IMPORT SUBSTITUTION OF FOOD PRODUCTS IN GHANA

By

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Introduction

The issue of import substitution is one of the most salient issues in the economics of developing countries today. As slogans such as "self-reliance" and "economic independence" are more frequently heard, the issue takes on political as well as economic connotations. In recent years, many developing countries have learned the hard way that import substitution does not just mean producing at home what was imported from abroad. President Kwame Nkrumah's program of import substitution through the socialist transformation of the Ghanaian economy during the period 1961-66 is one such example. High costs, inefficiency shielded by high protective tariffs, excess capacity, and astronomical expenditures of foreign exchange to maintain the production of import substitutes were among the unforeseen results.

The purpose of this paper is to discuss the economic prospects of import substitution for food products in Ghana. Ghana, a nation in which approximately 60 percent of the people are employed in agriculture (25, p. 276), imported 78 million dollars (U.S.) worth of foodstuffs in 1970 (40, p. 11, 314), 19 percent of total imports. Almost 15 percent of total consumer expenditure on food is spent on imports (33, p.7). Four of these food imports--fish, beef, rice and sugar--make up over 60 percent of Ghana's food imports. All four of these foods are produced on a large though inadequate scale locally. This paper will focus on Ghana's particular needs for import substitution, the current food situation in Ghana, the general trends in food imports, and the outlook for local production of the principal current food imports.

The Need for Import Substitution

One of the most serious constraints on the economic progress of the developing countries is the scarcity of foreign exchange. Foreign exchange is needed for the purchase of capital goods from developed countries for developing both the agricultural and nonagricultural sectors and for supplying workers with consumer goods, which can serve as incentives for higher production as well as increasing the general welfare. Producing at home what was imported from abroad may be an efficient means of conserving foreign exchange.

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Dependence on Cocoa

There are several circumstances in Ghana's situation which make the need to conserve foreign exchange even more vital. First is Ghana's dependence on one crop, cocoa, for most of its export earnings.

During the period of 1960-71, cocoa accounted for approximately two-thirds of Ghana's total export earnings, reaching a high of 70 percent in 1971 (18, p. 38). Because of the supply inelasticity of this tree crop and its low degree of price elasticity of demand on the world market, extremely sharp fluctuations in prices and thus quantities are common, as shown in Chart 1. The average annual price fluctuation between the years 1949-61, for example, was 25 percent with an average intra-season fluctuation of 40 percent (27, p. 379). Because of the tendency for price to decrease as the quantity of cocoa produced increases, total cocoa revenues have had a somewhat more stable trend, fluctuating approximately 16 percent per year between 1950 and 1961 (27, p. 382). Revenue fluctuations over the years 1954-68 are also shown in Chart 1.

The effects of such acute changes in levels of export earnings can be devastating. A loss of 5 percent in total export earnings amounts to approximately 70 million dollars, which may represent the fruits of a year's growth in real output (33, p. 29). One of the most serious effects of such fluctuations is the strain it imposes upon the balance of payments. Huge amounts of foreign exchange must be accumulated in surplus years to cushion deficits in years of poor export prices.

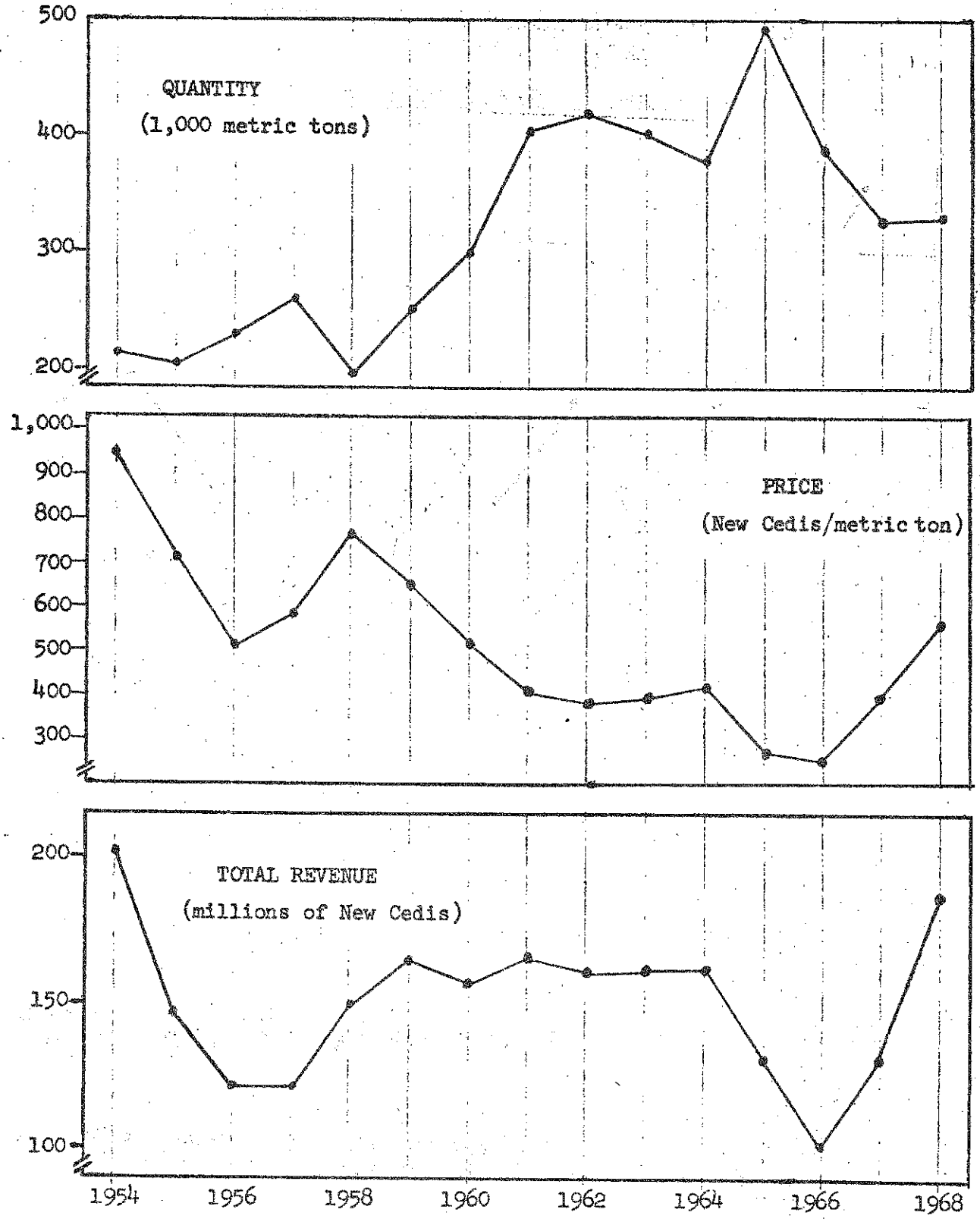
It should also be noted that there is no simple direct relationship between the value of exports and the level of consumer goods imports (28, p. 336), due to the fact that the price paid to cocoa growers is fixed by the government and that it is virtually impossible to equate cocoa supply (which is often unknown for as long as two months after the harvest begins) with purchase price. Thus import substitution of food can play an important role in decreasing the significance of the independence of consumer goods imports from export earnings.

Balance of Payments

The need to conserve foreign exchange is also heightened by Ghana's critical balance of payments and international debt position. Chart 2 shows Ghana's inability to achieve a balance on current accounts in every year between 1959 and 1969. These problems had several causes. It is generally agreed that in the late 1950s, a large sector of the middle and working classes developed standards of consumption based on the abnormally high cocoa prices which prevailed. Thus in the period 1960-66, Ghanaians were literally living beyond their means (38, p. 3).

CHART 1. QUANTITY, PRICE AND TOTAL REVENUE FROM COCOA BEAN EXPORTS, ANNUALLY 1954-1968*

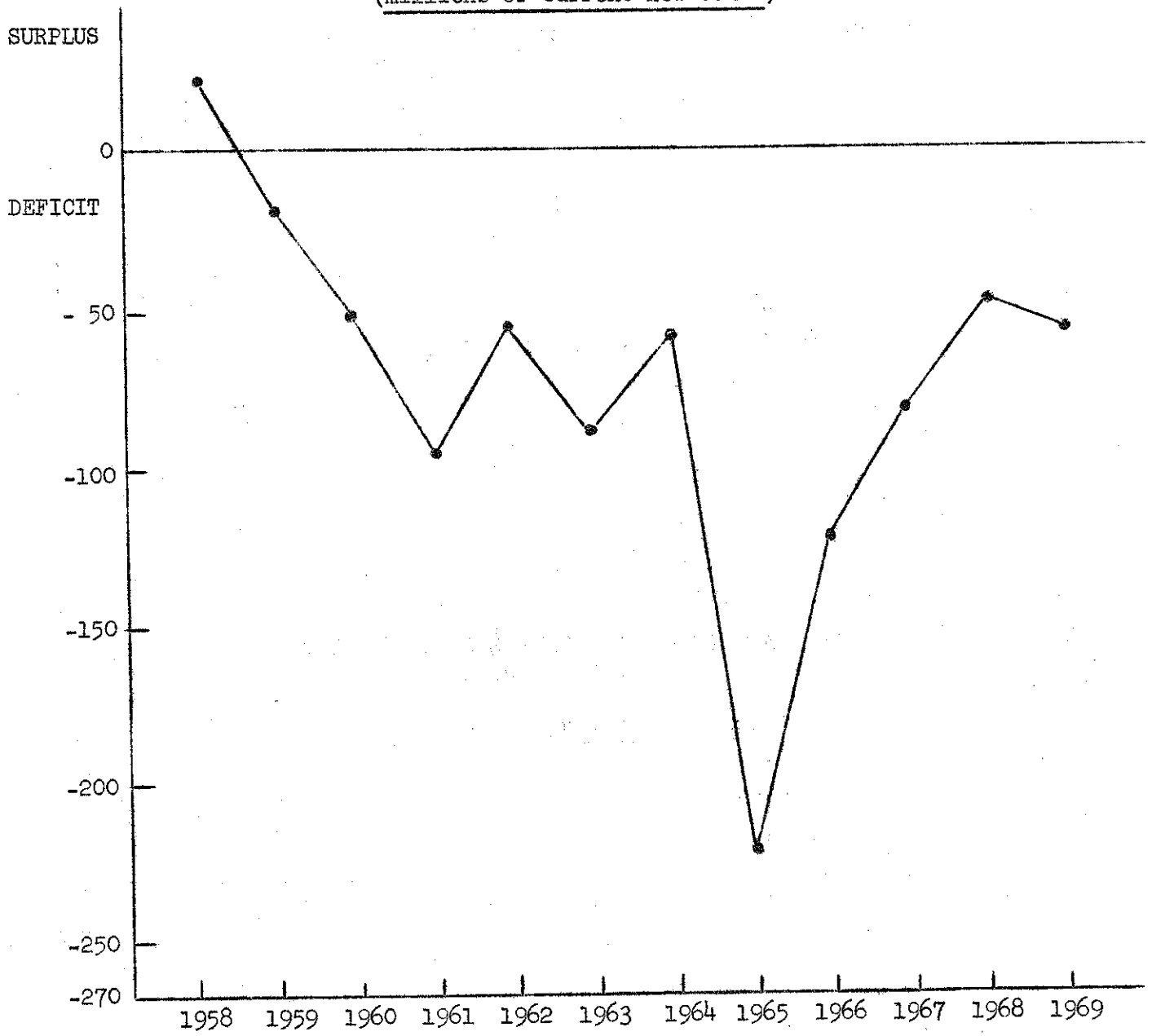
(1967 — 1 New Cedi = .98 U.S.$)



* Data from Tony Killick, "External Trade" in Walter Birmingham, ed., A Study of Contemporary Ghana, (Allen and Unwin, 1966), p. 348. Ghana, Central Bureau of Statistics, Statistical Handbook for 1968, p. 30.

CHART 2. GHANA'S BALANCE ON CURRENT ACCOUNT, ANNUALLY, 1958-1969*

(millions of current new cedis)



* Data from T. Merritt Brown, "Macroeconomic Data of Ghana," Economic Bulletin of Ghana (Legon, Ghana) No. 2, 1972, p. 70.

In addition, Nkrumah wasted huge amounts of foreign exchange in his hastily prepared program of "structural transformation" of the economy and the socialization of agriculture. Foreign exchange reserves, which had reached 546 million dollars in 1956, were completely exhausted by 1965 (25, p. 278). In addition, the government had acquired a heavy burden of foreign debt, most of which was short-term or medium-term credits. Debts were renegotiated in 1966 and again in 1968 but continued to increase to 886 million new cedis in 1972 (16, p. 76). In 1967, payments to service the external debt were 25 percent of total foreign exchange earnings (6, p. 195).

Ghana's Agriculture

Agricultural Zones

Although Ghana is a small country with an area of only 91,843 square miles, about the size of New York and Pennsylvania, it is divided into three quite diverse ecological zones: the Northern Savannah, the Forest, and the Coastal Savannah. These zones are shown in Map 1. The mean annual rainfall in different parts of Ghana is shown in Map 2.

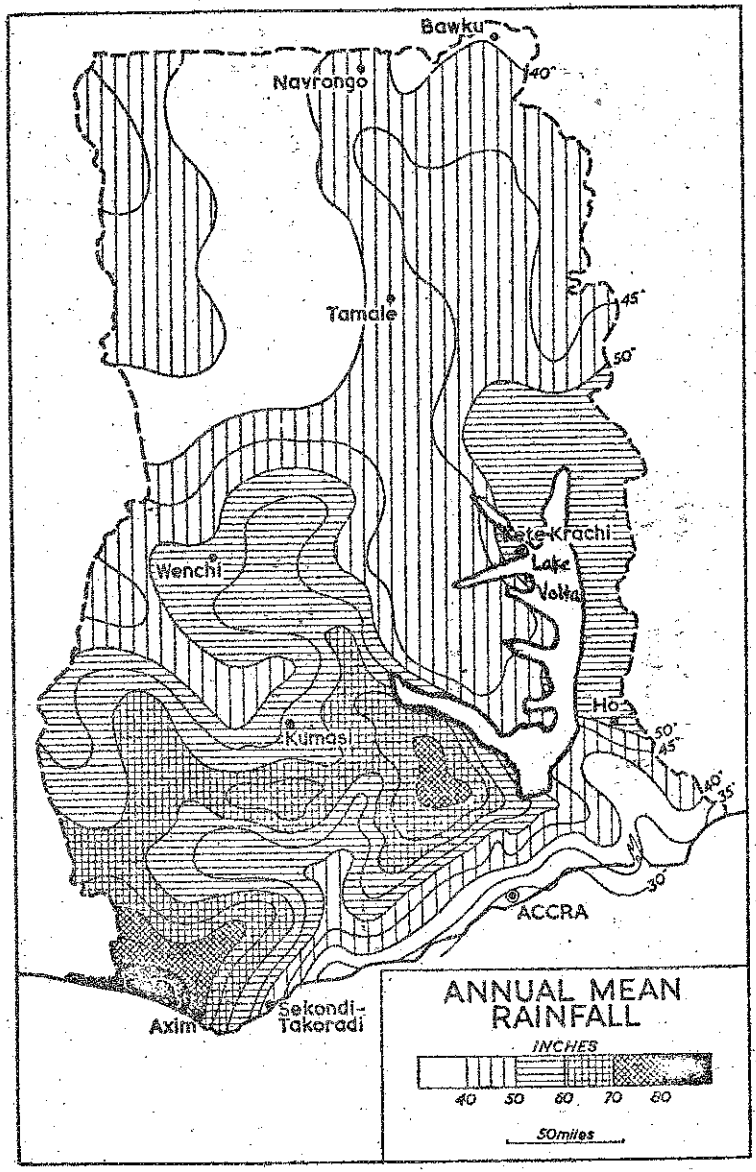
The Northern Savannah, making up about two-thirds of the area of the entire country, contains only one-quarter of Ghana's people. Although this region has a mean annual rainfall of 40-45 inches, it is concentrated in one rainy season from April to October. The starting date of the rains is usually uncertain and a long drought occurs every seven or eight years. The soil is poor and with the exception of plateau sections near the northern borders, population density is low. The vast majority of the people are subsistence farmers, and the only major products which are sent to the south are cattle and yams. Transportation is generally poor. In the northern part of the region, millet and sorghum are the chief crops. As one moves south and the rainfall becomes more reliable and more evenly distributed, maize, cassava, and yams are common crops. Cattle are kept in almost every village in the northern two-thirds of the region and are mostly of the low-yielding West Africa Shorthorn variety. Rice is grown in the central and northwestern parts of the region (44, p. 6; 35, pp. 126-28; 7, pp. 72-76).

The Forest zone is better suited for agriculture than the Northern Savannah. Rainfall is plentiful (50 to 70 inches, with 80 inches in the southeast) and is divided into two seasons (March-July and September-November). Soils are comparatively rich and population density is high. Year-round cultivation is the rule in the Forest zone and cocoa is by far the most important crop. Major food crops include plantain, cocoyam, cassava, and maize. Rice is also important in the southwestern and eastern sections of the region. Farming for the market is common throughout the region, especially in the areas around the major towns. Cattle are not kept because of the prevalence of the tsetse fly in the area (44, pp. 5-6; 35, pp. 128-30; 7, pp. 63-70).

MAP 1. AGRICULTURAL REGIONS IN GHANA*

*Source: E. A. Boateng, A Geography of Ghana, University Press, Cambridge, 1966, p. 5.

MAP 2. ANNUAL MEAN RAINFALL IN GHANA*



*Source: E. A. Boateng, A Geography of Ghana, University Press, Cambridge, 1966, p. 33.

The Coastal Savannah is the smallest and most highly urbanized of the three regions. Rainfall is low (averaging between 30-40 inches) but is more evenly distributed than in the northern zone. Maize and cassava are the only important crops and production is commercialized due to the proximity of cities and towns for markets. Fishing communities are common along the coast and the bulk of the fish are caught from canoes. Cattle are also raised along the coast, as the tsetse fly is rare in this region (44, p. 4; 35, pp. 130-31; 7, pp. 70-72).

Lake Volta, an artificial lake in Eastern Ghana, has become an important part of Ghana's geography since its formation with the construction of the Akosambo dam in the early 1960s. The lake is becoming increasingly important as a source of fish and for inland water transport. Plans are under way for the use of lake water for irrigation purposes (14, pp. 67, 88).

Characteristics of Ghana's Agriculture

Land rotation is the most commonly practiced method of agriculture in Ghana. Residences are permanent and are surrounded by farmed and fallowed areas. Periods of fallow vary between regions depending on soil fertility, but generally average five years in the forest and seven to ten years in the savannah. A two-year cropping period is the national average (26, pp. 217, 222).

In the Northern Savannah, vast areas of arable land are unfarmed. On the other hand, there is evidence that in some parts of the forest region, population pressure on land has reduced the period of fallow upsetting the delicate farm-fallow balance which maintains the fertility of the soil. The result is, of course, lower yields and increased soil erosion (26, p. 232; 5, p. 100).

Farms are generally small in size. The 1963 Agricultural Census found that the average farmer in Ghana has two noncontiguous parcels of land and a total holding of about six acres. Fragmentation of land is a major problem in many parts of the Forest region. Another important problem in Ghana's agriculture is the shortage of labor in rural areas at certain points of the year (26, p. 224; 45, p. 196).

Thomas Poleman's study of food movement statistics into Accra has shown that the supply system for staple foods is quite sophisticated and reasonably efficient. A substantial percentage of the foodstuffs are drawn upon from over 100 miles away and there is a high degree of local specialization in commercial food production in the eastern Forest zone and on the coastal plains (35, pp. 169-72). This cannot be said for the Northern zone, where subsistent farming is the rule and with regard to exports from the region, there is little responsiveness to price. The degree of commercialization and responsiveness to price seems to be a function of the proximity to urban areas, the development of the infrastructure, i.e., transportation, communication, and marketing systems, and the breakdown of cultural impediments to commercialization, such as taboos against the sale of cattle.

Food Supply and Demand

It is generally recognized that until the late 1950s, food production kept pace fairly well with demand (33, p. 60; 25, p. 309). But the decade of the 1960s was marked by stagnation in food production. Food prices began rising rapidly in 1962 and doubled between 1963 and 1970 (25, p. 299). An index of market prices of locally produced foodstuffs by location for the years 1963-68 is shown in Table 1. The price of imported food decreased relative to the price of local foods during the period 1951-62 (33, p. 60), and continued to decrease slightly throughout the 1960s, despite heavy tariffs and import quotas (21, p. 108).

The reasons for the inability of food production to keep up with demand stem from pressures on both the supply side and the demand side.

On the demand side, population increased by 2.5-3.0 percent per year during the 1960s (9, p. 29), and per capita incomes rose by about 2 percent per year from 1955 to 1963 (33, p. 22). In addition, urbanization was proceeding rapidly, at a rate of over 9 percent per year during the 1960s (9, p. 29).

Pressures on the supply side were also significant. Firstly, there are the above-mentioned problems associated with agriculture such as the upsetting of the farm-fallow balance and the lack of a response to price. Some, such as Polly Hill, view the inadequacies of the distribution system to be at least as important as the inability to increase production itself. She points to price differentials between different markets and regions which demonstrate that the inability of the market to cope with demand was at least partially responsible for price increases from 1960 to 1962 (26, p. 228).

Several trends and events during the 1960s affected the food supply situation adversely. The outmigration of alien laborers during the 1960s, numbering over 300,000, exacerbated the labor shortage in agriculture. This outflow resulted from both government restrictions on alien employment and better employment conditions in neighboring countries. Another factor affecting the supply of agricultural labor was the rapid increase in educational facilities, causing a decrease in child labor (42, p. 84; 30, pp. 262-63).

Government policies during the 1960s are also often held responsible for the gap between food supply and demand. Nkrumah's policies during the period 1961-66 virtually ignored the small farmer and emphasized nonproductive state farm enterprises and the production of nonfood crops. Because of the foreign exchange crisis in the 1960s, much of the transportation system, and rural feeder roads in particular, fell into disrepair (25, p. 309). Imports of lorries and spare parts were sharply reduced and taxes on petroleum were sharply increased in 1963. The results were higher transport prices and thus higher food prices (44, p. 11).

TABLE 1. INDEX OF MARKET PRICES OF LOCALLY PRODUCED FOODSTUFFS BY LOCATION*

(March 1963 = 100)

Year	Accra	Sekondi-Takoradi	Kumasi	Bolgatanga
1963[1/]	107.2	100.1	104.6	107.3
1964	116.1	117.7	128.2	120.1
1965	158.2	156.2	177.2	148.2
1966	163.2	184.9	178.7	175.2
1967	136.4	166.1	158.6	145.8
1968	154.3	179.4	166.8	137.7

* Data from Ghana, Central Bureau of Statistics, Statistical Handbook of Ghana, 1968, p. 108.

1/ Average of ten months--March to December.

The Food Supply and Nutrition

An assessment of food production under West African conditions is extremely difficult. Like most developing countries, Ghana lacks funds and trained personnel for conducting a thorough investigation. Year-round harvesting, frequent mixed cropping, subsistence production, land fragmentation, and the fact that farmers themselves are often unsure of the size of their holdings are among the chief reasons why the 1963-64 Agricultural Census carried out by the government was so inaccurate (24, p. 34). The estimates available for Ghana are frankly admitted to be no more than informed guesses (44, p. 35).

Table 2 shows a modified version of the Food and Agriculture Organization (FAO) of the United Nations' food balance sheet for Ghana for the years 1966-68 (average). The total number of calories and grams of protein thought to be available per person per day were 2,084 and 43.5 respectively. These figures are remarkably close to Pauline Whitby's estimates based on 1961-63 production and import statistics, which were 2,160 calories and 45.6 grams of protein per day (44, p. 57).

It must be recognized, however, that the food balance sheets only deal in average aggregate terms and do not shed any light on the distribution of food within a nation among subgroupings or seasons. Household budget surveys and nutritional surveys have indeed revealed serious nutritional problems in Ghana. P. L. H. Davey has noted that the weights of adults in certain parts of northern Ghana vary by ten pounds depending on the season (44, p. 32). Household budget surveys have also pointed to what Whitby calls "the major, and universal, nutrition problem in Ghana": a protein shortage (44, p. 18). An overall shortage of protein was found in many farming villages in both the coastal region and the forest region. Although human protein requirements have been significantly reduced since Whitby's 1968 study, clinical data demonstrate that protein shortage is an acute problem in the most vulnerable groups: children below the age of five, and pregnant and lactating women (44, p. 18).

Ghana's Food Imports

Six main foods--sugar, fish, cattle and beef products, rice, wheat products, and milk--account for almost 85 percent of Ghana's food imports. The value of imports of these foods over the period 1965-70 is shown in Table 3. Because of the changing nature of revenue tariffs and import quotas during the years shown, these figures are not indicative of unaffected changes in the demand for food imports. The period in which the National Liberation Council held power, 1966-69, was marked by tight controls over the level of food imports. The Busia government, which came into power in 1969, greatly liberalized the restrictions on food imports (25, p. 284; 16, p. 79).

TABLE 2. FOOD AVAILABILITY IN GHANA, 1966-68 ANNUAL AVERAGE*

Commodity	Production[a]	Imports[a]	Available for Human Consumption[a]	Per Capita		
				Grams Per Day	Calories Per Day	Grams Protein Per Day
Wheat and Flour	1	46	47	15.5	56	1.7
Rice (Milled)	27	39	65	21.9	79	1.5
Maize and Meal	287	2	289	97.3	350	9.0
Sorghum	105	4	89	30.0	103	3.0
Millet	81	-	77	25.9	90	3.0
CEREALS					680	18.2
Cassava (and Gari)	1,269	-	853	287.1	380	2.7
Taro	750	-	712	239.7	206	3.6
Yams	1,103	-	791	266.3	240	5.6
Plantains	730	-	657	221.2	166	1.8
STARCHY FOOD					993	13.7
Sugar Refined	0	60	60	20.2	78	0.0
Sugar Cane	94	0	82	27.6	19	0.1
SUGAR					97	0.1
PULSES, NUTS & SEEDS					116	3.1
FRUITS, VEGETABLES & MISC.					34	1.1
Cattle Meat	20	-	20	6.7	11	1.0
Sheep Meat	2	-	4	1.3	3	0.2
Poultry	7	-	8	1.0	4	0.4
Meat; Cured and Preparations	0	-	7	2.4	6	0.5
MEAT					26	2.2

continued . . .

TABLE 2. (continued)

MILK	0.7	0.5
FISH	27.0	4.3
OILS & FATS	93.0	10.7
GRAND TOTAL	2,084	45.3
ANIMAL	2,013	36.2
VEGETAL	71	7.3

* Data from Food and Agriculture Organization (FAO), Food Balance Sheets, 1964-66 Avg., 1971, pp. 220-27.

a/ In thousands of metric tons.

TABLE 3. MAJOR FOOD IMPORTS INTO GHANA*

(valued in millions of U. S. dollars)

Product	1965	1966	1967	1968	1969	1970
SUGAR	7.2	6.9	6.6	8.0	8.3	14.6
Raw	-	-	-	-	-	1.4
FISH	3.7	7.2	4.3	4.4	4.8	13.5
Frozen or Fresh	.3	.9	1.2	.2	.2	.9
Dried, Salted	.5	.5	.3	.2	.4	.3
Tinned	3.6	5.7	2.8	3.9	4.2	12.3
CATTLE AND MEAT PRODUCTS	10.6	9.8	10.7	8.1	10.8	11.8
Live Cattle	6.2	6.9	6.2	5.3	7.5	6.8
Meat, Fresh and Frozen	1.9	.8	1.2	1.0	1.1	1.7
Meat, Tinned	2.3	1.7	2.4	.7	1.4	2.3
RICE	5.0	9.0	7.5	6.6	5.8	9.9
MILK AND CREAM	5.4	7.0	6.3	6.2	7.7	8.7
WHEAT	4.9	4.0	7.5	8.5	7.4	7.2
Unmilled	-	-	-	.9	4.4	4.5
FOOD AND LIVE ANIMALS	49.6	55.0	51.3	49.9	54.0	77.9
TOTAL IMPORTS	446.6	351.8	307.1	307.6	347.3	409.9

* Data from United Nations, Commodity Trade Statistics, selected volumes.

Imports of food as a percentage of total imports rose from 11 percent in 1965 to 16 percent in 1968 to 19 percent in 1970 (40). In the early 1960s, it was estimated that approximately one-sixth of all calories and over one-half of all animal protein were obtained from imports (33, p. 65). Almost 15 percent of total consumer expenditure on food is spent on imports (33, p. 7).

The value of Ghana's food imports over the years 1951-70 are shown in Chart 3. During the 1950s, the value of food imports increased dramatically, rising in value from 28 million dollars in 1951 to 72 million dollars in 1961 (3, p. 194). If it were not for the severe government intervention, first with revenue tariffs in 1961 and then with quantitative restrictions in 1962, there can be little doubt that food imports would have increased substantially throughout the 1960s. As it was, food imports decreased sharply during the period 1961-63 and did not overcome the 1961 peak until restrictions were liberalized in 1970.

There are two main reasons why the demand for food imports increased so rapidly during the years 1951-70. Firstly, there was a tendency for the prices of imported foods to fall relative to prices of local foods (26, p. 225). This price adjustment was largely due to the failure of food production to keep pace with demand and all of the concomitant problems, as was previously noted. In addition, much of the increase was due to a second factor: changes in the structure of demand. Per capita income increased substantially between 1951 and 1963 and local foods were displaced by more sophisticated foods which were not produced locally (26, pp. 226-28). Wheat products and milk, which accounted for 20 percent of all food imports in 1970, fall into this category. But it is important to note that the four foods which made up two-thirds of Ghana's 1970 food import bill--rice, cattle and meat products, fish, and sugar--are all produced on a large scale locally (40). Only the latter, the production of refined sugar, is a recent introduction into Ghanaian agriculture.

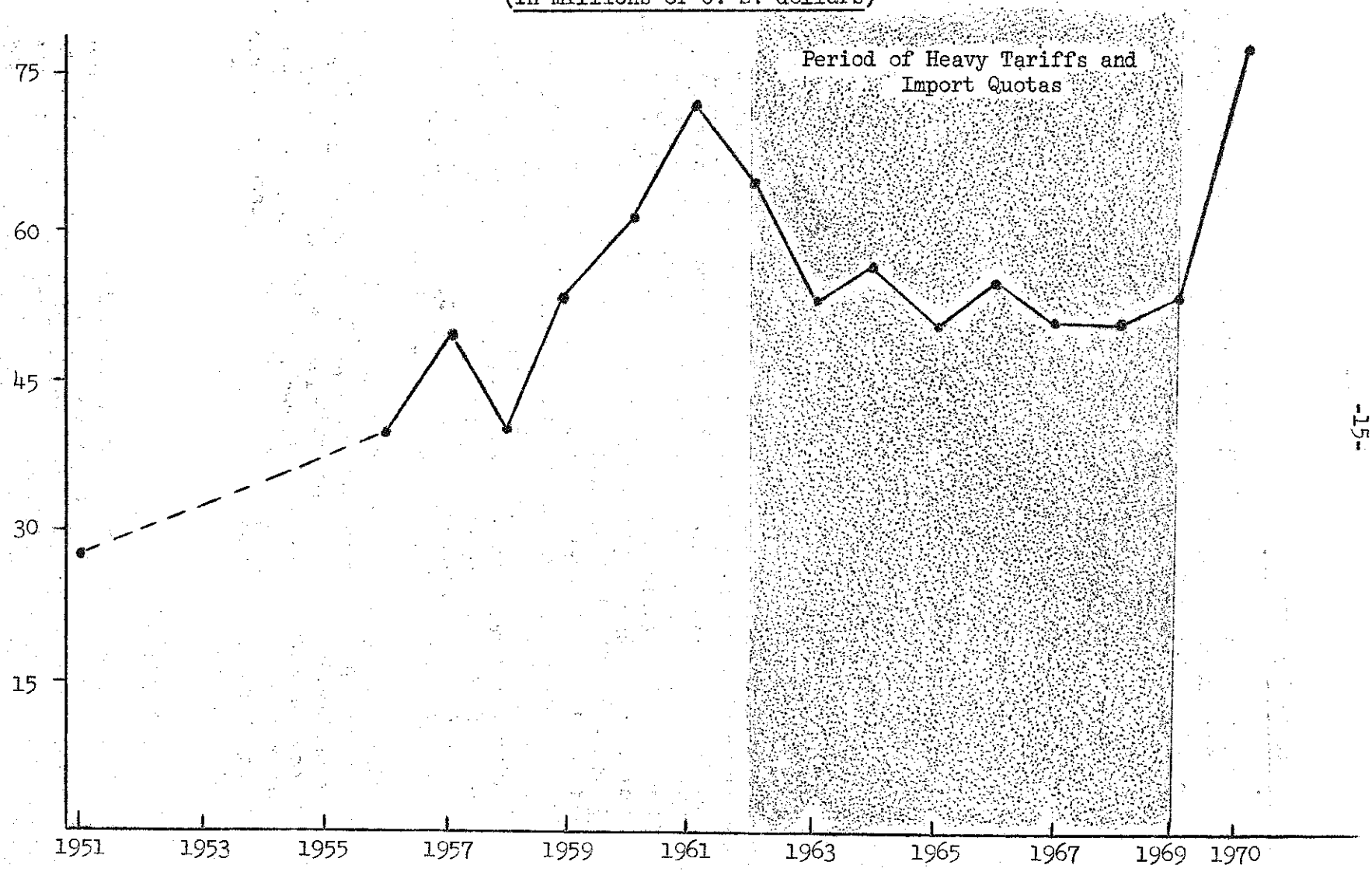
Trends in Food Imports: Analyzing Consumer Demand

Relative to most developing countries, quite a number of studies on food consumption have been conducted in Ghana. Nevertheless, the statistics which do exist have sharp limitations and the food economist must recognize that because of such limitations, his estimates will be subject to a wide margin of error.

The future demand for imported foods depends largely on four variables: changes in per capita income, changes in population, the income elasticity of demand for the food, and changes in the relative prices between commodities (36). Because the latter variable is virtually impossible to project into the future, it is ignored. Two different systems may be utilized to project demand: cross-section analysis and time series analysis.

CHART 3. VALUE OF GHANA'S FOOD IMPORTS, 1951-70*

(in millions of U. S. dollars)



*Ghana, Cent. Bur. Stat. 1961-62 Statistical Yearbook, p. 108; U. N. Trade Commodity Statistics, various volumes.

Cross-section Analysis

Cross-section analysis of household budget surveys is used to determine the income elasticity of demand for a product. Expenditures on foods by different income groups at a point in time are compared, and income elasticities of demand are derived from the differences. The income elasticities of demand for local and imported foods from six local household budget surveys and a nationwide survey, which were conducted between the years 1953 and 1962, are listed in Table 4. There are several factors which render household budget surveys in general, and Ghana's surveys in particular, of questionable value in determining income elasticity coefficients.

Cross-section analysis of household budget surveys focuses only on income, other factors are ignored. In addition, it was impossible to determine actual income in the surveys; because of conceptual problems and underreporting, total expenditure was used as a substitute. Consumption was based upon what people reported, not on what was actually consumed. Money cost of food and not actual quantities were used. In addition, the surveys were not taken from random samples. Biases were built in (for example, upper and lower income groups were excluded) and indeliberate (adult sex ratios in the samples were often unbalanced). Surveys were conducted over periods ranging from one week to one month, so seasonal changes in the consumption of imports were ignored. Of great importance, differentiation between imports and local foods was inaccurate or lacking. Fish, rice, and meat, for example, were considered to be local foods, whereas large quantities of these foods are imported (35, pp. 137-42; 33, pp. 45-50). The derived elasticity coefficients clearly demonstrate that the demand for imported foods is more income elastic than the demand for local food. The range for imported food groups is .98-1.52 while the range for local foods is .31-.81. This is not surprising, given the changing structure of demand for foods noted above and the fact that imported foods are regarded as more prestigious than local foods. Elasticities of demand ranged from .40 to .71 for meat, from .05 to .79 for fish, from .60 to 1.48 for rice, and from .49 to .85 for all foods.

Although these figures do reflect Engel's law, the tendency for people to spend less of a proportion of their incomes on food as income increases, they do demonstrate relatively high elasticities of demand for food, especially for rice. Moreover, the tendency to substitute animal protein for starchy staples as incomes increase, a widespread tendency in Western budget surveys, was not demonstrated in these cross-sectional studies.

Time-Series Analysis

Time-series analyses are generally recognized to be the most accurate means of determining elasticity coefficients. Theoretically, the most effective means of utilizing time-series analysis is to link total demand for an imported commodity with total income over a period of time. This particular method, however, must be ruled out in Ghana's case for several reasons.

TABLE 4. EXPENDITURE ELASTICITIES FROM GHANAIAN BUDGET SURVEYS, 1953-62*

	Urban					Rural			All Ghana
	Accra	Kumasi	Sekondi-Takoradi	Accra	N.H.S.	Oda Swodru	Ashanti	N.H.S.	N.H.S. Urban and Rural
	1953	1955	1955	1962	1961-62	1955	1956-57	1961-62	1961-62
TOTAL Food	0.85	0.64	0.63	0.44	0.76	0.59	0.39	0.78	0.77
Local Food	0.81	0.52	0.45	0.38	0.58	0.50	0.31	0.72	0.64
Meat	0.77	0.55	0.73	0.40	0.77	-	-	0.79	0.76
Fish	0.69	0.55	0.11	0.05					
Cassava (fresh)	0.77	0.51	0.17	0.09	0.56	-	-	0.84	0.78
Corn (dough)	-	0.41	2.10	-0.10					
Imported Food	0.98	1.41	1.52	0.56	1.17	1.31	1.07	1.32	1.30
Bread	0.92	1.48	1.73	0.41	-	-	-	-	-
Rice	1.48	1.15	0.65	0.60	-	-	-	-	-

* Data from U.S.D.A., ERS, Projected Level of Demand, Supply and Imports of Agricultural Products in 1965, 1970 and 1975: Ghana, 1964, p. 164.

Import statistics, although extremely accurate, do not represent the demand for imported commodities because of the government's frequent intervention in the import market, as mentioned above. Changes in local supplies from year to year will also affect import levels. In addition, a reliable time series of aggregate income statistics for Ghana is unavailable.

The use of time-series data for determining income elasticities has another serious shortcoming: one assumes that changes in the per capita demand for imports are due to one factor alone, income. Obviously, however, other factors are involved. The National Household Survey (1961) showed, for example, that urban households spend twice as much per capita on imported foods as rural households of the same income group (33, p. 87). Urbanization in Ghana is increasing rapidly; the percentage of urban population to total population increased from 23 percent in 1960 to 33 percent in 1970 (9, p. 29).

H. W. Ord, leading a project team for the Economic Research Service (ERS) of the U. S. Department of Agriculture (USDA), utilized a time-series analysis to determine elasticity coefficients and to project the demand for imported foods. Ord linked aggregate import statistics with real wages and salaries paid to cocoa farmers and recorded wage employees between the years 1954 and 1961. This time period was almost completely free of government intervention in the import market. The trends associated with these income statistics were believed to be largely representative of aggregate income trends in Ghana (33, pp. 49-50).

The income elasticity coefficients derived from Ord's analysis for 1961 are shown in Table 5. Rice was found to have a coefficient of 2.48; salted/dried fish, 1.93; sugar, 1.81, and cattle, 1.61. These figures are higher than those derived from cross-section analysis and emphasize the increase in demand for these commodities which accompanies increasing incomes.

The equations which best fit the time-series statistics for per capita import quantities and per capita cash expenditure varied between products. For refined sugar and fish, a linear model was most applicable. Semi-log models were used for rice and a double-log model for cattle. Projected per capita and aggregate demand for imported foods are shown in Table 5. Ord projected aggregate demand increases between 1960 and 1975 of 232 percent for rice, 192 percent for salted/dried fish, 171 percent for cattle, and 167 percent for sugar. These estimations are based upon per capita cash expenditure growth of 1.6 percent and a population growth of 2.91 percent per annum for the period 1960-75 (33, pp. 10, 57-58).

TABLE 5. PROJECTED DEMAND FOR IMPORTED FOODS, 1965, 1970 and 1975*

Imported Food Category/ Commodity	Per Capita Consumption				Aggregate Consumption				Income Elasticity of Demand
	1960	1965	1970	1975	1960	1965	1970	1975	1961
	(lbs.)				(million lbs.)				
By quantity									
Rice	10.2	17.7	19.1	22.2	69.2	136.3	169.9	229.8	2.48
Wheat flour	18.4	23.1	24.0	26.0	124.3	178.3	212.2	269.3	1.19
Sugar, refined	16.4	23.6	24.2	28.7	111.2	182.2	223.9	297.2	1.81
Milk, unsweetened	2.2	3.2	3.4	3.9	14.9	24.4	29.9	39.8	1.71
Cattle[a/]	0.02	0.02	0.02	0.03	105.6	166.0	203.6	271.6	1.61
Fish, salted/dried	2.0	3.0	3.2	3.8	13.3	23.6	28.8	38.9	1.93

* Data from U. S. Dept. Agr., ERS, Projected Level of Demand, Supply and Imports of Agricultural Products in 1965, 1970 and 1975: Ghana, 1964, pp. 58, 109.

a/ Cattle in numbers of head (per capita) or '000 head (aggregate demand).

TABLE 6. SELECTED PROJECTIONS OF DEMAND AND AMOUNTS SUPPLIED
(thousand metric tons, unless otherwise specified)

Product	1960 Consumption[a/]	1967 Ord's Projection[b/]	1967 Consumption			1980 FAO Projection[d/]
			Imports	Prod.	Total[c/]	
Cattle[e/]	105.6	181.0	66	64	130	...
Sugar	55.6	97.6	60	11	71	128
Rice[f/]	34.8	74.8	39	27	66	87
Fish	53.0	96.4	33	103	136	255

a/ U.S.D.A., ERS, Projected Level of Demand, Supply and Imports of Agricultural Products in 1965, 1970 and 1975: Ghana, 1964, pp. 58, 75.

b/ Extrapolated from estimates for 1965 and 1970, Ibid., pp. 58, 75.

c/ FAO, Food Balance Sheets 1964-66 Avg., 1971, pp. 221-27.

d/ FAO, Agricultural Commodity Projections, 1970-80, pp. 381, 396. e/ Thousand head.

f/ Excluding local supplies of fresh-water fish.

By comparing Ord's estimates with official import statistics and production levels during the late 1960s, his projections can be tested for accuracy. First it must be noted that Ord's per capita income growth projections of 2.3 percent per annum were grossly incorrect. From 1960 to 1968, per capita gross domestic product actually decreased 2.5 percent per annum (10, p. 70). Ord's population estimate of 8,890,000 for 1968, however, was only 140,000 short of the official estimate for that year (9, p. 29). Because population is the predominant factor influencing the demand for imported food, the accuracy of this figure is especially important. In Table 6, Ord's estimates of quantities demanded of imported foods for 1967 are compared with those which were reported to be actually supplied, according to the FAO food balance sheet for the annual average of the years 1966-68. Ord's estimates were 39 percent too high for cattle, 24 percent too high for sugar, 14 percent too high for rice, and 29 percent too low for fish.

Because 1966/68 were years of austerity during which food imports were curtailed, the actual supplies would have been higher if imports would have been sold at their prices on the international market. Unfortunately, the food economist has no basis for predicting governmental import policies. FAO's demand projections for 1980, based on past trends up to the years 1966/68, are also shown in Table 6.

The gap between the demand for imported food and actual quantities supplied is large and the government recognizes the unpopularity of maintaining import quotas, even in the short run. In an effort to close the gap, Ghana has embarked upon policies for import substitution as a more politically, as well as economically, viable alternative to import quotas.

Prospects for Import Substitution

The previous discussion has sought to emphasize the importance of the need for import substitution of food products in Ghana. This section will focus upon prospects for growth in the production of fish, rice, cattle, and sugar, which make up about two-thirds of Ghana's food imports.

Fish

The fish industry has been chosen by the successive governments of Ghana as a high priority industry both to solve Ghana's protein problem and to conserve foreign exchange by import substitution. Government officials have also expressed hopes that the fish industry will play a role in substituting for meat products and that fish production will soon become a foreign exchange earning export industry.

Between 1954 and 1966, annual marine catches expanded at a rate of 15 percent compared with a growth of gross domestic product of 4.8 percent (31, p. 3). This growth was a result of the tremendous increase in both the modern and the traditional sectors of the industry. The number of motorized canoes increased from 205 to 4,988 between 1959 and 1965 and the size of Ghana's modern fishing fleet increased from 56 powered vessels in 1956 to 412 in 1966 (20, p. 82). Varieties of fish caught include herring, tuna, mackerel, plaice, and bream. Chart 4 shows the quantities of fish produced locally and the value of imports for the years 1961-70.

Quantities of fish imports fluctuated greatly between 1961 and 1970. As can be seen from Chart 4, the level of imports does not have a clear relationship to the level of local production. Government tariffs and import quotas most influenced the quantity of imports during the period. The lack of a relationship between production and imports may be demonstrated by looking at statistics for two relatively tariff free years, 1961 and 1970.

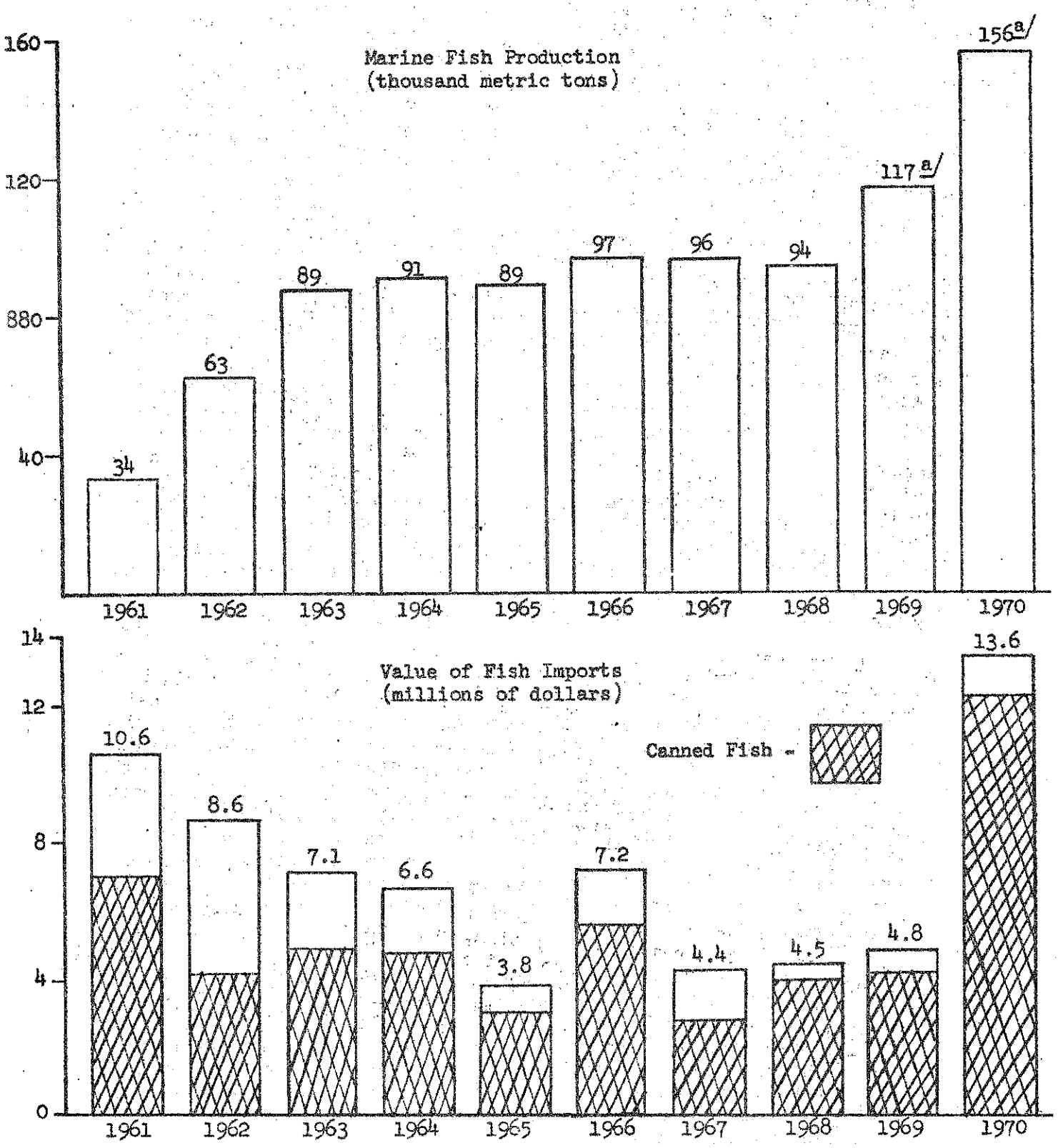
In 1961, local production was 63,000 tons and the value of fish imported was 10.6 million dollars. In 1970, although local production had more than doubled, the value of imports had risen to 13.6 million dollars. Imports of tinned fish made up over 90 percent of total imports in the latter year compared to only 65 percent in 1961. Imports of frozen, dried/salted, and smoked fish all decreased during the 1960s (40).

Economics of Production

Unfortunately, the story of the economics of fish production in Ghana is not as bright as the growth of the industry might imply. The State Fishing Corporation (SFC), established in 1961 by President Nkrumah, has operated at a loss every year since then (31, p. 9). In 1962, Nkrumah bought ten Soviet freezer trawlers and other equipment on which feasibility studies had not been made. The old fashioned trawlers have high operating costs and are one of the major reasons for the SFC's inability to make a profit. Many of the SFC's vessels are too large to enter the Tema fishing harbor, thus they have to be unloaded at a greater cost at the main harbor (31, p. 20).

R. M. Lawson computed the capital-output ratio for the SFC to be 1.5 times higher than that for the private modern sector (31, p. 11). Lawson points to corruption, nepotism, and overstaffing to be major problems for the SFC. She also claims that, "State employment deters the incentive to make quick decisions to work at all hours and to suffer periods of hard effort which go to make fishing profitable in the private sector," (31, p. 22). In 1968, a Norwegian fishing firm was hired by the government to manage the SFC.

CHART 4. MARINE FISH PRODUCTION AND VALUE OF IMPORTS, 1961-70*



* Data from Ghana, Min. of Ag., Annual Report for 1969, 1970, p. 156; Ghana, Cent. Bur. Stat., Economic Survey, 1965, p. 145. U.N. Commodity Trade Statistics (various volumes).

a/ Most of the increase in these years, according to the Ministry of Agriculture, was due to the introduction of more efficient statistical methods.

In contrast, profits have been rather high in the modern private fishing sector, which accounted for 28 percent of production in 1967, compared to the State sector's 15 percent (25, p. 315). Wages, profits, and returns to capital are much higher than in the traditional or state sectors. Paced by the large Makoadze Fisheries Corporation, which is reputed to be the most modern fishing enterprise in Black Africa, the private sector has a rate of return of approximately 15 percent (31, p. 9). Makoadze, like several other private fishing concerns, operates according to a modified "agapa" system, in which profits and expenses are shared among the workers (25, p. 316).

The landed price per ton of fish is lower for the foreign vessels which supply fish to Ghana than it is for Ghana's own modern fishing sector. With more efficient management and increased training, it is hoped that the gap will soon be closed. One important reason for the gap is the modern sector's low production/capacity ratio, reported to be less than 50 percent in 1970 (31, p. 10; 16, p. 75). Major causes of excess capacity are the too rapid growth of the industry's number and size of vessels, the lack of skilled manpower, and marketing constraints, which will be discussed below.

Throughout the 1960s, the traditional sector has maintained its role in fish production, supplying 51 percent of Ghana's domestic catch in 1962 and 49 percent in 1970 (20, p. 84; 22, p. 149). This has been accomplished largely through increases in the number of dugout canoes and motorized canoes, and the use of more sophisticated fishing nets and equipment.

There is much controversy over the effects of modern fishing on employment in Ghana. Although it is common to think of the canoe fishing industry as being labor intensive, Lawson claims that it is not, that in many years the capital/output ratio is as high as in the modern sector. Because of the short fishing season, usually between June and October, labor and capital are relatively unproductive most of the year (31, p. 9). The number of people involved in traditional marine fishing probably remained at about 50,000 between 1954 and 1969, while the number of employees in the modern fishing sector increased from zero to 6,000 by 1970 (25, p. 315). Irving Kaplan claims that in many areas, such as the Lower Volta river basin, fishermen were forced to move into agriculture as local produce were substituted by marine catches (25, p. 316).

The landed price of fish from canoes is lower than that of the catch from motorized vessels, due to the more seasonal nature of canoe fishing and weak bargaining power. Because of the higher distribution costs of fish caught in the traditional sector, due to the lack of economies of scale, sale price is similar to the price of fish from the modern sector (31, pp. 8, 12).

Marketing and Distribution

The problems involved in marketing and distribution are the most important barriers to import substitution. The most important problems are the limit on the area which may be supplied, seasonal distribution problems, marketing relationships between traders and small fishermen, and the SFC's marketing operation.

The traditional method of preserving fish to extend the area of the market is smoking. Approximately 70 percent of the fish sold at the retail level is smoked fish. Indeed, there seems to be a marked preference for smoked fish over all forms of fish, including fresh fish (25, p. 316). Unfortunately, smoking only prevents deterioration for a period ranging from a few days to two weeks, depending on local methods. Thus most of the interior is deprived of marine fish. Prospects for distributing fish into outlying rural areas and Northern Ghana depend to a great extent on improved methods of smoking, salting, and drying to preserve quality (44, p. 41).

The increase in the distribution of frozen fish has also aided in extending the area in which marine fish may be marketed. Freezer trawlers supply both local traders and the Ghana Cold Stores Corporation with frozen fish. Local traders, by utilizing frozen boxes from the trawlers to build makeshift storage facilities on the back of their trucks, have extended the period of freshness by two to three days. Because of this innovation, traders are able to transport fresh fish to outlying areas, where it may be eaten fresh or smoked with local woods according to tastes (17, p. 742). Ghana Cold Stores, a quasi-government corporation, is extending its cold storage outlets from the coast to inland towns and distribution points. It handled 13,000 tons of fish in 1968 (8, p. 18). In 1967 about 15 percent of the landed catch was frozen (17, p. 742).

The conditions of Ghana's roads are also a constraint to the wider distribution of fish from the coast. The deterioration of Ghana's roads and the rising transport costs which characterized the 1960s limited the speed with which perishable fish could be transported inland.

Seasonal constraints to production and import substitution are also major problems. In the early 1960s, it was estimated that 75 percent of Ghana's fish were caught between June and October. This is due to the fact that fish migrations to coastal waters take place at this time and because bad weather in the Spring inhibits canoe fishing (33, p. 71; 44, p. 4). The expansion of the modern fishing industry has somewhat alleviated the situation but seasonality is still a major problem. Firstly, it contributes to the excess capacity of the industry as a whole. Seasonality is also one of the major reasons why increases in production fail to result in import substitution. Chart 4 shows that over 90 percent of the fish imports in 1970 were imports of tinned fish. These imports were necessary to fill in the gap during the off season, as well as to supply areas to which transport was not reliable enough for the delivery

of frozen or smoked fish. J. Clottey has suggested that the canning of fish be undertaken in Ghana to decrease the amount of fish lost in storage and marketing, as well as to substitute for imports and close the gap in seasonal prices (11, p. 16).

Lawson claims that relationships between traders and traditional fishermen often serve to limit production. Fishermen are often tied to individual traders through indebtedness, and these small traders are often able to establish monopsonistic conditions, in which low producer prices and high retail prices prevail. Fishermen are thus deprived of an incentive to increase production, as the traders would absorb all increased profits. In recent years, large entrepreneurs have broken many of these small monopsonies in some areas (31, pp. 12-13, 22).

The SFC's state marketing operation, which supplies one-third of the market, is a major constraint to its profitability. Retail prices are fixed all over the country regardless of transport costs at an unprofitable level below the free market levels. Inland, retailers can make huge profits by buying from the SFC and selling on the free market. The result is frequent shortages at SFC stores and a clientele of special customers, according to Lawson.

Freshwater Fishing

In addition, there is much scope for increasing inland freshwater fish production. Lake Volta may provide a potential catch of 25,000 tons per year, if excess weeds and algae growth can be prevented (25, p. 318). Fish production from the lake rose steadily to 8,000 tons in 1968, and then jumped to 23,000 tons in 1969 with the introduction of modern trawlers. The lake was overfished, however, and production dropped to 2,000 tons in 1970 (22, pp. 151, 156).

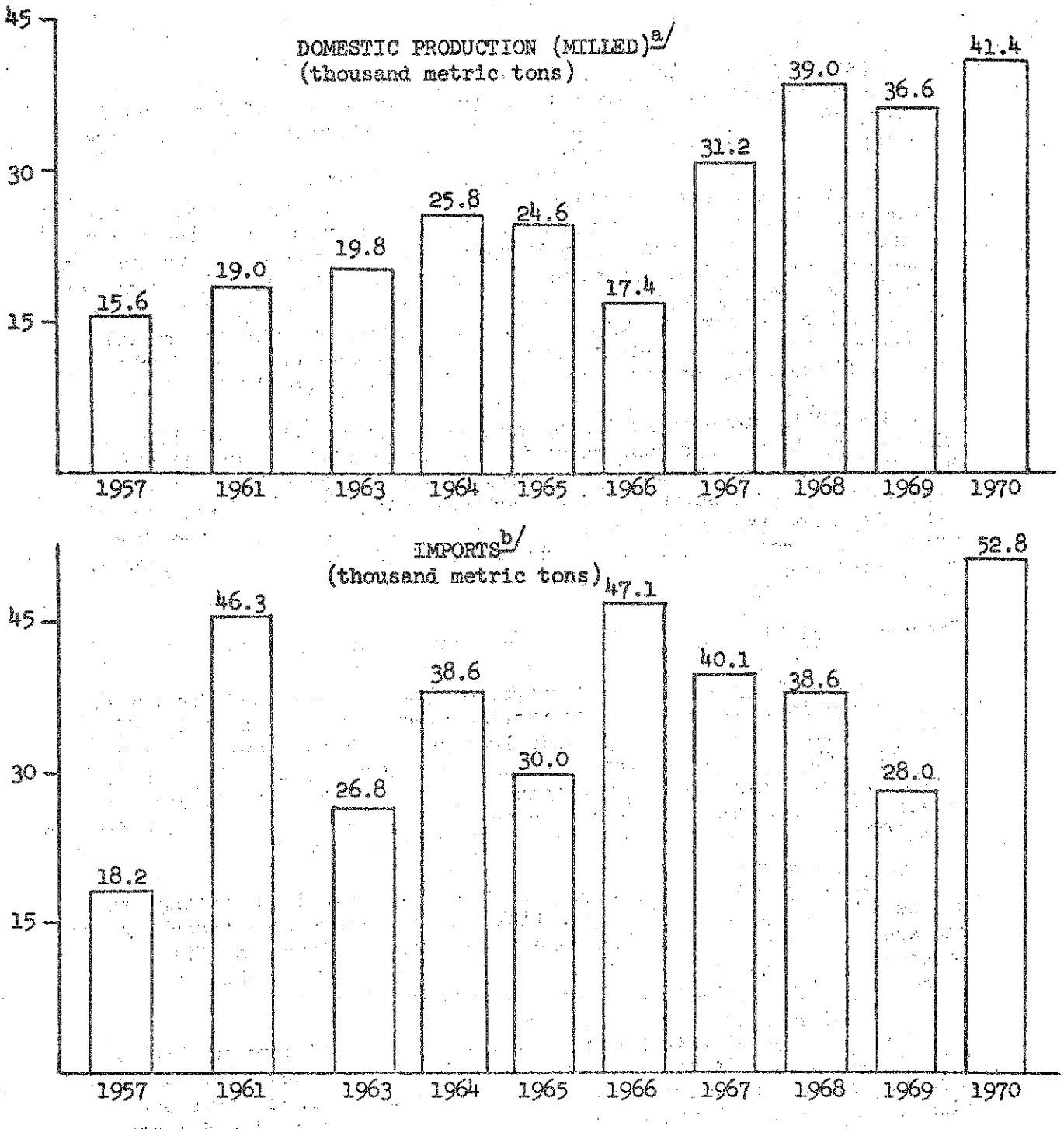
Fish from Lake Volta can play an important role in combating many of the aforementioned problems in fish marketing such as seasonality and the area of distribution. The lake is becoming an important fish supplier to the Northern region and to the Eastern Forest region, which are in closer proximity to the lake than to the ocean.

Cultural constraints prevent the exploitation of many of Ghana's rivers and smaller lakes. In some areas of Central Ghana, for example, many rivers are considered to be the homes of gods and are thus not fished. In much of Northern Ghana, fish is looked upon with distaste (14, p. 66).

Rice

In both Ord's time-series analysis and previous cross-section studies, rice was the imported food with the highest income elasticity of demand (Tables 4 and 5). Chart 5 shows quantities of milled rice produced domestically and quantities of milled rice imported for the years 1957-70.

CHART 5. RICE SUPPLY IN GHANA, 1957-70*



* J. K. Intisful, "Upland Rice Farming in Ghana," Ghana Farmer, Feb. 1969, p. 29, U.S.D.A.-AID, "Rice in West Africa," 1968, p. 18; U.N. Commodity Trade Statistics, various volumes; S. LaAnyane, Ghana Agriculture (London, 1963), pp. 194-95.

a/ Figures for local rice production were converted to milled production at an extraction rate of 60%. FAO, Food Balance Sheets 1964-66 Avg., 1971, p. 1220.

b/ All imported rice is milled rice.

Local production has increased rather sporadically, from 16,000 tons in 1957 to 31,000 tons in 1967. Imports of milled rice increased rapidly from 18,000 tons in 1957 to over 70,000 tons in 1962. In 1963, tariffs amounting to 45 percent of the c.i.f. value of imports were established and imports dropped substantially (33, p. 99). When imports were liberalized in 1970, the value of rice imports jumped 70 percent by value to 9,968,000 dollars.

Rice Production in Ghana

Rice is currently grown on small and medium-sized farms in many parts of the Northern region and the Forest region under a wide variety of conditions. Upland rice is common in the northern areas, while paddy rice is grown under rainfed, semiflooded conditions in southern areas. Because of the lack of irrigation, Ghanaian rice is highly dependent on adequate rainfall. Seeding is generally by broadcasting and no attempt is made to prepare a seed bed. Weeds are generally not controlled. Varieties are often low yielding and mixed, and soil fertility is poor. Yields were estimated to be 905 pounds per acre (26, p. 220), compared to a 1956 estimated average of 1,063 pounds per acre for all of Africa. Yields had probably improved little by the end of the decade as production increases were the result of bringing new land into production and not increasing yields per acre (23, p. 29).

Experts have made a wide variety of recommendations for increasing yields in Ghana. A USDA study on rice in West Africa in 1968 found the development of pure strains and the proliferation of pure seeds of one variety to be of high priority. Different strains have different maturing periods and result in a harvest which contains much immature and overripe grain. In addition, maximum yields obviously cannot be obtained with mixed varieties, since many of them are low yielding. The Ministry of Agriculture has begun producing pure seeds, distributing 17,000 pounds in 1968. The estimated need, according to the USDA study, is five million pounds. In the meantime, research is being conducted to obtain or isolate an optimum variety for Ghana's conditions. The USDA study recommends that Ghana become a one variety producing country as soon as possible. Characteristics which such a variety should have include a long grain which consumers prefer, resistance to rice blight, a stiff-strawed stem of medium height to prevent lodging, and responsiveness to fertilizer (41, pp. 62, 69-70).

The importance of weeding has also been stressed. In the second year of production after fallow, weeds have been known to reduce yields by as much as 70 percent (23, p. 29). J. Intisful has recommended that Japanese hand weeding tools be produced domestically. Upland rice should be sown in rows and not broadcast to permit weed cultivation (41, p. 70).

Soil improvement schemes have also been suggested, especially in Northern Ghana where erosion is most severe. Cropping in contour rows is an effective means of countering erosion. Nitrogen-phosphorous fertilizer has been demonstrated to be of great importance and is highly complimentary to weed control (2, p. 73; 26, p. 230).

Other suggestions for improving yields include more ample use of flooded conditions for crop sites, provision of efficient and adequate plowing, harvesting, and threshing devices, the elimination of shading through complete land clearing to make optimum use of sunlight, and the use of transplanted seedlings in flooded rice (2, p. 71; 23, p. 30).

A comprehensive research program to devise new techniques and methods as well as an adequate extension system to disseminate them is, of course, crucial to the success of increasing yields. The USDA study claims that rice research in Ghana is clearly inadequate and that much technology can be borrowed from research being conducted in other countries, especially from the International Rice Research Institute in the Philippines. Practical research into new varieties and methods is also essential. Experimental stations in Ghana have obtained yields of 2,900-4,800 pounds per acre so the potential is great. The extension system is also inadequate; too few workers, too few vehicles, and inaccessibility to many rice producing farms being among the major problems (41, p. 69; 23, p. 30).

As was true with fish, there is much more to meeting local demand for rice and substituting for rice imports than simply increasing production in the field. Some of the major factors involved include improved quality of local rice to compete with imports, milling, transportation, marketing, and the economics of rice production.

Improved Quality to Compete with Imports

Most of Ghana's imported rice comes from the Unites States and is of a uniform, white, unparboiled, long grained variety. Imported rice is clearly preferred to local rice, which most often consists of broken grains and grains of different lengths and colors. Most rice in the north is parboiled, giving it a light brown coloring, which consumers in the southern urban centers reject. In Accra, the price of imported rice is only slightly above that of local white rice, whereas the unparboiled rice from the north is sold at prices 20-30 percent less than imported rice (41, pp. 61-63, 65).

During the decade of the 1950s, the quantity of rice imported into Ghana increased ninefold while local production increased only 30 percent (33, p. 75; 26, pp. 226, 228). Why wasn't local production able to meet the increasing demand and substitute for imports? The supply inelasticity of local rice is clearly not the most important factor. In March 1971, for example, the government was forced to restrict rice imports because local rice was not sufficiently patronized (15, p. 7). Of much more importance is the differences in quality between local rice and

imported rice. Substitution of rice imports necessitates the production of a crop which is of such high quality that it will be preferred over imported rice. The wider the price difference is, of course, the less attention must be paid to quality. But as stated above, the price difference is very small and the price of imported rice has shown a tendency to decline over the years (33, p. 75). The alternative to outcompeting imported rice is import restriction, a highly unpopular policy.

Milling and Processing

In northern Ghana, most of the rice is parboiled, a process in which vitamins and minerals are leached from the husk and bran into the endosperm of the grain. Thus when the husk is removed, parboiled rice is more nutritious than unparboiled white rice. Parboiled rice also keeps better in storage than unparboiled rice. In southern Ghana, parboiled rice is rejected because of the slightly brown color of the rice. The government should try to promote the acceptance of parboiled rice, because of its more nutritious value (41, pp. 62-66).

The poor quality of Ghana's milled rice is partially a problem of milling processes and partially a problem involving other factors. In rural areas, rice is often threshed and dried on the ground and thus becomes contaminated with small stones. Provision of cement blocks in market areas would greatly alleviate this problem (41, p. 61).

Because of the lack of milling facilities, stocks are often built up in some areas while shortages are occurring in other areas. In 1968 for example, it was estimated that tens of thousands of bags of unhulled rice, some of which were two years old, had accumulated in the Northern region due to the lack of hulling facilities (43, p. 801). The USDA study recommends that more mills be built on a smaller scale so that they may be operated profitably in close proximity to producers. Much of Ghana's rice is presently milled by hand with a mortar and pestle. This method is slow, inefficient, and expensive (41, p. 24).

It must also be recognized that mixed varieties are largely responsible for poor milling quality. Because of the lack of uniformity in the size, shape, and age of the grain produced, the milling process becomes very inefficient and a poor quality product is produced. The same is true for parboiling (41, p. 70). The development of pure strains will thus benefit the quantity and quality of the milled product as well as the quantity and quality of the harvested crop.

Transportation and Marketing

Transportation and marketing are also serious constraints to meeting the demand for rice. Because there is virtually no price grading of rice by quality standards, there is little incentive for a farmer or miller to turn out a high quality product (41, p. 64).

Transportation is particularly a problem because of the tendency to grow rice in low-lying, flooded areas. Loads of rice often must be carried from the fields to roads by headload. The small scale on which the average rice farmer grows rice (approximately 1.2-2.4 hectares) also makes transport costs more expensive. It is not infrequent that the cost of transport for a ton of local rice sold in Accra is higher than the transport costs of rice imports per ton from the United States (41, p. 64). Roads in the north, where rice production has increased most dramatically in recent years, are particularly lacking.

Economics of Rice Production

Unfortunately, there is no information in regard to a systematic calculation of the costs of rice production versus those of alternative crops (41, p. 63). But it is significant that rice can be grown under a variety of conditions in several different areas of Ghana. In recent years, rice production has increased rapidly in the Northern Savannah, an area devoid of major cash crops. Much of the arable land in this region is unfarmed. A. M. Amoateng claims that only 30 percent of the potential rice acreage in the Northern Region is being farmed (2, p. 72).

Rice is a rather labor intensive crop, and this fact should be taken advantage of by Ghanaian planners. Unemployment and outmigration from rural areas are severe problems in Ghana. Inputs of labor in sowing, preparatory tillage, and weeding can be highly remunerative in upland rice production. In addition, labor inputs into transplanting, nursery preparation, and water control are profitable in swamp and irrigated production (41, pp. 107, 110). Statistics on the returns to labor inputs seem to indicate that upland and paddy rice are about equally remunerative in terms of man-days worked (41, pp. 109-10).

The USDA study cautions against the use of mechanization in production. The supplying of tractors for planting has been an unsuccessful venture, as has land clearing by machines. Some swampy areas, however, can be converted into irrigated paddy plots at little expense, permitting multicropping (41, pp. 10, 36).

Provision of credit on a large scale to rice farmers in the Northern Region began in 1971 (15, p. 7). Credit allows more use of both technology and labor, and eliminates the necessity of selling during the peak harvest periods.

In recent years, the government has instituted a guaranteed rice purchasing program in northern Ghana to stabilize farm prices, relieve the farmer of the tasks of parboiling and milling, and to facilitate the transport of rice from the northern farms to markets in the south. Proceeding cautiously, the government has set a rather low purchase price, and has been raising it gradually so as to absorb more of the market and encourage production (41, pp. 67-69). The price was raised from 6.2 new cedis per bag in 1969 to 7.5 (23, p. 33) whereas free market prices range 5-20 percent higher (41, p. 68).

The USDA study warns, however, that the government's role should not be such as to subsidize rice consumption. Although rice is a starchy staple, it is nevertheless a luxury starchy staple and consumers should pay for the costs of developing self-sufficiency. Through the maintenance of high tariffs and import quotas on rice, the price of local rice was able to rise and thus encourage further production in the late 1960s. Whether or not the opportunity costs involved warrant the shifting of resources into rice production is another question, however, and one which needs to be investigated.

Cattle and Beef Products

As can be seen from Table 7, the growth of the domestic cattle population has been very slow, averaging about 3 percent per annum to 580,000 in 1968. Imports of live cattle from neighboring countries make up a sizable percentage of the total number of cattle slaughtered, approximately 80 percent between 1961 and 1968. Total available beef for consumption decreased steadily throughout the 1960s, and by 1970 Ghanaians were consuming approximately nine pounds of beef per person annually (1, p. 18).

Increasing cattle production and the import substitution of processed meat products has not been of high priority to the government. The reasons for this stem from ecological and sociological constraints, Ghana's preliminary failures in improving production, the relative costs involved, and marketing problems.

Ecological and Sociological Constraints

The prevalence of the tsetse fly throughout Ghana is a serious constraint to high quality cattle production. Although the two major local breeds, the N'dama and the West African Shorthorn, have a degree of tolerance against trypanosomiasis, the quality of the cattle is affected. Thus cattle production is largely confined to those areas relatively free of the fly and plentiful in range land: the Northern Savannah and the Accra Plains (25, p. 304).

The seasonality of rainfall in these two regions is a major problem in livestock production. Because of the long dry season, when much of the water supply and grasses dry up, cattle need vast areas of range to get adequate feed and water. The construction of earthen dams across waterways has been undertaken in some areas to provide dry season water supplies (14, p. 182). Even then, dry season weight loss is substantial. Range pasture in Ghana is low in nutrition, with protein and phosphorus particularly lacking (4, p. 28).

TABLE 7. PRODUCTION, IMPORTATION AND AVAILABILITY OF CATTLE AND BEEF, BY YEAR, 1961-68*

Year	Domestic Cattle Numbers	Live Imports	Total National Slaughters	Total Available Beef[a/]
	(1,000)	(1,000)	(1,000)	(million Kg.)
1961	465.9[b/]	114.4	110.4	17.30
1962	468.4	96.5	108.7	15.66
1963	476.6	83.6	107.5	16.53
1964	504.6	77.6	114.1	16.96
1965	511.2	56.4	87.5	13.93
1966	527.6	61.4	75.3	12.44
1967	549.0[b/]	62.4	65.4	-
1968	580.0[b/]	47.6	67.7	-

* Data from John A. Clottey, "Production, and Utilization of Animal Products in Ghana," Stanford, 1968, p. 76; Ghana, Cent. Bur. Stat., 1967-68 Statistical Yearbook, p. 79.

a/ Includes all forms of edible beef.

b/ Estimate.

The production of forage crops, such as buffel grass, for dry season feed and silage has been proposed but little action has been taken. The best area for forage production is the Forest region, where the tsetse fly abounds and where population density and crop competition is high.

Disease control is also a primary factor in the low productivity of cattle. Aside from trypanosomiasis, bovine pleuropneumonia is a major problem which has been exacerbated by the increased movement of cattle for marketing. Ticks and other blood parasites are also widespread (13, pp. 19-21).

The importation of high yielding breeds into Ghana has serious limitations. The introduction of Zebu, Brahman, and many temperate varieties has brought about the introduction of new diseases. In addition, imported varieties tend to be less drought resistant and more susceptible to local diseases than local varieties. The N'dama and the West African Shorthorn are small and low yielding. Efforts are currently being made to upgrade local varieties by crossing them with imported breeds (13, pp. 18-19).

Sociological constraints to the development of a viable cattle industry have been noted to be at least as important as ecological ones (12, p. 2). In most areas cattle are kept for reasons of status or as a form of insurance on hoofs for times of emergency. This is becoming less true, however, in the Accra Plains region where farmers are in close proximity to the urban demand for beef (13, pp. 19, 51).

The Ghanaian farmer is widely recognized to be a terrible husbandryman and most often places his animals in the hands of Fulani herdsmen. Extension workers have been unsuccessful in educating Fulanis about proper managing and feeding methods (13, p. 55).

Land tenure is also a problem, as very few hersdmen own the land that they use for grazing. The herdsmen pay rent to local chiefs and family heads for grazing rights over the land. Cropping the land for dry season feed or investment in fencing and housing is not feasible under such conditions (13, pp. 32-33).

Overstocking is also prevalent in some areas, especially along the northern border. This problem is closely related to the possession of large herds for prestige purposes, with no regard for animal quality or marketing. Overstocking results in a shortage of animal feed and exacerbates soil erosion (14, p. 13).

Marketing Problems

Marketing problems are also significant. Approximately four-fifths of Ghana's cattle are located in the Northern region and it is this area where most of the imported cattle, from Mali and Upper Volta, enter the country. But the demand for meat is primarily in the southern urban centers, so the cattle must be driven on hoof south to the points of consumption. Many die along the way, and weight losses of 10 percent are frequent (33, p. 115; 14, p. 82).

The government has sought to combat this problem by aiding the motor transport of cattle, which is very expensive. A slaughterhouse was constructed in Bolgatanga in the Northern region in 1966, and as of 1968 it was operating at 30 percent of capacity due to the lack of a local market. Ghana's other slaughterhouse in Tema, near Accra, was operating at an even lower level. Although the slaughterhouses have the advantage of sanitary conditions, they are not able to compete with local butchers, who use more labor intensive methods (14, p. 86; 12, p. 20).

The processing of beef has also been unsuccessful. The Bolgatanga meat factory began producing canned corned beef in 1966 but stopped production in 1968 due to heavy losses (12, p. 21). Imported products were clearly preferred to the high costing, poor quality Ghanaian corned beef.

Large scale activities in both cattle slaughter and processing are highly capital intensive and require heavy inputs of skilled labor. They cannot presently compete with indigenous butchers in the former case or with high quality imports from developed countries in the latter case.

Sugar

Imports of refined sugar into Ghana have grown rapidly, from 61,000 tons in 1962 to 87,000 tons in 1968 to 117,000 tons in 1970 (40). In 1970, refined sugar imports were valued at almost fifteen million dollars, more than that of any other single food (Table 3). Most of the sugar is imported in cubed form, which is more expensive but is preferred over granulated sugar.

As mentioned earlier, refined sugar is the one food out of Ghana's four major food imports for which production has only recently begun. The growing of sugar cane for home uses, especially alcoholic beverages, has been common in Ghana for decades. Local produce is high in fibre content, however, and unsuitable for refined sugar production.

Import substitution of sugar imports has been a high priority in Ghana since the early 1960s. Production of refined sugar began in 1967 and averaged only 5,500 tons per year during the years 1968-70 (34, p. 17). Ghana's poor performance in refined sugar production has several causes: mismanagement and haste in initial investments, the complexity and requirements of establishing a viable sugar industry, production problems and ecological problems.

The Initial Investments

In 1963, Nkrumah purchased two sugar refineries from Czechoslovakia. These refineries were stored in Eastern Europe until 1965 at Ghanaian expense, due to the lack of buildings for the refineries in Ghana (39, p. 96). In 1967, the two refineries began production, one in Asutsuare, west of Accra, and the other in Komenda, in south-central Ghana. The

sites for the factories were poorly chosen. The area around Asutsuare has heavy black soils with poor drainage, and is thus not suitable for cane production, especially when under irrigation (34, p. 16).

Establishing a Viable Sugar Industry

The production and refining of sugar is a complex undertaking, much more difficult than those associated with most other crops. Firstly, the soil and water requirements of sugar are high. Sixty inches of well distributed rainfall per year is the minimum required and soils must be well drained. The production of sugar requires extremely heavy labor inputs at peak periods of the year such as harvesting.

Two factors are involved in obtaining high yields: high yields of cane and a high level of sucrose in the produce. Because the sucrose content of the field product cannot be obtained by direct observation, the cane is highly susceptible to being harvested at an improper time. Testing the chemical composition of the cane is the only reliable method of obtaining the highest sucrose yield out of a field of cane (32, p. 1237).

In addition, the harvesting of cane must be closely geared to factory operations. Cane begins to deteriorate soon after cutting, and the decrease in sucrose content becomes substantial as little as forty-eight hours after cutting. An efficient and reliable transport system from field to factory is thus required. In addition, the rate of harvesting must be carefully regulated and should be governed by the crushing capacity of the factory (37, pp. 239-40). As can be seen, the production of sugar is conducive to a plantation type agricultural system.

Because of the complexity and importance for coordination, sugar production and refining is an extremely difficult undertaking for a developing country and requires much planning and time before the industry can become profitable.

Ghanaian Sugar Production and Refining

Ghana's two sugar refineries are both run by the state-owned Ghana Industrial Holdings Corporation. The State's plantation holdings provide the factories with two-thirds of their sugar at Komenda and one-half of the sugar at Asutsuare. Private farmers supply the remaining amounts. Yields of cane are extremely low. Yields at the Asutsuare plantation in 1969 were 6.3 tons per acre, while "outgrowers" in the area averaged yields of 7.9 tons per acre. The plantation yields, incidentally, include an estimated 10 percent of harvested cane which is hidden in the field by workers. Yields at Komenda are somewhat higher, averaging 13.5 tons per acre. Average world yields are 15-35 tons per acre (34, p. 15; 29, p. 42).

Irrigation has been proposed as a profitable means of increasing yields. Partially irrigated experimental plots have yielded 26 tons per acre. Irrigation is not feasible in the Asutsuare region due to the poorly drained soils. J. K. Osei suggests that the Asutsuare refinery be moved to a new site in the Senchi region to the west where soils are more suitable and lower cost electric power is available (34, p. 19).

The provision of an extension program to sugar farmers is extremely important for increasing yields and assuring that the crop is harvested at the proper time. Annual land clearing by fire should be discouraged, as the soil is robbed of humus producing matter. Not only are yields of cane per acre very low, but the sugar yield from processing is low, due mostly to harvesting at an improper time. Sugar yields from processing were 2.8 percent at Asutsuare and 5.5 percent at Komenda. Normal yields are generally considered to be around 10 percent (34, p. 17).

The sugar industry in Ghana is also plagued by severe labor problems. Sugar harvesting is an extremely rigorous job and although piecework wages average 160 percent above the minimum wage, labor has not been forthcoming. Sowing has proceeded without regard to the supply of labor. Because of such poor planning as this, 60,000 tons of cane were left unharvested during the 1970/71 season. At Asutsuare, only 50 percent of the acquired land is under cultivation, while Komenda's figure is 90 percent. The cost of living in the plantation areas is extremely high, and accommodations are lacking. Workers want permanent labor and are unwilling to accept casual labor. Worker harvesting productivity is extremely low, averaging .3 tons per man per day at Asutsuare and 1.3 tons per man per day at Komenda. In Ethiopia, worker harvesting productivity averages 2 tons per man per day (34, pp. 17-18).

As a result of low yields and supplies of cane, the factories are operating with heavy losses. The Asutsuare factory was operating at 12 percent of capacity in 1969 and the Komenda factory at 40 percent. Output in 1970 accounted for less than 5 percent of total sugar consumption in Ghana. It is estimated that the production of refined sugar in Ghana costs 79 new cedis per ton in foreign exchange alone, while the price of imported sugar is 112 new cedis per ton (34, p. 17). In an effort to operate the factories at greater capacity, 14,500 tons of unrefined sugar were imported into Ghana in 1970 (40, pp. 11, 314). This figure represents over 20 percent of Ghana's sugar cane production for that year (34, p. 14).

Conclusion

Increasing per capita incomes, a high population growth rate, and high income elasticities of demand will all contribute to the increased demand for Ghana's food imports in future years. The prospects for import substitution of Ghana's four main food imports are mixed. Prospects appear favorable in regard to rice and fish but unfavorable in regard to cattle and sugar, at least for the near future.

Simply increasing local production of rice is clearly not the key to import substitution--emphasis must be placed on improving the quality of Ghana's rice. If Ghanaian rice can compete with imported rice for quality, import substitution will become feasible without the need for high tariffs and import quotas. Recommendations which emphasize improving the quality of Ghana's produce include the implementation of a price grading system, more efficient threshing, milling, and parboiling processes, and the development of pure stands. The most important recommendations in regard to increasing local supplies include improved transportation, the development of high yielding varieties, more effective use of labor intensive methods, and an adequate extension program.

Although the economics of rice production versus alternative crops has not been explored, upland rice production seems to be an ideal crop for commercializing much of the northern areas. There is much scope for increasing both yields and the area planted. This venture largely depends on the government's ability to develop and promote the development of the necessary infrastructure--transportation, milling, extension, and marketing--for meeting the urban demand in the south. The conversion of swamplands in the south into irrigated plots is also an important means for increasing rice production in Ghana.

Increases in the domestic production of fish in recent tariff-free years were accompanied by increases in the quantities of fish imported into Ghana. This trend clearly domonstrates what was found to be true for rice--that increasing supplies will not in itself lead to import substitution.

The major constraints to the import substitution of fish seem to be in the area of marketing. Expanding the area over which local fish can be supplied can be accomplished with improved methods of preservation, the extension of freezing facilities, and improved transportation. The development of the industry in Lake Volta is also important. Seasonal constraints to import substitution may be eased by the development of a canning industry, more fleet mobility, and the extension of freezing facilities.

Although inefficiency is common and prices are high in Ghana's modern fishing industry compared with that of importers, it is to be hoped that these are largely a result of the rapid growth of the industry and that problems will be ironed out with time. It is remarkable and indeed fortunate that different levels of capital and labor intensity can exist and grow side by side. Both the modern and the traditional sectors should continue to be encouraged.

In comparing the fish industry with the production of cattle, it is obvious why the former was chosen as the means for solving Ghana's protein problem as well as substituting for imports. Fish production lacks the problems of feed, disease, pests, climate, and distance from markets which plague the cattle industry. The seasonality of the water supply,

the unprofitability of large-scale improvements, and sociological constraints such as the lack of a commercial consciousness, overstocking, and land tenure problems are also serious constraints to increasing cattle production.

Fish production requires less investment per pound of protein produced, and being the cheapest source of animal protein, it is often the only source of animal protein available to low-income families (13, p. 63). It is no wonder then, that fish production has been chosen to substitute for meat imports as well as for fish imports.

This is not to say, however, that meat production should not be encouraged. Some scope does exist for increasing production, especially in the plains area around Accra. Improved north-south transportation and the gradual erosion of cultural constraints will facilitate production increases and the marketing of cattle.

The promotion of the production of refined sugar in Ghana has been a failure and the outlook for the industry is bleak. Amidst tremendous problems such as labor unavailability, excess capacity, improper ecological conditions, low yields, low labor productivity and low refining efficiency, it is indeed questionable whether sugar production and refining should continue in Ghana. This is especially true for the Asutsuare project which has had a consistently worse record than its counterpart at Komenda. The sugar industry has been a burdensome drain on both local resources and foreign exchange and a dramatic reorganization seems necessary if production is to continue. An examination of the opportunity costs of pouring further resources into the sugar industry and of the prospects for import substitution in the long run are needed.

The gains which Ghana can accrue by substituting local production for rice and fish imports, and by at least curbing the growth in cattle and meat imports, are many. Much foreign exchange can be saved for development, and Ghana's international financial position can be eased. The supply of animal protein can be increased significantly, and there may even be some scope in the future for a viable fish exporting industry. Increasing local supplies of fish and rice, both of which are highly preferred commodities, seems both possible and profitable and will increase consumer welfare as well as improving Ghana's economy.

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