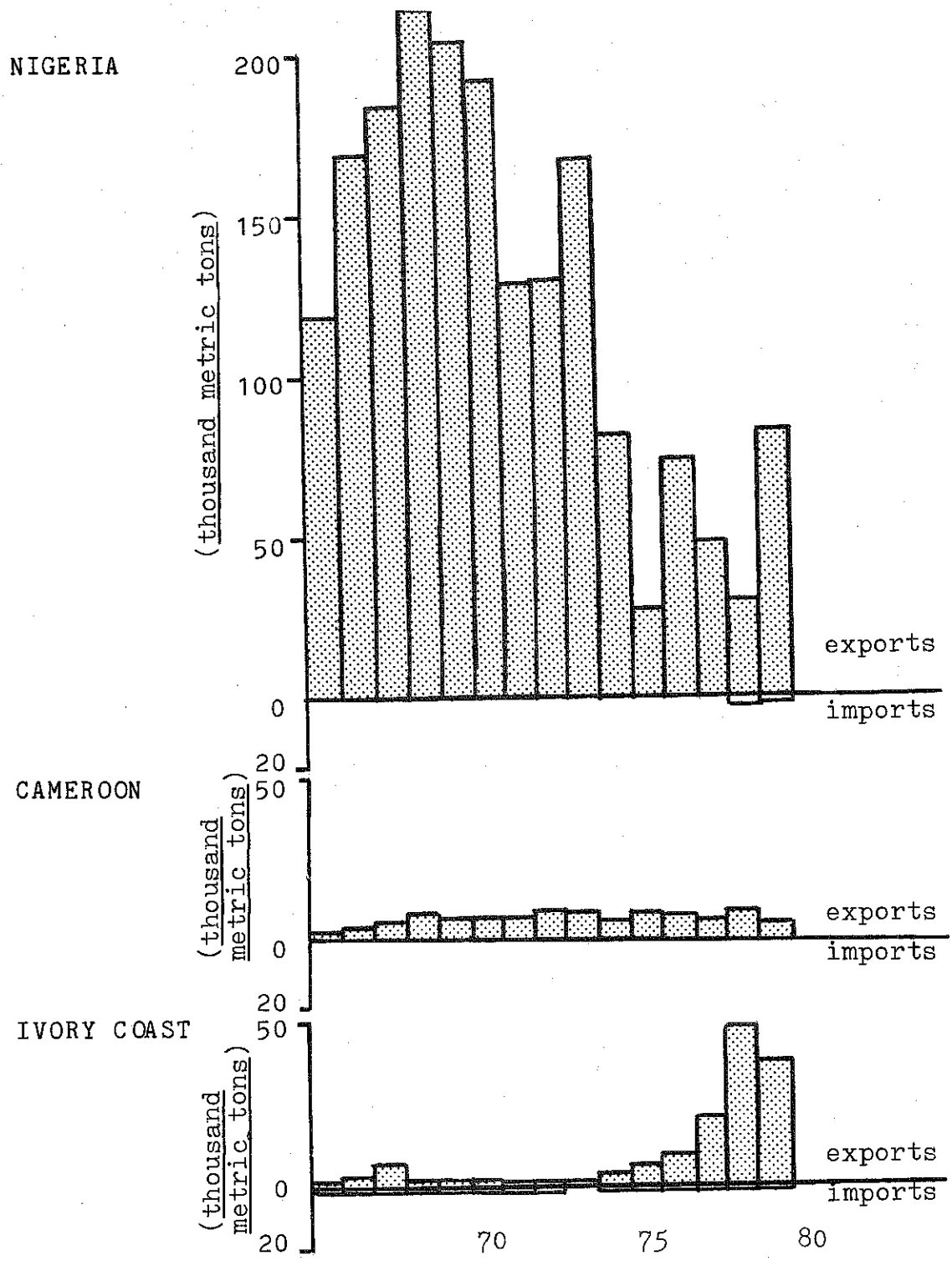
FIGURES UTILIZED FOR NIGERIA, CAMEROON AND THE IVORY COAST:

	Per capita soap availabilities				Total soap required		Implied oilseed requirement	
	1979	1985	1990		1985	1990	1985	1990
	(kg/year)				(thousand metric tons)		(thousand metric tons)	
Nigeria	2.5	3.7	5.0	low	336	517	84	129
				median	337	540	85	135
				high	338	546	85	136
Cameroon	2.3	3.4	4.6	low	32	48	8	12
				median	32	50	8	13
				high	33	50	8	13
Ivory Coast	6.3	9.4	12.6	low	88	132	22	33
				median	89	138	22	34
				high	89	140	22	35

[a] By assumption

FIGURE 14

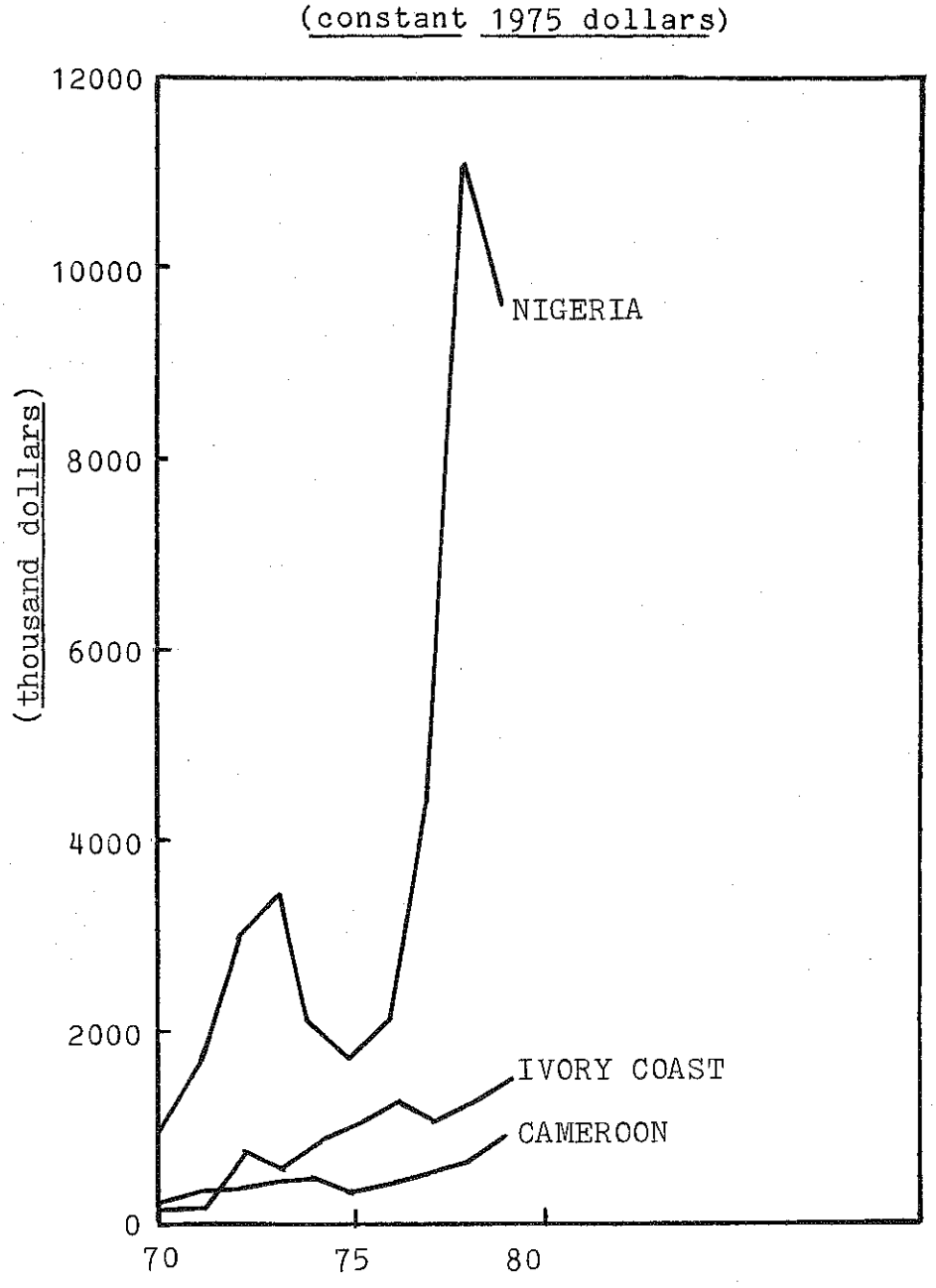
OILSEED MEAL EXPORTS AND IMPORTS, 1965-79



Source: FAO, Trade Yearbook, various issues.

FIGURE 15

DOLLAR VALUE OF FEEDSTUFF IMPORTS: NIGERIA, CAMEROON AND THE IVORY COAST, 1970-79



Source: FAO, Trade Yearbook, various issues.

Beef is currently the single most important meat in West Africa and this dominance is shown for Nigeria, Cameroon and the Ivory Coast in Figure 16 which plots meat availabilties (production - exports + imports). On a per capita basis, for 1979, total meat availabilities were 3.5 kg/year for Nigeria, 5.7 kg/year for Cameroon and 6.6 kg/year for the Ivory Coast. Of interest also in Figure 16 is the large increase in the availability of poultry meat, in the late 1970s, in Nigeria and the Ivory Coast. This is largely due to the establishment of commercial poultry operations.

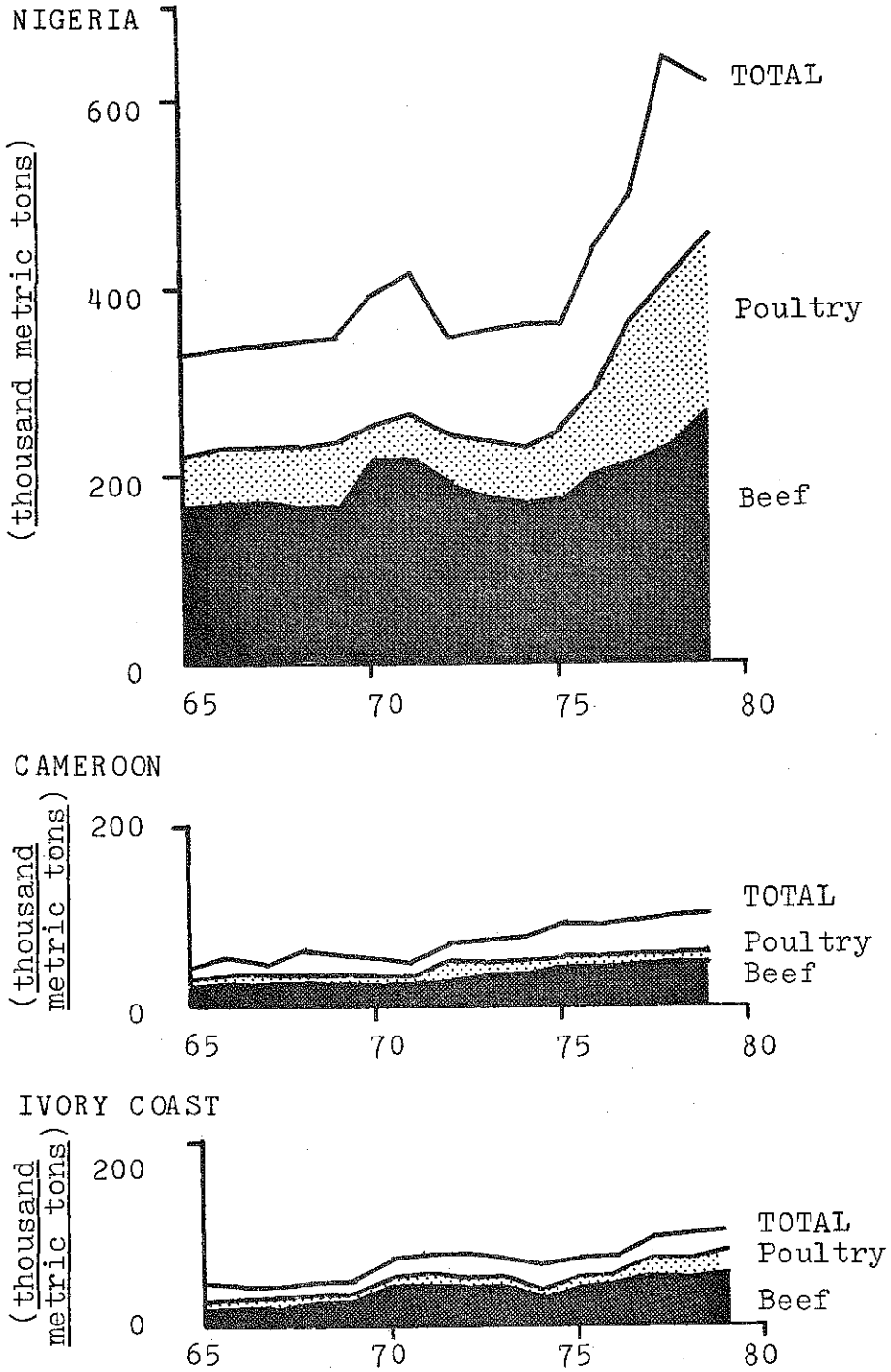
Figure 17 provides the schema used for projecting oilseed meal demand associated with poultry consumption. Poultry availabilities in Nigeria, Cameroon and the Ivory Coast in 1979 were 2.6 kg/person/year, 1.4 kg/person/year and 2.6 kg/person/year, respectively, which represents approximately a doubling in all three countries over 1965 levels. The projections made for feedstuffs to 1990 are based on the following assumptions 1) per capita availabilities ('demand') for poultry will double by 1990, 2) the feed conversion ratio for poultry is 2.2, i.e., for each kilogram of liveweight, 2.2 kg of feed must be consumed by the animal (58, p.16), 3) 50 percent of the poultry needed to meet poultry 'demand' will be completely fed out (in Nigeria in the mid-1970s, according to the Third National Development Plan, approximately 10 percent of the total poultry population received supplemental feedstuffs and 4) 50 percent of the total feed ration will be supplied by oilseeds. These assumptions are almost certainly overestimates of feed use.

In the projections obtained there was no difference among the population scenarios. Oilseed meal demand is estimated at 308, 16 and 31 thousand metric tons for Nigeria, Cameroon and the Ivory Coast, respectively, in 1990.

A similar analysis is presented in Figure 18 for feedstuff demands derived from the demand for beef. In this schema, it takes 7.5 kg of feed for each kg of liveweight and it was assumed that only 10 percent of the total beef 'demanded' would be met by animals fed out on feedstuffs, the 50 percent figure used for poultry being far beyond the imaginable for beef. In 1990 oilseed meal demand is estimated at 285, 45 and 56 thousand metric tons in Nigeria, Cameroon and the Ivory Coast, respectively.

FIGURE 16

TOTAL MEAT AVAILABILITIES IN NIGERIA, CAMEROON AND THE IVORY COAST, 1965-79



Sources: FAO, Production Yearbook, various issues; FAO, Trade Yearbook, various issues.

FIGURE 17

FLOWCHART OF OILSEED MEAL DEMAND PROJECTIONS DERIVED FROM POULTRY

SCHEMA:

1979 kg/person poultry availability $\times \frac{1.5^{a} = \text{1985 per capita poultry availability}}{2.0^{a} = \text{1990 per capita poultry availability}} \times$ Population $\times$ low / median / high $= \frac{\text{Total 1985 poultry requirement}}{\text{Total 1990 poultry requirement}} \times 50\%^{a} =$ Poultry to be obtained from animals feed supplements $\times 2.2^{b} = \frac{\text{Total 1985 feed requirement}}{\text{Total 1990 feed requirement}} \times 50\%^{a}$

$= \frac{\text{Total 1985 oilmeal requirement}}{\text{Total 1990 oilmeal requirement}}$

FIGURES UTILIZED FOR NIGERIA, CAMEROON AND THE IVORY COAST

	Per capita poultry availabilities				Total poultry required		Total feed required		Total oilmeal required	
	1979	1985	1990		1985	1990	1985	1990	1985	1990
	(kg/year)				(thousand metric tons)		(thousand metric tons)		(thousand metric tons)	
Nigeria	2.6	3.9	5.2	low	354	537	389	591	194	295
				median	356	561	391	617	196	308
				high	356	567	391	624	196	312
Cameroon	1.4	2.1	2.8	low	20	29	22	33	11	16
				median	20	29	22	33	11	16
				high	20	31	22	35	11	18
Ivory Coast	2.6	3.9	5.2	low	37	55	41	60	20	30
				median	37	57	41	63	20	31
				high	37	58	41	64	20	32

[a] By assumption

[b] Feed conversion ratio

FIGURE 18

FLOWCHART OF OILSEED MEAL DEMAND PROJECTIONS DERIVED FROM BEEF

SCHEMA:

1979 kg/person beef availability X $\frac{1.5^{a}=\text{1985 per capita beef availability}}{2.0^{a}=\text{1990 per capita beef availability}}$ = Population $\begin{matrix}\text{low}\\\text{median}\\\text{high}\end{matrix}$ = $\frac{\text{Total 1985 beef requirement}}{\text{Total 1990 beef requirement}}$ X $10\%^{a}$ = Beef to be obtained from animals feed supplements X 7.5^{b} = $\frac{\text{Total 1985 feed requirement}}{\text{Total 1990 feed requirement}}$ X $50\%^{a}$

= $\frac{\text{Total 1985 oilmeal requirement}}{\text{Total 1990 oilmeal requirement}}$

FIGURES UTILIZED FOR NIGERIA, CAMEROON AND THE IVORY COAST:

	Per capita beef availabilities				Total beef required		Total feed required		Total oilmeal required	
	1979	1985	1990		1985	1990	1985	1990	1985	1990
	(kg/year)				(thousand metric tons)		(thousand metric tons)		(thousand metric tons)	
Nigeria	3.5	5.3	7.0	low	481	723	361	542	180	271
				median	483	756	361	570	180	285
				high	484	764	361	570	180	285
Cameroon	5.7	8.6	11.4	low	82	119	60	90	30	45
				median	82	123	60	90	30	45
				high	82	125	60	98	30	49
Ivory Coast	6.6	9.9	13.2	low	93	139	68	105	34	56
				median	93	145	68	112	34	56
				high	93	146	68	112	34	56

a By assumption

b feed conversion ratio

VI. CONCLUSIONS: IMPLICATIONS OF OILSEED DEMAND PROJECTIONS

Table 14 summarizes, by source, the oilseed demand projections made in Chapter 6 for 1985 and 1990. In choosing between the food use projections, a range was built by utilizing the calorie projections which were higher and lower than the levels projected under the moderate income growth scenario. The moderate income projection was chosen for illustration purposes, but may prove to be unrealistic for any or all of these countries. The median population estimate was utilized throughout. A separate soap demand estimate was added to all but the Nigerian lower bound, which is based on the constant 1979 availability figure and so already includes a factor for industrial usage. As the soap and livestock meal projections are already very crude estimates, they were left as done in Chapter 5. The process of calculating a range for these estimates might add an air of significance to them which is unwarranted. Totaling food use and crude industrial use yields a total vegetable oil demand estimate for 1985 of 1280-1455 thousand metric tons for Nigeria, 190-250 thousand metric tons for Cameroon and 165-205 thousand metric tons for the Ivory Coast. For 1990 the figures are 1510-1755, 230-285, and 200-250, respectively.

Implications for Self-Sufficiency

The vegetable oil demand projections obtained consider oilseeds as a group, no allowance being made within these projections for consumer preferences for one oilseed over another. Evaluation of the implications of these demand projections should, however, try to take such preferences into account and examine the individual oilseeds as well as the gross totals. An ad hoc and crude way to segment the total projected demand levels into individual oilseeds would be to utilize the average share of a particular oilseed in total availabilities over the sample period, 1965-79. Such percentages were calculated for Nigeria, Cameroon and the Ivory Coast with imports divided, as far as possible, by type and are presented in Appendix C.

Nigeria

Figure 19 indicates that, for Nigeria, both of the 1985 projections and the lower 1990 projection are below or equal to peak production levels, demonstrating Nigeria's capacity to be self-sufficient in oilseeds. All of the projections are, however, well above recent Nigerian production which, in 1977-79, averaged some 500,000 metric tons below peak levels.

TABLE 14. SUMMARY OF DEMAND PROJECTIONS (MEDIAN POPULATION)

(thousand metric tons)

	1985	1990
NIGERIA		
Food Use[a/]	1280-1370	1510-1620
Soap[b/]	85	135
	1365-1455	1645-1755
Livestock Feedstuffs[b/]	376	593
CAMEROON		
Food Use[c/]	185-240	215-270
Soap[b/]	10	15
	195-250	230-285
Livestock Feedstuffs[b/]	41	61
IVORY COAST		
Food Use[d/]	140-180	165-215
Soap[b/]	25	35
	165-205	200-250
Livestock Feedstuffs[b/]	54	87

a/ Lower bound corresponds to constant 1977-79 projection given in Chapter 5, upper bound to the 20 percent of calories figure.

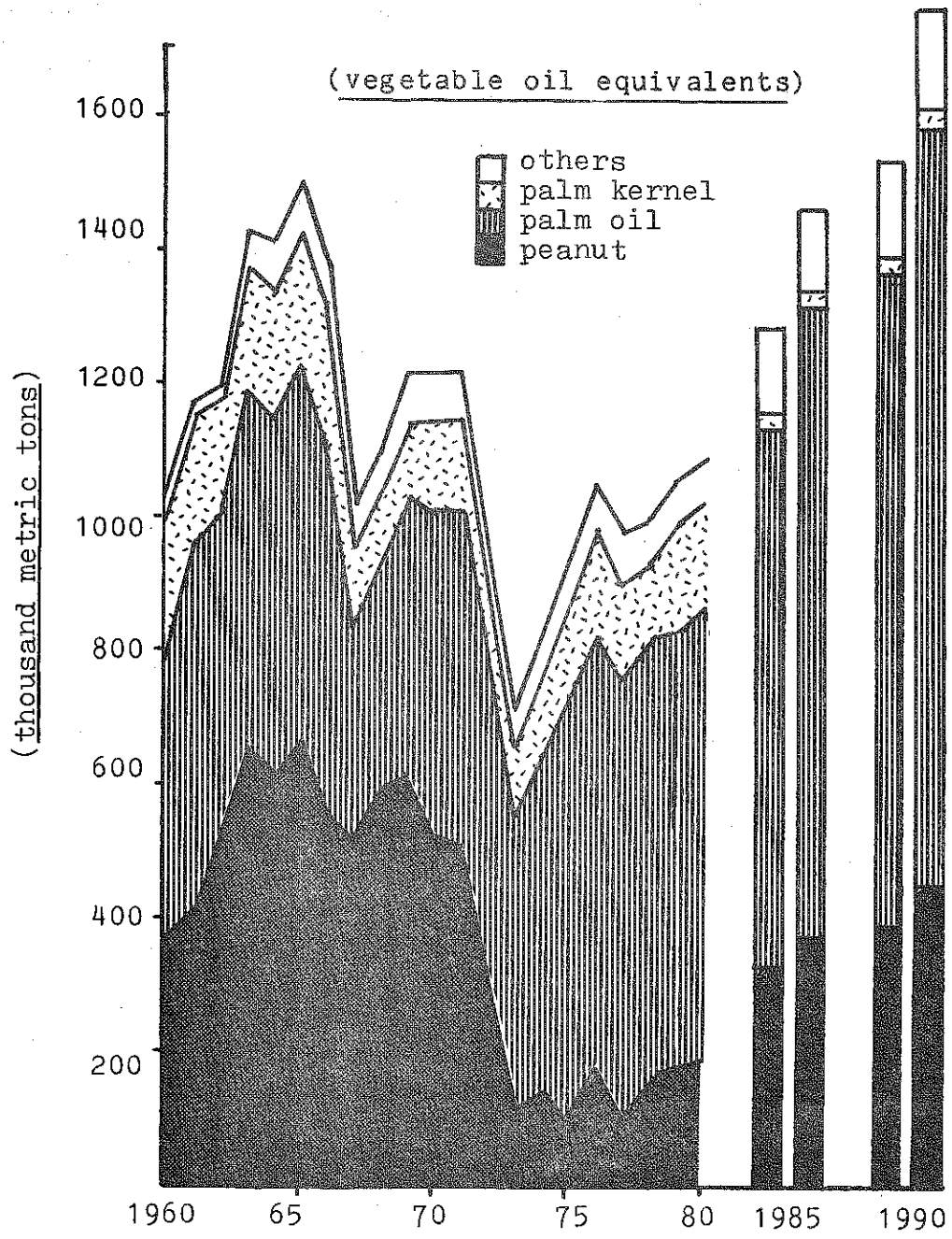
b/ Crude estimation

c/ Lower bound corresponds to the urban/rural projection given in Chapter 5, upper bound to the 30 percent of calories figure.

d/ Lower bound corresponds to the 20 percent of calories projection given in Chapter 5, upper bound to the urban/rural projection.

FIGURE 19

NIGERIAN OILSEED PRODUCTION, 1960-80 AND DEMAND PROJECTIONS TO 1990



Source: FAO, Production Yearbook, various issues.

In terms of the individual oilseeds, palm oil accounted in Nigeria for some 65 percent of total availabilities and peanuts 25 percent over the 1965-79 period. As Figure 19 shows, projected peanut demands for 1985 and 1990 are all well below peak peanut production levels, but above average 1977-79 levels. Palm oil projections are, for the most part above, peak Nigerian production. The figure implies, in fact, that for only palm kernels would 1977-79 production levels be sufficient to 1990.

What is the likehood of Nigeria producing, in the future, adequate total quantities of oilseeds as well as sufficient quantities of each oilseed individually? Nigerian gross oilseed production would need to increase from average 1977-79 levels by some 50 percent to reach the lower 1990 projection and by some 70 percent to reach the upper projection. In recent years Nigeria has launched a number of agricultural development programs. These programs are, however, largely dependent for funding upon petroleum earnings and, with present conditions in the world petroleum market, the progress of these programs may be hampered. Producer prices for oilseeds, as well as for other agricultural commodities, have also been raised substantially in recent years. Agriculture in Nigeria, however, competes with the industrial sector for labor and its downward trend may not be one which is easily reversed.

Cameroon

Cameroonian oilseed production has been rising steadily over the past 15 years as shown in Figure 20 . Total production in 1979 was 190,000 metric tons, in oil equivalents. This level falls near to the lower 1990 demand projection and in between the 1985 projections. Production has grown since 1965 by some 60 percent and if that pace were to continue over the next decade, production in 1990 would be some 300,000 metric tons or approximately equal to the upper 1990 demand projection.

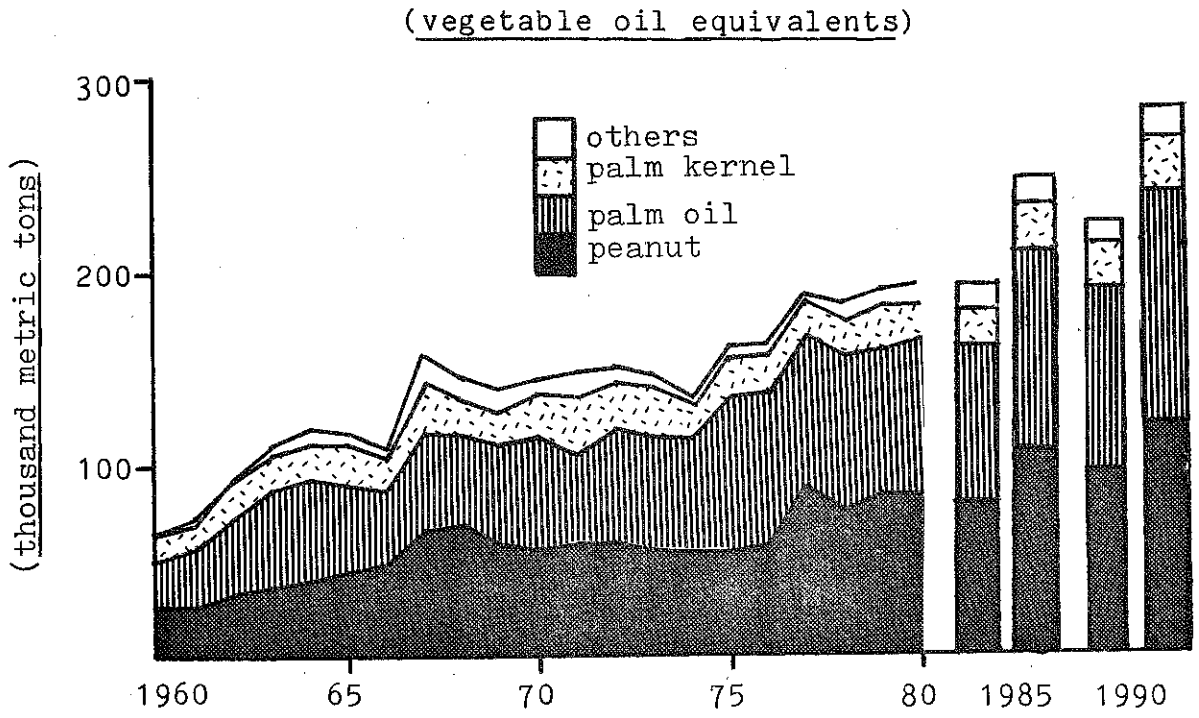
For individual oilseeds, recent Cameroonian production levels fall within the demand projections for each oil type as shown in Figure 20 . Palm oil and peanuts have each accounted for an average 42 percent of total oilseed availabilities during the 1965-79 period.

Ivory Coast

Ivorian production has increased far faster than Cameroonian production, increasing from 1965-79 by some 443 percent. This pattern is shown in Figure 21 . Highest levels of production for the 1965-79 period occurred in 1978 when some 200,000 metric tons were produced. This production level is above the 1985 projections both high and low, and within the range for 1990. In fact, to reach the high 1990 demand projection, production would have to increase by only 30 percent from average 1977-79 levels, over the next decade.

FIGURE 20

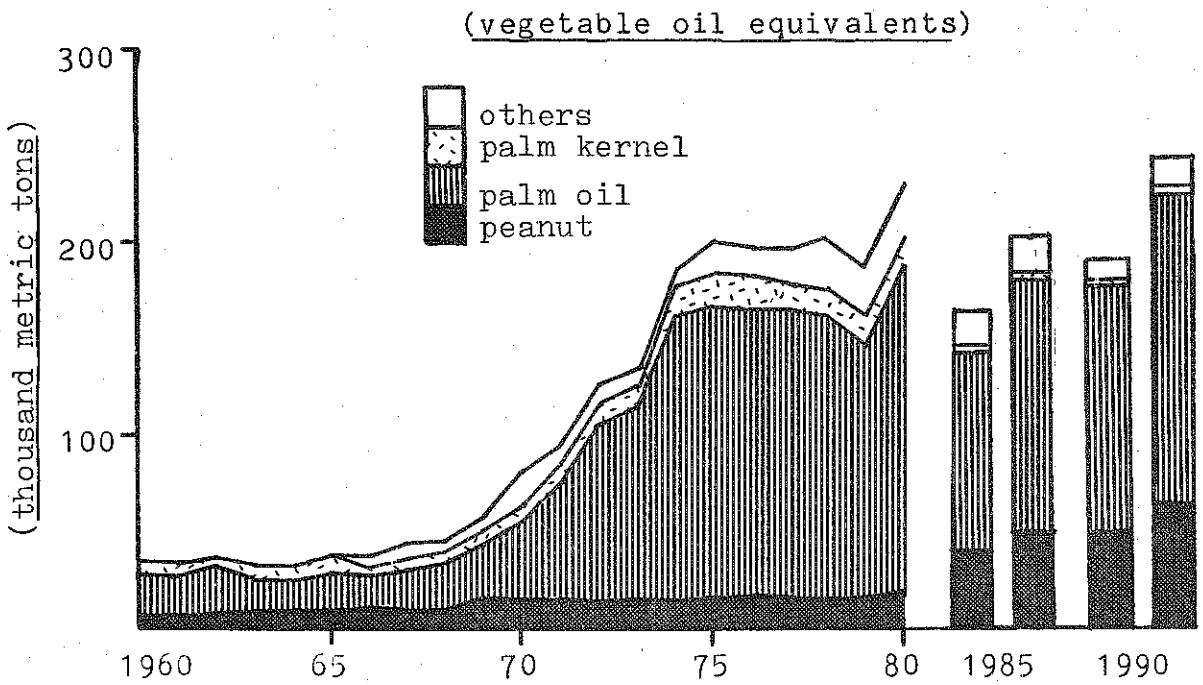
CAMEROONIAN OILSEED PRODUCTION, 1960-80 AND DEMAND PROJECTIONS TO 1990



Source: FAO, Production Yearbook, various issues.

FIGURE 21

IVORIAN OILSEED PRODUCTION, 1960-80 AND DEMAND PROJECTIONS TO 1990



Source: FAO, Production Yearbook, various issues.

Considering demand by type of oilseeds, Figure 21 suggests that current peanut production levels would fall short of peanut demand levels under all of the projections in the Ivory Coast. Current palm oil production appears to be adequate and current palm kernel production more than sufficient to meet future demands.

Implications for International Trade

Figure 22 summarizes the oilseed trade history of Nigeria, Cameroon and the Ivory Coast over the 1965-79 period. The figure indicates that imports have generally been negligible compared to exports. Exceptions are Nigeria since 1977, when imports have averaged some 11 percent of total availabilities, and the Ivory Coast in the mid-1960s.

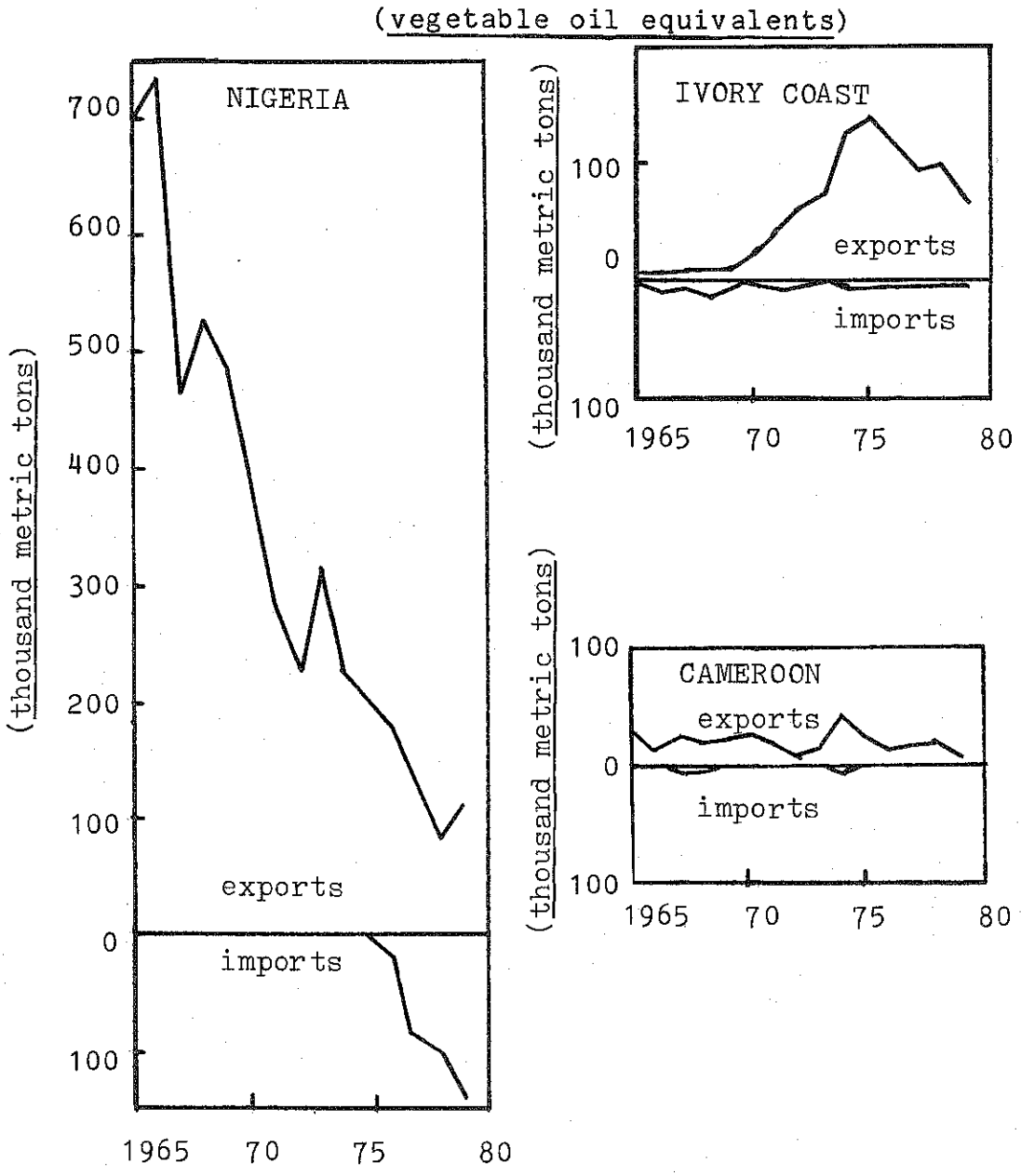
If oilseed export levels for Nigeria, Cameroon and the Ivory Coast were to remain at constant 1977-79 levels, the growth levels given earlier for domestic production would have to be modified. For Nigeria production would now have to increase by some 60-90 percent to meet 1990 demand levels and this is only to maintain the comparatively low export levels which the country obtained in the late 1970s. For Cameroon production would have to grow by 30-60 percent and for the Ivory Coast by 45-70 percent. These data, combined with earlier discussions, suggest that it is unlikely that Nigeria will again be a major oilseed exporter in the next decade. For the Ivory Coast, the addition of recent export levels makes it imperative that oilseed production continue to increase. Although the Ivory Coast could almost meet its own needs through the next decade with current production levels, it would lose valuable export earnings. Cameroon's recent export levels are fairly small and so their addition to demand levels does not greatly alter the needed increase in production levels.

The above discussion adds some quantitative evidence to the proposition that domestic income growth would complicate the oilseed trade position of the West African region. The region has been obtaining a declining share of world oilseed markets, particularly of the EEC market, and nothing found in the discussion above would lead to the conclusion that this trend will be altered. This is especially so when it is considered that the same sorts of demand changes undergone by the countries studied here can be expected to be occurring in other countries in the region as well.

How might these domestic demand trends impact on intraregional trade in these commodities? Figure 23 presents a trade matrix for oilseeds and their products constructed by the UN for West Africa in the mid-1960s. This figure indicates the almost negligible level of intraregional trade. Given increasing competition in the world oilseed market, the possibility that the EEC might impose a vegetable oil tax, and increased demand within the West African region, there may be an increased impetus for trade amongst these countries in the future which could fundamentally alter the region's trade patterns.

FIGURE 22

EXPORTS AND IMPORTS OF OILSEED PRODUCTS IN NIGERIA, CAMEROON AND THE IVORY COAST, 1965-79



Source: FAO, Trade Yearbook, various issues.

FIGURE 23

VEGETABLE AND ANIMAL OILS AND FATS TRADE MATRIX FOR WEST AFRICA, 1963

(thousand U.S. dollars)	Benin	Gambia	Ghana	Guinea	Ivory Coast	Liberia	Mali	Niger	Nigeria	Senegal	Sierra Leone	Togo	Upper Volta	Total Exports	Exports to West African region
Benin							54					37	1	1907	73
Gambia														1163	
Ghana												4	2	240	1
Guinea						1	1								
Ivory Coast			2			21	4	7					8	266	6
Liberia															
Mali										4				99	99
Niger							5		7					723	131
Nigeria	4		482		635	5		103			248			45095	1962
Senegal	174				323			9				122	3	39013	401
Sierra Leone							15							1	
Togo			163											28	27
Upper Volta							2								
Other Africa						459	2			8			1		
Overseas	10	3	398		34	233	1	9	105	58	385	10	33		
Total Imports	188	5	1045		1451	265	82	128	112	70	633	173	48		
Imports from West African region	178		647		959	27	81	119	7	4	248	163	14		

Source: United Nations, Establishment of Food Processing in West Africa (New York, 1966).

Livestock Feedstuffs

Figure 24 presents oilseed production data for Nigeria, Cameroon and the Ivory Coast in meal equivalents. The pattern, not surprisingly, follows the production patterns given earlier in oil equivalents from 1965-79. Average potential production in 1977-79 in Nigeria, Cameroon and the Ivory Coast was approximately 450,000 metric tons, 140,000 metric tons and 70,000 metric tons, respectively. Comparing these figures to the crude demand estimations for livestock feedstuffs, reveals that present potential oilmeal production would, in a gross sense, be adequate to 1990 with the limit being approached in Nigeria and the Ivory Coast. It must be remembered, however, that Nigerian peak potential production of these materials has been shown to be as high as 1,100,000 metric tons and that the demand projections themselves are likely to err on the side of overestimation.

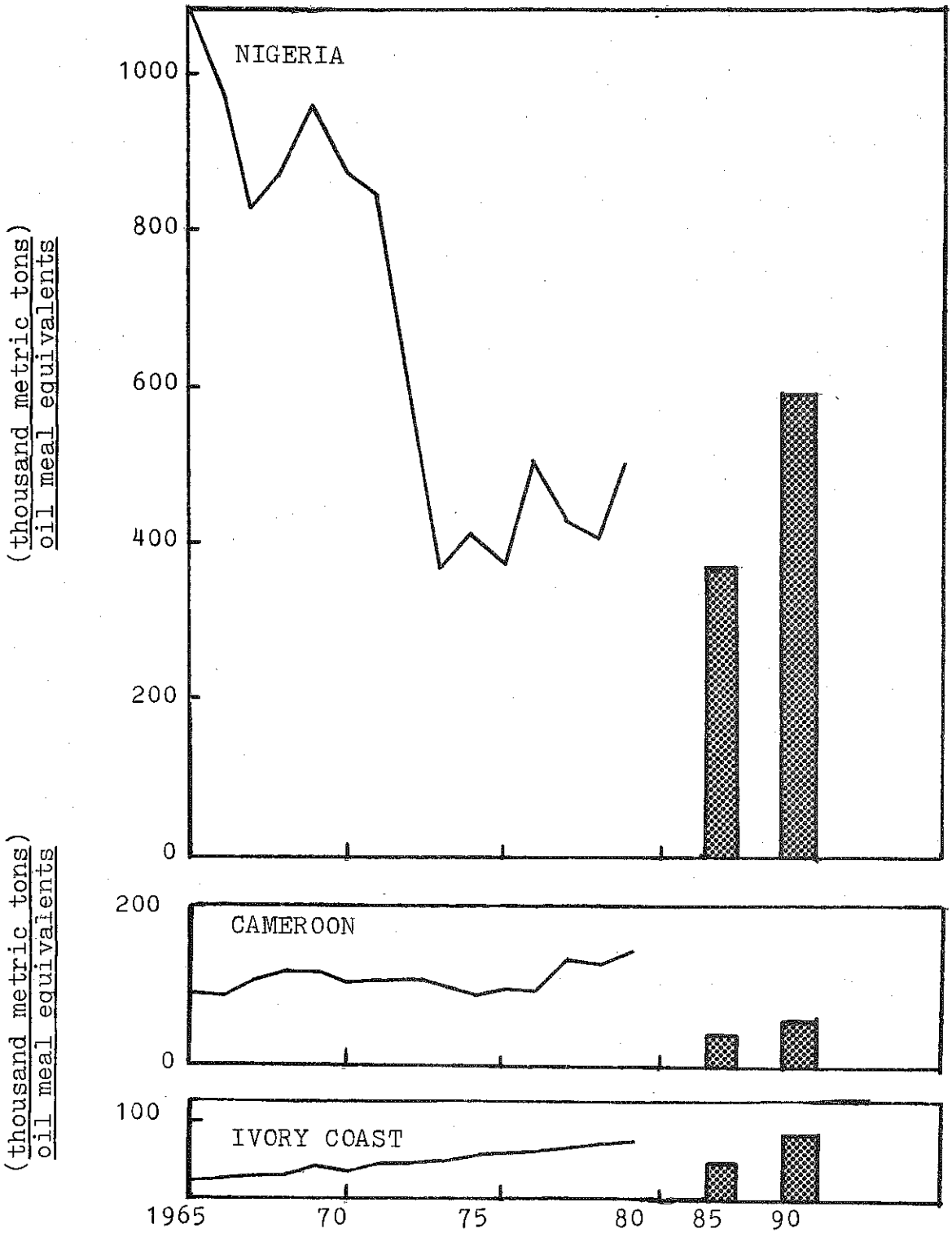
The demand for oilseed meals is far more complex than the comparisons made above would suggest. Oilseed meals are less interchangeable than are vegetable oils and so meal type is especially important. Given the oilseed production pattern in these three countries, the major share of the potential production figures quoted above are in the form of peanut and palm kernel meals and these are not satisfactory for all livestock types. In addition, whether an oilseed meal will be utilized in a feed ration at all and in what amount is closely related to the price and availability of other feedstuffs, such as grains and animal meals. With the limited information available, therefore, it is extremely difficult to evaluate future demand for oilseed meals in these three countries. In all likelihood, however, the three will remain self-sufficient through the next decade in the major types of meals produced within the region and would be required instead to import any other types of oilseed meals that might be required.

Concluding Observations

To summarize, the study finds that increases in domestic demand for oilseeds will complicate West Africa's role as an oilseed exporter. Of the three countries studied, the Ivory Coast and Cameroon have the best prospects to remain self-sufficient and continue to export, production, however, must continue to expand. Nigeria, already importing vegetable oils, is likely to continue to do so through the next decade barring a major reversal of trends in its agricultural sector.

FIGURE 24

POTENTIAL OILMEAL PRODUCTION AND DEMAND TO 1990



Source: FAO, Production Yearbook, various issues.

Appendix A

PROCEDURE FOR CALCULATING OILSEED AVAILABILITIES

1. Oilseed production and trade data were obtained for Nigeria, Cameroon and the Ivory Coast for 1960-1980 from FAO sources.

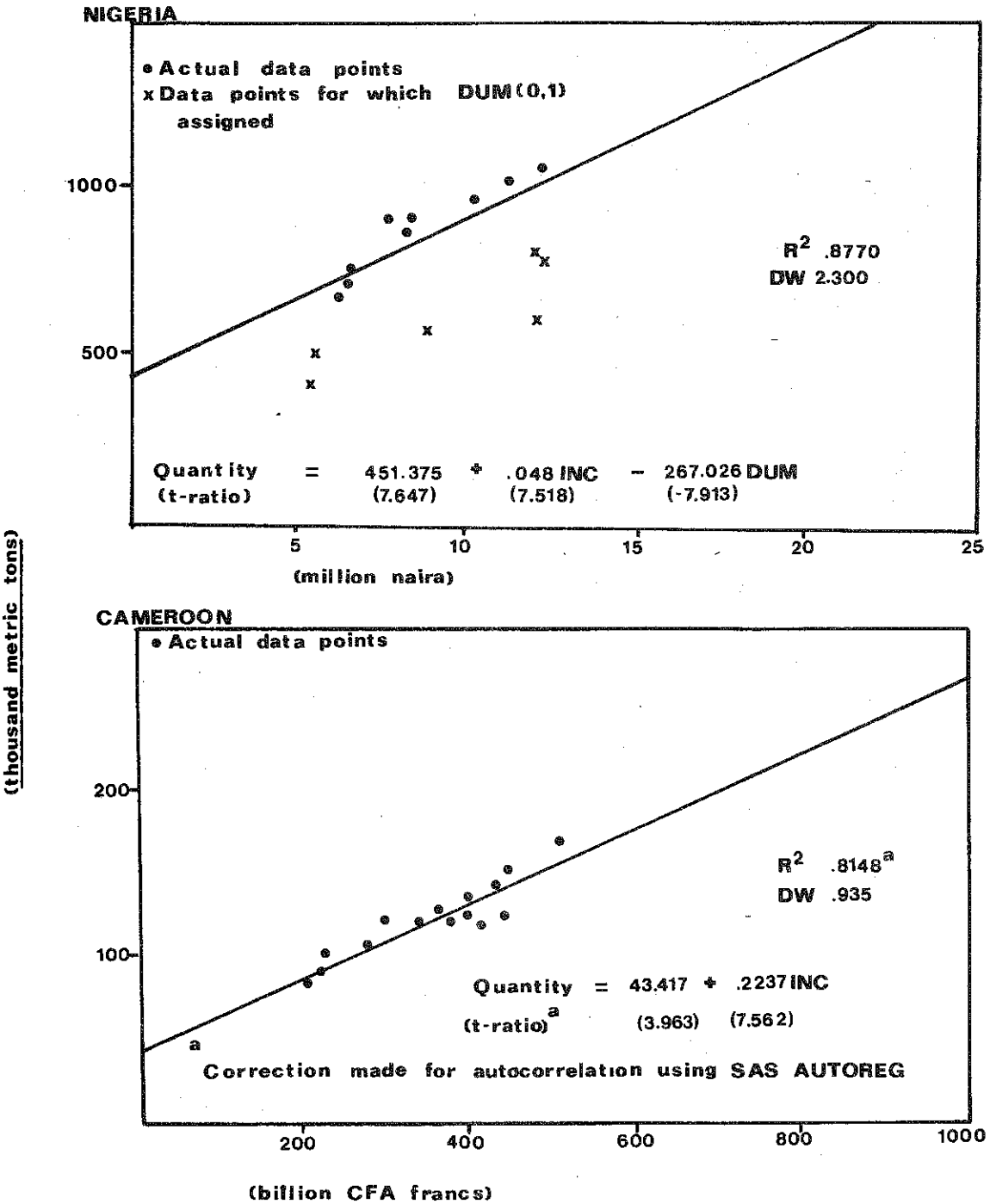
2. Domestic production minus exports for each oilseed were calculated with the higher export figure for meal or oil being added to seed exports to form total exports. For peanuts and cottonseed, as harvesting takes place late in the year and marketing continues into the next year, exports were subtracted from the previous year's production. For example, the 1966 availability figure for peanuts was calculated by summing the exports for 1966 and subtracting these exports from the 1965 production level. The vegetable oil equivalents of each of these availability figures was then calculated using the following conversions a) for peanuts, 70 percent to remove the shell and 45 percent to convert to oil, b) palm kernels 45 percent, c) palm oil 100 percent, d) copra 64 percent, e) cottonseed 18 percent, f) soybean 17 percent and g) sesame 47 percent. The oil equivalents for each year were then summed.

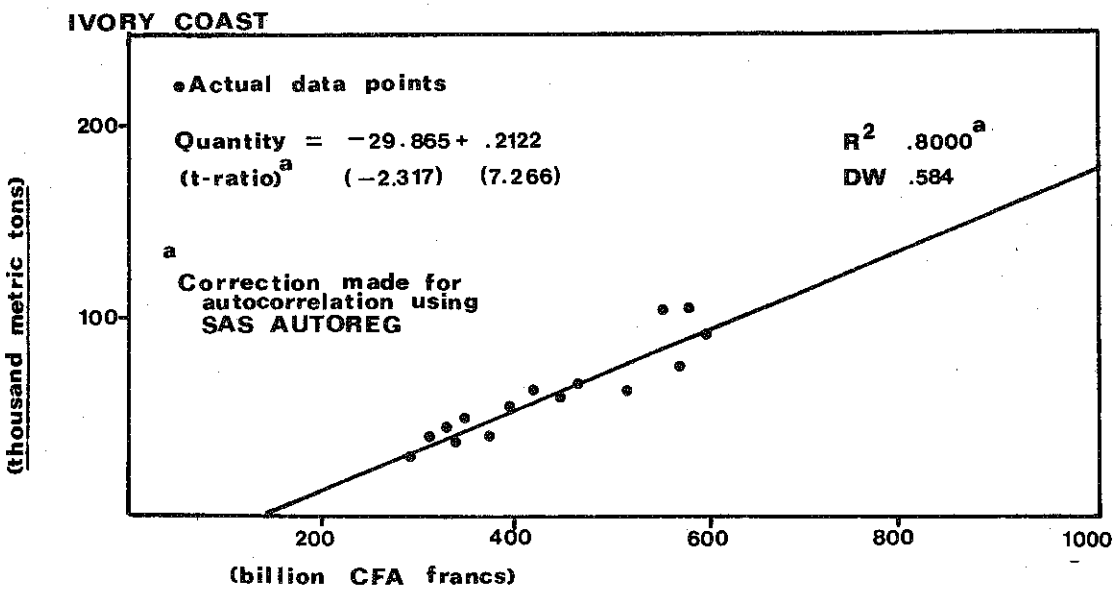
3. Vegetable oil imports were totaled with only the net imports (imports-exports), if any, of Fixed Vegetable Oil, NES entered.

4. Domestic availabilities and imports were summed and for Cameroon and the Ivory Coast a three year moving average of these figures was taken in order to make a crude adjustment for stores.

Appendix B

REGRESSION RESULTS FOR NIGERIA, CAMEROON AND THE IVORY COAST




IVORY COAST
•Actual data points
Quantity = −29.865+ .2122
(t-ratio)a (−2.317) (7.266)
R2 .8000a
DW .584
a
Correction made for autocorrelation using SAS AUTOREG
200
100
(thousand metric tons)
200
400
600
800
1000
(billion CFA francs)

Appendix C

OILSEED AVAILABILITIES BY OILSEED TYPE, AVERAGE 1965-79

	(percent)
NIGERIA	
Peanut	24.7
Palm oil	64.7
Palm Kernel	1.7
Cottonseed	1.6
Copra	0.6
Sesame	3.4
Soybean	2.6
Other imports	0.7
	100.0
CAMEROON	
Peanut	41.9
Palm oil	42.5
Palm kernel	10.1
Cottonseed	3.1
Copra	0.2
Sesame	2.1
Other imports	0.1
	100.0
IVORY COAST	
Peanut	24.9
Palm oil	64.3
Palm kernel	1.3
Cotton	1.9
Copra	2.5
Sesame	1.6
Soybean	2.3
Other imports	1.2
	100.0

Sources: FAO, Production Yearbook, various issues; FAO, Trade Yearbook, various issues.

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