CONSTRAINTS ON KENYA'S
FOOD AND BEVERAGE EXPORTS

By
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INSTITUTE FOR DEVELOPMENT STUDIES
UNIVERSITY OF NAIROBI

WITH

International Food Policy Research Institute
Washington D.C.

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FOREWORD

This report represents a joint research effort by the International Food Policy Research Institute and the Institute for Development Studies at the University of Nairobi, under a research permit from the Office of the President in Kenya.

The International Food Policy Research Institute and the Institute for Development Studies share a concern to see development of agricultural trade as a means of achieving accelerated economic growth. Trade among developing countries is of particular interest as a means of accelerating growth in a world where the growth of the industrialized countries has slowed dramatically. Kenya's particular location and agricultural base suggest that the potential is great for trade with the oil-exporting countries in the region, especially the Gulf States, Iran, and North Africa. Such trade is small at present. This report attempts to understand the constraints on development of that trade potential.

Michael Schluter examines both the international and domestic constraints governing expansion of Kenya's food and beverage exports. Subsidized exports of beef, sugar, and dairy products from high-income countries make it difficult for developing countries to raise domestic prices to boost local production, thus undermining development of the export potential of these products. With respect to domestic constraints, shortages of capital for infrastructural development suggest an export strategy based on high-value rather than high-volume crops. Equity considerations suggest a focus on crops produced in the smallholder sector.

Both high-value and smallholder crops, however, make particular demands on availability of trained manpower. Many minor high-value crops that could contribute to the diversity of exports require a sustained research effort to achieve the volume and quality for exports to be viable. The collection, processing, and payment of hundreds of thousands of small-scale producers and the marketing system needed to provide linkages between the international market and those producers also require large numbers of trained personnel. This points to a special role for the donor community in helping to provide the manpower training needed to develop an agricultural-export-based development strategy in Kenya.

Schluter's analysis is based on his eight years of residence in Kenya from 1974 to 1982, working both in the commercial sector and in economic research. His extensive practical knowledge of how institutions work at the grass roots is reflected in this study, which should be of practical use to those concerned with policy analysis and formulation in Kenya.

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SUMMARY

Although Kenya lacks the industrial raw materials and skilled workers required to promote industrial exports, it has excellent potential for producing a wide variety of agricultural commodities. As the need for foreign exchange increases, Kenya will probably be compelled to seek to expand its agricultural exports, rather than to continue to pursue its present goal of attaining self-sufficiency.

Specific food-importing countries were selected for the study because markets for agricultural products are highly differentiated, and prices often depend on taste preferences in the importing country. And, by focusing efforts to expand exports in a specific market, economies of scale can often be realized in freight, marketing, and credit costs. The oil-exporting countries are an obvious choice as a market for Kenya. Imports of most products grew by more than 70 percent from 1971-73 to 1976-78, whereas growth in many other markets stagnated during the same period. Because 97 percent of the oil exporters' agricultural imports in 1978 were food commodities and beverages, the study concentrates on these products.

Analysis of markets among the oil exporters shows that in 1978, 37 percent of the total value of imports was cereals and 21 percent was meat; sugar, oilseeds, and dairy products had 10 percent each. Of the countries considered, the largest regional markets in order of importance were the Gulf States, Iran, North Africa, West Africa, and Indonesia. Between the first oil shock (1971-73) and the second (1976-78) imports of meat products increased five to six times. Imports of maize, oilseeds, dairy products, rice, and oranges also grew rapidly.

Eight possible exports from Kenya are examined to analyze the international and domestic constraints that might prevent Kenya from realizing its export potential to these markets. The selected items are coffee, tea, sheep and goats, sugar, maize, pulses, and horticultural crops. The methodology uses a disaggregated nominal protection coefficient. For each commodity, the domestic border price is compared with the export parity price, which is defined as the price in the export market less duty, freight, and insurance costs. The main components of the domestic border price are the producer price, transport costs, and marketing margins. The potential for reducing each cost component is analyzed, especially the potential for reducing the farmgate price by introducing new technology.

For coffee and tea, the constraints arise both from the international market and the domestic marketing system. Because the demand for coffee and tea in Kenya's traditional markets is highly inelastic, Kenya will have to go to nontraditional markets to increase exports. Returns on coffee exports will be significantly lower in the oil-exporting countries than in the countries that presently receive Kenya's exports. However, the additional export volumes could be produced on existing area even at the returns available in these markets if the efficiency of the smallholder marketing systems could be improved so that producers receive a substantially higher proportion of the export value, and more quickly, than under the present system.

Among meat products, the prospects for beef and sheep and goats differ markedly. Subsidized beef exports from the European Community have lowered international prices to the point where it is no longer possible to stimulate production for export in Kenya by raising domestic prices. Projections of EC beef surpluses suggest this situation will continue through the 1980s. In contrast to beef, the potential for sheep and goats is substantial. Even though Kenya's exchange rate was overvalued in 1982, sheep and lamb prices in the Gulf States were 30 percent higher than Kenya's domestic border prices, but the government ban on food exports prevented this differential from being realized. A long-term research project on sheep and goats has provided the technological basis for substantial improvements in productivity, although higher prices will be needed to provide the incentives for farmers to apply improved management practices.

For maize and sugar, exportable surpluses have to come largely from Western and Rift Valley provinces, where these crops compete

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for high quality land with assured rainfall. Because these provinces are 800 kilometers from the port, more than 50 percent of the domestic border price of maize is the cost of handling and transport from producer to port. Although Kenya has ideal growing conditions for maize, the cost of capital for infrastructural development makes it impossible to develop competitive exports of this bulky, low-value commodity. For sugar, if indirect taxation of about 13 percent is deducted from the border price, Kenya's domestic border price is nearly 20 percent below the World Bank's estimated long-term equilibrium price in international markets. However, the capital costs of developing processing plants for additional white sugar capacity are so high that Kenya should probably try to develop production of jaggery, a brown sugar product that is less capital-intensive and more employment-creating. This would release part of existing white sugar capacity for export.

Pulses and horticultural crops are the other two commodities considered. For beans, international prices were almost double domestic border prices for several major varieties during much of the period 1971-81. However, Kenya's product is of low quality. It is not standardized for color or size, and it is often subject to 1 percent weevil damage, which excludes it from most of the world market. The absence of strong vertical linkages in the information chain from the world market back to the research and extension system accounts for the failure to develop export quality. For mangoes, there is substantial potential for export, but uncertainties of pest control lower expected returns on investment. Resources available for research into minor crops like mangoes are inadequate, and scarce supplies of improved planting material from government nurseries also restrict area expansion.

Finally, some of the institutional problems associated with Kenya's food and beverage exports are considered. "Who should export?" is not a trivial question in Kenya. Expatriate-controlled companies and Asian traders (citizens primarily of Indian descent) have the market information, technical knowledge, and working capital required, but their interests are not necessarily those of the national government. Parastatals and coopera-tives lack export know-how and often have severe management problems because there are no effective systems of accountability. Local African-owned businesses generally lack both export know-how and adequate working capital, and many Kenyan policy-makers believe they contribute to social stratification.

Both beverage and food exports create political difficulties for the government. Ninety percent of coffee production and 50 percent of smallholder tea production come from two provinces in central Kenya, whereas sugar and marketed maize production are concentrated in western Kenya. Changes in the relative prices of food and cash crops have important implications for the regional distribution of income. Also, with nearly 50 percent of gross export earnings and nearly 75 percent of net export earnings coming from coffee and tea exports, international price fluctuations create substantial instability in the domestic economy. Exports of food products with a high price elasticity of demand reduce domestic consumption by raising prices. Because key groups of consumers are often highly articulate, food exports are perceived as politically hazardous.

The report concludes that an agricultural export strategy should concentrate on high-value, low-volume crops, as this minimizes demands on high-cost domestic infrastructure. However, this emphasis requires a greater allocation of resources to agricultural research as many minor crops with export potential at present receive little attention. Vertical linkages between export markets and the farmer will also have to be developed. Existing marketing channels have limited institutional capacity to convey information about market size, price movements, and quality specifications to the research station, extension staff, or the farmer. Finally, it will be important to increase price incentives and persuasion through the input supply and extension agencies. This will necessitate a new or revitalized set of marketing institutions that will aggressively seek to increase farm productivity. It will be largely the willingness and ability to create these new institutions within a progressive price and policy framework that will determine the success of an agricultural export strategy.

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INTRODUCTION

Potential for Food Exports

Until recently there has been little recognition in Kenya of the potential to export food. The emphasis in food policy, as reflected in the National Food Policy Paper of 1981,[1] is toward self-sufficiency, defined as a domestic balance in production and consumption. Although a brief mention is made of food export potential in the paper, it is hedged with caveats regarding financial viability. To achieve self-sufficiency by 1989, high growth rates in production of many major foodstuffs will be necessary. However, the choice of 1976 as the base year in these estimates, when production was unusually low, has probably exaggerated the rates of growth required to attain self-sufficiency.[2] Periodic domestic shortages of basic foods, such as maize and milk, which require large imports, reinforce the view that Kenya can hope for no more than self-sufficiency in food as a target.

But, setting self-sufficiency as a goal may be inappropriate on two grounds. First, if Kenya has a comparative advantage in production of export crops rather than food crops, national income could be increased significantly by increasing export crop production and importing food crops. Such an export-based agricultural strategy would also provide employment as most export crops, such as coffee, tea, and horticultural crops, are more labor-intensive than maize and wheat, the main food staples.[3] The potential to increase rural employment through shifts in the cropping pattern has been spelled out for the Indian context,[4] These income and employment advantages may be offset by concerns about national security if there are administrative or other problems associated with guaranteeing adequate supplies of quality food staples from imports.

Second, a narrow food production focus is inappropriate if there is high aggregate supply elasticity in agriculture, so that production of both food and export crops can be raised simultaneously. Several factors indicate that Kenya could achieve growth rates of 4 percent (which is required if there is population growth of 3.5 percent, per capita income growth of 2.5 percent, and income elasticity of demand of 0.2 percent). Although such high growth rates have seldom been achieved in Asia, the yield gap in Kenya is usually much larger. That is, the average yield in Kenya is typically much smaller than that of the best farmer, while the average yield in Asia is only slightly lower.[5] Largely as a result of administrative and other institutional constraints, fertilizer consumption was stagnant in Kenya during the period 1971-81, whereas it increased two and a half times in India during the same decade.[6]

The problems of output marketing in Kenya have also been greater than in most parts of Asia. As is the norm in Africa, the government in Kenya has taken over almost all of the grain trade, whereas governments in Asia have attempted only limited intervention. In addition, monopsonist purchas-

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[1] Kenya, National Assembly, *Sessional Papers, 1981*, Paper No. 4, "National Food Policy."

[2] Food and Agriculture Organization of the United Nations, Agricultural and Rural Development Review and Programming Mission for Kenya, *Mission Findings and Recommendations* (Rome: FAO, 1981), p. 40.

[3] Kenya, Ministry of Agriculture, Central Development and Marketing Unit, *Yields, Costs and Prices 1982* (Nairobi: Government Printer, 1982), pp. 116-128.

[4] Gunvant M. Desai and Michael Schluter, "Generating Employment in Rural Areas," in *Seminar on Rural Development for the Weaker Sections* (Bombay: Indian Society of Agricultural Economics, 1973).

[5] Reasons for the yield gap in Eastern Africa are discussed in Michael Collinson, "Technological Potentials for Food Production—Eastern and Central Africa," a paper prepared for the Conference on Accelerating Agricultural Growth in Sub-Saharan Africa, Victoria Falls, Zimbabwe, August 29 to September 1, 1983 (mimeographed), especially pp. 37-39.

[6] Gunvant M. Desai, *Sustaining Rapid Growth in India's Fertilizer Consumption: A Perspective Based on Composition of Use*, Research Report 31 (Washington, D.C.: International Food Policy Research Institute, 1982), pp. 9 and 15.

ing rights have been given to cooperatives or parastatals for most major agricultural commodities. The lack of trained manpower and the poor systems of internal accountability in these institutions result in many disincentives to farmers. Consequently there is a large, untapped potential for aggregate supply increase if the output marketing system were decontrolled. However, the political complexities of making changes in the agricultural marketing system should not be underestimated.

Why Focus on Agriculture?

Three main arguments support a primary focus on agriculture as the key to growth and export earnings in Kenya. The first is the small absolute size of the manufacturing sector. In 1981, manufacturing still accounted for only 13.4 percent of GNP, 4 percent of total exports (excluding petroleum products), 30 percent of wage employment, and less than 10 percent of total employment in the economy.[7] Even if the 6 percent per year growth rate of employment in manufacturing achieved during the period 1972-77 could be sustained throughout the period 1981-2000, so that it increased nearly four times—from 1 million to 4 million workers—it would still absorb only 50 percent of the expected 6 million new entrants to the labor force.[8]

Second, the local value added in foreign exchange terms tends to be much higher for agricultural than industrial products. For most developing-country manufactured exports, generally 60 to 70 percent of the cost (at world prices) goes for raw materials and intermediate inputs, to which must be added the import component in transport, electricity, and other infrastructure.[9] In contrast, in Tanzania the foreign exchange component

in production, processing, and transport (to f.o.b.) for 1981/82 was less than 30 percent for all smallholder export crops except tea and a maximum of 50 percent for estate-produced sisal. Only in the case of relatively low-value food crops like wheat and estate sugarcane, harvested mechanically, did the proportion exceed 50 percent.[10] So the absolute value of manufactured exports probably has to be twice the value of agricultural exports to achieve a given amount of net foreign exchange earnings.

The third advantage of a focus on agricultural exports is the income distribution effect. The employment opportunities and income distribution benefits of a strategy of growth led by agriculture have been shown in the economic literature to be much greater than with a strategy led by industry.[11] Moreover, manufacturing businesses are still largely controlled by the European and Asian communities.[12] The capital and the technological know-how required for large-scale manufacturing production make entry difficult for African businessmen, whereas the potential for African businessmen to participate in the processing and export of agricultural commodities is substantial.

Food Versus Nonfood Agricultural Exports

Nonfood agricultural exports such as beverages and industrial raw materials appear to offer significant advantages over food products as developing-country exports. Substantial domestic demand for food products, which generally have a high price elasticity of demand, increases fluctuations in the supply available for export markets. And the export of products consumed by the poor may directly put at risk the availability and

[7] Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1981* (Nairobi: Government Printer, 1982).

[8] Kenya, Working Party on Government Expenditures, *Report and Recommendations of the Working Party* (Nairobi: Government Printer, 1982), p. 80.

[9] Donald B. Keesing, *Trade Policy for Developing Countries*, World Bank Staff Working Paper 353 (Washington, D.C.: World Bank, 1979), p. 101.

[10] Michael Sackett and Michael Schluter, *Estimates of the 1981/82 Import Requirements for the Production, Processing and Marketing of Major Crops in Mainland Tanzania* (Dar-es-Salaam: Marketing Development Bureau, Ministry of Agriculture, Tanzania, 1981).

[11] For example, see John W. Mellor, *The New Economics of Growth: A Strategy for India and the Developing World* (Ithaca, N.Y.: Cornell University Press, 1976).

[12] Although there has been some growth of Kenyanization since 1968, the basic structures are generally believed to be unaltered. National Christian Council of Kenya, *Who Controls Industry in Kenya?* (Nairobi: East Africa Publishing House, 1968).

price of essential food products, which could materially affect the real incomes of poor people. Also, the domestic political risks in exporting commodities with a high price elasticity at home are generally greater than exporting those with a low price elasticity.

However, there may be substantial domestic demand for some cash crops as raw materials for local industry. During the period 1976-80, 15 percent of officially marketed maize production was exported and only 12 percent of cotton production was.[13] Thus, a focus on cash crop exports may not increase the reliability of supplies, avoid hurting the poor, or reduce political instability. Furthermore, a focus on nonfood exports may not be an advantage in foreign exchange terms. Strongly negative terms of trade in the period 1962-77 were associated more with industrial raw materials, especially jute, sisal, and rubber, and products with a low elasticity of demand, such as tea, than with food products.[14]

The Role of Agriculture in Kenya's Exports

During the period 1970-80, Kenya's agricultural exports grew from U.S. $150 million to $700 million in current prices (Table 1), and increased 80 percent at constant 1975 prices.[15] In gross export earnings, the share of agricultural exports declined from 75 percent of total exports in 1970 to 65 percent in 1979, and to just 51 percent in 1980. However, in 1980 two-thirds of nonagricultural export earnings were from oil products, which were imported in crude form and exported as refined products, so that the local value added was small. They rose sharply in value following price rises by the Organization of Petroleum Exporting Countries (OPEC). If the import content is 85 percent for oil exports, 50 percent for other nonagricultural exports including manufactured goods, and 30 percent for agricultural products, the proportion

Table 1—Value of agricultural commodities exported by Kenya, 1970-80

Commodity	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
						(KSh million)					
Coffee	445.3	390.8	495.5	715.7	768.5	704.0	1,867.0	4,087.2	2,495.2	2,214.0	2,163.0
Tea	254.1	237.5	328.3	339.3	387.5	459.0	635.2	1,435.6	1,263.7	1,257.0	1,160.0
Fruit and vegetables	78.0	70.7	94.1	101.8	110.1	155.3	282.3	405.1	361.5	405.8	474.5
Sugar	2.4	3.7	2.2	7.0	9.0	9.9	152.7	83.2	11.4	77.1	270.3
Animal products (meat and skins)	48.3	80.3	117.9	116.2	103.6	123.8	301.6	189.8	222.0	291.9	238.5
Cotton and wool	32.0	28.9	32.0	44.3	37.0	34.4	34.1	24.7	57.2	37.3	86.5
Cereals and pulses	23.3	8.8	4.0	119.0	64.2	129.8	58.3	94.3	60.6	147.7	38.9
Oilseeds	10.6	9.7	9.8	8.0	10.1	12.9	16.4	27.1	27.3	42.4	27.2
Dairy products	6.8	2.4	26.2	22.6	15.7	8.4	15.4	16.6	42.6	50.2	5.7
Other agricultural products	167.0	185.3	238.8	316.6	612.0	488.6	389.9	505.7	412.0	485.8	537.1
Total agricultural products	1,067.8	1,018.1	1,348.8	1,853.5	2,117.7	2,126.1	3,752.9	6,869.3	4,953.5	5,005.2	5,001.7
Petroleum products	163.5	177.4	178.8	189.8	543.8	746.5	889.6	1,675.2	1,389.3	1,560.0	3,254.1
Other nonagricultural products	200.8	268.2	284.2	409.4	597.4	506.8	733.3	916.4	1,056.5	1,158.7	1,608.5
Total exports	1,432.1	1,463.7	1,811.8	2,452.7	3,258.9	3,379.4	5,375.8	9,460.9	7,399.3	7,723.9	9,864.3

Source: Kenya, Ministry of Finance, Statistical Branch, Customs and Excise Department, *Annual Trade Report*, 1970-80 (Nairobi: Government Printer, 1970-80).

Note: The figures in the table are Kenya's domestic exports. Reexports are excluded.

[13] Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1981*, pp. 58 and 102.

[14] Cathy L. Jabara, *Terms of Trade for Developing Countries*, Foreign Agricultural Economic Report 161 (Washington, D.C.: U.S. Department of Agriculture, 1980).

[15] The deflator used is the OECD-North GDP deflator in World Bank, *Commodity Trade and Price Trends* (Baltimore: The Johns Hopkins University Press, 1981), p. 30.

of net export earnings derived from agriculture in 1980 rises from 51 percent to 74 percent of the total (see Figure 1). Other nonagricultural exports did not exceed 16 percent of the gross value of exports at any time during the period 1970-80.

Kenya did not succeed in diversifying its agricultural exports significantly away from coffee and tea during this period (Table 1). Coffee's share grew from 30-40 percent to 40-50 percent of the gross value of agricultural exports between the first and second halves of the 1970s, and tea has continued to provide an additional 20-25 percent. For both crops the tonnage exported has grown by more than 80 percent. The share of fresh and processed fruit and vegetables has grown slightly from 7 percent to 9 percent of total exports during the decade, and sugar has ceased to be a major import item and become a potential export item. Animal products, including beef, animal skins, and wool, are also significant export items, constituting about 5 percent of total agricultural exports. Other small export items that have made up more than 1 percent of total agricultural exports in some or most years are cotton, maize, pulses, oilseeds (mainly sesame and sunflower), and dairy products. Maize was a significant export item in just two years, 1973 and 1979; in some other years it was imported in large quantities. This report aims to identify the international and domestic constraints that have inhibited diversification and growth of Kenya's agricultural exports.

Figure 1—Estimates of Kenya's gross and net export earnings, 1980
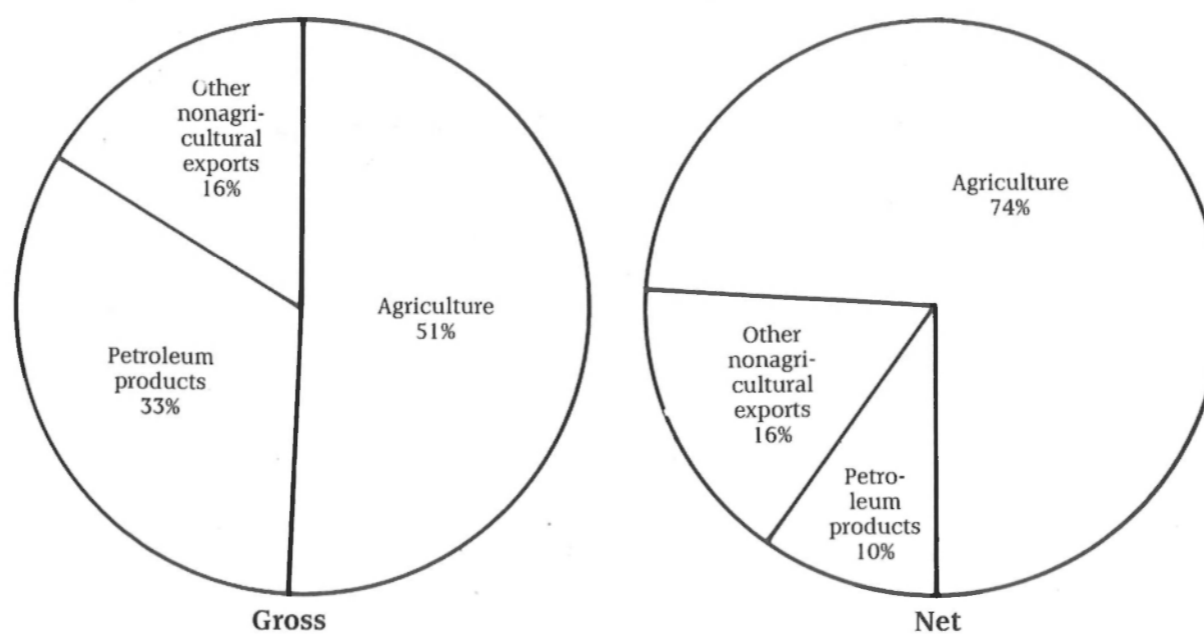
Gross

Net

Source: Kenya, Ministry of Finance, Statistical Branch, Customs and Excise Department, *Annual Trade Report*, 1970-80 (Nairobi: Government Printer, 1970-80).
Notes: Gross foreign exchange earnings are defined as the total foreign exchange earned from physical exports. Net foreign exchange earnings are defined as gross foreign exchange earnings less the value of imported products that are used in the production, processing, and transportation to port of physical exports. The following percentages of import content are assumed: for agricultural products, 30; for petroleum products, 85; and for other nonagricultural products, 50.

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METHODOLOGY FOR EXAMINING KENYA'S EXPORT POTENTIAL

Reasons for a Market-Specific Focus

It is generally assumed that the demand for Kenya's export products is infinitely elastic. This means that a single export price can be used for computing measures of export potential. However, many of the products exported by Kenya face sharply differentiated markets. The International Coffee Agreement limits exports to member countries to a fixed quota; the prices of exports to nonquota countries, which include most of the oil exporters, are often 60 percent below those in quota markets.[16] The highly inelastic demand for tea in traditional export markets results in a large gap between the average revenue and the marginal revenue earned from increased exports, and for Kenya to export to new markets, a different processing technique would have to be used, which changes the type of tea produced.

Different countries or regions demand specific qualities, sizes, grades, varieties, and types of a particular commodity. For example, Kenya has the potential to export fresh beef by airfreight to the Middle East, but not frozen cuts. Products such as pulses with 1 percent insect damage may have no market in Western countries, but they may still be acceptable in other developing countries with less stringent quality standards. Because there is seldom a costless movement from one quality or grade to another within the commodity, exporters are often forced to specialize in production of particular grades for particular markets.

When product markets are sharply differentiated, it makes it difficult to study all export possibilities. The volume of data required to study so many permutations of product specifications and markets makes it infeasible to cover them all. Two approaches may therefore be adopted. The first is to choose a small subset of commodities and to examine all possible markets for those commodities to determine which countries offer the highest return. The second is to examine the products with potential for a specific market. The important economies of scale that can be realized by concentrating on certain markets constitute the main argument for a study focused on markets rather than on commodities. These arise in the areas of freight, overcoming barriers to entry, and market development.

The economies of scale in freight costs are substantial. A national market focus lowers costs to the individual exporter. Such costs may be a significant part of the total cost of an exported item. This is particularly true of agricultural and food products, which are typically of low value and high volume. They are often highly perishable or involve special handling costs such as refrigeration. For small countries like Kenya, the ability to initiate trade to a certain market depends on being able to reach the critical minimum volume or value that makes it feasible to charter a steamer or aircraft to a particular destination. This applies particularly to Kenya's meat and horticultural exports to the Middle East and West Africa. Research may also be needed to determine the optimal storage and handling conditions for transporting agricultural exports to specific markets.[17] The problem of freight links is particularly acute in intra-African trade, owing to the low volumes and lack of infrastructural facilities. As bulk increases, there are further opportunities to realize economies of scale

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[16] Coffee Board of Kenya, *Annual Report, Balance Sheets and Statement of Accounts for the Year Ending 30th September 1982* (Nairobi: CBK, 1983), p. 14.

[17] For example, see International Trade Centre, "Export Development and Diversification. Packaging and Transportation of Perishable Produce by Sea from Kenya with Special Reference to Selected Vegetables, Pineapples and Mangoes," Project No. KEN/05/60, Geneva, March 1978 (mimeographed).

through larger carriers, bulk handling facilities, and lower insurance costs.

There are also economies of scale in marketing. Monopolies or oligopolies among distributors in importing countries often mean that new suppliers cannot enter the market unless they can offer a range of goods to the importer that matches the range offered by traditional suppliers. New suppliers have to match credit terms, which is particularly difficult for soft currency countries in competition with countries with convertible currencies. Because governments account for a large proportion of total expenditures on goods and services, it is important to try to capture at least a portion of this market. Often, tendering for government contracts cannot be attempted without the ability to supply relatively large quantities and a range of products rather than a single item.

Transaction costs associated with market development also argue for focus on a specific market. Bureaucratic requirements governing imports, such as quality conditions, packaging, labeling, and customs formalities, are often so complex that an official representative in the importing country is essential for establishing trading links. Lack of trained manpower to perform these functions in each nation and insufficient exportable surpluses to defray these overhead costs make it necessary to limit the number of countries that are the focus of an export drive. In addition, it is essential to establish a reputation for steady supplies and reliable quality: until a market foothold is established, new suppliers have to sell their product at discounted prices. Once the learning costs have been incurred for a particular market, the transaction costs of opening up new markets and the need for continuity of supply in exports make it desirable to stay in a particular market, unless the quantity available for export increases dramatically.

Taking into account differentiated products and markets does not make it possible to avoid restrictive assumptions altogether. It is necessary to assume an infinitely elastic demand for the specific quality of the product in the market under consideration. In Kenya's case, for the products and time frame considered, this was not reasonable because Kenya's market share was no more than 13 percent for any product in any country studied (see Chapter 4). However, it could be a restrictive assumption over the long term if export volumes increase rapidly to these markets.

Problems in Measuring Export Potential

A common method of examining agricultural export potential is to list all commodities with apparent export potential and then to rank them by the effective protection coefficient (EPC) or the domestic resource cost (DRC). The EPC uses the value added for a commodity to show whether there is positive or negative protection, whereas the DRC ranks commodities by the true opportunity cost of producing one unit of foreign exchange from them. By examining the full range of commodities a country may export, it is possible to determine those which the country produces at lowest cost relative to the estimated long-term international price trend and thus to determine priorities for long-term export development.

In Africa, data limitations make it difficult to provide accurate estimates of these coefficients for use in policymaking. The first set of problems is concerned with establishing actual inputs and outputs for a given commodity. There is a high degree of agroclimatic variation within small parts of Africa. The large zones of similar climate and topography that exist in the Indo-Gangetic plain, for example, do not exist in Kenya. There are large differences in yields between adjacent districts growing the same crop in Kenya, as well as differences over time, so that a national yield generally has little meaning. Although the DRC is a marginal concept, average values are often used in practice owing to the difficulty of accurately measuring marginal values. However, the gap between marginal and average costs may be substantial, as it is for tea (see Chapter 4). In addition, data on costs of cultivation are often scanty even for the major crops. There are many demands on the small group of trained and experienced research personnel able to go out and collect the data. Guesses have to be made about the physical quantities of inputs used in production, so that estimates like the DRC are accurate for single locations at best and have a wide margin of error.

A second problem with the DRC and EPC is that ranking commodities by their export

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potential for a given level of technology may be of limited usefulness if there is potential for rapid technological change. In Africa, estimates of potential yields using currently available technology are often much higher than actual yields, whereas in Asia potential yields are only slightly higher than actual yields.[18] Thus, a given policy intervention to increase fertilizer use, seed quality, or marketing channels can dramatically change average yields used for DRC estimates in a short time. Similarly, changes in technology in processing or transport sectors can dramatically alter the DRC. For example, trucks may be substituted for bullocks in transporting sugarcane, or facilities for the bulk handling of grains may be introduced. The DRC, then, has to be qualified by state-of-technology assumptions.

A third problem with the DRC is the difficulty of accurately measuring the social opportunity cost of resources. As Bruno points out, in Israel, "in actual government practice, and in the absence of better information, labor was usually valued at its market price, capital was imputed at a fixed rate of interest based mainly on the estimated marginal cost of foreign borrowing. . . ."[19] In practice, the World Bank also advises consultants to use market prices for labor and capital as a surrogate.[20] Whereas such approximations may provide reliable estimates for Israel, where unemployment is low and capital markets are relatively developed, they may not hold up so well in Africa. Given the lack of data for accurate confirmation of the true seasonal opportunity cost of labor in different regions or any objective measure of the opportunity cost of capital, in conjunction with the lack of physical input coefficients, there is no way to obtain accurate estimates of DRC or EPC coefficients for most commodities in Kenya.

Methodology

This paper uses a disaggregated form of the nominal protection coefficient (NPC).

For a number of commodities not being exported as a result of the government's ban on food exports, the coefficient is 1.0 or less than 1.0, so there is negative protection. The methodology used is similar to that of the NPC[21] and is based on a comparison of the domestic price at the border with the export parity price, also at the border, although there is no attempt to introduce a shadow rate of exchange.

$$NPC_i = P_i^d / P_i^b, \qquad (1)$$

where

NPC_i = nominal protection coefficient of the ith commodity;

P_i^d = domestic price of the ith commodity at the border (f.o.b.); and

P_i^b = export parity price of the ith commodity, with the export parity price being the international market price in the market under study multiplied by the official rate of exchange, less import tariffs, and less freight and insurance costs.

The next step is to disaggregate both the domestic price and the export parity price so that each of the major cost components can be examined separately. Given the importance of processing costs, transport costs, marketing margins, and indirect taxes in the domestic price, the numerator can be expanded as:

$$P_i^d = P_i^s + R_i + U_i + M_i + T_i^d, \qquad (2)$$

where

P_i^s = price received by the farmer for a unit of the ith commodity;

R_i = processing cost of a unit of the ith commodity;

U_i = domestic transport and handling costs (both road and rail) for the ith commodity, including interest charges for the period the crop is in transit from farm to port;

[18] Collinson, "Technological Potentials for Food Production," pp. 37-39.

[19] Michael Bruno, "Domestic Resource Costs and Effective Protection: Clarification and Synthesis," *Journal of Political Economy* 80 (January-February 1972): 22.

[20] Pasquale L. Scandizzo and Colin Bruce, *Methodologies for Measuring Agricultural Price Intervention Effects,* World Bank Staff Working Paper 394 (Washington, D.C.: World Bank, 1980), p. 16.

[21] Ibid., pp. 19-20.

M_i = marketing margin for a unit of the i*th* commodity; and

T_i^d = direct and indirect taxes paid in production, processing, and transport of the i*th* commodity.

M_i can be estimated as a residual by rewriting equation (2) as:

$$M_i = P_i^d - (P_i^s + R_i + U_i + T_i^d). \quad (3)$$

In different situations each of these cost components can be a large proportion of the domestic price. Bates estimates a marketing margin coefficient (m_i), although he does not define this formally, which seems to show marketing margins as a proportion of the export parity price:[22]

$$m_i = M_i/P_i^b. \quad (4)$$

Although these margins are sometimes ignored in calculating the NPC on the grounds that they are likely to be small.[23] Bates argues that they can represent up to half the export parity price.[24] which is confirmed by analysis in this report.

The transport component may also be substantial. In many studies P_i^d and P_i^b are not adjusted for measurement at the same location, so that the domestic transport component is not taken into account. For agricultural commodities that are bulky and perishable, this may significantly bias the results. On the definition $u_i = U_i/P_i^b$, this analysis estimates $u_{maize} = 0.35$, that is, 35 percent of the domestic border price for maize is the internal transport and handling cost from farm to port.

The denominator of equation (1) can also be decomposed into its major constituent parts.

$$P_i^b = P_i^x - F_i - D_i - I_i, \quad (5)$$

where

P_i^x = price in the export market under study for the i*th* commodity;

F_i = freight cost of the i*th* commodity to the market under study;

D_i = tariffs on the i*th* commodity in the market under study; and

I_i = insurance costs for the i*th* commodity in transit to the market under study.

A second subscript j, where j = 1, . . . , n could be added to identity (5) for different markets 1, . . . , n, as each of the variables in the identity refers to prices and costs in a specific market.

In practice the export parity price is difficult to estimate. The relevant price for analysis of export potential over the medium term is the expected price in base-year terms for the specific commodity in the specific market being considered. This should be compared with trends in prices of major competing crops in those markets, but it is difficult to obtain reliable price projections even for the specific commodities being studied. However, some attempt is made to examine the probable trend in international prices and the major factors likely to affect that price for each commodity considered.

The insurance costs were not included in the analysis, as they generally represent less than 1 percent of the export parity prices. Freight costs, however, are an important determinant of the export parity price. For example, prices of chilled meat by airfreight in the Gulf States have both different export parity prices and freight costs than frozen meat by refrigerated seafreight to the same market.

Thus, the NPC is used in the analysis in its expanded form,

$$NPC_i = (P_i^s + R_i + U_i + M_i + T_i)/$$
$$(P_i^x - F_i - D_i - I_i). \quad (6)$$

After calculating the NPC, the next step is to relax the restrictive assumption of fixed technology and costs in production. Specifically, the analysis examines the potential to raise farmers' net returns by increasing

[22] Robert H. Bates, *Markets and States in Tropical Africa* (Berkeley, Cal.: University of California Press, 1981).

[23] For example, see Scandizzo and Bruce, *Methodologies for Measuring Agricultural Price Intervention Effects*, p. 13.

[24] Bates, *Markets and States in Tropical Africa*, pp. 137-145.

production or by lowering input prices at the farm gate. The latter may be achieved either by reducing marketing margins in the input distribution network or by reducing indirect taxation on agricultural inputs.

Disaggregation of the NPC allows a focus on the major components of costs, which is advantageous in a policy context. Because of limitations of time in studying such a wide range of commodities, it was not possible to examine every parameter in equation (6), but only those that were deemed of greatest importance for the specific commodity. Although the analysis is partial, some generalizations are possible based on a comparative study of the export potential of a number of different commodities.

The analysis, then, follows this sequence. First, export parity prices net of freight costs are compared with domestic border prices. Then the major factors governing the domestic border price are examined, and the potential to lower processing, transport, and marketing margins is analyzed. Finally the potential to lower producer costs by lowering input costs or by shifting the production function through technological change is considered.

The analysis is limited to just eight agricultural commodities. Development of these exports over the medium term will require substantial resource allocations to agriculture, with some negative consequences for other parts of the economy. In particular, the study recognizes the importance of manpower training to provide the personnel required for agricultural research and the administration of the marketing system. There will also be a substantial need for working capital at the farm level to raise yields, using presently available technology. Given the high rate of return on that working capital and the rapidity with which such returns can be realized on investment in agricultural inputs, the working capital needs are probably not a significant constraint. The report does not attempt to examine the intersectoral resource allocation implications of an agricultural-based export strategy, but only whether a range of commodities with export potential exists and which of the commodities shows the greatest potential.

4

POTENTIAL MARKETS AMONG THE OIL EXPORTERS

Selection of Oil-Exporting Countries

There are four main reasons why the oil exporters were selected for the study: increase in demand, geographical proximity, ecological similarities, and hard currency payments.

The 1978 oil price increases passed as much as 1 percent of gross world product from oil consumers to oil producers.[25] Although real oil prices cannot be expected to stay at 1978 levels, they are unlikely to decline dramatically in the medium run.[26] The increase in the revenues of the oil-exporting countries led to large increases in agricultural imports, as governments distributed part of the increased revenues to lower-income groups. From 1971-73 to 1976-78 the volume of imports increased 300 to 800 percent for most commodities. These rates of growth contrast sharply with growth rates in other markets. In the European Community (EC), for example, annual rates of growth of imports for 1970-80 were generally less than 3 percent per year: beef rose 2.7 percent; coffee, 2.6 percent; and coarse grains, 0.1 percent; while tea declined 1.1 percent; wheat, 1.1 percent; and sugar, 3.7 percent.[27]

Geographic proximity of markets is important owing to potential savings in freight costs for agricultural exports. Kenya has a marked freight-cost advantage over other suppliers because of its close proximity to oil exporters in North Africa and the Gulf States regions. This is especially important for products that must be airfreighted to maintain quality, such as chilled lamb or beef and fresh fruits and vegetables.

Consumer preferences among types and grades of food products are often influenced by those locally available, which in turn are a consequence of the ecology of the region. Thus, consumers in the Middle East may prefer mangoes to apples and pay a premium for lean sheep raised under arid conditions over fat New Zealand lambs. This gives developing-country producers some competitive advantage over Western suppliers in developing-country markets.

Many of the oil-exporting countries have convertible currencies, whereas trade with most other developing countries has to overcome tough import restrictions. This makes the oil exporters a much easier market for Kenya to develop. As developing countries often do not give import licenses for high-value agricultural commodities, trade between developing countries can only take place on a bilateral basis. For example, an exchange of Kenyan pulses for Indian rice would require a bilateral agreement, as import restrictions in both countries would not permit allocation of hard currency for these products. There appears to be great potential for such exchanges.

Bilateral "soft currency" trade, however, depends on complex bureaucratic agreements rather than markets. This has obvious disadvantages. It is impossible to restrict bilateral trade to commodities that are not traded in hard currency markets, and the impact of additional demand on domestic prices is bound to affect resource allocations at the farm level. The negotiation and monitoring of agreements requires the most scarce resource in African countries—highly trained and experienced manpower. Thus, this trade tends to encourage personal opportunism, especially in countries that have not yet developed internal audit systems to provide effective accountability. Finally, bilateral agreements fail to provide the seller with the flexibility to import exactly what he wants from where he wants. Al-

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[25] *Economist*, March 6, 1982, p. 12.

[26] World Bank, *Price Prospects for Major Primary Commodities*, World Bank Report 814/82, 5 vols. (Washington, D.C.: World Bank, 1982).

[27] Ibid.

though Deepak Nayyar concludes that bilateral trade agreements on the whole were beneficial for India,[28] it is doubtful if they would be for Kenya despite their apparent trade-expanding potential. Thus, there are significant advantages to focusing expansion of trade on those developing countries with convertible currencies.

Only those oil-exporting countries that offer special potential as markets for Kenya's exports are analyzed. The oil-exporting countries of Latin America were excluded because of the high freight costs and because broader cultural and economic factors make them more likely to favor trade with the United States or other Latin American countries. In 1980, the year for which most recent data are available, Kenya's exports to the whole of Latin America constituted only 1.4 percent of total exports.[29] The U.S.S.R. was also excluded because it is geographically distant, and trade links at present are negligible. Thus, the oil-exporting countries considered in this analysis are the Gulf States of Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates; Nigeria and Gabon in West Africa; Libya and Algeria in North Africa; Iran; and Indonesia.

The Gulf States are geographically close to Kenya, and common political interests vis-à-vis the Western and Eastern blocs may assist in developing markets in this area. Angola and Egypt were excluded because they export so little oil. Kenya developed significant trade with Iran prior to its current political difficulties, and with its relatively large population of 40 million, it is likely to again become a major market in the future. Indonesia is also a country with potential as a trade partner because it has a large population of more than 150 million; it is industrializing rapidly; and, as a consequence, it is generating a rapidly growing demand for certain food items.[30]

Agricultural Imports of the Oil Exporters

Selection of Commodities and Data Sources

All commodities listed in the Food and Agriculture Organization of the United Nations (FAO) trade data were examined for the selected oil-exporting countries. Any commodity with a total import value to those countries of more than U.S. $180 million in 1978—more than 2 percent of total agricultural imports to the selected countries—was considered a major item. Other commodities were grouped as "other items" within each of the seven major commodity categories (see Table 2).

The structure of Kenya's exports was analyzed on the basis of the *Annual Trade Report*, prepared by the Ministry of Finance. These were complemented by individual commodity and country studies where these were available, particularly for commodities where international marketing constraints were a major factor inhibiting export growth. Several studies have been carried out on the Middle East markets, both for specific commodities[31] and for Kenya's export potential to those markets.[32] However, these studies do not consider domestic supply constraints in Kenya and tend to examine short-term rather than long-term potential.

The first step of the analysis is to examine the structure of demand in 1978 for all agricultural products in the oil-exporting countries selected for the study. This shows the relative importance of different commodity groups in total agricultural imports of these countries after adjustment to the first major oil price increase. Price trends for a number of major commodities were examined for the period 1975-81 to see if the use of 1978 would bring distortions into the analysis.

[28] Deepak Nayyar, *India's Exports and Export Policies in the 1960's* (Cambridge: Cambridge University Press, 1976).

[29] Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1981*.

[30] International Food Policy Research Institute, *Food Needs of Developing Countries, Projections of Production and Consumption to 1990*, Research Report 3 (Washington, D.C.: IFPRI, 1977), especially p. 77.

[31] See, for example, International Trade Centre, *The Market for Fresh Horticultural Products in Selected Gulf Countries* (Geneva: ITC, 1980); and the Arab Organization of Agricultural Development and the Food and Agriculture Organization of the United Nations, "The Market for Livestock and Meat in the Arabian Peninsula and the Role of Supplies from Neighboring African Surplus Regions," FAO Near East Regional Office, Cairo, November 1979 (mimeographed).

[32] Industrial Market Research, *The Potential for Increasing Kenyan Exports to Selected Middle East Countries* (London: IMR, 1980).

Table 2—Major and minor items imported by selected oil-exporting countries, by commodity group, 1978

Commodity Group	Major Items	Minor Items
Cereals	Wheat, rice, maize, and barley	Rye, oats, malt, and bran milling products
Sugar	Total raw sugar equivalent	
Meat products	Beef products,[a] live sheep and goats, fresh meat and poultry	Dried meat, pig products, offal, eggs, animal fats and oils, and frozen meat[b]
Beverages and spices	Tea, coffee, and cocoa	Pepper, pimento, and vanilla
Dairy products	Dry milk, condensed and evaporated milk, butter, and cheese and curds	
Oilseed products	Soybeans and soybean oil	Coconut and palm products, sunflower oil, cottonseed oil, groundnuts and groundnut oil, sesame, olive oil, oilseed cakes, and margarine[c]
Fruit and vegetables	Oranges, tangerines and clementines, and apples	Bananas, lemons and limes, pears, grapes, raisins, other citrus, onions, potatoes, and tomatoes
Nonfood agricultural products	Wool, tobacco, cotton, and natural rubber	Jute, sisal, silk, castor oil, linseed, and linseed oil
Other items[d]	Hops, honey, and forestry products	

Source: Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, 1978.

Notes: Major items are those commodities that made up more than 2 percent of the imports of the oil-exporting countries in 1978; these imports had values exceeding U.S. $186 million. Imports of the minor items were less than that.
  The selected oil-exporting countries include the Gulf States of Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates and Nigeria, Gabon, Libya, Algeria, Iran, and Indonesia.

[a] Beef products include fresh bovine meat, live bovine cattle, canned meat, and prepared meat. This assumes that both canned and prepared meat are primarily beef products.

[b] The quantity of frozen meat not falling into other specific categories is extremely small.

[c] Margarine is assumed to be based primarily on oilseeds.

[d] The commodities in this category do not fit any of the other categories easily.

Oilseeds, and perhaps rice, may appear slightly more important than is warranted by the long-term trend, whereas the prices of sugar, wheat, and perhaps cotton may be below the long-term trend. In general, however, 1978 does not seem to have been a year of unusual price distortions.[33]

The rate of growth in demand from just before the first oil price shock to just before the second shock is then considered. Specifically, the period 1971-73 is compared with the period 1976-78, when the major part of the adjustment to the first increase in oil prices had taken place. Unfortunately, data are not yet available nor has the adjustment process proceeded far enough to see the impact on demand generated by the second major increase in oil prices from the end of 1978 to early 1981. Rates of growth for each commodity during the period 1965-78 were not estimated, although data are available, because the data show a major discontinuity between the early 1970s and the late 1970s for most products in most of the oil-exporting countries. The increase in foreign exchange availability after the first oil price increase led to a large increase in food imports.

[33] World Bank, *Commodity Trade and Price Trends*, pp. 31-79, 88-89.

Major Import Categories

Out of a total of U.S. $9.3 billion in agricultural imports in 1978, almost $9 billion or 97 percent were food products; nonfood items were only 3 percent of these imports (Table 3).

Analysis of the major commodities imported into this group of countries is shown in Table 3. Cereals, mainly rice and wheat, were by far the largest item, amounting to nearly 36 percent of total imports. Meat products came after cereals: the largest single meat product was beef, followed by sheep and goats and fresh poultry meat. Imports of sheep and goat meat were slightly greater in value than imports of live sheep and goats.

After meat, sugar, milk products, and oilseed products were almost equal. Each of these constituted imports into the selected countries of about $1 billion in 1978 or about 10 percent of total imports. Milk products were primarily dry, condensed, and evaporated milk rather than butter and cheese. The chief oilseed products were soya beans and soya oil, but imports of other oilseeds, including groundnuts, sunflower, sesame, and cottonseed combined were considerably larger than soya products.

Beverages made up 5 percent and horticultural crops 4 percent of total imports in 1978. Coffee and tea were the most important beverages with a total value of more than $400 million. However, the high price of coffee in 1978, following the Brazilian frost of 1977, somewhat exaggerates its long-term value. The major horticultural products were citrus fruits and apples. Of the nonfood items, the most important were cotton, wool, tobacco, and rubber.

Size of the Market

Table 4 shows that the Gulf States constituted approximately a third of the total market of the selected countries. For individual countries, the largest four—each with imports of more than $1 billion—were Nigeria, Algeria, Indonesia, and Saudi Arabia.

For all regions except Iran, cereals were the most important item, constituting more than half of total imports for West Africa and Indonesia, but only about a third for North Africa and the Gulf States (Table 5). Among the cereals, rice was by far the largest item for West Africa, Indonesia, and Iran, whereas wheat was most important for North

Table 3—Value of agricultural commodities imported by selected oil-exporting countries, 1978

Commodity	Value of Imports	Percent of Total Imports
	(U.S. $ million)	
Cereals	3,376	36.3
Wheat and flour (wheat equivalent)	1,317	
Rice	1,630	
Maize	184	
Barley	185	
Other cereal products	60	
Meat products	1,932	20.8
Beef products (live bovine, fresh, chilled, and frozen)	822	
Live sheep and goats and sheep meat	545	
Fresh poultry meat	321	
Other animal products	244	
Sugar (total raw equivalent)	1,049	11.3
Dairy products	942	10.1
Dry milk	302	
Condensed and evaporated milk	291	
Butter	170	
Cheese and curds	179	
Oilseed products	907	9.7
Soybeans and soybean oil	327	
Other oilseed products	580	
Beverages and spices	476	5.1
Cocoa products	10	
Tea	187	
Coffee	262	
Spices	17	
Fruit and vegetables	312	3.3
Oranges and tangerines	106	
Apples	83	
Other fruit and vegetables	123	
Nonfood agricultural products	315	3.4
Wool	103	
Tobacco	41	
Natural rubber	23	
Cotton	138	
Other	10	
Total	9,309	100.0

Source: Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, 1978.
Notes: The selected oil-exporting countries include the Gulf States of Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates and Nigeria, Gabon, Libya, Algeria, Iran, and Indonesia.

Africa and the Gulf States. Meat, including live animals, constituted a quarter of the total agricultural imports for the Gulf States and 21 percent for Iran, but less than 10 percent of imports for North and West African countries. Sugar was a major import item in

Table 4—Shares of selected oil-exporting countries and regions in total imports of agricultural commodities, 1978

Region/Country	Value of Imports	Each Region's Share of Total Imports
	(U.S. $ million)	(percent)
Gulf States	3,150	33.8
Saudi Arabia	1,327	
Iraq	802	
Kuwait	453	
United Arab Emirates	278	
Bahrain	114	
Oman	100	
Qatar	76	
Iran	1,923	20.7
North Africa	1,640	17.6
Algeria	1,199	
Libya	441	
West Africa	1,429	15.4
Nigeria	1,391	
Gabon	38	
Indonesia	1,167	12.5
Total	9,309	100.0

Source: Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, 1978.

all the regions considered, with imports into each region valued at about $200 million in 1978, or between 8 and 15 percent of their total agricultural imports. Dairy products were also a major import item in all areas,

especially West and North Africa and the Gulf States. Oilseed imports were larger than imports of dairy products for Iran and North Africa, but of less importance in West Africa, which largely produces its own oilseed crops, and in the Gulf States with relatively small populations. Fruit and vegetables were 6 percent of total agricultural imports into the Gulf States and Iran, but of little significance in other areas. Only in Indonesia and Iran did nonfood agricultural commodities make up more than 5 percent of total agricultural imports in 1978.

Import Demand for Individual Commodities

For rice, the major import demand is from Indonesia, with 36 percent of total imports, and West Africa, with 26 percent (Table 5). For other cereals, mainly wheat, the major areas of demand are the Gulf States and North Africa, each of which takes a third of the total. The value of import demand for sugar is split almost evenly between the five regions, whereas the demand for both beef and sheep and goats (live and meat) is highly concentrated in the Gulf States and Iran. Imports of beverages and spices are also highly concentrated with 43 percent in the Gulf States and 43 percent in North Africa. There are imports of dairy products in all the regions, but they are twice as large in the Gulf States as in any other area; they are also

Table 5—Values of agricultural commodities imported by selected oil-exporting countries, by commodity group and region, 1978

Commodity Group	West Africa	North Africa	Gulf States	Iran	Indonesia	Total
			(U.S. $ million)			
Cereals (excluding rice)	327	568	572	182	97	1,746
Rice	423	18	347	250	592	1,630
Sugar	202	207	234	233	173	1,049
Dairy products	193	179	364	145	61	942
Oilseed products	95	202	193	322	95	907
Beef products[a]	117	71	472	160	6	822
Sheep and goats	6	44	271	224	. . .	545
Beverages and spices	2	207	202	63	2	476
Nonfood agricultural products	5	53	12	115	130	315
Fruit and vegetables	. . .	33	158	110	11	312
Total	1,370	1,582	2,825	1,804	1,167	8,744

Source: Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, 1978.
[a] Includes fresh bovine meat as well as chilled and frozen meat.

substantial in both North and West Africa. All regions also imported oilseeds in 1978, with the major areas of demand being Iran, 36 percent; North Africa, 22 percent; and the Gulf States, 21 percent. For fruit and vegetables, almost half the demand in value was in the Gulf States, with Iran the other major importer at 35 percent. Almost 80 percent of the nonfood agricultural imports go to Indonesia and Iran.

The increase in the volume of imports for various products from 1971-73 to 1976-78 for all these regions taken together is shown in Table 6. The largest increases were for meat products—poultry, beef, and sheep meat all increased five times or more. Soya products and oranges and tangerines increased three to four times. Imports of some dairy products, such as butter and cheese, nearly trebled. Imports of rice, barley, coffee, sugar, and live sheep and goats all approximately doubled. Imports of tea and cocoa showed relatively modest increases of 25 to 40 percent. Among nonfood items, the largest increases were for cotton, which increased two and a half times, and wool, which doubled.

Growth of Demand by Region and Commodity

The percentage increase in the volume of imports for each commodity in each region for 1971-73 to 1976-78 is shown in Table 7. Taking the major commodities first, the main increases in wheat imports were in West Africa and the Gulf States, where imports doubled during this period. Increases in rice imports were substantial in West Africa and Iran, but also large in the Gulf States, where they almost doubled, and in Indonesia. Maize imports, starting from a small base and used mainly as livestock feed except in West Africa, more than trebled. Imports of beef products, of much greater importance, also showed a large increase in all regions. In contrast, the increase in imports of live bovine animals and live sheep and goats was concentrated mainly in Iran, whereas fresh poultry imports increased dramatically in all areas except North Africa. Tea imports increased between 50 and 100 percent in all regions except North Africa, while North Africa was the only region to register a large increase in coffee imports. The increase in the imports of dairy products is remarkable, as it affects all products in all regions, with

Table 6—Increase in the volume of selected agricultural commodities imported by selected oil-exporting countries, 1971-73 and 1976-78

Commodity	1971-73	1976-78	Increase
	(1,000 metric tons)		(percent)
Cereals			
Wheat	3,998	6,810	70
Rice	1,480	3,299	123
Maize	208	799	284
Barley	391	816	109
Sugar	1,235	2,321	88
Meat products			
Beef (fresh, chilled, and frozen)	14	106	637
Sheep meat (fresh, chilled, and frozen)	17	104	500
Fresh poultry	26	192	649
Beverages			
Cocoa	3	3	25
Tea	62	85	37
Coffee	30	61	104
Dairy products			
Dried milk	80	188	136
Condensed and evaporated milk	143	286	100
Butter	32	89	175
Cheese and curds	23	87	190
Soybeans and soybean oil	111	404	265
Fruit			
Oranges and tangerines	101	348	245
Apples	88	166	89
Nonfood agricultural products			
Wool	14	29	98
Tobacco	17	25	52
Natural rubber	26	18	-30
Cotton	36	86	140
Pulses	66	121	83
	(1,000 head)		
Live bovine cattle	404	339	-16
Live sheep and goats	3,681	6,739	83

Source: Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, 1978.
Note: The selected oil-exporting countries include the Gulf States of Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates and Nigeria, Gabon, Libya, Algeria, Iran, and Indonesia. The increase indicated may differ from the figures given because of rounding.

increases varying between 45 and 450 percent depending on the product and the region. Only the imports for cheese and curds show a more dramatic increase than this. In contrast to milk products, growth of imports of soya products was confined to Indonesia

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Source: Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, 1978.
[a] Includes fresh bovine meat as well as chilled and frozen meat.

substantial in both North and West Africa. All regions also imported oilseeds in 1978, with the major areas of demand being Iran, 36 percent; North Africa, 22 percent; and the Gulf States, 21 percent. For fruit and vegetables, almost half the demand in value was in the Gulf States, with Iran the other major importer at 35 percent. Almost 80 percent of the nonfood agricultural imports go to Indonesia and Iran.

The increase in the volume of imports for various products from 1971-73 to 1976-78 for all these regions taken together is shown in Table 6. The largest increases were for meat products—poultry, beef, and sheep meat all increased five times or more. Soya products and oranges and tangerines increased three to four times. Imports of some dairy products, such as butter and cheese, nearly trebled. Imports of rice, barley, coffee, sugar, and live sheep and goats all approximately doubled. Imports of tea and cocoa showed relatively modest increases of 25 to 40 percent. Among nonfood items, the largest increases were for cotton, which increased two and a half times, and wool, which doubled.

Growth of Demand by Region and Commodity

The percentage increase in the volume of imports for each commodity in each region for 1971-73 to 1976-78 is shown in Table 7. Taking the major commodities first, the main increases in wheat imports were in West Africa and the Gulf States, where imports doubled during this period. Increases in rice imports were substantial in West Africa and Iran, but also large in the Gulf States, where they almost doubled, and in Indonesia. Maize imports, starting from a small base and used mainly as livestock feed except in West Africa, more than trebled. Imports of beef products, of much greater importance, also showed a large increase in all regions. In contrast, the increase in imports of live bovine animals and live sheep and goats was concentrated mainly in Iran, whereas fresh poultry imports increased dramatically in all areas except North Africa. Tea imports increased between 50 and 100 percent in all regions except North Africa, while North Africa was the only region to register a large increase in coffee imports. The increase in the imports of dairy products is remarkable, as it affects all products in all regions, with

Table 6—Increase in the volume of selected agricultural commodities imported by selected oil-exporting countries, 1971-73 and 1976-78

Commodity	1971-73	1976-78	Increase
	(1,000 metric tons)		(percent)
Cereals			
Wheat	3,998	6,810	70
Rice	1,480	3,299	123
Maize	208	799	284
Barley	391	816	109
Sugar	1,235	2,321	88
Meat products			
Beef (fresh, chilled, and frozen)	14	106	637
Sheep meat (fresh, chilled, and frozen)	17	104	500
Fresh poultry	26	192	649
Beverages			
Cocoa	3	3	25
Tea	62	85	37
Coffee	30	61	104
Dairy products			
Dried milk	80	188	136
Condensed and evaporated milk	143	286	100
Butter	32	89	175
Cheese and curds	23	87	190
Soybeans and soybean oil	111	404	265
Fruit			
Oranges and tangerines	101	348	245
Apples	88	166	89
Nonfood agricultural products			
Wool	14	29	98
Tobacco	17	25	52
Natural rubber	26	18	−30
Cotton	36	86	140
Pulses	66	121	83
	(1,000 head)		
Live bovine cattle	404	339	−16
Live sheep and goats	3,681	6,739	83

Source: Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, 1978.
Note: The selected oil-exporting countries include the Gulf States of Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates and Nigeria, Gabon, Libya, Algeria, Iran, and Indonesia. The increase indicated may differ from the figures given because of rounding.

increases varying between 45 and 450 percent depending on the product and the region. Only the imports for cheese and curds show a more dramatic increase than this. In contrast to milk products, growth of imports of soya products was confined to Indonesia

Table 7—Percentage increase in the volume of imports, by commodity and oil-exporting region, 1971-73 to 1976-78

Commodity	Gulf States	North Africa	West Africa	Iran	Indonesia	Total
			(percent)			
Cereals						
Wheat	116	78	132	26	26	70
Rice	92	28	8,974	729	65	123
Maize	205	442	932	267	356	284
Barley	...	96	41	221	...	109
Sugar	28	51	174	164	318	88
Meat products						
Beef (fresh, chilled, and frozen)	531	286	1,978	938	312	632
Sheep meat (fresh, chilled, and frozen)	300	489	195	499	...	388
Fresh poultry	623	...	6,714	2,023	348	649
Live bovine cattle	...	187	...	1,221	...	...
Live sheep and goats	49	...	...	614	...	83
Beverages						
Cocoa	57	...	...	...	1,023	25
Tea	46	...	62	96	54	37
Coffee	...	283	...	...	232	104
Dairy products						
Dried milk	166	274	77	187	73	136
Condensed and evaporated milk	150	69	112	465	136	100
Butter	170	152	334	153	353	175
Cheese and curds	162	157	128	1,806	43	190
Soybeans and soybean oil	49	...	...	128	65,795	265
Fruit						
Oranges and tangerines	62	...	25	1,018	907	245
Apples	52	...	134	1,430	18	89
Nonfood agricultural products						
Wool	...	...	...	117	...	98
Tobacco	46	29	118	...	72	52
Natural rubber	14	...	...	...	1,733	...
Cotton	...	50	...	...	188	140

Source: Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, 1978.

and Iran, which were also the countries with the most rapid increase in imports of fruit.

In sum, three important conclusions for defining Kenya's agricultural export strategy emerge. First, 97 percent of agricultural imports into the selected oil-exporting countries in 1978 were food or beverage products. Thus, to increase agricultural exports to these countries will require that Kenya increase exports of coffee and tea or food products in competition with domestic demand.

Second, there is a large and rapidly rising demand among the oil-exporting countries for a range of labor-intensive products, including coffee, poultry, sugar, and dairy products. There is also a large and rising demand for products that require extensive land use, particularly beef, sheep and goat meat, and fruit. Because Kenya has areas suitable for both intensive and extensive cropping, Kenya can seek to expand exports

for both groups of commodities.

And third, according to the dual criteria of a product being more than 10 percent of total agricultural imports and having rapid growth during the period 1971-73 to 1976-78, the most promising products appear to be cereals (rice and wheat), beef, sheep and goats, dairy products, coffee, and oilseeds. Both maize and horticultural products showed very high rates of growth but started from a small base. Tea's share of total imports is small and it has not grown as rapidly as most other items.

Kenyan Products with Potential for Oil-Exporter Markets

In 1980, Kenya's exports to the oil-exporting countries were valued at KSh 232 million,

or 2.4 percent of total exports.[34] In comparison, 40 percent of Kenya's total exports went to Western Europe and 17 percent to neighboring African countries. The more important markets for Kenya among the oil exporters in 1980 were Saudi Arabia, with imports of KSh 50 million; the United Arab Emirates, KSh 38 million; and Nigeria, Oman, Iraq, and Iran, which each imported between KSh 20 million and KSh 35 million. Exports to Algeria and Libya together were only KSh 3.4 million. Exports to Iran clearly declined after 1976 because of its political upheavals. Exports to Nigeria and Indonesia began and have grown rapidly during the last five years, but they are still a small part of Kenya's total domestic exports. A study of total imports of the Gulf States in 1978 showed that Kenyan products were less than 1 percent of total imports in that year in each of the six countries studied. Only in the case of coffee to Kuwait did Kenya have a market share of more than 10 percent for any product in any of the countries studied.[35]

Agricultural products make up a smaller share of exports to oil-exporting countries than their share in Kenya's total exports: during the period 1970–80 Kenya primarily exported nonagricultural products to the oil-exporting countries. Kenyan exports to the seven major importers (Saudi Arabia, the United Arab Emirates, Iraq, Kuwait, Iran, Nigeria, and Indonesia) had a value of KSh 191 million in 1980. More than 70 percent of these exports were nonagricultural products. The major items were cement (KSh 23 million) and kraft paper (KSh 8 million). Another 22 percent was coffee and tea. Other agricultural products constituted just 6 percent of total exports to those countries.

Kenya's total domestic exports of most major agricultural commodities are small relative to the value of imports of those commodities into selected oil-exporting countries in 1978 (Table 8). The only products for which Kenya's total exports exceed the imports of the selected countries were coffee and tea. For all other products except fruits, vegetables, and pulses, Kenya's total exports of the products constituted less than 5 per-

cent of the oil-exporting countries' imports in 1978. Therefore, except for coffee, tea, and perhaps some horticultural products, the key constraint to export expansion appears to lie on the supply side, rather than in limitations of market size or market saturation. Even for coffee and tea, the small market share suggests considerable scope for Kenya to increase exports.

The present structure of Kenya's agricultural exports is not well suited to the import demands of oil-exporting countries. Kenya's two chief exports, coffee and tea, which together constitute less than 4 percent of the oil-exporting countries' agricultural imports, experienced slow growth rates in those countries relative to most other food products in the mid-1970s. Those agricultural imports that have risen rapidly in oil-exporting countries but are exported from Kenya only in small quantities include beef, sugar, and sheep and goat meat. Other commodities that Kenya does not export at all are rice, wheat, dairy products, and soya products.

For further commodity analysis, this study focuses on those products that Kenya is already exporting, even if they do not appear to have the best prospects from the viewpoint of the selected countries' imports. This is for three reasons. First, the rate of growth of demand for all food commodities, even the slowest growing, in the oil-exporting countries is so high relative to demand growth for almost any commodity in other parts of the world that it is attractive for Kenyan exporters. Second, as already pointed out, Kenya's share of the market for all the products considered is so small at present that market share is unlikely to be a constraint, even for products for which imports are low or slow growing. Third, Kenya imports some of the products imported by oil-exporting countries, such as rice, wheat, and dairy products. To develop exports of these products will be a slow process as high rates of growth will be required even to bridge the domestic demand gap. For example, the National Food Policy Paper estimates that to reach self-sufficiency by 1989 will require annual compound rates of growth during

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[34] The Kenyan shilling (KSh) was worth approximately U.S. $0.07 in December 1983.
Export values are from Kenya, Ministry of Finance, Statistical Branch, Customs and Excise Department, *Annual Trade Report, 1980* (Nairobi: Government Printer, 1980).
[35] Industrial Market Research, *The Potential for Increasing Kenyan Exports.*

Table 8—Value of selected agricultural commodities exported by Kenya as a proportion of imports by selected oil-exporting countries, 1976-78

Commodity	Average Value of Kenya's Exports of Selected Commodities	Average Value of Imports by Oil-Exporting Countries	Kenya's Exports as a Percentage of Oil Exporters' Imports
	(U.S. $ million)		(percent)
Coffee	356.9	199.3	179
Tea	140.9	133.9	105
Fruit and vegetables	44.3	262.1	17
Raw sugar	10.4	920.4	1
Bovine meat (including live animals)	1.3	65.9	2
Sheep and goat meat (including live animals)	...	210.5	...
Cotton	2.5	120.2	2
Oilseeds (excluding soybeans)	3.0	307.3	1
Dairy products (milk, cheese, butter)	3.2	790.3	...
Cereals	3.7	129.2	3
Pulses	5.2	67.0[a]	8

Sources: Data on Kenya's exports are from Kenya, Ministry of Finance, Statistical Branch, Customs and Excise Department, *Annual Trade Report*, 1976-78 (Nairobi: Government Printer, 1976-78). Data on the imports of oil-exporting countries are from Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, 1978. Exchange rate data are taken from Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Economic Survey 1980* (Nairobi: Government Printer, 1980), p. 43.

Notes: The average exchange rate was U.S. $1 = KSh 7.89 for December 1975, December 1976, December 1977, and December 1978.

The selected oil-exporting countries include the Gulf States of Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates and Nigeria, Gabon, Libya, Algeria, Iran, and Indonesia.

[a] This is for 1978 alone.

the period 1980-89 of 14 percent for wheat flour, 16.4 percent for rice, and 5.6 percent for milk.[36]

The eight largest agricultural export commodities from Kenya in the period 1976-78 are examined. In order of importance, these are coffee, tea, fruit and vegetables, beef, sheep and goats, sugar, pulses, and maize. Meat is included but skins are not, because the market for skins is almost totally in Europe, whereas the demand for all kinds of meat is large and growing in the selected oil-exporting countries.

Some of the commodities included in this list are likely to cause surprise. For example, a 1977 study predicted that Kenya might be importing beef by the mid-1980s.[37] However, this study confirmed Kenya's export potential for beef, and small changes in the rate of growth of output would be sufficient to generate significant export surpluses. Sheep and goat meat, which has never constituted a significant export item, is another example. There has been rapid growth in production, and a solid base has been laid for a large increase in flock productivity (see Chapter 6). Kenya also seems to have comparative advantage in maize production; the reasons why maize exports cause losses to the Treasury are analyzed in Chapter 7.

Several agricultural products have been omitted that one might expect to find included in a study of Kenya's agricultural export potential, notably dairy products, fresh poultry meat, cotton, and pyrethrum. Dairy products were omitted because Kenyan imports totaled KSh 104 million in 1980, not counting concessional imports, and because domestic demand for the marketed surplus is rising rapidly as a result of a school milk

[36] Kenya, National Assembly, *Sessional Papers, 1981*, Paper No. 4, "National Food Policy," p. 49.

[37] This study was not accepted by the government, but is valuable as a source of data on the industry. Chemonics International, Consulting Division, "Livestock and Meat Industry Development Study, Final Report," Nairobi, March 1977 (mimeographed).

scheme and urban population growth. Also, the growing surpluses of milk products in the European Community and other countries are likely to result in world prices substantially below production costs in the major producing countries. Exports of surplus milk products, subsidized by the European Community, may reach 7.56 million metric tons by 1985.[38] Production of poultry meat has been discouraged by low domestic beef prices and the high costs of animal feed. Future potential, therefore, depends largely on policies adopted toward beef and maize. Cotton is not included because imports into oil-exporting countries other than Indonesia are negligible. Wool is not included because it is generally regarded as a by-product of meat production in Kenya, except for highly specialized products such as mohair from Angora goats.[39] Pyrethrum is excluded because there is little demand for it in oil-exporting countries.

Each of the high-potential crops and animal products will now be examined individually to identify critical constraints on export growth, both in international markets and in domestic supply relations.

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[38] All tons referred to in this report are metric tons.

Timothy E. Josling, Mark Langworthy, and Scott Pearson, *Options for Farm Policy in the European Community.* Thames Essays 27 (London: Trade Policy Research Centre, 1981), p. 69.

[39] A. John De Boer, *Sheep and Goat Development Project, Kenya: Production Economics* (Rome: Food and Agriculture Organization of the United Nations/United Nations Development Programme, 1981).

5

BEVERAGE EXPORTS: COFFEE AND TEA

Coffee

The International Market

The volume and value of Kenya's coffee exports from 1975/76 to 1979/80 are shown in Table 9. During this five-year period Kenya's exports to all nonquota markets, including the oil exporters, never exceeded 6.8 percent of total exports in either volume or value, and they were as low as 1.7 percent in 1975/76. Kenya's exports to the selected oil-exporting countries made up about 1 percent of its total exports in four out of five years. The United Arab Emirates and Saudi Arabia have been the two principal oil-exporting countries importing Kenya's coffee. But even in Saudi Arabia, Kenya's share was only 13 percent of the value of total coffee imports in 1977, compared with India's share of 65 percent.[40] Coffee exports to the selected oil-exporting countries were sold for only 60 percent of the overall average export price of coffee in 1975/76 and 77 percent in 1976/77, but in 1977/78 and 1978/79 they brought 3 to 4 percent more than the average export price.[41] However, this was before the reintroduction of quotas by the International Coffee Organization in 1982.

Under the 1980 International Coffee Agreement, the main producing and consuming countries agreed to limit the volume of coffee allowed to enter the main consuming countries in order to maintain prices between specified limits. Each producing country is given a quota for its exports to these markets and must sell any surplus production to countries outside the agreement. Kenya's quota, which is adjusted annually, was about 70,000 tons in 1981/82, so that Kenya has to sell the balance of its production, about 20,000 tons a year, to nonquota markets. This compares with average

sales of only 3,250 tons per year to these markets during the period 1976-80. Nonquota markets include most OPEC countries, and also Eastern Europe, China, and other developing countries that do not produce coffee. Similar rates of increase are required by all the major coffee-producing countries. The alternative to nonquota market sales is domestic storage, which makes it difficult for the Coffee Board of Kenya to finance payment to producers. The intense competition for sales in nonquota markets means that average prices realized in these markets generally were 40 percent of those obtained in quota markets in 1981/82, although part of this differential is a consequence of the lower quality of coffee sold to nonquota markets.[42] Thus marginal revenue from expanded coffee production is substantially lower than average revenue.

There are two main reasons for the low sales of coffee in the past to oil-exporting countries. First, Kenya's coffee is of particularly high quality, and Western Europe and North America and other quota markets have been willing to pay a higher premium for quality than oil-exporting countries. Second, some countries, such as the Gulf States and Nigeria, have traditionally purchased coffee from neighboring countries, Ethiopia and the Ivory Coast.

It is not clear whether the International Coffee Agreement is in Kenya's long-term interests. The opportunity costs of resources for Kenya's smallholders are probably lower than those of the Latin American estates. If this is so, then a price war with Latin America would probably be to Kenya's advantage in the long run, despite the high costs in the short run. Also, the freeze on new beverage projects by the World Bank is probably against the interests of Kenya and Africa generally. Kenya should press the multilateral agencies for a study to estimate how its

[40] Industrial Market Research, *The Potential for Increasing Kenyan Exports.*

[41] Coffee Board of Kenya, *Annual Report, Balance Sheets and Statement of Accounts,* various issues (Nairobi: CBK, various years).

[42] Coffee Board of Kenya, *Annual Report, Balance Sheets and Statement of Accounts, 1982,* pp. 14-15.

Table 9—Volume of Kenya's coffee exports, by region of destination, 1975/76-1979/80

Region	1975/76	1976/77	1977/78	1978/79	1979/80
	(metric tons)				
Quota markets					
European Community	50,911	57,936	55,384	55,642	61,624
European Free Trade Association[a]	14,458	11,315	10,728	10,243	12,575
North America	10,985	8,883	7,071	3,808	3,369
Others[b]	2,869	3,672	4,564	1,715	1,469
Total	79,223	81,806	77,747	71,408	79,037
Nonquota markets					
Oil-exporting countries	392	703	942	659	874
Others[c]	950	3,162	4,774	1,802	2,052
Total	1,342	3,865	5,716	2,461	2,926
Total exports	80,565	85,671	83,463	73,869	81,963

Source: Coffee Board of Kenya, *Annual Report, Balance Sheets and Statement of Accounts for the Year Ending 30th September,* 1976-80 (Nairobi: CBK, 1977-81).

Note: The international coffee year runs from October 1 to September 30.

[a] The European Free Trade Association includes Austria, Finland, Norway, Sweden, and Switzerland.

[b] Other quota markets include Australia, Cyprus, Ireland, Israel, Japan, New Zealand, Portugal, Spain, and Yugoslavia.

[c] Other major nonquota markets to which Kenya has exported include China, Egypt, Greece, Jordan, Syria, Taiwan, and East Bloc countries.

long-term costs from international agreements of this type compare to the costs of other developing countries, so that it can seek compensation from those developing countries that gain the most from such agreements.

Domestic Production Structure

Of the two major coffee types, Kenya at present produces only the relatively high value, highland, Arabica type. The lower value, lowland, Robusta type is still in the experimental stage in Western Kenya, but is produced under similar ecological conditions in adjacent areas of Uganda and Tanzania. Since 1977/78 the proportion grown and processed on larger estates has dropped to less than 40 percent, while 60 percent comes from smallholders (Table 10). Smallholder production is processed in small local cooperative society factories, which are part of a broader cooperative structure that has cooperative unions as the middle tier and a cooperative bank and a centralized milling plant in Nairobi at its apex.

The hulling plant is run by the Kenya Planters Cooperative Union (KPCU). The crop is then sold at auction to about 40 private exporters who arrange international shipment. The exporters pay the Coffee Board by banker's check within seven days of the auction. Proceeds from the auctions are paid into a pool for that year (October 1 to September 30) and average prices are calculated for each grade. This evens out weekly price fluctuations. A small partial payment is made by the Coffee Board almost as soon as delivery is received by the KPCU. Further interim payments are made on a quarterly basis.

The Coffee Board passes the funds back to the estates directly through the KPCU, but funds for the smallholder must pass not just through the KPCU, but through the Cooperative Bank, the local cooperative unions, and the cooperative societies. Within a single society, different factories may make different deductions. Each link deducts its costs before passing the funds down the chain, so that the farmer's payment is not a fixed price but a residual after deducting domestic costs from the international price.[43]

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[43] For a description of the coffee marketing chain, see the advertisement by the Kenya Planters' Cooperative Union, "Ensuring Farmers Get Their Money" in the *Daily Nation,* August 10, 1983, p. 4.

Table 10—Coffee production, yields, quality, and producer payments, 1970/71-1981/82

	Deliveries to CBK				Area Sown with Mature Coffee			Yields		
Year	Small-holders	Estates	Sweepings and Miscellaneous	Total	Small-holders	Estates	Total	Small-holders	Estates	National
	(metric tons)				(hectares)			(kilograms/hectare)		
1970/71	26,302	28,600	5,008	59,910	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1971/72	28,363	29,600	3,227	61,190	55,614	29,162	84,776	510	1,015	719
1972/73	34,734	39,043	2,184	75,961	55,308	29,533	84,841	628	1,322	896
1973/74	40,872	31,714	695	73,281	55,600	29,129	84,729	735	1,089	857
1974/75	35,465	29,985	672	66,122	57,786	28,603	86,389	627	1,048	765
1975/76	36,135	37,675	786	74,596	56,595	28,603	85,198	638	1,317	864
1976/77	47,660	49,685	3,873	101,218	56,600	27,821	84,421	844	1,782	1,199
1977/78	47,744	33,685	3,563	84,992	56,600	30,888	87,488	730	1,091	971
1978/79	46,079	26,809	1,449	74,337	62,574	29,102	91,676	736	920	810
1979/80	51,900	39,109	673	91,682	71,172	31,232	102,404	729	1,252	895
1980/81	64,007	34,744	966	99,717	84,717	32,861	117,571	756	1,057	848
1981/82	52,531	34,392	514	87,437	97,473	33,635	131,108	539	1,023	667

	Share of Coffee in Grades 1-3			Payments to Farmers by CBK[a]		
Year	Small-holders	Estates	National	Average Grades 1-5[b]	Overall	Overall Pool at Constant Prices[c]
	(percent)			(KSh/kilogram of clean coffee)		
1970/71	39	12	24	n.a.	n.a.	n.a.
1971/72	24	10	16	n.a.	n.a.	n.a.
1972/73	40	8	22	9.22	8.90	7.56
1973/74	26	3	16	10.40	10.10	7.55
1974/75	21	3	13	9.67	9.40	6.02
1975/76	20	2	11	22.95	22.31	12.58
1976/77	18	1	9	44.09	39.34	20.01
1977/78	24	3	15	28.94	26.07	11.84
1978/79	43	4	27	27.37	26.60	10.96
1979/80	32	2	19	26.45	24.83	9.20
1980/81	22	3	15	25.70	21.33	6.97
1981/82	22	3	14	33.32	27.80	8.07

Source: Coffee Board of Kenya, *Annual Report, Balance Sheets and Statement of Accounts for the Year Ending 30th September, 1974-81* (Nairobi: CBK, 1975-82).

Notes: The international coffee year runs from October 1 to September 30. The CBK is the Coffee Board of Kenya. Deliveries to the CBK are reported by the coffee mill. There is some coffee left after milling that the mill cannot credit to a particular producer. This is counted as "sweepings and miscellaneous." Where n.a. appears the data were not available.

[a] These are the total pool payments for the coffee year.

[b] Grades 1-5 include grade 6 for 1970/71-1975/76.

[c] These are deflated by the Nairobi middle-income consumer price index (1969 = 100).

Production, area, yields, quality, and producer payments for 1970/71-1981/82 are shown in Table 10. Although estate yields are generally more than 50 percent higher than smallholder yields, the proportion of production in Grades 1 to 3 is generally 20 to 40 percent for small farmers, but only 2 to 4 percent for estates. The 50 percent increase in total production during the period 1974/75-1976/77 resulted primarily from increased yields, which in turn came primarily from higher international prices, although the production figures for estates may be slightly exaggerated by some smuggling of coffee from Tanzania and Uganda. This suggests high short-run supply elasticity as farmers apply more fertilizers, chemicals, and labor for weeding and pruning to the existing tree stock. The producer payments data show pool payments to all producers made by the Coffee Board of Kenya. The long marketing chain to the smallholder means that he

receives substantially less than the pool payment recorded by the Coffee Board. After the boom of 1976/77, even pool prices in 1980/81 were lower in real terms than at any point since data became available in 1972/73 (Table 10).

The area sown with coffee and coffee production both rose sharply in the late 1970s. Kenya's production of clean (hulled) coffee increased from 60,000 tons in 1971/72 to 92,000 tons in 1979/80 (Table 10), and production is likely to continue to increase in the 1980s, although at a slower rate than in the 1970s, as a consequence of new planting following the 1976/77 boom in coffee prices. Although the area planted with mature coffee increased by only 6,500 hectares between 1976/77 and 1978/79, it increased by 10,000 hectares from 1978/79 to 1981/82. This increase occurred almost entirely in the smallholder sector. In 1979 there were an additional 26,000 hectares of coffee plants under two years old and 9,000 hectares of new planting. Enough seedlings for another 7,500 hectares were issued by the government and still more seedlings came from private nurseries, which are not included. It appears that coffee area in production will increase by about 10 percent per year up to 1985.[44]

Increased production from greater area sown with coffee will be offset by two factors. First, much of the increased area is in districts like Machakos in Eastern Province where agroclimatic conditions are not as suitable as those in traditional coffee areas, so production per hectare will be lower. In 1979/80, 33 percent of the 8.9 million seedlings sold to farmers by commercial and union or society controlled nurseries were sold to Machakos District.[45] And second, the sales of chemicals to control coffee berry disease and other diseases appear highly sensitive to changes in producer payments by the Coffee Board. For example, sales of these chemicals by two leading suppliers in 1981/82 fell about 30 percent from 1980/81, after the producer price paid by the Coffee Board fell for the fourth successive year (Table 10).[46] Production gains

may be somewhat offset by higher incidence of disease.

The area and production of coffee by district in 1982 for both the estates and smallholders are shown in Table 11. (The provinces and districts are shown in Figure 2.) Ninety percent of total production and 89 percent of smallholder production came from Central and Eastern provinces—more than half from Central Province alone. The most important districts in total production are Kiambu, with 38 percent of total production, and Muranga, with 17 percent, whereas the two largest districts in smallholder production are Meru, with 23 percent of total smallholder production, and Muranga, with 21 percent. However, the major future potential probably lies in other parts of the country, especially in Robusta production in Western Kenya.

Yield varies greatly between districts. Estate yields in Nyeri are less than half those in Kiambu, but more than twice those in Nakuru. The low yields in Nakuru, which average 250 kilograms per hectare, may be due in part to the low standards of management by local companies and cooperatives that have recently purchased estates. For smallholders, yields in Muranga and Kirinyaga are more than double those of Meru and Machakos, reflecting in part higher rainfall but probably also standards of management and levels of input application. Smallholder yields even in Muranga are only 67 percent of estate yields, while in Kiambu they are just 36 percent of estate yields. These data underline the potential to raise production by raising yields on both estates and smallholdings.

Several factors suggest that Kenya can produce Arabica coffee on smallholdings for less than the current price in nonquota markets if problems in the delivery and payment system can be resolved. Payment delays, transaction costs, and uncertainty about deductions all contribute to high marketing costs.

Payments are made quarterly, and an annual crop's deliveries are paid for over several separate payment days at 3-month

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[44] Coffee Board of Kenya, *Annual Report, Balance Sheets and Statement of Accounts for the Year Ending 30th September 1976* (Nairobi: CBK, 1977); Coffee Board of Kenya, *Annual Report, Balance Sheets and Statement of Accounts for the Year Ending 30th September 1979* (Nairobi: CBK, 1980); and Coffee Board of Kenya, *Annual Report, Balance Sheets and Statement of Accounts for the Year Ending 30th September 1980* (Nairobi: CBK, 1981).

[45] Coffee Board of Kenya, *Annual Report, Balance Sheets and Statement of Accounts, 1980,* p. 9.

[46] Personal communication, two leading agrochemical suppliers in Nairobi, March 1982.

Table 11—Coffee area, production, and yield, by province and district, 1982

Province/District	Smallholders			Estates		
	Area[a]	Production	Yield	Area	Production	Yield
	(1,000 hectares)	(1,000 metric tons)	(kilograms/ hectare)	(1,000 hectares)	(1,000 metric tons)	(kilograms/ hectare)
Central Province	38.6	27.9	723	25.9	32.7	1,263
Kiambu[b]	11.0	5.2	471	21.0	27.4	1,308
Muranga[c]	12.6	11.0	875	3.4	4.2	1,235
Nyeri	7.5	5.6	747	1.5	1.1	586
Kirinyaga	7.5	6.1	815	...	...	...
Eastern Province	45.0	18.9	420	0.5	0.2	362
Meru	31.3	12.3	393	...	...	...
Embu	6.1	3.7	612	...	...	...
Machakos	7.6	2.9	379	0.5	0.2	362
Rift Valley Province	...	...	...	5.9	1.2	203
Nakuru	...	...	...	3.8	1.0	251
Trans Nzoia	...	...	...	2.1	0.2	101
Nyanza Province	7.5	3.6	482	...	...	...
Kisii	7.5	3.6	482	...	...	...
Western Province	4.5	1.7	378	...	...	...
Bungoma	3.4	1.4	380	...	...	...
Kakamega	1.1	0.3	245	...	...	...
Others	1.9	0.6	294	1.4	0.4	360
Total	97.5	52.5	539	33.6	34.4	1,023

Province/District	Total			Percent of Total Production	Percent of Smallholder Production
	Area	Production	Yield		
	(1,000 hectares)	(1,000 metric tons)	(kilograms/ hectare)	(percent)	
Central Province	64.5	59.5	922	68	55
Kiambu[b]	32.0	32.6	1,019	38	10
Muranga[c]	16.0	15.2	950	17	21
Nyeri	9.0	5.6	747	6	11
Kirinyaga	7.5	6.1	815	7	12
Eastern Province	45.5	19.1	420	22	36
Meru	31.3	12.3	393	14	23
Embu	6.1	3.7	612	4	7
Machakos	8.1	3.1	383	4	6
Rift Valley Province	5.9	1.2	203	1	...
Nakuru	3.8	1.0	251	1	...
Trans Nzoia	2.1	0.2	101	...	...
Nyanza Province	7.5	3.6	482	4	7
Kisii	7.5	3.6	482	4	7
Western Province	4.5	1.7	378	2	3
Bungoma	3.4	1.4	380	2	3
Kakamega	1.1	0.3	245	...	...
Others	3.3	1.0	303	1	1
Total	131.0	86.9	663	100	100

Source: Coffee Board of Kenya, *Annual Report, Balance Sheets and Statement of Accounts for the Year Ending 30th September 1982* (Nairobi: CBK, 1983).

[a] Area indicates area sown with mature coffee.

[b] For estates, the Kiambu district includes Limuru, Thika, Ruiru, Donyo Sabuk, and Kabete.

[c] For estates, Muranga includes Mitubiri and Makuyu.

Figure 2—Provinces and districts of Kenya

intervals. In many areas farmers receive an advance payment against the value of the crop in the form of fertilizers and agricultural chemicals. In some areas a first payment is made on delivery of the crop, but in others the first is made 4 to 6 months after delivery. Final payments follow 6 to 12 months after delivery. In 1977, farmers in the Mount Kenya area were still receiving partial payments as much as 15 months after the coffee was sold in auction, or 18 months after the coffee was delivered to the local

cooperative society.[47] As explained earlier, payments take so long because they must pass through such a long chain from the Coffee Board to the farmer. Delays also occur because district and provincial cooperative officers have to authorize cash being drawn to make farmers' payments.[48] With a rate of inflation of about 15 percent per year, this delay represents at least a 20 percent fall in the real price paid to the farmer on the delayed part of the payment.

Transaction costs for a smallholder are high. To deliver small quantities of cherry (ripe coffee berries) often means long waits in queues, sometimes far into the night. The farmer has little recourse if he is told to regrade. Obtaining payment sometimes involves several more days of waiting in line. These additional fixed costs for the smallholder arise because he is only allowed to sell to the cooperative society where he is registered, which consequently enjoys all the privileges of a monopsonist.

Farmers are not able to reconcile deliveries and payments because of the spreading out of payments discussed earlier. The system is further complicated by credit and advances. The field survey in 1977 listed the following deductions from payments to coffee farmers in Embu and Kirinyaga districts:[49] cooperative union cess (7.5 percent); deduction for advances of fertilizers and chemicals from the local society; deduction for consumption loans obtained by the farmer from the society; deductions to pay off loans from the Intensive Agricultural District Program (IADP) and other loans given to the farmer by the society; and deductions for operating the local cooperative society, such as running expenses for the factory and other cooperative society activities.

The key problem is that the smallholder is given no written statement to enable him to reconcile his account with the society, so he has no way of being sure that payments match deliveries. Lack of payment reconciliation information makes it impossible to measure accurately the deductions made from an individual farmer's account and thus the percentage of the value of the crop received by the farmer. Estimates are usually based on the proportion of the value of the crop received by the Cooperative Bank, assuming that the remainder reaches the farmer after deduction of the union cess and the society's overhead.

What the societies received is not even a reliable guide to what smallholders actually received. The International Coffee Organization estimates that in the period 1973/74-1975/76 estates in Kenya received close to 90 percent of the export value of their coffee after deducting processing costs, but smallholders received only 59-63 percent, and deductions by unions and societies trebled in those three years.[50] Even these estimates of what reaches smallholders may be too high in view of delays and uncertainty about society deductions.

Several pointers indicate that union and society deductions may be substantial. Loans made by the Cooperative Bank in Nairobi to a cooperative union in a coffee-growing area for any rural development purpose are secured on the basis of the coffee crop. Thus, default on an IADP loan by a union, for example, may result in deductions from coffee payments to the union by the Cooperative Bank. This then results in reduced payments or further delays to farmers. With no effective bookkeeping control in most societies, it is also possible that deductions made by the union or society's management may be used for personal expenditures, as many newspaper articles have alleged.[51] Since much of the money owed to the farmers has been used for other purposes, the only way for cooperatives to meet payment obligations for past deliveries is to use cash available from the next deliveries. Therefore, the outstanding amount as a result of payment delays is not accumulating somewhere in the system. This is what makes the problem of lagging payments so intractable.

If farmers were paid the full market value of their crop—after deducting competitive

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[47] Michael Schluter, "Rural Development in the Diocese of Mount Kenya East," a report prepared for the Diocese of Mount Kenya East, Embu, June 1977 (mimeographed), p. 3.

[48] Daily Nation, advertisement, "Ensuring Farmers Get Their Money."

[49] Schluter, "Rural Development in the Diocese of Mount Kenya East," p. 3.

[50] International Coffee Organization, Coffee in Kenya, 1977 (London: ICO, 1978), pp. 24, 50, 52.

[51] See, for example, the Daily Nation, March 1, 1982, p. 3; April 22, 1982, p. 1; and April 15, 1983, p. 6.

processing, transport, and administrative costs—in cash on delivery of the cherry, the producer price could be raised substantially without any change in the international market price or adjustment in the exchange rate. Reform of the payment system for smallholders requires examination of the problems of the cooperative movement as a whole, which is discussed in Chapter 9.

To increase production from existing coffee area will be difficult without reform of the marketing and payment systems. However, based on yield response from 1974/75 to 1976/77 (Table 10), the short-term supply response to higher prices could be as much as 50 percent over three years. This would raise average smallholder yields from the 1981/82 level of 539 kilograms per hectare to the 1976/77 level of 844 kilograms per hectare. Even this is still a long way below average estate yields of 1,252 kilograms per hectare in 1979/80 or of 1,782 kilograms per hectare in 1976/77.

Increased production depends partly on increased use of fertilizers and pesticides. Labor is the other major input, for pruning, weeding, and mulching, as well as for picking. The opportunity cost of labor is high in most coffee-growing areas, as there is competition for labor for tea picking. Coffee zones generally are below and adjacent to tea zones, and employment opportunities always exist in tea zones, even in nonpeak seasons. Because there are two growing seasons in Kenya, opportunities for work in dairying or the cultivation or harvesting of crops such as maize, pulses, forage, and horticultural crops exist during much of the year. Thus an increase in coffee production would probably reduce dairy and horticultural crop production in the coffee zones.

Another way to raise coffee production in Kenya in the long term is through new planting. Since this is now allowed by the International Coffee Agreement, the key question is whether to produce more Arabica in the traditional highland areas or to produce Robusta coffee in the lowland areas of Western Kenya. In Central Kenya approximately 17 percent of total cultivated area

and more than 25 percent of the official coffee zone area was already planted with coffee in 1974/75.[52] Thus, expanding coffee area in the coffee zone may mean using more marginal land. Gross foreign exchange earnings from Arabica and Robusta are likely to be similar, the higher Robusta yields being offset by lower prices. A study has shown, however, that in Tanzania 25 percent of the gross foreign exchange earnings of the Arabica crop must be plowed back in imported inputs for production, processing, and transport, but only 10 percent of the earnings from the Robusta crop must be, despite the much greater distance of Robusta growing areas from the coast.[53] So net foreign exchange earnings per hectare would probably be greater from Robusta production. Emphasis on new Robusta production would probably also decrease the variability of total production because it is less susceptible to coffee berry disease. In Western Kenya the opportunity cost is defined by returns to sugar and maize, which are discussed in Chapter 7.

Tea

The International Market

There has been a steady increase in Kenya's tea area, production, and exports during the last 10 years, as shown in Table 12. Area increased from 40,000 to 75,000 hectares from 1970 to 1979, and exports have increased at a compound growth rate of more than 11 percent per year during this period. This rate of production growth is likely to slow to 7.5 percent during the period 1980-85, with export growth of 10 percent, which compares favorably with export growth projections of 6.3 percent for China, 1.6 percent for Sri Lanka, and –0.4 percent for India.[54] In 1980 Kenya's production still constituted only 5 percent of the world total and her exports only 8 percent of total world trade in tea.[55] The world market in tea, however, is highly differentiated by type and quality; Kenya's share in the specialist quali-

[52] Kenya, Ministry of Finance and Planning, Central Bureau of Statistics, *Integrated Rural Survey 1974-75, Basic Report* (Nairobi: Government Printer, 1977), p. 79.

[53] Sackett and Schluter, *Estimates of the 1981/82 Import Requirements.*

[54] World Bank, *Price Prospects for Major Primary Commodities,* p. 47.

[55] Ibid., p. 47.

Table 12—Tea production, area sown, yields, and smallholder payments, 1971-82

Year	Production Smallholders	Production Estates	Production Total	Area Sown Smallholders	Area Sown Estates	Area Sown Total
	(million kilograms)			(1,000 hectares)		
1971	8.1	28.2	36.3	20.5	22.8	43.3
1972	13.1	40.2	53.3	26.5	23.3	49.8
1973	15.1	41.5	56.6	31.2	23.6	54.8
1974	16.2	37.3	53.5	34.6	24.1	58.7
1975	17.9	38.8	56.7	37.2	24.3	61.5
1976	21.5	40.5	62.0	41.4	24.5	65.9
1977	30.7	55.6	86.3	43.6	24.9	68.5
1978	34.8	58.6	93.4	46.9	25.2	72.1
1979	37.6	61.6	99.2	48.9	25.4	74.3
1980	34.0	55.9	89.9	50.7	25.9	76.6
1981	35.8	55.1	90.9	52.7	26.2	78.9
1982	39.9	56.1	96.0	54.7	26.4	81.1

Year	Yields of Mature Tea[a] Smallholders	Yields of Mature Tea[a] Estates	Yields of Mature Tea[a] National	Average Payment to Smallholders[b] First	Average Payment to Smallholders[b] Second	Average Payment to Smallholders[b] Total	Total in Constant 1969 Prices[c]
	(kilograms/hectare)			(KSh/kilogram of green leaf)			
1971	874	1,356	1,207	0.88	0.55	1.43	1.32
1972	1,071	1,885	1,588	0.88	0.99	1.87	1.59
1973	1,027	1,900	1,542	0.88	0.33	1.21	0.91
1974	905	1,673	1,328	0.88	0.52	1.40	0.90
1975	873	1,699	1,309	0.88	0.72	1.60	0.90
1976	811	1,741	1,245	0.88	2.54	3.42	1.74
1977	985	2,352	1,575	1.00	1.38	2.38	1.08
1978	1,004	2,433	1,591	1.00	1.33	2.33	0.96
1979	1,011	2,531	1,613	1.00	1.75	2.75	1.02
1980	821	2,278	1,364	1.00	1.50	2.50	0.82
1981	821	2,217	1,327	1.00	1.51	2.51	0.73
1982	851	2,230	1,331	n.a.	n.a.	n.a.	n.a.

Sources: Data provided by the Kenya Tea Board; Kenya Tea Development Authority (KTDA), *Annual Report and Statement of Accounts, 1980/81* (Nairobi: KTDA, 1981); KTDA, *Annual Report and Statement of Accounts, 1981/82* (Nairobi: KTDA, 1982); and Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Economic Survey,* 1979-82 (Nairobi: Government Printer, 1979-82).

Note: Where n.a. appears, the figure was not available.

[a] Yields per hectare are estimated by dividing production by the total area sown with tea four years before to allow for time taken for the tea bush to mature after planting.

[b] Average payments to smallholders are given for fiscal years, so the 1971 figures are for 1971/72 and so forth.

[c] Constant prices are estimated by averaging the upper, middle, and lower income groups under "Nairobi Annual Retail Price Increases, 1970-82," in *Economic Survey,* 1979-82.

ties it produces is much higher. Kenya probably would benefit from an international tea agreement limiting new planting and production, but no agreement has yet been reached.[56]

The major growth in tea consumption and imports is among the developing countries. The developing countries' share of world imports is expected to grow from about 40 percent of world imports in 1980 to 50 percent in 1995.[57] Tea imports of the selected oil exporters grew by 37 percent, from 62,000 tons to 85,000 tons, between 1971-73 and 1976-78 (Table 6). Although this growth is slow compared with imports of other products by the oil exporters, it is rapid

[56] C. P. Tyler, "The Interests of East Africa in an International Tea Agreement," Discussion Paper 25, Institute of Development Studies, Nairobi, March 1977 (mimeographed).

[57] World Bank, *Price Prospects for Major Primary Commodities,* p. 47.

relative to the growth of imports in other markets. Imports into the largest market—the United Kingdom—fell by 14 percent between 1971-73 and 1977-79. Iraq is the largest market among the selected countries with imports close to 30,000 tons in the period 1977-79, followed by Iran with 20,000 tons and Libya with 10,000 tons. The market doubled in Iran from 1970-72 to 1977-79 and increased by about 50 percent in Iraq, but it appears to have been erratic in Libya.

Sri Lanka is the largest supplier to Iraq, Iran, and Libya, supplying 55 percent of the 164,000 tons of tea sold to the three countries combined in the period 1977-79, although it exports only 20 percent of world marketed production.[58] Only in Iraq have East African teas made an inroad, with the market share increasing from 0.003 percent in 1977 to 3.8 percent in 1979. Imports by other oil-exporting countries are minimal. Indonesia is a tea exporter, Nigeria's tea imports are insignificant, and the population of the Gulf States is so small that the demand for tea is also small.

From 1976 to 1980 there was little change in the direction of Kenya's exports.[59] In 1976 and 1980 five countries accounted for more than 85 percent of Kenya's total exports: the United Kingdom, Pakistan, the United States, Canada, and Egypt. The United Kingdom took 48 to 60 percent in each of the five years and was the largest buyer. Pakistan and Egypt together accounted for 15 to 30 percent of total exports in each year from 1975-79. Kenya's exports to the United Kingdom in 1979/80 were about 45,000 tons, which was close to 25 percent of total imports by the United Kingdom in those years.

The high degree of product differentiation in the international tea market is probably the main reason why Kenya has been unable to penetrate the markets of Iraq, Iran, and Libya. Kenya now produces only teas processed by the cut, tear, and crush (CTC) method, whereas consumers in these countries prefer lowland, orthodox teas. The CTC processing method results in smaller fragments of leaf, which appear bright in the cup. Orthodox teas have larger fragments, a bolder taste, and appear black in the cup. CTC teas generally command a 20 percent higher price in auction than orthodox teas.

In 1975 as much as 30 percent of Kenya's production was orthodox teas, but factories have converted their production to CTC teas in response to higher prices for CTC tea in international markets. The Kenya Tea Development Authority has encouraged the conversion because it eliminates the need to differentiate payments to farmers according to factory. The orthodox tea manufacturing machinery has been stored in the factories, so that reversion to partial orthodox tea manufacture would be simple if market conditions warranted it.

Tea exports to oil-exporting countries can be increased in several ways. Kenya could launch a major marketing initiative in the target countries to popularize CTC teas in order to create additional demand. Marketing could focus on Nigeria, where tea consumption is growing from a small base and a predilection for either CTC or orthodox teas has not been formed, and Iran and Iraq. This is likely to take a long time, as creating or changing consumer preferences seldom happens rapidly. The second option would be to shift part of production from CTC teas to orthodox teas. This might lower returns while Kenya established a market in orthodox tea markets, but in the medium term, high quality orthodox tea prices would probably be close to those of CTC teas.

Domestic Production Potential

The structure of the industry is similar to coffee in some respects. The estates, totaling approximately 20,000 hectares in 1980, are generally owned by large, foreign-owned corporations. They account for nearly 50 percent of total production. Production goes from the factories of the estates straight to auction in Mombasa. The smallholders, totaling approximately 55,000 hectares and 143,000 growers in 1982, are organized by a parastatal, the Kenya Tea Development Authority, which is responsible for input distribution, collection of leaf, farmers' payments, processing, and delivery to auction in Mombasa.[60] In contrast to coffee, the payments tunnel is short, with just the Tea Development Authority between the auction

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[58] International Tea Committee, *Annual Bulletin of Statistics* (London: ITC, 1981).

[59] Ibid.

[60] Kenya Tea Development Authority, *Annual Report and Statement of Accounts, 1981/82* (Nairobi: KTDA, 1982), p. 18.

and the smallholder. As with coffee, smallholder yields are typically 33 to 50 percent smaller than those of the estates, but the area is much greater and growing more rapidly (Table 12). Production is heavily concentrated in certain regions, with half of total production from Kericho and Nandi districts and a further 25 percent from Central Province. Half of smallholder production is from Central Province, with 45 percent from Kisii, Kericho, Meru, and Embu districts (see Table 13).

If Kenya is to maintain its share of existing CTC markets, but at the same time seek a share of the oil exporters' markets for orthodox teas, then production will have to increase. The greatest potential to expand production is from existing tea area, where bushes are already established but the proportion harvested is low due to labor shortages. No systematic data are available to estimate the proportion unharvested, but observations in field reports repeatedly note this point. A field survey in 1976/77 estimated that only 50 percent of potential yield was harvested, the other half being left on the bush.[61] This suggests high short-run supply elasticities. The large yield differences between smallholders and estates noted in Table 12 confirm this observation.

The main reasons why so much tea remains unpicked appear to be the cost of labor and the payment system for farmers. In explaining the lower yields of smallholders in Kenya, Ram observed the critical shortage of labor on small farms in areas west of the Rift, which also depend heavily on hired labor.[62] He notes that farmers under the Tea

Table 13—Tea production, by province and district, 1982

| Province/District | All Producers | | Smallholders[a] | | | 1981/82 Average Yield |
	Production of Made Tea	Share of Production	Area	Production of Green Leaf	Share of Production	
	(million kilograms)	(percent)	(1,000 hectares)	(million kilograms)	(percent)	(kilograms/hectare)
Rift Valley Province	50.1	52	7.9	5.1	14	590
Kericho	34.4	36	6.7	4.7	13	701
Nandi	15.6	16	1.3	0.4	1	294
Subukia	0.1	...	...	...	...	...
Central Province	25.6	27	20.4	18.3	52	889
Kiambu	8.3	9	4.6	3.2	9	685
Muranga	7.4	8	8.2	6.3	18	764
Nyeri	6.0	6	4.8	4.9	14	1,023
Kirinyaga	3.9	4	2.9	3.9	11	1,350
Nyanza Province	13.7	14	10.3	6.6	19	637
Kisii	7.3	8	9.3	5.9	17	637
Sotik	6.4	7	1.0	0.7[b]	2	601
Eastern Province	5.5	6	7.6	4.9	14	646
Meru	4.1	4	5.8	3.4	10	591
Embu	1.4	1	1.8	1.5	4	822
Western Province	0.7	1	1.8	0.6	2	301
Kakamega	0.7	1	1.8	0.6	2	301
Total	95.6	100	48.9	35.3	101	734

Source: Unpublished data provided by the Kenya Tea Board.
Notes: Percentages do not always add up to the subtotals or totals because of rounding. Made tea is the manufactured product when it leaves the factory. Green leaf is the tea after it is plucked from the bush and before it is processed.

[a] Data for smallholders exclude settlement schemes at Lessos, Chepsir, and Cherangani, which produced 0.18 million kilograms in 1982.

[b] Data relate to settlement schemes.

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[61] Schluter, "Rural Development in the Diocese of Mount Kenya East," p. 3.

[62] C. S. Venkata Ram, "Tea in the Small Grower's Sector—A Study in Kenya." *Planter's Chronicle* (Calcutta), 1981, pp. 203-206.

Development Authority show a marked tendency to pick more in the second half of the month, which he attributes to their anxiety to meet a monthly target, and he also notes high deliveries on days when schools are closed so that farmers' children are able to assist in picking.

The way payments are made to producers becomes the second critical factor in increasing production from a policy perspective. At present, farmers are given an initial payment at the end of each month and a final payment after the end of the year, when it is possible to calculate an average market value for each grade net of processing and marketing costs. Farmers' payments rose dramatically in 1975/76 in real terms, but since then they have fallen continuously so that their value in 1981/82 was less than half their value in 1971/72 (Table 12). Figure 3 shows an index of payments to coffee and tea growers. The percentage of payments made to farmers at the end of the month was less than 50 percent in every year after 1971/72 except 1972/73 and 40 percent or less for every year between 1978/79 and 1981/82. Any shift in the proportion from the first to the second payment, any increase in deductions from the crop, or further delays in payment reduces marginal returns, and thus

Figure 3—Indexes of tea and coffee payments to growers, 1971/72-1981/82
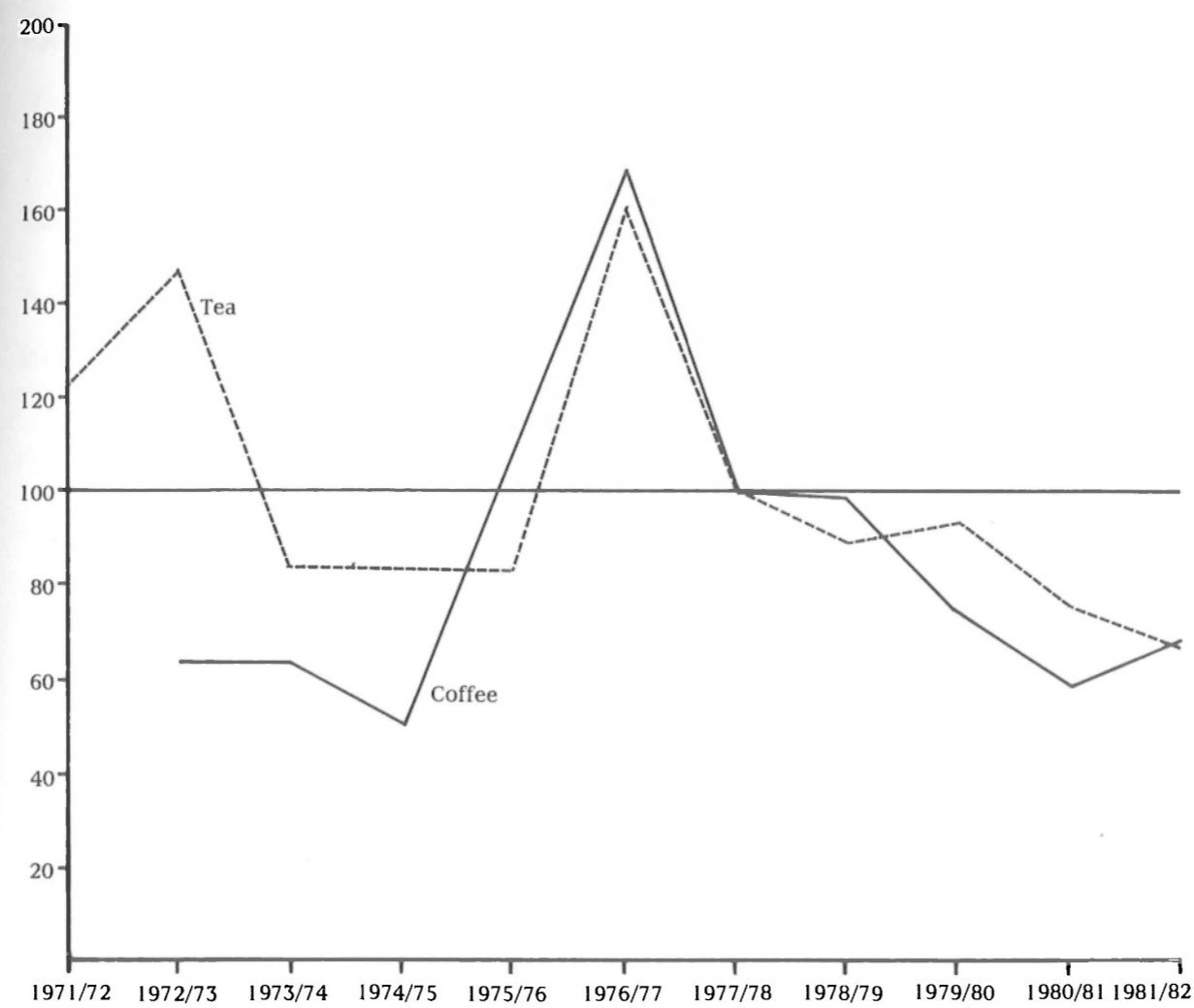
41

the quantity picked. Also, the amount of the first payment is crucial in determining how much capital the farmer has to hire labor for harvesting.

The opportunity cost of labor in picking tea is determined by returns from the major competing enterprises—potatoes, maize, and dairy production. The dramatic maize shortage in 1980 increased maize prices in tea growing areas to about K Sh 800 per bag, or more than seven times the official purchase price of the National Cereals and Produce Board (NCPB). At the same time, there was a dramatic increase in potato prices. As a consequence, field visits indicated that tea growers shifted labor into maize and potato production. This may account for the drop in national smallholder tea yields by 15 percent from 1,000 kilograms per hectare in 1978 and 1979 to 850 kilograms per hectare in 1981 and 1982 (Table 12), although rainfall may also have been a factor.

Future research could examine this hypothesis by analyzing whether monthly deliveries of tea to factories in the smallholder zones dropped most markedly in 1981/82 and 1982/83 in months of peak labor demand for food crops. Uncertainty about future maize prices and availability helps maintain maize and potato area for several years following a single year of maize shortages so that tea exports may be affected for an extended period. From a policy perspective, this underlines the central importance of stable maize prices and availability as a foundation for sustained growth of agricultural exports.

6

MEAT PRODUCTS: BEEF AND SHEEP AND GOATS

In Kenya, beef cattle and sheep and goats are primarily raised by smallholders, although nomadic pastoralists provide a significant proportion of the surplus for urban consumption or export (Table 14). In range areas the major production decision is between beef and sheep-goat production; in large and small farm areas it is between beef, sheep and goats, dairy stock, and oxen. Competition is for scarce pasture land, but also for labor, management resources, and capital.

A parastatal, the Kenya Meat Commission (KMC), provides a floor to the market for all red meat, with prices fixed by the govern-

ment.[63] Private slaughterhouses are allowed to compete. The KMC has had a monopoly on meat exports in the past, but all exports have been banned since 1980. The government prefers to export meat rather than live animals because the slaughtering and processing of meat increases domestic value added and provides employment. The KMC, like many parastatals, has had severe financial problems, which have resulted in payment delays to farmers. The Ministry of Livestock Development is reponsible for overall direction of the industry, including issuing licenses and providing inspection of slaughterhouses and supervising the KMC.

Table 14—Number of cattle, number slaughtered, and beef output, by type of farm and location, 1970 and 1975

Type of Farm and Location	Number of Cattle		Number Slaughtered		Beef Output	
	1970	1975	1970	1975	1970	1975
	(1,000 head)				(1,000 metric tons)	
Range	2,907	1,980	219	201	23.2	19.3
Northern[a]	1,571	1,250	136	121	14.9	12.1
Southern[b]	1,336	730	83	80	8.3	7.2
Small farms	5,251	7,167	612	951	71.1	101.4
Coastal[c]	300	370	32	55	3.2	5.0
Eastern[d]	1,090	1,523	109	183	12.6	19.0
Central Province	482	1,081	57	139	8.7	19.3
Rift Valley[e]	1,145	1,106	128	181	14.9	18.8
Nyanza Province	1,478	2,327	155	264	17.2	26.4
Western Province	756	760	131	129	14.5	12.9
Large farms[f]	558	550	121	133	20.9	21.8
Total	8,716	9,697	957	1,295	115.2	142.6

Source: Chemonics International, Consulting Division, "Livestock and Meat Industry Development Study, Final Report," Nairobi, March 1977 (mimeographed).

Note: Beef output includes the weight of meat and offal, which is equivalent to carcass cold dressed weight.

[a] The northern range is made up of the following districts: Lamu, Tana River, Isiolo, Marsabit, Turkana,Samburu, and West Pokot. It also includes North Eastern Province.

[b] The southern range is made up of Narok and Kajiado districts.

[c] The coastal region is made up of Kilifi, Kwale, and Taita districts.

[d] The eastern region is made up of Machakos, Kitui, Embu, and Meru districts.

[e] The Rift Valley is made up of Nandi, Kericho, Elgeyo Marakwet, and Baringo districts.

[f] The large farm regions are Nakuru, Trans Nzoia, Uasin Gishu, and Laikipia districts.

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[63] For a definition of the Kenya Meat Commission's functions, see Kenya, Laws of Kenya, *The Kenya Meat Commission Act,* Chapter 363 (Nairobi: Government Printer, 1972).

It is also responsible for all extension services, including provision of veterinary services to smallholders, control over cattle movements between districts to prevent the spread of disease, and animal breeding for smallholders. Some private breeding is still important, however.

Beef

Markets Among the Oil Exporters

As stated earlier, the potential for exporting beef to oil-exporting countries is large. During the period 1971-73 to 1976-78, beef imports by oil-exporting countries, excluding live bovine animals, increased six times, from 50,000 tons to more than 300,000 tons. The largest markets for beef imports in 1978 were the Gulf States and Iran, which together imported more than U.S. $1 billion of beef in that year. There were also significant markets in North and West Africa of more than U.S. $100 million each; and Libya has been a major importer of Kenyan meat in the past.[64] Demand in all regions trebled from 1971-73 to 1976-78 and increased about 20 times in West Africa and 9 times in Iran (Table 7). Thus, all of the selected oil-exporting countries, perhaps with the exception of Indonesia, appear to offer Kenya excellent opportunities to expand beef exports. (Indonesia has a small part of the beef imports of the selected countries; it had less than 1 percent of the value in 1978.) Kenya's proximity to the Gulf States, in particular, is a definite advantage over major competitors such as Australia and New Zealand because live animals and chilled meat command a premium of at least 20 percent over frozen beef in these markets.[65] In 1978 the airfreight rate for chilled meat was 40 percent lower from Nairobi to Jeddah than from Sydney to Jeddah, and the seafreight rate was 50 percent lower for live lambs (including feed cost and mortality).[66]

Kenya's Production and Exports

KMC cattle and calf purchases and Kenya's beef exports from 1970 to 1980 are shown in Table 15. Kenya's exports ranged from about 5,000 to 8,000 tons per year in 1970-77, but declined sharply in 1978-80. They amounted to just 663 tons in 1980. This resulted mainly from a sharp drop in the KMC meat purchases from about 200,000 head per year in 1970-72 to less than 70,000 in 1978-80. The decline in official purchases does not necessarily reflect a decline in total production. For example, between 1970 and 1975, when the KMC purchases fell by 32 percent, production is estimated to have grown by 23 percent from 115,200 tons to 142,600 tons (Table 14). With exports at 5 percent of total beef output in 1970 and 1975 (Tables 14 and 15), there seems to have been a large increase in domestic consumption in the early 1970s. The Ministry of Livestock Development estimates that production has stagnated or even fallen since the mid-1970s, so that, with rapid population growth, per capita consumption has declined by more than 4 percent per year since 1975.[67] Against this background of rapidly growing imports by oil-exporting countries and falling exports and stagnant production in Kenya, what potential exists for Kenya to increase beef exports to the Middle East? This requires a study of the international market to determine whether exports can be used to raise local prices paid to producers so as to stimulate production if Kenya adopts a beef export strategy.

The International Market for Beef

Kenya could export significant quantities to the EC under the Lomé Convention at prices of about $3,500 per ton, or double 1982-83 prices in the Middle East. The total Second Lomé Convention beef quota for the African, Caribbean, and Pacific (ACP) countries exporting to the EC has been fixed at

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[64] Kenya, Ministry of Agriculture, Marketing Development Project, *Background Marketing Briefs for the Agricultural Price Review 1981/82* (Nairobi: Government Printer, 1981).

[65] Kenya Meat Commission, personal communication, June 1982.

[66] Arab Organization of Agricultural Development and the Food and Agriculture Organization of the United Nations, "The Market for Livestock and Meat in the Arabian Peninsula," p. 7.

[67] Kenya, Ministry of Livestock Development, Animal Production Division, *Annual Report for 1979* (Nairobi: Government Printer, 1980).

Table 15—Purchases by the Kenya Meat Commission and meat exports, 1970-80

Year	Cattle and Calf Purchases	Meat Exports[a]	Canned Beef Exports	Total Beef Exports
	(1,000 head)		(metric tons)	
1970	197.9	1,798	3,131	4,929
1971	210.3	2,380	3,493	5,873
1972	199.1	3,542	4,128	7,670
1973	155.0	3,567	2,004	5,571
1974	159.5	3,231	2,599	5,830
1975	134.1	3,711	3,646	7,357
1976	228.5	2,719	5,778	8,497
1977	158.1	4,029	4,039	8,068
1978	68.0	1,254	1,070	2,324
1979	67.7	529	1,341	1,870
1980	55.9	112	551	663

Sources: Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1979* (Nairobi: Government Printer, 1979); Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract 1980* (Nairobi: Government Printer, 1980); Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1981* (Nairobi: Government Printer, 1981); and Kenya, Ministry of Finance, Statistical Branch, Customs and Excise Department, *Annual Trade Report,* 1970-80 (Nairobi: Government Printer, 1970-80).

[a] These include fresh, chilled, and frozen meat.

38,100 tons since January 1981. Countries participating are Botswana, Kenya, Madagascar, Swaziland, and Zimbabwe. As ACP exports did not exceed 20,000 tons in 1981 and are unlikely to in 1982, Kenya could probably obtain a larger quota to meet the gap between present ACP exports and the total ACP quota into the EC. Exports from ACP countries enter at the same price as is offered to European producers.

EC regulations forbidding beef imports from areas thought not to be free of foot-and-mouth disease make it most unlikely that Kenya will even be able to initiate exports to the EC. In mid-1980 the EC further strengthened this regulation to state that it would not accept meat from areas where inoculation against foot-and-mouth disease was used to maintain disease-free zones. The major factor that has led to the breaking down of the disease-free zones in Kenya has been the inability to control cattle movement within the country. Such control requires substantial resources, including vehicles and manpower, especially a highly disciplined cadre of trained personnel to prevent illegal movement. Large areas could be fenced as in Botswana, but huge amounts of fencing would be required, and for reasons discussed below the returns are unlikely to warrant such an investment.

Without access to the EC, Kenya's major markets are the oil-exporting Middle East countries. However, these markets often have the lowest beef prices in international trade owing to the structure of the world market. The major beef-exporting countries are Australia and New Zealand, which have access to the United States market as they are free of foot-and-mouth disease. Any excess production from Australasia that is not sent to the United States goes to the Middle East. The EC and South America also use the Middle East (in addition to the U.S.S.R.) as a major market for their growing surpluses. And finally, the Middle East is an important market for other African countries with veterinary problems owing to its nonrestrictive animal health import controls. Because of the number of countries that are competing to export beef to the Middle East, prices are lower in these markets.

The EC's position has changed from one of net imports of 720,000 tons in 1970 to net exports of 310,000 tons in 1980, with net exports of 660,000 tons projected by 1990.[68] These projections assume that Spain and Portugal will join the EC and become an additional source of demand, so surpluses may be even greater if their accession is delayed beyond 1990.

[68] World Bank, *Price Prospects for Major Primary Commodities,* pp. 86-87.

The EC surpluses have arisen as a consequence of price support policies and slow growth of consumption. Consumption within the EC increased only 3 percent from 1976 to 1980, from 6.54 million tons to 6.75 million tons.[69] To dispose of the surpluses, the EC has offered large subsidies to EC exporters to make up the difference between the market price and the price of stocks inside the EC. The market price for each potential export market is fixed on a monthly basis to guarantee that the exporter will not suffer a loss. Only in this way has it been possible for the EC to increase its market share so dramatically since 1978 in a somewhat depressed world market. Major suppliers of chilled and frozen bovine meat to Saudi Arabia in 1978, for example, were Australia, with 42 percent of the market; Argentina, 12 percent; the United States, 12 percent; India, 8 percent; and New Zealand, 8 percent.[70] Even with an upturn in the economies of the countries of the Organization for Economic Cooperation and Development (OECD) and reduced production when the world beef cycle reaches its next low, the EC is likely to continue to subsidize exports for a protracted period. However, small adjustments to reduce the beef subsidy appear likely as the cost escalates further.[71]

Declining international beef prices make it difficult to raise the price paid to the local producer in Kenya. The U.S. import price for frozen, boneless cuts (f.o.b. port of entry) declined from U.S. $2,884 per ton in 1980 to U.S. $2,475 in 1981.[72] This is still higher than the average price for 1975-77, which was U.S. $1,471 per ton at current prices. Recent trend data from the Middle East countries are not available. However, the KMC estimates a price of about U.S. $2,000 c and f Jeddah, or U.S. $1,700 f.o.b. Mombasa, for high quality beef in mid-1982.[73] Estimates from Botswana suggest U.S. $1,700 c and f Iran port, or U.S. $1,400 Botswana port, for lower-priced cuts

of Botswanan beef.[74] At an exchange rate of U.S. $1 equals K Sh 10.5, and a bone-in factor of K Sh 1.3, this reduces the export parity price of Kenyan beef to K Sh 15.35 per kilogram for high-quality cuts or K Sh 11.30 for low-quality cuts. Allowing for local processing costs of K Sh 2.0 per kilogram there is no margin left for the KMC overhead even at the low June 1981 producer prices of K Sh 13.30 for prime and K Sh 10.0 for standard-grade beef (Table 16). Even for chilled meat delivered by airfreight, the return after deducting additional freight costs is not sufficient to cover the KMC overhead. Assuming that no substantial increase in the international beef price is likely in the near future, particularly in view of continued large EC production, lower local costs of production would be required in order to make Kenyan beef competitive in the Middle East market at the artificially low prices now prevailing.

Policies and Programs to Raise Kenya's Beef Production

Several studies have identified ways to increase Kenyan beef production:[75]

Means	Increase (tons)
Develop areas with high potential	32,000
Develop range	23,000
Improve animal health and in particular reduce calf mortality through improved veterinary services	22,940
Improve transport facilities for marketing	5,000
Increase use of feedlots	1,800
Total	84,740

[69] General Agreement on Tariffs and Trade, *The World Market for Bovine Beef at 16 December 1981* (Geneva: GATT, 1982), p. 47.

[70] Industrial Market Research, *The Potential for Increasing Kenyan Exports.*

[71] Josling, Langworthy, and Pearson, *Options for Farm Policy in the European Community.*

[72] World Bank, *Price Prospects for Major Primary Commodities.* Table 6, p. 88.

[73] Kenya Meat Commission, personal communication, June 1982.

[74] Personal communication with V. von Massow, a research scholar from Gottingen University, who was doing research on beef in Botswana, May 1982.

[75] Chemonics International, Consulting Division, "Livestock and Meat Industry Development Study;" and C. Karue, "Livestock Production Trends in Kenya: Meat Production," a paper presented at the National Council of Science and Technology Workshop on Food Policy Research Priorities, Nairobi, June 1982 (mimeographed), p. 19 ff.

Table 16—Producer prices for beef set by the Kenya Meat Commission, 1969-81

Year	Prime Beef	Fair Average Quality Beef	Standard Beef	Commercial Beef
		(KSh/kilogram carcass dead weight)		
1969	3.41	3.30	2.75	2.40
1970	3.49	3.32	2.73	2.38
1971	4.06	3.76	2.85	2.47
1972	4.43	4.08	3.02	2.63
1973	4.77	4.42	3.46	3.00
1974	5.29	4.96	4.13	3.64
1975	5.98	5.57	4.74	4.12
1976	6.68	6.49	4.79	4.18
1977	7.47	7.35	5.19	4.54
1978	8.23	8.08	6.76	5.37
1979	...	8.25	6.95	5.45
1980	11.80[a]	11.65[a]	8.00	6.25
June 1981	13.30	13.00	10.00	7.50

Sources: Data for 1969-78 are from Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1979* (Nairobi: Government Printer, 1980); data for 1979 and 1980 are from Kenya, Ministry of Agriculture, Central Development and Marketing Unit, *Yields, Costs and Prices 1982* (Nairobi: Government Printer, 1982); and data for 1981 are from Kenya Meat Commission.

Note: For 1972 to 1976 there are a few cents difference between these data and those cited in Chemonics International, Consulting Division, "Livestock and Meat Industry Development Study, Final Report," Nairobi, March 1977 (mimeographed).

[a] Includes a KSh 2.00 bonus above the price published in the *Kenya Gazette.*

In the first item, development of potential includes rearing male dairy calves to 2-3 years and fattening dairy animals prior to slaughter. Most beef comes from small farms that are located in areas with high potential (see Table 14).

Each of these methods to increase production would require a substantial increase in the real beef price. A significant change in the ratio of beef to milk prices would be essential if fodder is to be diverted from its present use primarily as feed for dairy animals to feed for beef cattle. However, the Ministry of Livestock Development has declared that dairy animals have priority over beef in high-potential areas.[76]

The price of beef also determines levels of investment in ranches in the semiarid and arid areas. Only U.S. $6 million of the U.S. $22 million provided under a World Bank loan for livestock development through the Agri-cultural Finance Corporation was actually disbursed during the period 1976-80. One of the main reasons appears to have been the unattractive economic returns to investment in beef production at prevailing prices.[77] Increased rates of culling still offer some potential for increasing production but only in the northern areas, as culling rates in the traditional Maasai tribal areas are already close to the optimum.[78] Improved veterinary services depend primarily on allocations of increasingly scarce government funds. If, to overcome the budgetary constraint, the government allows increased private-sector participation in delivery of veterinary services so that farmers have to pay the market price for these services, the beef price will again become a constraining factor.

Several major studies in the 1970s emphasized the potential role of feedlots as a labor-intensive way to increase beef pro-

[76] Personal communication with the head of the Development Planning Division, Ministry of Livestock Development, Nairobi, March 1982.

[77] Agricultural Finance Corporation, personal communication, 1981.

[78] J. M. White and S. J. Meadows, *Evaluation of the Contribution of Group and Individual Ranches in Kajiado District to Economic and Social Development* (Nairobi: Government Printer, 1981).

duction.[79] However, they all stressed the importance of low maize prices relative to prevailing international prices and the sensitivity of feedlot returns to the beef/maize price ratio. Almost all of the 14 feedlots in the country were empty during the period 1978-83, which indicates that a substantial improvement in the ratio would be required to induce major investment in this area. Although either slightly lowering the domestic maize price or adjusting the exchange rate to raise the shilling value of the international beef price might make a minor improvement, the change in the ratio is unlikely to be sufficient. Moreover, a recent study has shown the number of steers available annually from the North Eastern Province for fattening is much smaller than originally thought, although these data have yet to be confirmed.[80]

Although small quantities of beef could possibly be exported to EC-linked markets like Réunion, this analysis suggests there is little potential for substantial beef exports to oil-exporting countries in the foreseeable future. The structure of the international market, and in particular the recent emergence of the EC as a major beef exporter, has depressed international prices. This has made it impossible to increase local prices to stimulate local production without the KMC being compelled to export at a loss. Indeed, losses are inevitable for the KMC on exports to these markets even at present local prices. However, the increase in production necessary to generate the surplus required will be difficult if not impossible to obtain without such a price increase. Higher returns can be obtained from sheep and goat production in the range areas and from dairying in the highland areas. Estimates of the Ministry of Livestock Development show that gross margins in 1982 were nine times higher for dairying than for beef production in "intensified small-scale com-

mercial livestock farming systems."[81] One major negative side effect of artificially depressed beef prices has been lower poultry prices, which has discouraged employment generation in the poultry industry.

Sheep and Goats

The International Market

Imports of sheep and goats, both live and as meat, into the selected oil-exporting countries were valued at U.S. $545 million in 1978, and imports grew from 1971-73 to 1976-78 by 83 percent for live animals and by nearly 500 percent for meat. The Gulf States and Iran were the major areas of demand. Separate estimates of imports by selected oil-exporting countries, compiled by Chemonics International in 1977, confirm these observations. They estimate imports of sheep and goat meat into the Gulf States, excluding Iran, will rise from 106,000 tons in 1980 to 270,000 tons by 1990.[82] This does not include imports of live animals, although there has been a particularly large and growing demand for live lambs in Saudi Arabia at the time of the Hajj pilgrimage season. A study by the Arab Organization for Agricultural Development (AOAD) and FAO estimates imports of all types of red meat into Arabian peninsular states will increase 43 percent from 535,000 tons in 1978/79 to 766,000 tons in 1983/84, so that African suppliers can potentially expand exports by up to 250,000 tons, depending on the growth of local production.[83]

Two aspects of the market give important advantages to nearby African countries. The AOAD-FAO study affirms that "The Arabian consumer has a natural preference for locally slaughtered fresh meat. Climate, tradition and religion ... accentuate this preference."[84]

[79] W. Schaefer-Kehnert, "Economic Aspects of Intensive Beef Cattle Feeding in Kenya," International Bank for Reconstruction and Development, Regional Mission in East Africa, Nairobi, March 1981 (mimeographed); and Food and Agriculture Organization of the United Nations/World Bank, *The Outlook for Meat Production and Trade in the Near East and East Africa*, Livestock Development Country Studies, vol. 2 (Rome: FAO, 1977), p. 113.

[80] J. M. White and S. J. Meadows, *An Estimate of the Supply of Immatures from Kenya's Northern Rangelands*, Livestock Development Project, Report 193a KE, Phase II, forecast 1980 (Washington, D.C.: World Bank, 1974).

[81] Kenya, Ministry of Livestock Development, Animal Production Division, *Costs-Prices 1982 for Livestock* (Nairobi: Government Printer, January 1982).

[82] Chemonics International, Consulting Division, "Livestock and Meat Industry Development Study."

[83] Arab Organization of Agricultural Development and the Food and Agriculture Organization of the United Nations, "The Market for Livestock and Meat in the Arabian Peninsula," Chapter 7.

[84] Ibid., p. 7.

As a consequence, chilled meat is heavily discounted against live animal weight equivalent, and frozen meat is discounted even further. Estimates of the price differential given by the study for February 1979 are shown in Table 17. In Riyadh, for example, the differential between frozen and chilled sheep and goat meat was 83 percent, and the

differential between fresh meat from live African stock and frozen was nearly 280 percent. These differentials do not just reflect consumer preference for fresh meat, but also consumer preference for range-fed, lean animals of African stock, which are similar to local indigenous stock. Because the fat on Australian sheep is sold at salvage

Table 17—Carcass meat prices in Arabian and African retail markets, February 1979

City	Beef			
			Fresh	
	Frozen	Chilled	Local Stock	African Stock
	(U.S. $/kilogram)			
Kuwait	. . .	. . .	. . .	. . .
Qatar	. . .	3.50	. . .	. . .
Abu Dhabi	. . .	. . .	. . .	. . .
Dubai	. . .	. . .	. . .	. . .
Riyadh	. . .	. . .	. . .	. . .
Jeddah	2.50	3.50	. . .	3.60
Sana'a	3.70[a]	. . .	6.50	5.50
Hodelda	. . .	. . .	5.50[a]	. . .
Khartoum	. . .	. . .	. . .	2.00
Mogadishu	. . .	. . .	. . .	2.00

City	Sheep and Goat Meat						Fresh Camel Meat	Frozen Chicken
			Fresh					
	Frozen	Chilled	Local/Middle Eastern Stock	African Stock	Indian Stock	Australian Stock		
	(U.S. $/kilogram)							
Kuwait	. . .	3.10[b]	5.50	. . .	. . .	2.20[b]	. . .	2.20
Qatar	. . .	3.60	. . .	. . .	. . .	2.60[b]	. . .	. . .
Abu Dhabi	. . .	3.60[a]	. . .	. . .	. . .	3.60[a]	. . .	. . .
Dubai	. . .	. . .	5.70	5.20	3.15	3.90	. . .	. . .
Riyadh	1.80[b]	3.30	6.00	5.00[a]	. . .	4.50[a]	3.00[a]	. . .
Jeddah	1.60[b]	3.30[b]	6.00	5.00	. . .	4.00	3.00	2.00
Sana'a	3.70[a]	4.90[a]	13.00	. . .	. . .	. . .	. . .	2.10
Hodelda	. . .	. . .	8.80[a]	7.50[a]	. . .	. . .	2.00[a]	. . .
Khartoum	. . .	. . .	. . .	3.00	. . .	. . .	1.60	. . .
Mogadishu	. . .	. . .	. . .	3.00	. . .	. . .	1.80	. . .

Source: Arab Organization of Agricultural Development and the Food and Agriculture Organization of the United Nations, "The Market for Livestock and Meat in the Arabian Peninsula and the Role of Supplies from Neighboring African Surplus Regions," FAO Near East Regional Office, Cairo, November 1979 (mimeographed).

Notes: The prices are converted to U.S. dollars using the bank exchange rates of February 1979. The subsidies vary. In Kuwait they are U.S. $0.55 (1.50 dinar) per kilogram of carcass at the point of slaughter for local and imported sheep and goats and U.S. $0.28 per animal of imported stock (this is the subsidy of cattle slaughter discounted as of early 1977). Qatar uses the subsidized import price of Australian sheep in order to standardize butcher calculation within the control price system. The present subsidy is about U.S. $0.45 per kilogram or 40 rials/head. The United Arab Emirates has heavily subsidized import and distribution schemes exclusively for the Ramadan period. These currently involve a subsidy of U.S. $1.00-$2.00 per kilogram of carcass derived from live or chilled imports. Saudi Arabia has a subsidy, paid to importers, of U.S. $0.60 per kilogram of frozen "bone-in" mutton and lamb meat and U.S. $0.83 per kilogram of the same meat chilled.

[a] This is the government control price, unsubsidized.

[b] This is the government control price, subsidized.

value, whereas the fat on East African fat-tailed sheep is appreciated by the consumer at a price equal to that of meat, the figures shown in Table 17 need a further downward adjustment of 15 to 20 percent for Australian supplies.[85] Clearly, consumer preference gives Kenya a substantial advantage over Australia and other more distant suppliers.

Domestic border prices for sheep, goat, and lamb meat are well below the export parity price of consignments to these markets. KMC estimates of price differentials in June 1982 are shown in Table 18. For chilled exotic-cross lamb, the differential is as high as 50 percent, whereas that for chilled local sheep is 33 percent. The differential for frozen goat meat is lower, because, as explained earlier, the market discounts frozen meat heavily, and the KMC finds it difficult to obtain carcasses of consistent quality to match the quality of Australian supplies. The KMC estimates that the market for chilled exotic-cross lamb is at least 5,000 tons per year, or nearly three airfreight charters a week of 35 tons each. In addition, there is potential for live sheep and goat exports, for which trials are already in progress.[86] An FAO study in Kenya in June 1980 estimated an export parity price per animal of KSh 545 or U.S. $50, against a domestic border price of KSh 320.[87] Export markets offer a 70 percent premium over local markets.

Structure of Domestic Production

Sheep and goat production in Kenya is divided almost equally between the range areas and the small farm areas. Out of an estimated 15.1 million head of sheep and goats in 1980, 8.2 million were in the range areas, 6.5 million on small farms, and the balance of 0.4 million on large farms.[88] Estimates of the sheep and goat population in 1969 and again in 1978 suggest an annual increase of 4.4 percent in the sheep population and 4.8 percent in the goat population. Goats increased from 5.09 million to 8.49 million, which is higher than the rate of human population growth.

There has been a marked increase in the number of sheep and goats slaughtered annually. The offtake rate has risen from 15 percent of the flock in 1969 to 25 percent in 1978 for sheep, and from 17 percent to 31 percent for goats,[89] which has resulted in a large increase in the supply of meat and animal skins. Part of this increase in skins may reflect skins, or even animals, crossing the borders from neighboring countries, that is, from Uganda into Western Province or from Somalia into North Eastern Province. If this were the major source of increase, however, one would not expect to find a large increase in Eastern Province, which is far from the border (Table 19). Thus the major source of the increase in skins is probably the increased offtake rates, which also account for the large increase in meat production. This source of increase is not yet exhausted, but it cannot continue without reducing the size of the national flock.

There was an almost continuous fall from 1971 to 1979 in official purchases of sheep and goats by the KMC. Despite the large increases in production noted above for sheep, purchases of sheep and lambs fell from 65,000 to 10,000 and goats from 47,000 to 2,000 during this period.[90] On the basis of total offtake estimated from the number of skins, the KMC share of slaughtered sheep has dropped from 7.4 percent to 0.6 percent, and the share of slaughtered goats from 4.7 percent to less than 0.1 percent from 1972 to 1979. The main reason for the drop in KMC purchases has not been the decline in real prices during the period as a whole (Table 20). However, sharp falls in real prices in 1975, 1976, and 1977 may account for the fall in KMC purchases during those three

[85] Ibid., p. 12.

[86] The study by the AOAD and FAO states that export approval was given in 1978 for 30,000 animals. Live animals were still being exported in 1982 by the same company. See "The Market for Livestock and Meat in the Arabian Peninsula," p. 12.

[87] E. Reusse, "Consultant's Report on the Potential Export of Kenyan Sheep and Goats to Arabian Markets," Food and Agriculture Organization of the United Nations, Rome, 1980, p. 5 (mimeographed).

[88] Unpublished data provided by the Kenyan Ministry of Livestock Development, Sheep and Goat Development Project.

[89] Ibid.

[90] Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, Statistical Abstract, 1979 (Nairobi: Government Printer, 1980); and Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, Statistical Abstract, 1980 (Nairobi: Government Printer, 1981).

Table 18—Estimates of the differences between export parity prices and domestic border prices for sheep and goat products exported to Middle East markets, June 1982

Product	Destination	International Market Price (with Cost and Freight)	Freight Cost	Export Parity Price (f o b.) Foreign Currency	Export Parity Price (f o b.) Domestic Currency[a]	Domestic Border Price
		(U.S. $/metric ton)			(KSh/metric ton)	
Chilled exotic-cross lamb (well formed, 8-13 kilograms)	Dubai	3,450	1,000 (air)[b]	2,450	26,705	18,000
Chilled local-bred sheep (14-22 kilograms)	Jeddah	2,550	700 (air)[b]	1,850	20,165	15,000
Frozen goat meat	Gulf port	1,800[c]	300 (sea)	1,500	16,350	15,000

Source: Estimates supplied by the Kenya Meat Commission.

[a] An exchange rate of U.S. $1.00 = KSh 10.9 is assumed.

[b] It is assumed that 35 tons constitutes a charter shipment, that is, 3,000 lamb carcasses or 2,000 local sheep carcasses.

[c] Frozen goat meat from Australia, of uniform weight and quality, is valued at approximately U.S. $2,100 per ton.

Table 19—Production of sheepskins and goatskins, by province, 1972-79

Province	1972	1973	1974	1975	1976	1977	1978	1979
				(1,000)				
Nyanza	315	398	377	483	514	624	637	567
Sheep	156	166	165	212	215	258	253	235
Goats	159	232	212	271	299	366	384	332
Western	62	98	91	98	195	314	354	248
Sheep	34	54	46	40	62	116	105	77
Goats	28	44	45	58	133	198	249	171
Central	134	162	238	172	204	212	203	239
Sheep	87	105	149	104	114	120	116	134
Goats	47	57	89	68	90	92	87	105
East	463	636	721	855	1,228	1,034	1,067	1,208
Sheep	158	194	213	271	404	378	338	391
Goats	305	442	508	584	824	656	729	817
North Eastern	92	138	176	236	254	252	401	542
Sheep	48	77	100	122	123	135	218	316
Goats	44	61	76	114	131	117	183	226
Coast	117	136	142	158	212	164	266	212
Sheep	28	23	28	28	45	45	69	67
Goats	89	113	114	130	167	119	197	145
Rift Valley	535	665	785	677	1,069	1,113	1,275	1,250
Sheep	225	277	315	294	457	454	526	516
Goats	310	388	470	383	612	659	749	734
Nairobi	...	...	...	...	12	17	54	32
Sheep	...	...	...	...	6	5	20	21
Goats	...	...	...	...	6	12	34	11
Total sheep	736	896	1,016	1,071	1,426	1,510	1,645	1,760
Total goats	982	1,337	1,514	1,603	2,262	2,219	2,612	2,541
Total	1,718	2,233	2,530	2,674	3,688	3,729	4,257	4,301

Source: Data provided by the Kenya Ministry of Livestock Development.

Table 20—Average dressed carcass weights of sheep and goats and actual and deflated prices paid by the Kenya Meat Commission, 1964-79

Year	Nairobi Middle-Income Price Index (1972=1.00)	Sheep			Lambs			Goats		
		Weight	Actual Price	Deflated Price	Weight	Actual Price	Deflated Price	Weight	Actual Price	Deflated Price
		(kilograms)	(KSh/kilogram)		(kilograms)	(KSh/kilogram)		(kilograms)	(KSh/kilogram)	
1964	0.83	13.2	2.68	3.21	17.2	4.99	5.98	12.2	1.06	1.27
1965	0.83	14.1	3.04	5.68	17.2	5.65	6.85	11.7	1.12	1.36
1966	0.84	16.3	3.30	3.94	17.7	5.59	6.67	11.0	2.47	2.95
1967	0.85	15.5	3.56	4.17	17.7	5.74	6.73	10.0	3.46	4.06
1968	0.86	17.0	3.37	3.90	16.0	5.47	6.32	10.0	3.20	5.70
1969	0.87	17.0	3.43	3.93	15.0	4.40	6.18	10.0	3.46	3.96
1970	0.89	17.0	3.73	4.18	14.0	5.34	5.99	10.0	3.51	3.93
1971	0.93	13.0	3.81	4.11	13.0	5.52	5.94	11.0	3.76	4.05
1972	1.00	11.0	4.14	4.14	13.0	5.32	5.32	10.0	4.26	4.26
1973	1.07	11.0	4.69	4.39	16.0	5.61	5.25	10.0	4.96	4.64
1974	1.25	16.0	5.02	4.02	16.0	7.40	5.93	10.0	5.02	4.02
1975	1.42	16.0	5.37	5.79	16.0	7.84	5.54	11.0	5.37	3.80
1976	1.64	16.0	5.13	3.13	16.0	7.84	4.78	12.0	5.13	3.13
1977	1.96	16.0	5.28	2.69	17.0	7.59	3.87	12.0	5.28	2.70
1978	2.00	16.0	10.17	5.14	16.0	11.23	5.68	11.0	8.43	4.26
1979	2.12	16.0	10.58	5.00	14.0	12.00	5.67	11.0	8.71	4.11

Source: A. John De Boer, *Sheep and Goat Development Project, Kenya: Production Economics* (Rome: Food and Agriculture Organization of the United Nations and the United Nations Development Programme, 1981).

Note: Weights are figured in kilograms of cold dressed weight.

years. The KMC's declining share, then, suggests that prices have been rising more rapidly in unofficial markets than in official markets (KMC). Because the KMC is the only official exporter, this trend has discouraged exports, although in 1983 a few private companies were licensed to export small quantities.

Thus there has probably been a sharp increase in consumption of sheep and goat meat in Kenya, with one estimate of an increase from 3.6 to 4.7 kilograms per capita from 1970 to 1975.[91] With sheep and goat consumption in 1975 estimated at 4.7 kilograms per person in a population of 13 million, total consumption in 1975 was 61,000 tons, which is 43 percent of the estimated beef output in that year.[92]

Demand for sheep and goat products is closely related to the availability and price of beef and of pig and poultry meat. Based on the middle demand estimate, and on a 20 percent increase in the real price of beef by 1990, the demand for sheep and goat meat will be 134,000 tons by 1990, or 2.2 times that of 1975, so that production must increase by 5.4 percent compounded per year just to keep up with the domestic demand.[93] Without any change in the real price of beef, production would have to double between 1975 and 1990 to keep up with domestic demand, or increase at a compound growth rate of 5 percent per year. To begin to export significant amounts of sheep and goat meat on top of such large domestic demand projections will require both a large increase in the availability of alternatives at competitive prices—beef and white meat—and a sufficiently large increase in productivity, so that growth in supply exceeds growth in demand. Factors governing growth of beef production were considered above, but the problems associated with growth of white meat production are beyond the scope of this paper.

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[91] Chemonics International, Consulting Division, "Livestock and Meat Industry Development Study."

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The potential to achieve a growth in production of more than 5 percent per year for sheep and goats will now be considered.

Policies and Programs to Increase Production

There is little scope to increase sheep and goat productivity in the short to medium term by increasing the size of the national flock. The area of land available for agricultural use is expected to fall from 50.4 million hectares to 48.8 million hectares between 1975 and 1990.[94] There are parts of the large farm and southern range areas of Tana River, Lamu, and Kwale districts where the herds appear to be far smaller than the land's carrying capacity. The major constraint on development of this land is institutional. It has been divided into large farms but neither capital inflow nor intensive management has been applied to its development. The problems in development of the various forms of cooperative, private, and group ranches have been studied extensively at the Institute of Development Studies (IDS) and elsewhere, but without reform of the landholding system, little progress is likely to be made.[95]

Ways of increasing productivity of the existing flock and estimates of their potential contributions are shown in Table 21. The most important factor is to cut back on surplus males in the flocks and to increase the number of females. Although the proportion of males in the flocks of the Maasai tribe may now be close to the norm of 6 to 7 percent in some areas, a study in Kajiado in 1981 suggested that offtake rates for sheep and goats in that district could be 20 percent higher.[96] The northern tribes, such as the Samburu and Turkana, are still holding close to 40 percent of the adult flock in males, but they will probably adjust gradually as economic pressures on their communities build up.[97] Improved marketing arrange-

ments such as auctions, and increased availability of consumer goods on which the pastoralists can spend earnings from livestock sales are likely to accelerate this process. In recent experiments in Machakos and Kitui, auctions have raised prices by as much as 50 percent.[98] Auctions are also an ideal place to provide information and veterinary drugs to nomads and to demonstrate the benefits of improved management practices. For pastoralists to be willing to reduce holdings of male animals, however, which they keep as a food stock for use in years of low food supplies, adequate supplies of maize for human consumption must be available in these remote markets, even in the worst drought years. This has important implications for national storage policy.

A second important way to increase flock productivity is to increase weight gain per unit of feed intake. The FAO work has shown that this is primarily a function of disease control in both the range and smallholder areas.[99] Disease control not only increases weight gain per unit of feed in an animal but also in the subsequent three generations produced by that animal. It results in a large outward shift of the production function relating animal live weight to feed intake (see Figure 4). The major diseases requiring control are trypanosomiasis (tryps) in goats and roundworm infestation in sheep. Control of either requires use of imported veterinary drugs. Roundworms are controlled by worming sheep every 10 days to 2 weeks, and tryps by dipping goats every 2 weeks. The major constraints on disease control, then, are the availability of drugs in the field and farmers' willingness to administer them as often as necessary.

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[94] Ibid.

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[96] White and Meadows, *An Estimate of the Supply of Immatures from Kenya's Northern Rangelands.*

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1972	1.00	11.0	4.14	4.14	13.0	5.32	5.32	10.0	4.26	4.26
1973	1.07	11.0	4.69	4.39	16.0	5.61	5.25	10.0	4.96	4.64
1974	1.25	16.0	5.02	4.02	16.0	7.40	5.93	10.0	5.02	4.02
1975	1.42	16.0	5.37	5.79	16.0	7.84	5.54	11.0	5.37	3.80
1976	1.64	16.0	5.13	3.13	16.0	7.84	4.78	12.0	5.13	3.13
1977	1.96	16.0	5.28	2.69	17.0	7.59	3.87	12.0	5.28	2.70
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[97] Food and Agriculture Organization of the United Nations, Small Ruminants Project, personal communication, October 1981.

[98] Ibid.

[99] Ibid.

Table 21—Estimated production of edible protein from sheep and goats and the effects on total production of improvements in the flock

Variable	Flock Structure				Share of Flock Slaughtered			Protein
	Adult Female	Adult Male	Young	Total	Total	Adults	Female	
	(1,000)				(percent)			(1,000 metric tons)
1. Existing national flock in 1975	5,363	1,267	5,329	11,959	23	41	50	53.6
2. Converting surplus males to females	6,468	258	6,468	13,194	25	49	50	64.7
3. Achieving proper growth	5,363	1,267	5,329	11,959	23	41	50	94.5
4. Offtake of 95 lambs per 100 ewes[a]	5,363	1,267	5,363	11,993	42	77	95	102.0
5. Combining 2, 3, and 4 above	6,468	258	6,468	13,194	47	92	95	232.0
6. Achieving offtake of 120 lambs per 100 ewes[b]	6,221	249	7,780	14,250	53	117	120	311.0

Source: A. John De Boer, *Sheep and Goat Development Project, Kenya: Production Economics* (Rome: Food and Agriculture Organization of the United Nations and the United Nations Development Programme, 1981).

Notes: The estimates in (5) are based on the performance of Red Maasai sheep at the Naivasha National Animal Husbandry Research Station. The estimates in (6) are based on the performance of Dorper sheep at the Naivasha National Animal Husbandry Research Station, and on a flock structure reduced by 10 percent to allow for increased forage requirements.

[a] Five percent of lambs are retained for replacement of lost ewes.

[b] Eight percent of lambs are retained for replacement of lost ewes.

reorganized over the years, with a separate Ministry of Livestock Development from 1979 to 1983, it is difficult to determine what long-term changes have been made in allocations to veterinary services in recurrent expenditures of the government, and in particular those to sheep and goats. But there is evidence that allocations for transport for Ministry field officers have dropped sharply.[100] The share of the total budget allocated to veterinary services will have to increase, if production is to expand enough to ensure a surplus for export. Much of the increase should go to vehicles, fuel, and drugs. It would be easier to justify foreign exchange allocations to the livestock sector if the sector could be shown to earn foreign exchange itself. This is an argument not from economic theory but from political reality.

The third way to raise flock productivity is to increase "twinning rates" by improvement in the quality of the breeding stock. This is probably the largest potential source of increased production from the existing flock size (Table 21). The major breed improvements for sheep are crosses between upgraded Dorper and local Red Maasai stock for meat and between Hampshire rams and Corriedale ewes for wool and meat in highland areas. Improved stock has been made available from government research stations, but sales are low relative to sales from private flocks, which in 1981 had more than 12,000 Dorper rams.[101] The major constraint on developing this source of productivity growth is the absence of price incentives to encourage pastoralists to purchase the Dorper rams. The problem of expanding the sales of improved stock is also in part a problem of government resources, because the Ministry of Livestock Development is the only institution breeding to improve the stock, although many private ranches sell young stock of existing improved breeds. Thus a substantial increase in the resources allocated to breeding stations will be required for a long-term sustained

[100] David K. Leonard, "Administrative Issues in Implementing Kenya's Food Policy," a paper presented at the National Food Policy Seminar, July 1982.

[101] Food and Agriculture Organization of the United Nations, Small Ruminants Project, personal communication, October 1981.

Figure 4—Mean growth rates of Red Maasai sheep in Naivasha under improved management compared to the same breed in Kitui and Narok districts
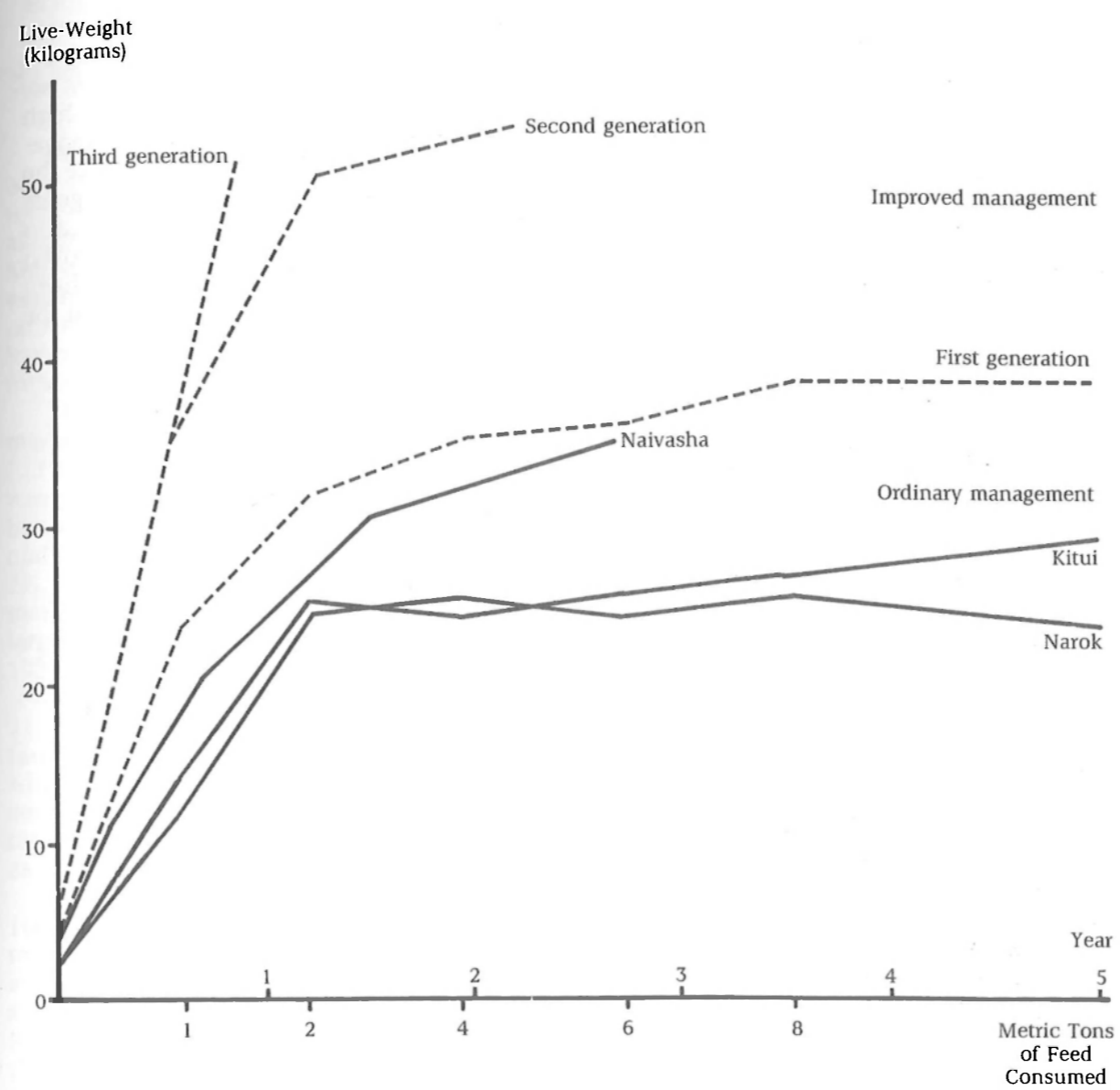
Source: Data provided by the Ministry of Livestock Development of Kenya, Small Ruminant Research Project, Kabete, Nairobi, 1982.

increase in flock productivity from improved breeds.

In 1980 an FAO study suggested that exports could be initiated slowly by allowing the export of just 140,000 sheep and goats per year.[102] This amounts to only 1.5 percent of estimated national consumption of sheep and goat meat, or 0.6 percent of total red meat consumption. The estimated impact on prices was a 5 percent rise in the price of sheep and goat meat and a 2 percent rise in the price of total red meat supplies.[103] The study recommends a broad distribution of export licenses to private traders, as well as to the KMC, and a minimum export price control to guarantee returns of foreign exchange.

An alternative approach would be to permit the KMC to export 5,000 tons of chilled sheep and goat meat initially, by airfreight,

[102] Reusse, "Consultant's Report on the Potential Export of Kenyan Sheep and Goats."
[103] Ibid., p. 9.

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but to limit them to the export of male Dorper-Red Maasai cross animals less than 14 months old and more than 30 kilograms in weight. (It is possible for a trained person to distinguish the pure Dorper breed from the Dorper-Red Maasai cross.) By limiting exports to males of this cross, the breeding stock would be protected and ranches, estates, and pastoralists would be encouraged to breed improved stock. It would also ensure that exports would be associated with rising productivity and thus help to restrict the effect on local prices.

In summary, Kenya has greater potential for supplying markets in the Gulf States and Iran with sheep and goats (live or as meat) than with beef. As domestic border prices were 33 percent below export parity prices in 1981/82, local sheep and lamb prices could be raised substantially to increase producer incentives without threatening the competitiveness of the local industry. Also, the short period between births, the high proportion of twinning under good management, and the rapid gain in weight, make the supply elasticity higher for sheep and goats than for beef. More frequent births also make possible faster selection for improved breeds. This suggests that exports of sheep and goats, live and as meat, should be gradually liberalized.

7

SUGAR AND MAIZE

Sugar and maize are examined together because a key policy issue in Kenyan agriculture is the balance to be maintained in land allocation between these two crops in western Kenya. Also, both exemplify the problem of exporting relatively low-value, high-volume commodities from areas far from the port in low-income countries with poorly developed infrastructure.

The structure of production and the marketing channels of sugar and maize differ. In 1982/83, 27 percent of the sugar produced was grown on estates owned and operated by the factories, 16 percent on large farms, and 57 percent on smallholdings (see Table 22). Part of the smallholder production is marketed through cooperatives, whereas most large farms sell directly to the factories. In 1982/83, 26 percent of the 97,300 hectares sown with sugarcane was on factory estates, 21 percent on farms of individual large farmers, and 53 percent on smallholdings, which usually belonged to cooperatives or settlement projects. More than 25,000 hectares of smallholder sugarcane are registered as the Mumias Outgrowers Company.[104]

The government owns between 75 and 100 percent of the equity of each of the six main sugar factories.[105] Overall coordination and control of the industry is exercised by a small team in a Nairobi-based parastatal, the Kenya Sugar Authority (KSA), which is under the Ministry of Agriculture. The head of the Crops Production Division in the Ministry is also responsible for licensing the 120 or so privately owned jaggery (brown sugar) factories, but these are not permitted within a 26 kilometer radius of the white sugar factories to avoid competition with them.

Maize is also sold to a parastatal, the National Cereals and Produce Board (NCPB), formerly the Maize and Produce Board. Maize production is highly concentrated in 10 districts. However, not all maize marketed is sold to the NCPB; the proportion varies sharply from year to year depending on prices paid by the NCPB relative to prices in the informal market. The proportion marketed does not increase monotonically by farm size, and there are important differences between farm-size groups in type of maize sold. In 1974/75, 25 percent of the total marketed surplus was produced on farms of less than 2 hectares, and 78 percent of this was traditional varieties. Only 20 percent of the marketed surplus came from farms of more than 5 hectares and 73 percent of this was hybrid maize (see Table 23).

The NCPB, which is also accountable to the Ministry of Agriculture, is the only legal purchaser of maize except what is "sold or bartered by a producer in the district in which it has been grown, to an individual in the same district, for the latter's consumption, or that of his family in the said district."[106] Thus in theory the informal market should be extremely small. However, for one year in 1977/78 a maize glut led to a change whereby millers and traders were allowed to buy directly from farmers, and purchases by millers were 40 percent as large as those of the NCPB. Until 1979/80, the Maize and Produce Board hired local traders to transport the maize to its storage facilities and deducted the cost of KSh 3.50 from farmers' payments. Since 1980/81, the NCPB has established its own collection points and has borne the cost of transport from the collection centers to its main depots, which in effect has raised the price to the grower. In years of poor crops, prices paid to farmers by private traders are often 200 to 300 percent higher than those paid by the NCPB in rural markets.[107] The lack of effective police supervision in rural areas has permitted this substantial informal market to develop. The

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[104] Data provided by the Kenya Sugar Authority, August 1983.

[105] Kenya, Working Party on Government Expenditures, *Report and Recommendations*, p. 94.

[106] Kenya, Laws of Kenya, *The Maize Marketing Act*, revised ed., Chapter 338 (Nairobi: Government Printer, 1972), p. 7.

[107] Data on maize prices in informal markets have been published monthly since 1977 in Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Monthly Bulletin of Statistics*, various issues.

Table 22—Sugarcane production, by type of grower, 1978-82

Farm Type	1978	1979	1980	1981	1982[a]
			(metric tons)		
Factory estates	626,467	920,595	924,978	839,423	847,422
Large farms	282,260	379,618	555,927	675,694	496,874
Smallholders	846,854	1,228,876	1,772,264	1,720,520	1,331,724
Cooperative societies	351,079	231,680	310,762	260,831	165,530
Settlement schemes	242,548	386,811	408,348	325,512	266,186
Total	2,349,208	3,147,580	3,972,279	3,821,980	3,107,736

Source: Unpublished data from the Kenya Sugar Authority.

[a] The figures for 1982 are provisional.

government fixes maize prices in an annual price review. It also decides other important parameters, such as who pays transport and drying costs, although these are not usually included in the price review process.

Sugar

Export Market Potential

Kenya's sugar production tripled between 1970 and 1980 (see Table 24). As a result, Kenya changed from being a net importer of 21,000 tons in 1970 to being a net exporter of 95,000 tons in 1980, despite a large increase in consumption during the 10 years. In 1980 Kenya exported 56,000 tons of "plantation white" sugar, with a value of U.S. $28.2 million. Of the principal countries buying this sugar, Sri Lanka purchased 40,000 tons, Sudan, 13,000 tons, and Djibouti, 2,500 tons.[108] In addition, Kenya exported 92,000 tons of molasses with a value of U.S. $6.6 million, mainly to the United Kingdom. Kenya did not export any sugar to the EC: as a traditional importer, Kenya received a quota of only 93 tons under the Lomé Convention.[109]

There is a potential market for Kenyan sugar exports in the oil-exporting countries of Africa and the Middle East, but because these countries generally import refined white sugar, rather than the less refined "plantation white" quality, additional capital investment in refining capacity would be required in those factories that would produce for the export market. The four major oil-producing countries importing sugar are Iran, Iraq, Algeria, and Indonesia. In 1979 these four countries together constituted 10 percent of the total world market in sugar and more than 25 percent of the Third World market.[110] For Kenya to export to these markets it would have to compete with the world's major exporters of sugar. In 1979 these were Cuba, with 25 percent of world exports; France, 9 percent; Australia, 8 percent; Thailand, 5 percent; and the Philippines, 5 percent. Note, however, that the major suppliers to Indonesia in this period were all Third World countries: India, 33 percent; Brazil, 19 percent; and Cuba, 18 percent.[111]

Long-Term Prices and Production Costs

The long-term international sugar price, estimated at constant 1981 prices, is U.S. $372 per ton.[112] The World Bank points out two factors that could undermine the prospects for developing-country exports in the long run. The first is the large and growing exports of the EC. The EC was a net importer—of 1.76 million tons in 1975—but became a net ex-

[108] Kenya, Ministry of Finance, Statistical Branch, Customs and Excise Department, *Annual Trade Report, 1980.*

[109] K. Dankowski, R. Barth, and Guntwin Bruhns, *Zuckerwirtschaftliches Taschenbuch 1979/80* (Berlin: Verlag Dr. Albert Bartens, 1979), p. 41.

[110] International Sugar Organization, *Statistical Bulletin,* various issues, 1980.

[111] Ibid.

[112] World Bank, *Price Prospects for Major Primary Commodities,* 2: 53.

Table 23—Marketed surplus of maize, by farm size group, 1974-75

| Farm Size | Traditional Varieties | | | | Hybrid Varieties | | | | Total | |
	Area Sown[a]	Yield	Share Sold[b]	Quantity Sold[b]	Area Sown[a]	Yield	Share Sold[b]	Quantity Sold[b]	Total Quantity Sold[b]	Share of Total Sales[b]
(hectares)	(1,000 hectares)	(metric tons/ hectare)	(percent)	(1,000 metric tons)	(1,000 hectares)	(metric tons/ hectare)	(percent)	(1,000 metric tons)		(percent)
Less than 0.5	79.2	0.72	19.2	10.9	24.8	1.81	38.3	17.2	28.1	4.3
0.5 – 0.9	143.7	1.51	52.0	112.9	39.6	1.45	42.8	24.5	137.4	20.8
1.0 – 1.9	306.2	0.84	46.0	117.9	79.5	1.11	29.4	25.9	143.8	21.8
2.0 – 2.9	217.2	0.72	44.4	69.8	66.8	0.93	41.2	25.6	95.4	14.5
3.0 – 3.9	139.5	0.39	32.7	17.8	52.0	0.70	13.0	4.7	22.5	3.4
4.0 – 4.9	109.1	1.18	62.9	81.0	44.8	1.09	42.6	20.7	101.7	15.4
5.0 – 7.9	138.8	0.42	45.4	26.3	110.2	1.01	34.3	38.1	64.4	9.8
8.0 or more	60.9	0.42	35.4	9.0	83.0	1.22	57.0	57.7	66.7	10.1
Total	1,194.6	0.80	47.6	445.6	500.8	1.10	37.9	214.4	660.0	100.1

Source: Kenya, Ministry of Finance and Planning, Central Bureau of Statistics, *Integrated Rural Survey 1974-75, Basic Report* (Nairobi: Government Printer, 1977).

Note: Vertical and horizontal totals may differ slightly because of rounding.

[a] This includes area planted in mixed stand with maize and beans.

[b] The percent sold was calculated as all produce not consumed. This slightly exaggerates the quantity sold because a small amount is retained for seed.

porter—of 2.67 million tons—by 1980; net exports are estimated to rise to 4.5 million tons by 1985 and to 5.8 million tons by 1990. In 1980 EC gross exports of 5.1 million tons represented nearly 20 percent of gross exports by main countries and economic regions.[113]

Although the World Bank expects the growth of EC exports to slow from 10 percent per year in the 1970s to 4 percent per year in the 1980s, the EC is expected to keep its share of world exports, which is about 20 percent. Under the sugar protocol, countries that exported sugar to the United Kingdom under the Commonwealth Sugar Agreement were given a duty-free quota of 1.3 million tons into the EC when the United Kingdom joined. For this reason, EC imports are unlikely to fall below this, so that rising production surpluses in the EC will be exported rather than used to displace imports. Given that demand is highly inelastic with respect to price, a 10 percent increase in traded world sugar supplies may well lower the international price by more than 10 percent.

A second factor detrimental to developing-country export prospects is the rapid growth of production of a sugar substitute made from maize, called high fructose corn syrup. The United States and Japan are expected to increase production of this sweetener from 2.4 million tons in 1980 to 5.5 million tons in 1990.[114] Largely as a consequence of these two factors, the World Bank sees no real increase in international sugar prices up to 1995 despite expectations of a large increase in demand from Third World countries.

International sugar prices fluctuate greatly around the trend. Kenya's price at the factory and the world market price are shown in Table 25 for the period 1971-80. The world price is for raw sugar, which always lies a few percentage points below the market price for the plantation white sugar that Kenya currently produces. In 6 out of the 11 years from 1971 to 1981, the international sugar price was above the price paid by the government to the factories in Kenya. When the cost of transport is added to the factory cost, the domestic border price is substantially greater. For example, in September 1981, the cost of moving sugar to the coast was U.S. $52 per ton, which was 18 percent of the factory

[113] Ibid., 2: 69 and 70.
[114] Ibid., 2: 60.

Table 24—Kenya's sugar production, consumption, and trade, 1970-82

Year	Population	Production	Imports	Consumption	Exports	Area Under Cane[a]	Per Capita Consumption
	(millions)		(1,000 metric tons)			(1,000 hectares)	(kilograms/year)
1970	11.2	131	21	162	...	n.a.	14.5
1971	11.7	107	72	183	...	n.a.	15.6
1972	12.1	90	104	195	...	43.2	16.1
1973	12.5	138	77	217	...	45.2	17.4
1974	12.9	164	71	224	...	47.2	17.4
1975	13.4	160	13	195	...	48.9	14.6
1976	13.8	167	45	197	...	50.2	14.3
1977	14.3	181	36	224	...	60.5	15.7
1978	14.8	238	46	251	...	66.6	16.9
1979	15.3	296	13	253	2.0	87.8	16.5
1980	15.9	401	2	300	94.7	n.a.	18.9
1981	16.5	367	2	324	69.1	n.a.	19.6
1982	17.2	307	...	328	18.3	97.3	19.1

Source: Unpublished data from the Kenya Sugar Authority.
Note: Where n.a. appears, the data were not available.

[a] Refers to crop year, that is, the 1972 figure is for 1972/73, and so forth.

cost, or 16 percent of the domestic border price (Table 26).

The relatively high indirect taxation on sugar production pushes up the domestic costs of production. The major cost components in sugarcane production are shown in Table 27. Nearly 50 percent of cane cost is in transport and field machinery costs, and 26 percent in fertilizer and chemicals. High road taxes contribute to the high transport costs. The rate of taxation on 7- and 12-ton trucks in early 1982 was 26 percent (Table 28). This tax encourages intermediate technology, such as bullock carts, that saves

Table 25—Kenya's sugar production costs and world sugar prices, 1971-81

Year	Kenya Factory Price[a]	Exchange Rate	Converted Kenya Factory Price	World Price[b]	World Price in Relation to Kenya Factory Price
	(KSh/metric ton)	(KSh = U.S. $1)		(U.S. $/metric ton)	
1971	1,080	7.14	151	99	−52
1972	1,080	7.14	151	160	+9
1973	1,230	6.90	178	208	+30
1974	1,230	7.14	172	653	+481
1975	1,860	8.25	225	448	+223
1976	2,300	8.31	277	253	−24
1977	2,800	7.95	352	178	−174
1978	2,800	7.40	378	172	−206
1979	2,800	7.33	382	212	−170
1980	2,800	7.57	370	631	+261
April 1981	3,050	8.45	361	480	+119
September 1981	3,050	10.42	293	320	+27

Sources: Data on the Kenya price at the factory were supplied by the Kenya Sugar Authority. The exchange rate is from the selected foreign exchange mean rates in Central Bank of Kenya, *Economic and Financial Review* 14 (October-December 1981). The world price is taken from International Sugar Organization, *Statistical Bulletin*, various issues.

[a] The factory price is the price fixed by the government at which the factory sells processed white sugar to the Kenya National Trading Corporation.

[b] The International Sugar Organization's world price refers to the price f.o.b. or stowed at main Caribbean ports.

Table 26—Estimated costs of moving sugar from the farm to the port of Mombasa, 1981/82

Transportation Cost Component	Cost
	(KSh/ metric ton)
Bags[a]	174
Rail transport from sugar factory to Mombasa	300
Wharf and handling[b]	18
Insurance (1 percent of f.o.b. value)[c]	26
Interest (14 percent of f.o.b. value for 1 month)[c]	31
Total	549
Total in U.S. dollars	52.30

Sources: The cost of bags comes from a personal communication from the Ministry of Agriculture. The cost of transport from sugar factory to Mombasa was given by Kenya Railways, and the wharf and handling charges are taken from Kenya Ports Authority, "Tariffs of Rates and Charges for Wharfage Handling and General Services," *Tariff Book No. 2, Effective 1 July 1982* (Nairobi: Kenya Ports Authority, 1982).

[a] Sugar is exported in bags. The figure used here is the cost of 11 new bags (the number needed for 1 metric ton) with polythene liners. Each bag costs KSh 12.85 and the liner is an additional KSh 3.00.

[b] This is the minimum charge, assuming that there are no late document charges, no transfer of cargo in the port area, no hiring of equipment, nor any other additional charges.

[c] The costs of insurance and interest are based on an f.o.b. value of U.S. $120 per metric ton, with U.S. $1.00 equaling KSh 10.5.

foreign exchange, but it also helps to make low-value, bulky agricultural exports uncompetitive in world markets.

Assumptions were required for some parts of the sugar production process, because there was not enough time to collect data for detailed estimates. The average rate of taxation on heavy agricultural machinery was assumed to be 20 percent, which is lower than that for 12-ton trucks, because import duty for most agricultural machinery is lower. There are no taxes on imported fertilizers or chemicals, but a 5 percent implicit tax component is added to cover transport costs and packaging materials. Based on the relative weights attached to production inputs in Table 27, this gives a total indirect tax rate on sugarcane production of 13 percent.

The tax on sugarcane processing and transport to the coast is more difficult to estimate. Aldington estimates approximately 50 percent of processing costs are items with a large import component, such as machinery (including both depreciation and spare parts), oil, chemicals, road maintenance, and so forth.[115] Assuming an average tax rate of 20 percent on operating this machinery as with agricultural machinery and given that these elements represent half of total processing costs (Table 26), the rate of taxation for processing would be about 10 percent. As the sugar is transported to the point of exit on the railways, only a 5 percent indirect tax is assumed because there is no duty and sales tax rate applicable to imported engines or rolling stock. Thus the overall tax rate for sugar produced for export is estimated at about 10 percent; further research should estimate this more precisely. Given that in September 1981 the cost of Kenya sugar was U.S. $293 per ton at the official exchange rate (Table 25), plus U.S. $52 for transport (Table 26) and less U.S. $30 in indirect taxes (as estimated above), the domestic border price net of tax would have been U.S. $315. This is 15 percent below the long-term equilibrium sugar price to 1995 at the constant 1981 price of U.S. $372 estimated by the World Bank. Thus Kenya can probably export sugar competitively at long-term international prices.

Potential to Lower Production Costs

High sugar yields are another indicator of Kenya's ability to compete effectively in the international sugar market. Current yields reflect the suitability of the climate and soil conditions in the growing area, the adoption of high-yielding varieties, and the improved agronomic practices used by farmers. Yields vary widely among Kenya's eight factories, so that average yields at Mumias are three or four times higher than at Ramisi (Table 29). Yields of farm area attached to factories in western Kenya compare favorably with those in Maharashtra in western India, which has a similar length of growing season. Maharashtra

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[115] T. J. Aldington, "Domestic Resource Costs," Nairobi, 1979 (mimeographed).

Table 27—Estimates of the domestic resource costs of sugar production, 1978

Production Cost Component	Total Costs		Foreign Exchange Costs		Domestic Costs		
	Area	Volume	Share from Foreign Exchange	Cost in Foreign Exchange	Share from Domestic Resources	Opportunity Cost Weight	Opportunity Cost of Domestic Resources
	(KSh/hectare)	(KSh/metric ton)	(percent)	(U.S. $/metric ton)	(percent)		(KSh/metric ton)
Cane							
Field machinery	1,412.00	6.28	60.0	0.50	40.0	1.20[a]	3.01
Seed treatment	103.00	0.46	60.0	0.04	40.0	1.20[a]	0.22
Planting	303.45	1.35	100.0	0.18	...	...	...
Labor	2,757.30	15.28	...	...	100.0	0.55[a]	8.40
Fertilizer	1,776.10	7.89	77.0	0.81	23.0	0.90[a]	1.63
Transport	...	27.00	60.0	2.16	40.0	1.20[a]	12.96
Interest (10 percent)	...	3.42	...	...	100.0	1.00	3.42
Land opportunity cost	880.00	3.91	...	...	100.0	1.00	3.91
Total	7,231.85	65.59	42.2	3.69	57.8[a]	...	33.55
White sugar							
Cost of cane	...	655.90	42.2	36.90	57.8[a]	0.88[a]	335.50
Processing	...	1,238.74	52.8	87.19	47.2[a]	0.99[a]	580.77
Transport to coast							
Sugar	...	347.00	49.4	22.84	50.6[a]	1.04[a]	182.65
Molasses	...	234.00	57.7	18.05	42.3[a]	1.17[a]	115.82
Total	...	2,475.64	50.0	164.98	50.0	0.99[a]	1,228.57

Source: Derived from data contained in T. J. Aldington, *Domestic Resource Costs* (Nairobi: Government Printer, January 1979).

Notes: The exchange rate assumed is U.S. $1.00 = KSh 7.5. The planting costs incurred are for the sugarcane used for planting. This can be regarded as a foreign exchange cost because the cane used for planting would otherwise have been processed and exported.

[a] This is the weighted average of estimates for components that make up these costs.

averaged 65.9 tons per hectare in 1976/77 and 85 tons per hectare in 1978/79.[116] Kenya's sugarcane yields are even more remarkable in view of the limited resources allocated to sugarcane research.

There is still considerable scope to increase yields through improvements in water control, input delivery, and extension services. Average yields of estates, at 300 tons per hectare over a 60-month cycle, were 70 percent higher than those of smallholders in 1980/81.[117]

The impression that production costs are low in Kenya has been supported by a comparison of international production costs.[118] But this apparent technical superiority has to be examined in the context of input use and overall cost increases to analyze whether it reflects a genuine comparative advantage.

Kenya may also be able to lower long-term costs by reducing finance, factory maintenance, and transport costs. Because all but two of Kenya's factories have been built since 1965, capital costs have not yet been written off. Transport costs are also high: 50 percent of cane production costs are for transport and field machinery (Table 27). Initial experiments to reduce these costs by replacing trucks and machinery with bullock labor have been encouraging, at least for weeding between rows.[119] But because the main cost of bullock labor is the opportunity cost of land to produce the feed required, further analysis is needed. Finally, an increased domestic capability to manufacture spare parts would reduce the number of spares that need to be kept in stock and perhaps also reduce their cost.

[116] India, Ministry of Agriculture and Education, Department of Economics and Statistics, *Estimates of Area and Production of Principal Crops in India, 1978/79* (New Delhi: Controller of Publications, 1980).

[117] Kenya Sugar Authority, personal communication, 1982.

[118] Connell, Rice and Co., *World Sugar: Capacity, Cost and Policy* (Westfield, N.J.: Connell, Rice and Co., 1977).

[119] Kenya Sugar Authority, personal communication, 1982.

Table 28—Estimate of the tax rate paid by the road transport industry, 1981/82

Item of Expenditure	7-Ton Truck		12-Ton Truck		Tax Rate
	Operating Cost	Tax	Operating Cost	Tax	
	(KSh/kilometer)				(percent)
Depreciation[a]	0.81	0.27	1.02	0.35	. . .
Fuel[b]	1.73	0.41	1.85	0.44	23.7[h]
Insurance[c]	0.30	. . .	0.45	. . .	. . .
Spare parts[d]	0.60	0.32	0.69	0.37	34.0[i]
Labor	0.24	. . .	0.28	. . .	. . .
Labor for servicing	0.12	. . .	0.12	. . .	. . .
Tires[e]	0.45	0.14	0.75	0.23	30.0[j]
Road tax[f]	0.03	0.03	0.03	0.03	. . .
Interest (15 percent)[g]	0.24	. . .	0.30	. . .	. . .
Total	4.52	1.17	5.49	1.42	25.9

Sources: Data on insurance, servicing, and spare parts are from records of a major road freight and forwarding company of Nairobi. The rates of duties and sales taxes are from Kenya's Custom and Excise Act of 1978 and the Finance Bill, which was published in the *Kenya Gazette Supplements* for June 1978, June 1979, June 1980, and June 1981.

Notes: The costs are calculated assuming that the trucks go 100,000 kilometers each year. Total taxes placed on the trucks are 34 percent. This assumes that the user paid KSh 323,000 for a 7-ton truck and 406,000 for a 12-ton truck. With a sales tax rate of 15 percent, deductions of 7.5 percent for the profit of the importer and 10 percent for the cost of the chassis, and a duty of 40 percent, the total tax is KSh 109,990 for a 7-ton truck and KSh 138,259 for a 12-ton truck.

[a] Depreciation is assumed to be a straight 25 percent each year for four years.

[b] Fuel is assumed to cost KSh 5.18 per liter. Fuel consumption is assumed to be 3 kilometers per liter for a 7-ton truck and 2.8 kilometers per liter for a 12-ton truck.

[c] The insurance on a 7-ton truck is assumed to be KSh 30,000 and on a 12-ton truck, KSh 45,000.

[d] The costs of servicing a 7-ton truck are KSh 8,000 a month; KSh 5,000 of this is for spare parts. It is assumed that the costs for a 12-ton truck are 15 percent higher. This is because it would carry heavier loads (the engines of the two kinds of trucks are the same size).

[e] It was assumed that 1.5 sets of retreads and 1.5 sets of new tires are bought for each truck each year. A 7-ton truck has 6 wheels; a 12-ton truck, 10. So if a new tire costs KSh 5,500 and a retread, KSh 2,000, the total cost of tires would be KSh 45,000 for a 7-ton truck and KSh 75,000 for a 12-ton truck.

[f] The road tax is KSh 3,000 per year.

[g] Interest can be defined as the opportunity cost of capital tied up in the vehicle. Under this definition, the interest falls as the vehicle depreciates. As it is assumed that the vehicle is written off after 4 years, interest here is the opportunity cost of the capital in the vehicle when it is 2 years old and worth half of what it was new.

[h] The duty on diesel fuel is KSh 440 per 1,000 liters and the sales tax is KSh 787 per 1,000 liters, for a total tax of KSh 1,227 per 1,000 liters, which is 23.7 percent of the pump price.

[i] The taxes on spare parts are the same as the taxes on the trucks themselves, that is, the duty is 40 percent, and the sales tax, 15 percent, which gives a total tax of 34 percent.

[j] The sales tax on both new tires and retreads is 15 percent. The duty on the raw materials that go into new tires is 30 percent. The duty on the machinery and spare parts used for retreads is 20 percent. So the tax rate on all tires is 30 percent.

New Factory Capacity

Although Kenya is expected to have some excess factory capacity between 1981 and 1989, none is expected after 1989 unless factory capacity is expanded. Capacity is expected to reach 481,500 tons in the early 1980s and could increase to 520,000 tons by 1988 by extending existing factory capacity. In addition, a new factory may be built at Busia. This growth in production is not expected to keep up with growth in consumption, which the 1981 National Food Policy paper estimates will reach 570,000 tons by 1989, based on a 4 percent annual growth rate.[120] This is lower than the compound

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[120] Kenya, National Assembly, *Sessional Papers, 1981*, Paper No. 4, "National Food Policy."

Table 29—Yields of sugarcane from area belonging to eight sugar factories, 1976-80

Factory	1976	1977	1978	1979	1980
			(metric tons/hectare)		
Western Kenya					
Mumias	101.4	123.3	153.2	150.9	167.7
Nzoia[a]	...	...	161.3	141.7	n.a.
Chemilil	67.2	79.4	121.2	126.5	100.9
Muhoroni	84.5	76.3	85.1	75.3	84.9
Miwani	42.4	40.8	94.5	99.8	63.3
Sony[a]	...	...	...	71.3	n.a.
Kabwas	65.1	68.8	75.5	68.5	n.a.
Coast Province					
Ramisi	26.4	32.7	45.4	39.9	n.a.

Source: Unpublished data provided by the Kenya Sugar Authority.
Note: Where n.a. appears, the figure was not available.

[a] Production began at Nzoia in 1978 and at Sony in 1979.

growth of consumption from 162,000 tons in 1970 to 300,000 tons in 1980, which is a compound growth rate of 6.36 percent (Table 24). However, the growth rate will primarily be determined by growth in per capita income. Unless growth in consumption drops substantially below 4 percent per year, there is not expected to be any surplus available for export by 1989 without investment in additional factory capacity.

With costs of new factory capacity now at U.S. $1,500 to $2,000 per ton of raw sugar per year and 60-80 percent higher if the cost of the agricultural complement and the infrastructure are included,[121] the capital costs for 50,000 tons of white sugar per year will be about U.S. $85 million at current prices. An alternative would be to expand the already substantial jaggery production for domestic consumption, making part of existing white sugar production available for export. The number of jaggery factories in Kenya is uncertain. The 1974 Directory of Industries lists only six companies in Western and Nyanza provinces that produce jaggery,[122] but as many as 120 jaggery factories are licensed by the Ministry of Agriculture.[123] Of these, the majority are sited on sugar estates formerly owned by Asians, which are now owned and operated by African farmers. If jaggery were priced below white sugar in the domestic market, low-income groups might be persuaded to use it instead of white sugar. Moreover, there would be nutritional benefits because jaggery contains several important minerals, such as iron, that are not contained in plantation white sugar.[124]

Although the sugar recovery ratio is significantly lower in jaggery than in white sugar (7.5 percent as against 10 percent), it would have several major advantages. Jaggery production allows factories to be located close to production and thus reduces transport costs, which are 38 percent of all grower costs (Tables 27 and 28). Most of the skills required in jaggery processing are not acquired from formal training, and thus the industry makes fewer demands on the scarce supply of highly trained manpower. Also, it has greater backward linkages to domestic manufacturing, as the machinery and spare parts could be manufactured locally.

The process probably is also less capital-intensive per unit of output. A 1977 study of

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[121] World Bank Regional Mission for East Africa, Nairobi, personal communication, November 1981. The Commodities and Export Projections Division of the World Bank in Washington estimates factory costs at roughly $1,000 per ton of annual capacity, which probably reflects the lower costs in the more industrialized countries of Asia and Latin America (see World Bank, *Price Prospects for Major Primary Commodities*, 2: 54).

[122] Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Directory of Industries* (Nairobi: Government Printer, 1974).

[123] Kenya Sugar Authority, personal communication, November 1982.

[124] Ruth Oniango, "Nutrition and Food Consumption Policies," a paper presented at the Food Research Priorities Conference of the National Council for Science and Technology, Nairobi, June 2, 1982 (mimeographed).

small plantation white sugar plants that produce less than 600 tons of sugar per day estimates that the total cost per ton of sugar produced by these miniplants was K Sh 2,967, against K Sh 5,743 for the large Nzoia factory being constructed at that time.[125] Data on whether lower capital intensity extends down to the jaggery factory is not available, but should be easy to obtain given the large number of factories already operating in Kenya. There can be no doubt that, because more labor is used per unit of output, jaggery offers greater employment opportunities per ton of sugar produced than the larger units. The smaller absolute amounts of capital involved for each production unit make it possible to finance construction by mobilizing rural savings rather than by using foreign loans. However, the interests of the existing white sugar factories and large-scale machinery manufacturers overseas militate against expansion of the jaggery industry.

Maize

It may seem surprising to include maize as a potential food export commodity after the shortages in 1979/80 and 1980/81. However, the history of Kenya's maize production during the last 20 years shows alternating periods of surplus and deficit, and during many of the periods of surplus, there have been exports (see Table 30).

Although the fluctuations of NCPB purchases and sales are caused in part by weather variability, it is not because rainfall is unreliable in the major producing areas. Between 65 and 88 percent of NCPB purchases in each year of the last 10 years have come from six districts in Western and Rift Valley provinces (Table 31). To be adequate for maize production, the rainfall in these districts in the growing period from April to August should be a minimum of 100 millimeters each month. This also allows for some unevenness in the distribution of rainfall within each month. Rain is particularly important during the 10 days when the maize tassels appear, which usually occurs in late June or early July. With few exceptions, rainfall in each of the major maize exporting districts in each month of the growing season in each year has exceeded the minimum requirements (Table 32). As Table 33 shows, however, there is substantial weather variability in districts where maize deficits periodically occur. This suggests that fluctuations in NCPB purchases are a consequence of official NCPB price changes and other nonprice factors governing crop delivery and payment rather than of weather variability.

A regression analysis of maize deliveries to NCPB during the period 1965-74 by Hesselmark, which uses only rainfall as an explanatory variable, showed low correlation with the major producing areas, which he calls North Rift (0.0006), Western Kenya (0.22), and Central and Eastern Kenya (0.06). However, when hybrid seed sales were added, the model showed a close fit to the data for the major maize-surplus areas of North Rift ($r^2 = 0.93$) and Western Kenya ($r^2 = 0.98$), but rather poor results for the areas of occasional maize deficit in Central and Eastern Kenya ($r^2 = 0.4$).[126] Hybrid seed sales in North Rift and Western Kenya were probably a good proxy variable for changes in the area planted in those regions, and also for expected price.

These results conflict with the data in Table 32, which show that rainfall was always adequate for maize in the major surplus regions, and thus it should not be a significant variable. A possible way to explain rainfall's significance in the model is through an understanding of unofficial markets. If rainfall in maize-deficit areas is highly variable, as Table 33 suggests, then years of low rainfall in maize-deficit regions may be years of low sales by maize-surplus areas to NCPB, because there is greater opportunity to sell to maize-deficit areas through unofficial markets. Rainfall in maize-surplus regions in Hesselmark's model may, therefore, be a proxy for rainfall in maize-deficit regions, as well as a proxy for demand for maize in unofficial marketing channels.

Price and Nonprice Factors

The official price paid by the government to farmers increased from K Sh 80.00 in 1979/

[125] J. P. Mukherji and Assistants, "Feasibility Study on Mini Sugar Plants in Kenya," a study undertaken for the Ministry of Agriculture, Nairobi, 1977 (mimeographed).

[126] Olof Hesselmark, "The Relation between Rainfall and Maize Marketing in Kenya," a paper prepared for the Maize and Produce Board, Nairobi, May 1975 (mimeographed).

Table 30—Purchases and sales of maize by the National Cereals and Produce Board (NCPB) and imports and exports of maize, 1959/60-1981/82

Year	NCPB Purchases	NCPB Sales	Surplus or Deficit	Imports	Exports
			(1,000 bags)		
1959/60	1,659	1,404	+255	...	100
1960/61	1,586	2,127	-541	199	2
1961/62	1,643	1,433	+210	713	101
1962/63	2,233	1,041	+1,192	...	1,063
1963/64	1,073	1,131	-58	...	611
1964/65	1,170	5,505	-4,335	396	11
1965/66	1,474	1,735	-261	2,131	...
1966/67	2,509	1,616	+893	...	694
1967/68	3,582	1,073	+2,509	...	2,986
1968/69	3,246	1,284	+1,962	...	2,715
1969/70	2,152	2,003	+149	148	380
1970/71	2,668	3,208	-540	...	...
1971/72	4,211	2,117	+2,094	298	...
1972/73	5,083	2,153	+2,930	...	1,799
1973/74	3,727	3,876	-149	...	1,512
1974/75	5,009	3,773	+1,236	...	...
1975/76	6,174	4,193	+1,981	...	2,495
1976/77	6,031	4,253	+1,778	...	162
1977/78	2,713[a]	1,442	+1,271	...	306
1978/79	2,648	4,149	-1,501	...	1,456
1979/80	1,456	5,222	-3,766	1,833	233
1980/81	4,367	7,611	-3,244	4,867	...
1981/82	7,500[b]	5,876	+1,624	2,278	...

Sources: For 1959/60 to 1978/79, Maize and Produce Board, *Annual Report,* 1959/60-1978/79 (Nairobi: Maize and Produce Board, 1960-79). For 1979/80 to 1981/82, unpublished data provided by the National Cereals and Produce Board.

Note: One bag equals 90 kilograms net.

[a] This figure does not include purchases of 2 million bags by millers directly from farmers.

[b] This estimate was announced by the Minister of Agriculture (*Daily Nation,* April 26, 1982).

80 to KSh 95.00 per bag in 1981/82. However, changes in nonprice factors, such as collection and drying costs, have become of major importance since 1975, and they may change the farmgate price to the farmer by as much as 20 percent. Prior to 1980/81, farmers were responsible for the cost of delivering their crops to NCPB depots, paying KSh 3.50 per bag. In 1980/81, in response to maize shortages, the NCPB took over the cost of transferring maize from the farm by establishing buying centers in various locations close to farms to collect smallholders' produce. This was at a cost to the NCPB of KSh 15.30 per bag of 90 kilograms.[127]

That same year NCPB agreed to dry at its own cost any lot less than 10 bags, which is approximately 75 percent of the Kenyan maize crop. For 1981/82, the total cost to NCPB of this drying of the crop was KSh 13.20 per bag or KSh 147.00 per ton. This figure is based on drying costs of KSh 8.42 per bag for fuel, machinery depreciation, management, and labor. The weight loss of nearly 5 kilograms when the water is removed adds a further cost of KSh 4.78, as additional maize must be added to bring the weight of the bags back to 90 kilograms. This brings the total cost of drying to KSh 13.20 per bag.[128] Because only 75 percent has to be dried, the average cost of drying is reduced from KSh 13.20 to KSh 9.90 per bag, or 10.4 percent of the official price in 1981/82 of KSh 95.00 per 90 kilogram bag.

With NCPB now meeting transport costs, the KSh 3.50 for transport was also no longer

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[127] National Cereals and Produce Board, personal communication, 1982.

[128] Kenya, Ministry of Agriculture, Nairobi, personal communication, 1982.

Table 31—Official purchases of maize from selected districts, 1970/71-1979/80

Year	Rift Valley Province				Western Province	
	Nandi	Nakuru	Trans Nzoia	Uasin Gishu	Bungoma	Kakamega
			(1,000 bags)			
1970/71	212.3	163.5	690.9	470.3	521.0	297.1
1971/72	359.6	147.9	1,048.2	521.0	906.1	504.8
1972/73	418.1	328.1	1,283.2	508.9	561.3	509.7
1973/74	376.1	59.4	843.0	425.8	509.9	846.6
1974/75	400.7	164.4	787.4	346.7	551.2	1,070.3
1975/76	452.1	592.5	1,206.6	320.1	647.2	1,153.6
1976/77	378.2	282.5	1,187.9	255.8	785.5	1,024.1
1977/78	253.8	249.1	546.8	238.3	280.2	548.3
1978/79	118.3	275.2	721.7	380.6	162.0	384.8
1979/80	123.3	69.2	574.4	191.5	134.4	171.2

Year	Other Districts	Total NCPB Purchases	Direct Purchases from Large-Scale Millers	Total
		(1,000 bags)		
1970/71	311.2	2,666.3	13.4	2,679.7
1971/72	723.0	4,210.6	23.7	4,234.3
1972/73	1,472.5	5,081.8	3.5	5,085.3
1973/74	663.5	3,724.3	1.1	3,725.4
1974/75	1,492.0	5,012.7	13.6	5,026.3
1975/76	1,801.3	6,173.4	81.4	6,254.8
1976/77	2,117.2	6,031.2	190.7	6,222.1
1977/78	596.7	2,713.2	2,028.4	4,741.6
1978/79	586.2	2,628.9	130.0	2,758.9
1979/80	226.2	1,490.2	67.8	1,558.0

Sources: For 1970/71 to 1978/79, Maize and Produce Board, *Annual Report*, 1970/71 to 1978/79 (Nairobi: Maize and Produce Board, 1971-79). For 1979/80, unpublished data provided by the National Cereals and Produce Board (NCPB).

deducted from the farmgate price, so the return to the farmer from 1979/80 to 1981/82 increased by 43 percent rather than by the 19 percent indicated in the official maize price. Thus, a strong argument can be made for including the decision on who will bear the drying and transport costs in the annual review process.

In 1979/80 and 1980/81 payments to farmers took up to six months to reach them, which offset the hidden price increase farmers received for collection and buying costs assumed by the NCPB. Delays in payments by the NCPB not only reduce official prices by approximately 7 percent (assuming an inflation rate of about 14 percent per year),

but also affect the timely planting of the next season's crop because the capital for seed and other inputs is not available. This may greatly raise the cost to the farmer. It is the official price plus or minus all the nonprice aspects with which the informal market has to compete.

Potential to Increase Yields

Because Kenya has ideal growing conditions for maize in the main maize-surplus districts, the potential for increasing yields is large. The most important factor affecting yields is the time of planting.[129] Based on

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[129] D. N. Ngugi, "Research Priorities for Increased Food Production," a paper presented at the Food Research Priorities Conference of the National Council of Science and Technology, Nairobi, June 2, 1982.

Table 32—Rainfall during the maize-growing period in the major maize-exporting districts, 1970-80

Province/District	Month	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
							(millimeters)					
Rift Valley Province												
Nandi	April	253.2	346.7	46.8	109.9	145.5	164.2	164.7	190.6	172.1	172.0	250.7
	May	149.7	250.1	194.9	129.7	50.2	157.4	172.0	179.1	180.7	219.6	232.8
	June	173.6	167.2	245.7	178.0	81.6	121.4	104.5	256.3	209.6	169.3	93.0
	July	81.0	220.9	82.1	119.0	238.9	251.1	113.0	213.2	99.3	168.5	106.3
	August	133.2	328.4	130.1	181.4	77.0	196.5	196.1	186.2	160.1	293.5	189.2
	Total	790.7	1,313.3	699.6	718.0	593.2	890.6	750.3	1,025.4	821.8	1,022.9	872.0
Nakuru	April	197.3	86.7	35.0	43.5	137.4	149.5	104.9	221.0	146.5	120.0	102.3
	May	106.4	147.2	102.5	115.9	61.7	144.9	118.6	175.3	117.8	98.3	342.1
	June	43.5	118.5	113.9	24.7	112.7	121.2	70.0	78.6	54.5	91.4	85.2
	July	97.7	60.0	81.5	62.8	137.2	72.0	107.2	193.1	97.6	81.9	29.3
	August	69.7	136.9	128.2	188.6	197.2	193.3	168.5	91.3	105.6	127.2	58.6
	Total	514.6	549.3	461.1	435.6	646.2	681.0	569.2	759.3	522.0	518.8	617.5
Trans Nzoia	April	198.7	161.4	156.5	38.6	107.5	135.0	72.6	289.0	70.3	111.3	125.7
	May	136.2	182.4	160.7	216.0	157.2	138.6	157.2	92.5	138.7	87.5	n.a.
	June	62.6	147.7	96.7	109.5	195.7	129.5	101.8	168.8	109.7	119.2	n.a.
	July	177.3	117.4	70.9	104.5	222.6	224.0	137.3	178.2	195.4	82.8	n.a.
	August	205.1	173.5	63.3	220.9	138.7	236.0	85.2	135.5	95.5	95.4	n.a.
	Total	779.9	782.4	548.1	689.5	821.7	863.1	554.1	864.0	609.6	496.2	125.7
Uasin Gishu	April	139.9	96.6	83.9	30.8	20.1	142.5	68.2	265.6	32.8	151.3	147.3
	May	110.6	150.4	64.2	236.9	113.0	187.5	156.3	102.9	110.3	125.6	300.2
	June	52.2	169.1	122.2	107.5	80.4	98.9	79.6	106.4	168.4	172.9	156.7
	July	134.9	132.6	297.2	147.8	166.5	124.3	135.7	132.9	142.6	106.8	n.a.
	August	214.8	204.6	160.3	195.4	105.0	268.2	209.9	129.9	198.7	96.1	67.8
	Total	652.4	753.3	727.8	718.4	485.0	821.4	649.7	735.7	652.8	652.7	672.0
Western Province												
Bungoma	April	260.8	n.a.	251.7	140.7	291.3	296.1	179.5	285.9	137.2	121.0	156.1
	May	403.9	n.a.	222.4	259.5	179.5	160.2	128.3	116.9	187.0	259.3	257.9
	June	109.0	38.9	124.7	114.9	80.9	120.4	232.1	125.9	100.7	75.3	121.5
	July	73.0	147.7	127.8	38.4	161.7	151.4	132.8	117.6	77.4	45.1	82.7
	August	268.0	87.2	107.1	189.1	115.4	61.6	52.3	174.3	128.8	77.5	969.7
	Total	1,114.7	273.8	833.7	742.6	828.8	789.7	724.3	820.6	631.1	578.2	1,587.9
Kakamega	April	273.1	227.3	250.1	181.3	251.9	221.1	219.1	318.9	153.4	102.0	217.3
	May	217.8	245.0	205.6	362.1	168.0	218.6	312.4	319.5	245.4	224.8	269.5
	June	148.4	124.1	192.8	285.8	245.9	193.5	158.8	238.8	207.4	166.2	204.6
	July	218.9	82.0	212.7	109.9	239.4	284.2	198.0	180.5	78.1	96.1	125.3
	August	303.4	249.0	219.1	241.5	91.7	291.8	330.6	212.9	237.1	139.0	157.6
	Total	1,161.6	927.4	1,080.3	1,180.6	996.9	1,209.2	1,218.9	1,265.6	921.4	728.1	974.3

Source: Unpublished data provided by Kenya, Ministry of Transport and Communications, Meteorological Department.
Note: Where n.a. appears, the data were not available.

Table 33—Rainfall during the maize-growing period in the major maize-deficit districts, 1970-80

Province/District	Month	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
							(millimeters)					
Central Province												
Nyeri	April	179.9	110.7	90.4	265.6	166.2	159.7	90.1	289.4	156.1	66.3	57.2
	May	132.2	133.0	335.8	111.3	28.0	166.6	115.5	133.5	68.5	360.3	209.1
	June	90.2	27.9	30.8	n.a.	69.0	34.4	32.6	17.9	38.2	81.9	209.1
	July	30.0	29.2	11.1	37.1	133.3	50.3	55.2	25.6	19.1	34.8	5.6
	August	20.2	34.1	38.1	22.1	47.0	31.7	25.2	30.7	27.6	14.0	49.8
	Total	452.5	334.9	506.2	436.1	443.5	442.7	318.6	497.1	309.5	557.3	530.8
Muranga	April	362.3	330.5	79.4	156.7	374.5	401.9	227.2	459.3	426.1	289.2	204.6
	May	139.7	269.5	307.5	133.6	144.6	248.0	82.5	371.8	90.0	216.2	185.2
	June	19.1	21.6	58.7	12.1	143.0	34.9	61.7	15.8	21.2	49.9	2.5
	July	16.5	29.0	15.5	25.0	149.8	34.2	10.2	11.3	21.3	14.7	6.3
	August	20.5	2.9	8.9	9.0	93.1	19.9	8.5	16.8	13.8	22.1	38.4
	Total	558.1	653.5	470.0	336.4	905.0	738.9	390.1	875.0	572.4	592.1	437.6
Kirinyaga	April	428.5	302.0	152.0	253.5	218.2	312.5	424.7	510.1	429.1	306.1	254.0
	May	163.4	325.3	286.2	343.4	250.7	351.9	130.3	236.6	99.0	323.1	208.7
	June	48.7	55.5	27.5	39.3	589.9	58.4	111.6	37.8	59.3	52.5	14.2
	July	93.0	78.0	44.0	51.1	194.8	47.0	53.1	42.1	56.4	50.5	30.6
	August	89.8	45.5	15.0	59.8	68.0	48.9	24.3	39.7	65.9	50.3	111.6
	Total	823.4	806.3	524.7	747.1	1,321.6	818.7	744.0	866.3	709.7	782.5	619.1
Kiambu	April	358.1	297.4	39.1	154.8	267.6	164.9	282.2	517.0	311.0	172.6	131.4
	May	155.3	315.9	152.0	78.0	46.5	97.3	135.9	184.0	138.2	148.7	327.6
	June	61.4	19.8	133.2	10.1	125.6	16.5	36.7	59.7	14.4	22.6	6.9
	July	n.a.	62.3	8.7	14.7	168.3	57.5	16.3	13.2	28.8	14.5	n.a.
	August	10.7	17.6	3.4	16.6	17.5	6.8	1.3	73.3	3.2	7.4	8.8
	Total	585.5	713.0	336.4	274.2	625.5	343.0	472.4	847.2	495.6	365.8	474.7
Eastern Province												
Embu	April	n.a.	317.1	106.8	155.7	231.3	297.1	366.5	431.7	422.9	284.0	147.9
	May	n.a.	102.6	281.2	60.3	105.5	107.2	41.5	200.3	65.8	243.9	216.4
	June	n.a.	37.1	38.5	0.7	60.5	n.a.	131.1	14.5	36.6	44.3	4.1
	July	n.a.	19.1	18.3	28.4	180.0	n.a.	35.0	54.4	62.8	30.8	9.6
	August	n.a.	19.3	n.a.	18.8	18.1	n.a.	10.0	33.7	52.7	34.3	42.0
	Total	n.a.	495.2	444.8	263.9	595.4	404.3	584.1	734.6	640.8	637.3	420.0
Machakos	April	188.2	275.9	25.2	172.9	281.3	204.0	124.2	297.2	318.2	415.7	120.6
	May	76.7	102.3	136.6	12.1	20.2	47.9	30.3	35.0	30.0	146.4	118.4
	June	0.0	22.8	15.2	0.0	20.9	0.0	49.3	0.0	0.0	15.0	0.0
	July	0.0	0.0	0.0	0.0	32.2	31.5	2.5	21.8	3.9	10.5	0.0
	August	3.4	0.0	0.0	0.0	19.0	0.0	0.0	16.3	0.0	0.0	45.7
	Total	268.3	401.0	177.0	185.0	373.6	283.4	206.3	370.3	352.1	587.6	284.7
Kitui	April	57.8	294.7	73.4	119.3	410.1	206.1	304.7	350.6	530.9	620.1	165.0
	May	112.1	107.9	12.9	7.5	40.8	58.2	22.5	103.4	6.1	135.0	10.4
	June	0.0	5.5	2.8	0.0	6.3	0.0	3.7	0.0	0.0	20.9	0.0
	July	0.0	0.0	0.0	0.0	16.8	0.0	0.0	0.0	0.0	13.1	0.0
	August	6.9	2.0	1.0	0.0	0.0	0.0	8.3	17.0	0.0	0.0	20.1
	Total	176.8	410.1	90.1	126.8	474.0	264.3	339.2	471.0	537.0	789.1	195.5

Source: Unpublished data provided by Kenya, Ministry of Transport and Communications, Meteorological Department.
Note: Where n.a. appears, the data were not available.

research at the National Agricultural Research Station at Kitale from 1965 to 1968,[130] the Kenya Seed Company estimates as a rule of thumb that there is a loss of 1 bag per hectare per day for maize planted late, so that with approximately 1 million hectares of maize planted 10 days late on average, the loss from late planting is approximately 10 million bags. Sales of maize seed continue in Kitale up to the end of May, although the optimal planting time is in March. As stated, late planting is caused in part by delays in payments for the previous year's crop and by delays in seasonal credit disbursement.

There is also potential to raise yields through increased use of improved seeds and fertilizer. No recent data are available on area coverage of hybrids and composites, but FAO estimates, based on the 1975 Rural Survey, suggest that in 1974/75, 90 percent of the areas suitable for composites in Eastern and Coast provinces were still planted with traditional varieties of maize. Adoption of composites would be especially beneficial because seeds taken from plants grown from composite seeds retain their high-yielding characteristics, whereas farmers must obtain new supplies of hybrid seeds each year. Moreover, 85 percent of the area in Nyanza and 72 percent in Central Province suitable for both composites and hybrids, and 29 percent of the area in Western and 19 percent in Rift Valley suitable for hybrids were still in traditional maize.[131] Seed sales by the Kenya Seed Company increased 30 percent from 1974/75 to 1980/81 (see Table 34). But, at a planting rate of 25 kilograms per hectare, only 480,000 hectares were covered in 1981, or 28 percent of estimated total maize area in 1974/75, including areas where both maize and beans were planted.[132] Growth of seed sales since 1974/75 has been concentrated in the smaller packaging units purchased by small farms (see Table 35). The

major growth has been outside the traditional maize growing areas of Trans Nzoia, Uasin Gishu, and Western Province (Table 34). Growth since 1974/75 has been especially rapid from the Kenya Farmers Association's sales outlets at Kisumu, Nyahururu, and Nanyuki, although the proportion of area covered with hybrid seeds in these areas remains low.

Fertilizer consumption in Kenya has shown no significant increase since the early 1970s (Table 36), which suggests that fertilizer use on maize has been almost constant, although there may have been some diversion to maize from other crops. This contrasts sharply with experiences in other developing countries. During this period in Nigeria fertilizer consumption increased more than 10 times,[133] and in India it multiplied 2.3 times, even though it started in 1971/72 from a much higher base.[134] Stagnant fertilizer consumption suggests that a major source of increased marketed production has been a transfer of area from uncultivated land and grass leys to maize in the major maize-exporting districts. This could be the consequence of rapidly rising man-land ratios in these districts. Data on changes in cropping patterns over time are not available to test this hypothesis.

International Demand for Maize

By 1978 maize imports into the selected oil-exporting countries had reached $184 million (Table 3). Although starting from a small base, the rate of growth from 1971-73 to 1976-78 was high, ranging from a doubling of imports in the Gulf States to a tenfold increase in West Africa (see Chapter 3). The World Bank explains this growth as resulting largely from efforts to establish feed-based livestock and poultry industries in oil-

[130] A. Y. Allan, "Early Planting of Maize—Essential for High Yields," *Kenya Farmer,* March 1980.

[131] Food and Agriculture Organization of the United Nations, Agricultural and Rural Development Review and Programming Mission for Kenya, *Mission Findings and Recommendations,* p. 44.

[132] Maize hectarage in 1974/75 is estimated from Kenya, Ministry of Finance and Planning, Central Bureau of Statistics, *Integrated Rural Survey,* p. 79.

[133] Samson Olajuwon Olayide and Francis Sulemanu Idachaba, "Input Supply and Food Marketing Systems for Agricultural Growth: A Nigerian Case Study," a paper presented at the Conference on Accelerating Agricultural Growth in Sub-Saharan Africa, Victoria Falls, Zimbabwe, August 29 to September 1, 1983 (mimeographed), p. 8.

[134] Gunvant M. Desai, "Fertilizer Use on India's Unirrigated Areas: A Perspective Based on Past Record and Future Needs," a paper presented at the seminar of the International Crops Research Institute for the Semi-Arid Tropics on Technology Options for Dryland Agriculture: Potential and Challenge, Patancheru, Andhra Pradesh, India, August 22-24, 1983 (mimeographed), p. 16.

Table 34—Hybrid seed sales in major maize-producing districts, 1969/70-1980/81

Province/District	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75
	(metric tons)					
Trans Nzoia[a]	617.4	893.9	1,154.6	1,116.4	846.9	1,190.2
Uasin Gishu[b]	682.9	838.6	1,171.8	1,114.1	927.2	1,523.7
Nandi[c]	258.2	371.7	624.9	877.9	914.0	1,208.8
Western Province districts[d]	536.1	789.4	873.4	1,089.8	1,190.3	1,288.5
Nyanza Province districts[e]	514.9	891.2	886.3	1,162.7	1,456.7	1,412.9
Nakuru	251.3	466.6	767.3	861.5	821.1	1,013.8
Nyandarua[f]	13.7	39.7	85.5	117.8	252.1	307.4
Central Province districts[g]	110.7	241.5	374.0	581.2	762.3	801.6
Nairobi area	167.2	209.9	273.9	207.1	251.2	265.6
Other	55.4	56.9	75.3	16.5	25.6	35.7
Total	3,207.8	4,799.4	6,287.0	7,145.0	7,447.4	9,048.2

Province/District	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81
	(metric tons)					
Trans Nzoia[a]	1,422.0	1,753.1	1,110.6	893.6	1,850.5	1,497.0
Uasin Gishu[b]	1,614.7	2,001.3	1,865.3	1,233.8	1,873.4	1,696.9
Nandi[c]	1,532.0	1,552.0	1,365.0	1,124.6	1,530.3	1,769.1
Western Province districts[d]	1,339.8	1,525.4	1,023.8	986.9	1,635.3	1,354.5
Nyanza Province districts[e]	1,642.9	2,005.3	2,438.0	2,043.3	2,475.5	2,378.3
Nakuru	1,217.2	1,171.6	1,349.8	965.9	1,336.2	1,075.8
Nyandarua[f]	481.8	568.3	254.5	328.9	538.2	707.7
Central Province districts[g]	1,042.2	1,171.3	1,086.4	1,236.4	1,423.5	1,283.2
Nairobi area	323.0	386.9	359.8	319.4	390.4	372.4
Other	84.3	88.8	68.7	59.6	19.9	62.1
Total	10,699.9	12,224.0	10,921.9	9,192.4	13,073.2	12,197.0

Source: Data provided by the Kenya Seed Company.
Note: Sales of hybrid seeds take place at sales outlets of the Kenya Farmers Association.

[a] These figures are for sales at Kitale.

[b] These figures are for sales at Eldoret and Moi's Bridge.

[c] These figures are for sales at Turbo and Lumbwa/Kipkelion.

[d] These figures are for sales at Bungoma, Webuye, and Lugare.

[e] These figures are for sales at Kisumu/Kisii.

[f] These figures are for sales at Nyahururu and Nanyuki.

[g] These figures are for sales at Karatina, Sagana, Maragua, and Thika.

exporting countries, including Iraq, Iran, and Saudi Arabia. Rising incomes have greatly increased the demand for meat in these countries.[135]

The major substitutes for maize are other coarse grains, such as barley, rye, oats, and millet, and cassava. According to World Bank estimates, the largest exporters of coarse grains in 1980 were the United States with 66 percent of total exports, France, and Argentina. Of the major importers, the EC imported 19 percent; Japan, 17 percent; the U.S.S.R., 14 percent; and developing countries, 36 percent. World imports grew by 8.3 percent per year from 1970 to 1980 and are projected to grow 6-7 percent in the 1980s.[136] The dominance of the United States as a supplier may provide Kenya with additional opportunities to export maize to the EC. Although maize is not yet included under the Lomé Convention, Kenya is one of the ACP countries favored under the Convention. Kenya may also export to countries that

[135] World Bank, *Price Prospects for Major Primary Commodities*, 2: 161.

[136] Ibid., 2: 165-166.

Table 35—Sales of 10- and 25-kilogram units of hybrid maize seeds, 1969/70-1980/81

Year	10-Kilogram Units	25-Kilogram Units
	(1,000)	
1969/70	217.7	41.2
1970/71	336.7	57.3
1971/72	462.6	66.4
1972/73	594.6	48.0
1973/74	656.6	35.2
1974/75	790.8	45.6
1975/76	942.7	50.9
1976/77	1,074.0	59.4
1977/78	1,019.6	29.0
1978/79	868.9	20.1
1979/80	1,185.0	48.9
1980/81	1,127.6	36.8

Source: Data provided by the Kenya Seed Company.
Note: Sales of hybrid seeds are made at the sales offices of the Kenya Farmers Association. The 10-kilogram units are favored for small farms; the 25-kilogram units, for larger farms.

wish to diversify supplies in order to decrease their dependence on the United States. In addition, neighboring countries like Zambia and Tanzania have a strong preference, as

Kenya does, for white maize and pay a premium for it. These countries provide additional markets for maize, and because of proximity, Kenya may enjoy an advantage in freight costs over other large suppliers. In 1979, however, when Kenya previously exported maize, the main buyers were South America, 47,000 tons; Japan, 45,000 tons; and Switzerland, 14,000 tons.[137]

This brief survey indicates that there is a significant and rapidly growing demand for maize in oil-exporting countries. There is also likely to be growth of demand in other developing countries, the Eastern bloc, and Japan. But are Kenya's costs low enough to compete against the United States and other large grain exporters?

Potential to Export Maize Competitively

There are two main components of the domestic border price of maize. The first is the price paid to the grower by the NCPB, which is fixed by the government. The second is the cost of handling and transport from the farmgate to the vessel in Mombasa.

The prices paid to maize growers by NCPB in each year from 1971 to 1982, calculated in dollars at prevailing exchange rates, are

Table 36—Fertilizer imports, 1970-1981/82

Year	Nitrogen	Phosphorus	Others	Total
	(metric tons)			
1970	50,170	41,818	48,900	140,888
1971	41,025	41,252	47,610	129,887
1972	55,530	37,331	62,817	155,678
1973	77,437	30,986	33,145	141,568
1974	104,538	49,540	37,995	192,073
1975	44,394	30,626	33,884	108,904
1976	20,194	30,636	29,474	80,304
1977	88,201	33,500	7,338	129,039
1978	78,170	19,625	57,384	155,179
1979	38,375	11,455	10,924	60,754
1980	61,829	25,460	42,383	129,672
1980/81	n.a.	n.a.	n.a.	129,865
1981/82	n.a.	n.a.	n.a.	150,430

Sources: The data for 1970-80 are taken from Kenya, Ministry of Finance, Statistical Branch, Customs and Excise Department, *Annual Trade Report*, 1970-80 (Nairobi: Government Printer, 1970-80), cited in Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1981* (Nairobi: Government Printer, 1982). The figures for 1980/81 and 1981/82 were obtained from Kenya Farmers Association, "Input Supply Systems," a paper prepared for the Workshop on Food Policy Research Priorities, Nairobi, June 14-17, 1982.
Note: Where n.a. appears, the data were not available.

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[137] Kenya, Ministry of Finance, Statistical Branch, Customs and Excise Department, *Annual Trade Report, 1980.*

shown in Table 37. The Kenyan price was well below the international price in the early 1970s, above it during 1977-79, and again below it during 1980-82. However, with the 42 percent increase in the producer price in Kenya for the 1982/83 crop purchasing period, from KSh 95 to KSh 135 per bag (Table 37), and with the international price still depressed, the Kenyan producer price was above the export parity price but still below the long-term equilibrium price of U.S. $141 per ton at 1981 prices.[138]

The second component of the maize export price is the cost of handling and transport. The costs of moving maize from the farmgate to Mombasa are estimated to be U.S. $70.60 per ton, or more than 60 percent of the current price of maize delivered to U.S. Gulf ports (Table 38). This would raise the domestic border price of Kenya's maize above the export parity price even in years

when the producer price is well below the international price. Kenya might enjoy some advantage in freight costs over the United States or Argentina in supplying cereals to North Africa or the Gulf States because the distance is shorter. However, this is probably more than offset by the smaller freighters available to Kenya and by delays and high port charges at Mombasa, which raise freight rates charged by the shipping companies.

Table 38 shows that the single largest item in transferring maize from the farm to the port is rail transport. The rail charges of Kenya Railways—U.S. $28.60 per ton—are higher than those in the United States— about U.S. $20 per ton—even though the distances in the United States are much greater. For example, the freight rate by rail from Des Moines, Iowa, to New Orleans, Louisiana (effective April 10, 1982), was U.S. $27 per ton by rail or U.S. $13-16 by barge.[139] A high

Table 37—Kenya's official producer prices for maize and world maize prices, 1971-83

Year	Price Per Bag[a]	Price Per Ton	Exchange Rate	Price Per Ton	World Price[b]	Difference Between the Export Parity Price and the Kenyan Domestic Border Price
	(KSh/bag)	(KSh/ metric ton)	(KSh=U.S. $1)		(U.S. $/metric ton)	
1971[c]	30	333.3	7.14	46.7	58.4	+11.7
1972	35	388.9	7.14	54.5	56.0	+1.5
1973	35	388.9	6.90	56.4	98.0	+41.6
1974	40	444.4	7.14	62.2	132.0	+69.8
1975	60	666.7	8.25	80.8	119.6	+38.8
1976	65	676.4	8.31	81.4	112.4	+31.0
1977	85	944.4	7.95	118.7	95.3	−23.4
1978	85	944.4	7.40	127.6	100.7	−26.9
1979	80	888.9	7.33	121.3	115.5	−5.8
1980	80	888.9	7.57	117.4	125.3	+7.9
1981	85	944.4	8.45	111.8	130.8	+19.0
1982[d]	95	1,056.0	10.50	10.6	116.0	+15.4
1983[d]	135	1,500.0	10.70	140.2	129.2	−11.0

Sources: The international prices are from World Bank, *Price Prospects of Major Primary Commodities*, World Bank Report No. 814/82, 5 vols. (Washington, D.C.: World Bank, 1982). For the exchange rates, see Central Bank of Kenya, "Selected Foreign Exchange Mean Rates," *Economic and Financial Review* 14 (October-December 1981). The Kenya price paid to the farmer is derived from Maize and Produce Board, *Annual Report*, various issues (Nairobi: Government Printer, various years); and *Kenya Gazette*, various issues.

Note: Each bag weighed 90 kilograms.

[a] This is the purchase price paid by the National Cereals and Produce Board during the maize purchasing period (January to June).

[b] The price is for yellow maize U.S. No. 2, f.o.b. U.S. Gulf ports.

[c] 1971 refers to the purchasing periods for 1970-71.

[d] The prices for 1982 and 1983 were projected in 1981.

[138] World Bank, *Price Prospects for Major Primary Commodities*, 2: 167 and 177.

[139] U.S. Department of Agriculture, Economics and Statistics Service, Washington, D.C., personal communication, June 1982.

Table 38—Estimated costs of moving maize from the farm to the port of Mombasa, 1981/82

Transportation Cost Component	Cost
	(KSh/ metric ton)
Purchase of grain (including transport)[a]	179
Bags[b]	106
Drying (including weight loss)[c]	110
Rail transport from storage to Mombasa	300
Wharf and handling charges[d]	18
Insurance (1 percent of f.o.b. value)[e]	13
Interest (14 percent of f.o.b. value for 1 month)[e]	15
Total	741
Total in U.S. dollars	70.60

Sources: The cost of purchasing grain is from the National Cereals and Produce Board (NCPB). The cost of bags comes from a personal communication from the Ministry of Agriculture, as does the figure for the drying costs. The cost of transport from storage to Mombasa was given by Kenya Railways, and the wharf and handling charges are taken from Kenya Ports Authority, "Tariffs of Rates and Charges for Wharfage Handling and General Services," *Tariff Book No. 2, Effective 1 July 1982* (Nairobi: Kenya Ports Authority, 1982).

[a] Collection and handling are estimated to have cost the NCPB KSh 15.30 per bag in 1980/81. It is assumed that these costs did not change in 1981/82 even though buying centers handled greater volumes.

[b] Maize requires bags because of the lack of bulk handling facilities in NCPB up-country stores and in the port of Mombasa. New bags are used to carry the maize up to the side of the ship. Then the maize is poured from the bags into the ship's hold. Bags are badly torn in the port, so they are sold by the NCPB at low prices. The figure used here assumes that 11 new bags are used to carry a metric ton and includes 75 percent of their cost, at KSh 12.85 per bag.

[c] The NCPB has to dry any lot of less than 10 bags at its own cost. Seventy-five percent of the maize delivered comes in such lots. Given drying costs of KSh 8.42 per bag, with a water removal rate of 5 percent, plus an average weight loss of 5 percent and a price to the farmer of KSh 95 per bag in 1981/82, the total cost comes to KSh 13.20 per bag dried, or KSh 147 per metric ton. As only 75 percent has to be dried, this is reduced to KSh 110.

[d] This is the minimum charge, assuming that there are no late document charges, no transfer of cargo in the port area, no hiring of equipment, nor any other additional charges.

[e] The costs of insurance and interest are based on an f.o.b. value of U.S. $120 per metric ton, with U.S. $1.00 equaling KSh 10.5.

[140] Ibid.

proportion moved to the U.S. ports on the Gulf of Mexico goes on barges. More than 85 percent of the maize transported to New Orleans or Houston in 1977 went by barge, 14.5 percent by rail, and 0.5 percent by truck.[140] To a degree, U.S. grain exports represent a return on capital investments in infrastructure that began 120 years ago, much of it in periods when capital had a lower cost than today. Even the cost of U.S. $28.60 for movement in Kenya may be underestimated, for if large quantities of maize are put on the railways, it might well drive other goods onto the road owing to the physical and managerial limitations of Kenya's railways. In this case, the true marginal cost is the road haulage cost, which would be significantly higher given the present cost structure.

A second major cost in the border price of maize is the cost of transport from farmgate to depot, which forms a major part of the NCPB purchase price (Table 38). Since the 1980/81 government directive, NCPB has paid transport costs to the farmer of KSh 0.18 per kilometer per bag or KSh 2.0 per ton per kilometer for whole large loads delivered to the NCPB depot. The NCPB estimated its total purchasing costs in 1980/81, after it took over much of the collection cost, to be KSh 15.30 per bag, including the transport element but not including interest on the estimated capital cost of KSh 17 million to set up the 368 buying centers, or the cost of Ministry of Agriculture supervision. The Ministry of Agriculture uses personnel, vehicles, and fuel from its operating budget to supervise the purchasing operations of the NCPB. It has been impossible to estimate this cost. Before the NCPB took over all purchases, traders were paid KSh 3.50 per bag or roughly 4 percent of the producer price to deliver maize to the Board's main warehouses, so the change to direct purchases has greatly increased the NCPB costs. The high costs of transport are in part a consequence of unpaved rural access roads and the high rates of taxation in the transport industry noted earlier.

Bags are another major cost. As bags are 55 percent jute and 45 percent sisal (some jute is used because sisal is so rough to handle), there is a significant import content. Based on estimates of 30 percent of the cost

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of the finished bag being jute and the prevailing 30 percent duty on imported jute, there is approximately a 10 percent tax component in the final factory price of bags.[141] Bag costs could be avoided largely by construction of bulk handling facilities in the port (construction of such a facility began in June 1982) and in rural NCPB stores.

The fourth significant cost of nearly U.S. $10.50 per ton is the estimated cost of crop drying (Table 38). The moisture in the crop when it is received has to be reduced to an acceptable moisture level for storage, which is 13.5 percent. Although the NCPB has been drying all deliveries of less than 10 bags since 1980/81 at its own expense, it is still permitted to charge the costs of drying larger lots to the individual farmer, which amounts to about 25 percent of deliveries. In the United States the cost of drying the crop and the weight loss incurred are borne by the farmer and not by the grain exporter.

Policy Implications

Because the major agricultural production areas are all more than 500 kilometers from the coast, it is probably not feasible for Kenya to export bulky, low-cost agricultural commodities like maize, wheat, minor cereals, oil cakes, and cassava. Low-cost vegetables like onions and potatoes and even slightly higher-value products like sugar and pulses are affected by the high transport costs. Only high-value exports like coffee, tea, and meat products are not significantly affected. However, Thailand has exported cassava (a lower cost item than maize) to the EC, despite producing areas 400-500 kilometers from the coast, no railways to the producing areas, no subsidies, and a 6 percent duty rate charged by the EC. Therefore, it should be feasible for Kenya to export maize in the future if the government is prepared to take some radical steps. These would include eliminating taxes on road transport; further reducing road transport costs by taking a more laissez-faire attitude on vehicle standards; reducing bag costs, drying costs, and weight losses; and minimizing administrative overheads by selectively involving the private sector in transport and farmgate purchasing. It would also necessitate heavy infrastructural invest-ment in rural access roads and the railways, which must be weighed against returns on capital in raising production and exports of other commodities.

The role of the NCPB in the maize marketing system needs to be reexamined. The costs to the NCPB of collecting, transporting, and drying are making considerable demands on government resources of manpower and working capital, while other areas of government activity in agriculture, such as research and extension, are often starved for funds. The NCPB could keep prices within a broad band if it gradually handed over grain handling and distribution to African businessmen. If it intervened only when farmgate prices rose above domestic border prices (delivered Nairobi) or fell below export parity prices, it could control the supply of maize at no long-term cost, unless large-scale imports were required.
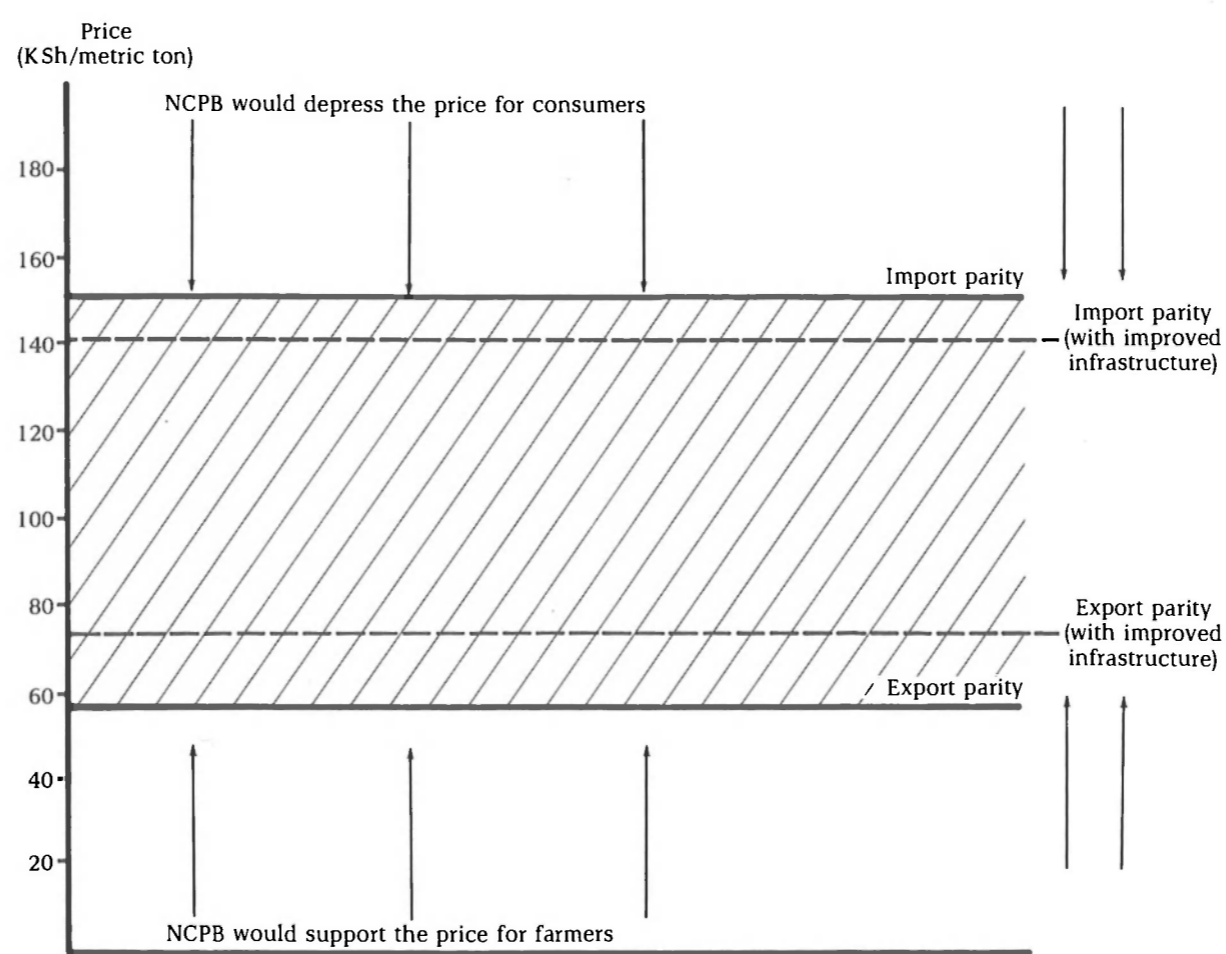
Based on the data in Table 38, in June 1982 the government would have intervened if maize fell below U.S. $60 per ton or rose above U.S. $160, or if maize were outside the range of KSh 57-152 per bag, as shown in Figure 5. With lower road transport costs and bulk handling facilities, the band could perhaps be narrowed to between KSh 75 and KSh 140 per bag at the June 1982 exchange rates. If this band were still too wide, setting a relatively narrow band even for a short time would help to limit NCPB losses and establish the principle of limiting the NCPB interventions to periods of high surplus or shortfall. The role of the NCPB would then be similar to that of the controlling parastatal in India, the Food Corporation of India, especially if the NCPB retained a monopoly over imports and exports of grain.[142]

One means of gradually phasing out the NCPB involvement in grain marketing would be to make use of one of the provisions in the present Maize Marketing Act (Cap 338). Under paragraph 15(6), the Minister may allow free trade in maize to extend from within a single district to "two or more contiguous districts." If the contiguous districts were redefined as all districts within the province, it would be possible to allow substantial interdistrict trade while still controlling interprovincial trade. The government would thereby retain control of supplies to Nairobi and Mombasa, while leaving the

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[141] East Africa Bag and Cordage Co., personal communication, November 1982.

[142] See R. N. Chopra, *Evolution of Food Policy in India* (Bombay: Macmillan, 1981).

Figure 5—Setting maize prices to limit financial obligations of the National Cereals and Produce Board (NCPB)

Price
(KSh/metric ton)

NCPB would depress the price for consumers

180 —

160 —

140 — Import parity

Import parity
(with improved
infrastructure)

120 —

100 —

80 — Export parity
(with improved
infrastructure)

60 — Export parity

40 —

20 —

NCPB would support the price for farmers

supply of many smaller towns to the market except under conditions of shortage. This would allow the African business sector to expand its operations gradually.

Sugar and maize compete for land in western Kenya. A critical policy issue in Kenya is what proportion of available land should be allocated to each of these two crops. As the area is relatively homogeneous in its agroclimatic conditions, the appropriate analytical tool to pursue this question is the domestic resource cost, which Aldington estimated for maize and sugar in 1978.[143] His estimates were KSh 12.65 per dollar of

export earnings for sugar and KSh 18.01 per dollar for export maize, with more than 50 percent of the domestic border price for maize being transport from farm to port. If sugar for export displaces maize production required to achieve domestic self-sufficiency, the situation is reversed. From data in Aldington's paper, the DRC for home-consumed maize per dollar of foreign exchange saved on imports is only KSh 2.23. Thus, the economic desirability of growing sugar as an export crop depends totally on there being sufficient maize for home consumption.

The aim of government policy must be to

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[143] Aldington, "Domestic Resource Costs."

raise yields of both crops, and this analysis has indicated the potentials of each. However, price policy also plays a role in the allocation of resources between these crops. Attention must not only focus on official prices, but also on prices in the informal market. The ratio of official sugarcane and maize prices during the period 1971-81 remained stable in a band between 1.10 and 1.50 for each of the 11 years, except 1974 when maize prices rose sharply relative to sugar prices (Table 39). In 1979 a fall in unofficial maize prices, following a large maize surplus in 1977/78, resulted in a substantial increase in sugar area planted. However, in 1979/80 the unofficial maize price increased to KSh 200-300 per bag. At an average price of KSh 250 per bag, this effectively reduced the sugarcane to maize ratio from the official level of 1.76 in 1978/79 to 0.53 in 1979/80, and thus it induced a substantial shift from sugar to maize. This caused factory sugarcane purchases to fall by 24 percent from 1980 to 1982 (Table 24). Sugar prices in 1980 were 10 percent above the 1971 level in real terms, but more than 20 percent below the level for 1976-78. However, in 1982, sugar prices were 13 per-

cent below the 1980 level and 36 percent below the 1976-78 level in real terms.

Maize has little potential as an export crop because the transport costs to the port are so high. The long-term potential of sugar is better, but its success as an export crop will depend on the answers to three critical questions.

First, can marketed maize production rise fast enough to keep pace with growth of domestic demand so that land can be released from maize to grow more sugar? This will depend on the rate of adoption of presently available technology, growth in fertilizer consumption, and the long-term capacity of the research system to produce new high-yielding seed varieties.

Second, can sugar production costs per ton be reduced, either by substituting local transport and manufacturing parts for imports or by lowering sugarcane production costs in the field through new varieties or greater efficiency of input use?

Finally, can the capital costs of creating new sugar processing capacity be reduced by building jaggery factories to meet local demand for sweeteners, thus releasing existing factories to produce white sugar for export?

Table 39—Current and constant official 1969 prices of sugarcane and maize and the ratio of current prices of the two commodities, 1971-82

Year	Current Prices		Ratio of Current Sugarcane Price to Maize Price	Constant 1969 Prices	
	Sugarcane	Maize		Sugarcane	Maize
	(KSh/metric ton)	(KSh/100 kilograms)		(KSh/metric ton)	(KSh/100 kilograms)
1971	45.2	33.3	1.36	42.7	31.5
1972	50.0	38.8	1.29	44.8	34.8
1973	51.8	44.4	1.17	41.8	33.2
1974	61.8	66.7	0.92	43.1	42.7
1975	89.4	72.2	1.24	52.9	40.7
1976	104.5	94.4	1.11	56.3	48.0
1977	127.1	94.4	1.55	61.3	42.9
1978	133.0	88.9	1.50	57.1	36.6
1979	133.0	88.9	1.50	52.7	36.6
1980	133.0	94.4	1.41	46.3	30.5
1981	133.0	105.6	1.26	41.5	29.6
1982	145.0	144.0	1.01	39.0	34.4

Sources: Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1979* (Nairobi: Government Printer, 1980); Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1980* (Nairobi: Government Printer, 1981); and *Kenya Gazette,* various issues.

Notes: The prices are those expected at the time of planting for the crop year following, that is, the 1977 figures are for purchases in 1977/78. To obtain constant prices, current prices were deflated by the Nairobi middle-income consumer price index.

8

PULSES AND HORTICULTURAL CROPS

Background

The last two products to be considered are pulses and horticultural crops. Both are considered "minor crops" in Kenya, although pulses rank among the top 10 crops in area and in total value of production. Exports of pulses were erratic throughout the 1970s, while there was steady growth in exports of horticultural products (see Table 1).

Pulses are produced extensively on small farms but are generally not grown commercially on large farms in Kenya. This is surprising in view of the ideal growing conditions and the possibility of rotating pulses with maize. The commercial planting of pulses in the United States illustrates the financial feasibility of large-scale production of pulses. Fruit and vegetable production is also smallholder dominated. Large-scale production is confined primarily to pineapples at Thika in Central Province and to vegetables for fresh export and dehydration near Lake Naivasha and some apple and avocado orchards at Kitale in Rift Valley Province.

Marketing of pulses, as well as many other potentially important minor crops, is carried out by the NCPB. The NCPB is the only legal buyer of beans in quantities of more than 10 bags (900 kilograms), and movement across district boundaries is usually restricted to 1 bag unless the farmer has an official permit. Since 1980/81 the NCPB has taken delivery at collection centers as well as at its major stores. After delivery, it dusts the crop against weevil infestation, stores it, and sells it locally, with occasional export sales in years of large surpluses. Major NCPB problems are management control to prevent purchase of weevil-infested beans, quality and variety control at the point of purchase (there are more than 90 traditional varieties of beans registered in Kenya),[144]

and the financial resources required to ensure prompt payments to farmers. Distortions in the internal marketing system have been much discussed in the literature.[145]

Major buyers of smallholder horticultural crops are African and Asian traders and wholesalers who sell directly to the retail markets, the eight main fruit and vegetable processors, and buyers of relatively small quantities of high-quality produce for fresh export by airfreight. A government agency established in the early 1970s, the Horticultural Crops Development Authority, is responsible for overall control of the industry. The Authority's functions include monitoring markets for fresh produce in Kenya and overseas, controlling fresh export quality, and general promotion of the industry. It is financed in part by a small direct cess on all fresh exports and produce purchased by processors.

Research on both pulses and horticultural crops is carried out at the National Horticultural Research Station. The government has established nurseries for improved fruit-crop planting material and has become the major supplier. Vegetable seeds are still mainly imported. Improved seed varieties for beans, which are being developed through a major aid-assisted grain-legume breeding project, are being multiplied and distributed by a subsidiary of the Kenya Seed Company and a small private company, but there is no agency to multiply improved seeds from the FAO-assisted breeding scheme for grams. As for all crops, extension is entirely the responsibility of the Ministry of Agriculture.

Pulses

Pulses were not shown as a separate item in Chapter 4, as imports by the oil

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[144] National Horticultural Research Station, Thika, personal communication, 1982.

[145] See Olof Hesselmark, *The Marketing of Maize and Beans in Kenya—A Proposal for Improved Effectiveness*, Working Paper 300 (Nairobi: Institute of Development Studies, 1977); and Guenter Schmidt, *Maize and Beans Marketing in Kenya—The Interaction and Effectiveness of the Informal and Formal Marketing Systems*, Occasional Paper 31 (Nairobi: Institute of Development Studies, 1979).

exporters were less than 2 percent of their total agricultural imports in 1978. From Kenya's standpoint, however, the potential for growing pulses for export is good because growing conditions for both edible dry beans and for grams are favorable. Total imports of pulses to the selected countries averaged 363,000 tons per year, with an average value of $185 million during the period 1976-78 and have almost doubled since the early 1970s. Imports are concentrated in North Africa and the Gulf States (Table 40). For the dry edible beans, the main markets are Iraq and North Africa for white beans and Iran for both colored and white beans.

As a relatively small item in international trade, data on world production and price trends of pulses are difficult to obtain. Production of dry edible beans in the United States, the largest producer, nearly doubled in the late 1970s from 0.8 million tons in 1977 to 1.44 million tons in 1981.[146] However, this growth was due to exceptional demand in Mexico in 1980 and 1981 and is probably above the long-term trend. International prices of several main varieties of dry edible beans for which data were available showed considerable fluctuations between 1970 and 1980 (Table 41). The Michigan pea bean or "navy bean," which made up 15-30 percent of total U.S. production in the late 1970s, and the Great Northern bean correspond closely to the Ethiopian white bean and the white Kenya pearl bean, for which the main market is the United Kingdom at 90,000 to 100,000 tons per year. The reason for higher prices for the U.S. product is its standardized quality and guaranteed freedom from insect infestation and from an excessive amount of broken beans. The U.S. California and U.S. Michigan dark red kidney beans correspond closely to the Kenyan Canadian Wonder type in shape and to the Kenyan red haricot bean in color; their relatively high prices and the large areas where these beans are grown in Kenya make them of special interest. The Kenyan brown speckled Rosecoco corresponds closely to the U.S. pinto bean and the red speckled Rosecoco to the U.S. cranberry bean.

Bean exports appear viable, even at the rather depressed prices of 1981. For example, with a freight factor of U.S. $50 per ton and an

Table 40—Volume and value of pulses imported by selected oil-exporting countries, 1971-73 and 1976-78 averages

Region	Volume		Value	
	1971-73	1976-78	1971-73	1976-78
	(1,000 metric tons)		(U.S. $)	
West Africa	1	3	. . .	3
North Africa	76	164	15	87
Gulf States	113	163	40	80
Iran	8	30	2	14
Indonesia	1	3	. . .	1
Total	198	363	57	185

Source: Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, 1978.

exchange rate of U.S. $1 equals KSh 10.50, the U.S. red kidney bean price of U.S. $720 per ton in March 1982 would give an export parity price of KSh 7,035 per ton or KSh 633 per bag against the current farmgate price for Canadian Wonder beans of KSh 330 offered to farmers by the NCPB. Even allowing for KSh 63 per bag for packing, handling, and local transport, as for maize (Table 38), and even if the export parity value is 20 percent below the U.S. product, the Kenyan domestic border price of KSh 4,367 per ton is 22.5 percent lower than the export parity price of KSh 5,658. To obtain prices comparable with those of the United States will require variety and quality standardization and complete success in the battle against insect infestation. The inability of importers to remove weevil-damaged beans mechanically makes it difficult to dispose of insect-infested beans at almost any price.

Dry edible beans are second only to maize in area cultivated in Kenya. This makes the neglect of the export potential of the crop in literature on Kenyan agriculture surprising. In 1974/75 there were nearly 50,000 hectares of beans grown in pure stands. If 30 percent of the area sown in stands mixed with maize is included, a further 235,500 hectares is added, bringing the total to nearly 0.3 million hectares. Area sown in grams was even greater at 387,000 hectares, of which the most widely grown were cowpeas and pigeon peas.[147]

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[146] U.S. Department of Agriculture, Statistical Reporting Service, Crop Reporting Board, "Crop Production," Washington, D.C., December 1981, p. A-8.

[147] Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Integrated Rural Survey*, p. 79.

Table 41—World prices of dry beans, 1971-80

Month and Year	Kenya Rosecoco[a]	White Kenya Pearl-beans	Ethiopian White (Small AB Quality)	Michigan Pea	U.S. Great Northern	U.S. California Dark Red	Michigan Small	Ethiopian White	Michigan Pea	U.S. Great Northern
				(U.S. $/metric ton)					(1975 U.S. $/metric ton)	
February 1971	...	...	255	297	295	...	...	...	...	...
July 1972	195	215	235	297	360	...	...	...	...	...
August 1973	...	405[b]	415	525	540	...	...	...	...	...
March 1974	...	680	740	675	750	...	...	846.7	772.3	858.1
April 1975	...	280	280	350	485	...	...	280.0	350.0	485.0
December 1976	...	...	555	425	440	...	...	348.7	417.5	432.2
March 1977	...	...	400	450	585	560	...	362.0	407.2	529.4
July 1978	...	...	435	...	...	590	555	332.8	...	...
July 1979	...	...	465	660	700	790	810	310.6	440.9	467.6
July 1980	...	...	...	640	800	...	635	...	382.6	478.2
March 1981	...	...	...	820	910	990	910	...	441.1	489.5
March 1982	450[c]	...	680	810	660	720	550	325.8	388.1	316.2

Source: Market reports of Schlüter and Maack GmbH, Hamburg, various issues, February 1971-March 1982.

Notes: Prices are cost and freight, or c.i.f. Antwerp/Hamburg range, or ex-warehouse, including bags. To obtain constant prices, current prices were deflated by the GDP deflator of the Organization for Economic Cooperation and Development-North. This deflator has 1975 equal to 100.

[a] It is assumed by international buyers that Kenya Rosecoco beans will always contain 2 percent broken and damaged beans. This is a major reason why its value is low.

[b] This figure is cited as £165 in the Schlüter and Maack market report. It was converted to U.S. dollars using the market rate listed for 1973 (2.4522) in International Monetary Fund, *International Financial Statistics Yearbook, 1981* (Washington, D.C.: IMF, 1981).

[c] This was a verbal offer made by Schlüter and Maack to a Kenyan exporter in March 1982.

Fifty-six percent of total bean production and 58 percent of bean sales are from farms of less than 2 hectares, and only 1.6 percent of total marketed surplus is from farms of more than 8 hectares (Table 42). Small farms are of even greater importance in marketed pulse production than in maize (compare with Table 23).

Yields of pulses in Kenya are low. Estimates made in Nyeri District of Central Province show yields of beans at six bags per hectare, which is 187 kilograms per acre for 1980,[148] compared with average yields in the United States of more than 650 kilograms per acre in 1980 and 1981.[149] Yields of grams are also low, typically between 200 to 460 kilograms per hectare.[150]

Beans and grams are still grown in most parts of the country using traditional seeds and agronomic practices, without row planting or chemical fertilizers. The low yields in areas of good rainfall underline the unrealized potential to produce export surpluses through improved varieties, better cultivation methods, and use of chemical fertilizers. A Dutch-assisted grain-legume research project has produced improved varieties for the two major dry edible bean varieties—Rosecoco and Canadian Wonder. Adoption of the new varieties, although still less than 1 percent of the area, is accelerating.[151] Also, green gram varieties, the most commonly grown grams, are now becoming available from an FAO assisted dryland farming research project at Katumani. Yields of up to 1,800 kilograms per hectare have been obtained on the research station,[152] although data are not yet available for yields on farmers' fields.

Officially marketed production of beans and grams by province during the period 1970/71-1979/80 is shown in Tables 43 and 44. On the basis of three-year moving averages, total marketed production of beans fluctuated between 80,000 bags and 140,000 bags from 1966/67 to 1975/76. It then fell sharply to less than 10,000 bags in 1978/79 before rising again to 60,000 bags in 1980/81.[153] In

1981/82, the NCPB purchases were about 0.8 million bags or more than 73,000 tons, with a potential export parity value of more than U.S. $36 million. Official gram purchases fell steadily from about 30,000 bags per year in the early 1970s to less than 5,000 bags per year in the late 1970s, but again rose to nearly 30,000 bags in 1981/82. Eastern Province was the major area of production of both beans and grams until 1975/76, but marketed production of beans has also been significant from all the other provinces except Coast Province, where production conditions are unsuitable. In 1981/82 the major suppliers to the NCPB were Rift Valley Province with 40 percent and Eastern Province with 30 percent. This was particularly surprising in view of the small area planted in beans in Rift Valley Province in 1974/75 (Table 43).

The dramatic increase in bean purchases in 1981/82—over five times larger than in any year in the preceding decade—needs to be explained. Although part of the crop may have come from neighboring countries, the large purchases in Eastern Province, which has no borders with other bean-growing countries, suggests that most of it was locally produced. The 62 percent increase in the price in 1980/81 was clearly a major factor (see Tables 45 and 46), although the response was delayed until 1981/82. The delay may well have resulted from the high unofficial prices still prevailing for maize in 1980/81. As maize became abundantly available in 1981, lower maize prices were expected, which may have encouraged a shift into beans. The price increase in beans probably caused some area to be diverted from potatoes and sorghum and millets, as well as maize.

The constraints to increasing pulse exports are in the internal marketing and input supply systems. The NCPB does not provide strong vertical linkages between the export market and the local smallholder. Large differences in international prices for different types of colored beans are not reflected

[148] Nyeri, District Agricultural Officer, *Nyeri District Annual Report, 1980* (Nairobi: Ministry of Agriculture, 1980).

[149] U.S. Department of Agriculture, Statistical Reporting Service, Crop Reporting Board. "Crop Production."

[150] J. D. Acland, *East African Crops* (Nairobi: Longmans, 1971), p. 117.

[151] National Seed Quality Control Service, Nakuru, personal communication, 1982.

[152] Katumani Research Station, Katumani, personal communication, March 1982.

[153] These moving averages were derived from figures for 1966/67 to 1979/80 from Maize and Produce Board, *Annual Report*, various issues (Nairobi: Maize and Produce Board, various years). The data for 1980/81-1981/82 were provided by the National Cereals and Produce Board.

Table 42—Marketed surplus of beans, by farm size group, 1974/75

Farm Size Group	Number of Farms Sown with Beans[a]	Area Sown with Beans[b]	Yield	Share of Yield Sold[c]	Quantity Sold[c]	Share of Total Sales
(hectares)	(1,000)	(1,000 hectares)	(metric tons/ hectare)	(percent)	(1,000 metric tons)	(percert)
Less than 0.5	123.9	47.1	0.31	26.4	3.85	9.7
0.5 – 0.9	177.8	93.3	0.25	22.3	5.20	13.1
1.0 – 1.9	305.5	220.2	0.20	31.5	13.87	34.9
2.0 – 2.9	153.4	114.3	0.15	31.2	5.35	13.5
3.0 – 3.9	92.3	88.7	0.19	17.3	2.92	7.3
4.0 – 4.9	75.7	71.6	0.18	13.8	1.78	4.5
5.0 – 7.9	64.2	88.2	0.16	43.5	6.14	15.4
8.0 and more	28.1	40.1	0.07	23.3	0.65	1.6
Total	1,020.9	763.5	0.19	27.8	39.76	100.0

Source: Kenya, Ministry of Finance and Planning, Central Bureau of Statistics, *Integrated Rural Survey 1974-75, Basic Report* (Nairobi: Government Printer, 1977).

Note: Vertical and horizontal totals differ slightly because of rounding.

[a] Farms are defined here not as registered farms on the land registration lists in the district land office, but as the land associated with a household that is used wholly or partially for agricultural purposes and managed as a single economic unit.

[b] This includes the areas sown with mixed maize and beans and pure stands of beans.

[c] The amount sold was calculated as all produce not consumed. This exaggerates the quantity sold as a small amount is retained for seed.

in domestic price differentials. Until mid-1982 bags of mixed beans received the same price as those grown from certified seeds, and there was no premium for purchases of uniform size and color. In the export market, these quality differences command price differentials of up to 300 percent. In the local market, the NCPB often cannot obtain significantly higher prices for quality differences, especially in periods of shortage. It is difficult to control decisions by buying clerks in remote buying centers who have to grade beans at the time of purchase. Also, there are no smallholder pressure groups to articulate problems to the NCPB. This affects such issues as quality differentials and the number and location of buying centers.

Another problem has been the NCPB's difficulty in establishing a reputation among international buyers for a product that is free from weevil infestation. The NCPB's task is difficult when many beans from smallholders are sold to the NCPB already infested with weevils, which quickly spread to other lots. The training and supervision of buying clerks that is required to control this effectively will probably be beyond the institutional capacity of the NCPB for some years.

High collection costs are another problem associated with NCPB buying, because parastatal purchasing operations do not have the flexibility of manpower, transport, timing of collection, and payment arrangements that characterize the operations of small traders.

On the input side, a number of problems constrain realization of the three to four times increase in yields possible by early planting, clean seed, and other good husbandry practices.[154] In the case of grams, a major problem is likely to be the lack of any institution to carry out seed multiplication and to distribute improved seed. Because of price controls, the Kenya Seed Company, which is 85 percent owned by the government, is reluctant to subsidize development costs on these and other minor crops like sorghums and millets from profits on maize

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[154] For the yield gap and ways to increase bean yields, see D. N. Ngugi, "Agricultural Research to Increase Food Production," a paper presented at the Food Research Priorities Conference of the National Council of Science and Technology, Nairobi, June 2, 1982 (mimeographed).

Table 43—Total official purchases of beans, by province and district, 1970/71-1979/80 and 1981/82

Province/District	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1981/82
						(1,000 bags)					
Rift Valley Province	3.6	2.0	10.0	2.9	2.0	12.3	50.7	0.8	0.5	9.0	327.1
Nakuru	2.4	0.2	0.5	...	0.1	0.1	1.2	...	...	...	n.a.
Baringo	...	...	...	...	...	...	...	...	...	...	n.a.
Uasin Gishu	...	...	0.2	0.1	...	0.5	8.3	...	...	1.3	n.a.
Other	...	0.5	0.6	...	...	...	...	0.2	...	...	n.a.
Trans Nzoia	1.2	1.0	8.7	2.8	1.7	3.0	17.9	0.6	0.3	7.7	n.a.
Elgeya Marakwet	...	...	...	...	...	...	0.7	...	0.2	...	n.a.
Narok	...	...	...	...	...	...	...	...	...	...	n.a.
Kericho	...	0.3	...	...	...	0.6	5.8	...	...	...	n.a.
Nandi	...	...	...	...	...	...	...	...	...	...	n.a.
West Pokot	...	...	...	...	...	0.3	0.5	...	...	...	n.a.
Kajiado	...	...	...	...	...	7.8	15.8	...	...	...	n.a.
Laikipia	...	...	...	...	0.2	...	0.5	...	...	...	n.a.
Central Rift	...	...	...	...	...	...	...	...	...	...	n.a.
Western Province	4.9	5.2	9.2	4.7	7.0	20.0	63.9	1.1	1.1	4.0	143.5
Bungoma	2.3	1.4	6.8	3.3	5.0	7.3	29.6	0.4	...	0.2	n.a.
Busia	0.1	0.1	...	0.2	0.1	9.1	4.1	...	1.1	2.0	n.a.
Kakamega	2.5	3.7	2.4	1.2	1.9	3.6	30.2	0.7	...	1.8	n.a.
Nyanza Province	1.5	15.8	15.1	11.9	4.9	23.6	19.0	3.8	...	1.7	62.1
Central	0.2	0.2	...	0.6	...	...	...	...	...	...	n.a.
South	1.3	11.7	13.0	7.5	4.0	10.0	6.8	0.3	...	...	n.a.
Kisii	...	3.9	2.1	3.8	...	12.9	11.9	3.5	...	1.7	n.a.
Siaya	...	...	...	...	0.9	0.5	0.3	...	...	...	n.a.
Kisumu	...	...	...	...	...	0.2	...	...	...	...	n.a.
Eastern Province	49.2	119.1	75.8	40.6	117.9	55.9	21.7	2.4	...	0.7	241.8
Meru	6.5	73.1	38.9	30.8	79.2	34.9	16.0	1.1	...	0.2	n.a.
Embu	17.2	39.5	36.7	9.8	37.3	20.2	5.7	1.3	...	0.5	n.a.
Kitui	0.7	4.8	0.2	...	1.2	0.6	...	...	...	...	n.a.
Machakos	24.8	1.7	...	...	0.2	0.2	...	...	...	...	n.a.
Central Province	8.4	12.0	13.6	3.1	9.7	5.2	11.1	0.5	1.2	...	33.9
Nyeri	0.1	...	0.2	0.3	0.3	0.2	...	...	...	...	n.a.
Kirinyaga	2.9	6.7	9.6	1.0	4.2	3.4	9.9	0.3	...	...	n.a.
Muranga	0.5	0.7	2.6	1.2	1.2	1.3	0.6	...	...	...	n.a.
Kiambu	...	0.4	0.2	...	0.1	0.2	0.2	...	0.2	...	n.a.
Nyandarua	4.9	4.2	1.0	0.6	3.9	0.1	0.4	0.2	1.0	...	n.a.
Ngong	...	...	...	...	...	...	...	...	...	...	n.a.
Total	68.2	154.1	123.7	63.2	141.5	117.0	166.4	8.6	2.8	15.4	808.2[a]

Sources: For the years 1970/71-1979/80, Maize and Produce Board, *Annual Report,* 1970/71-1979/80 (Nairobi: Government Printer, 1971-81); for 1981/82, National Cereals and Produce Board, personal communication.
Note: One bag weighs 90 kilograms. The district figures for 1981/82 were not available.
[a] The balance of 8,100 bags was produced in Coast Province.

seed. Nor have other small seed companies shown any interest. Thus, a gap exists between the research station and farmer adoption of the improved varieties.

Although trials by the research stations have shown clearly the profitability of using fertilizer on improved varieties of beans, its adoption has been slow.[155] As Table 36 shows, fertilizer consumption has grown slowly for all crops in Kenya as the result of macroeconomic policy to minimize foreign exchange expenditures on fertilizer and other institutional factors. The gross retail margin given by the Kenya Farmers Association and other importers is typically 2 percent of the sales value, which does not

[155] National Horticultural Research Station, Grain Legume Project, "1980 Annual Report," Thika, 1980 (mimeographed); and National Horticultural Research Station, Grain Legume Project, "1981 Annual Report," Thika, 1981 (mimeographed).

Province/District	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
					(1,000 bags)					
Nyanza Province	2.0	1.4	2.1	0.7	...	...	...	...	...	...
South	2.0	1.4	2.1	0.7	...	...	...	...	...	...
Eastern Province	29.8	17.8	3.0	5.6	27.0	4.0	6.4	4.8	...	2.1
Meru	0.4	...	...	1.6	7.1	1.5	1.0	2.7	...	...
Embu	13.2	13.3	2.3	...	1.0	1.4	5.2	0.6	...	...
Kitui	1.2	3.1	0.7	4.0	18.6	1.1	...	1.4	...	...
Machakos	15.0	1.4	...	...	0.3	...	0.2	0.1	...	2.1
Central Province	7.6	11.2	7.1	...	...	0.3	1.2	...	...	...
Kirinyaga	7.6	11.0	7.1	...	...	0.3	1.2	...	...	...
Muranga	...	0.2	...	...	...	...	...	...	...	...
Total	39.4	30.4	12.2	6.3	27.0	4.3	7.6	4.8	...	2.1

Source: Maize and Produce Board, *Annual Report*, 1970/71-1979/80 (Nairobi: Government Printer, 1971-80).
Note: One bag equals 90 kilograms.

cover costs of handling, storage, and selling.[156] Also, prices of fertilizer specified to retailers in letters from the price controller appear to cover an area such as Machakos, but in fact refer to the town itself rather than the district as a whole. Thus, retailers are generally not aware that they may increase the price in rural markets above the urban retail price to cover legitimate road haulage and other costs. This has severely restricted fertilizer distribution outside major urban centers. Lateness of seasonal credit[157] and lack of mobility of the extension staff[158] are also constraints on rapid diffusion of yield-increasing technological innovation for beans and probably also for grams.

Horticultural Crops

The substantial imports of nearly U.S. $400 million in fruit and vegetables in oil-exporting countries in 1978 were highly concentrated in Iran and the Gulf States. An International Trade Centre study of the market for selected horticultural products in selected Persian Gulf countries in 1980 confirms that the two major fruits were oranges and apples and the major vegetables were potatoes and onions (Table 47).[159] Kenya could successfully develop exports of fruits including apples, oranges, mangoes, and grapes or vegetables including onions, potatoes, tomatoes, and garlic, based on demand growth in these countries.

Kenya's horticultural exports are made up of a highly diversified group of fruit and vegetables, both fresh and processed. The five largest groups given by the Standard International Trade Classification (SITC) code in the Kenya annual trade statistics for the period 1976-80 comprise about 75 percent of total horticultural exports, which amounted to nearly $35 million in 1980 (Table 48). The single largest item is tinned pineapple, which is processed in a single factory in Thika, but the major growth items are fresh tropical fruit and tinned fruit and vegetable juices. Fresh fruit and vegetables by airfreight are also a major item.

The Horticultural Crops Development Authority statistics list 30 countries that import fresh fruit and vegetables from Kenya by order of importance. The top seven are all in Western Europe. In 1980 these accounted for more than 90 percent of total airfreight exports by weight. Five Gulf States appear in

[156] Kenya, Ministry of Agriculture, Central Development and Marketing Unit, *Yields, Costs and Prices 1981* (Nairobi: Government Printer, 1981), p. 14 ff.

[157] Kenya, Ministry of Agriculture, Development Planning Division, "National Food Policy Seminar Summary Report," Nairobi, 1981.

[158] Leonard, "Administrative Issues in Implementing Kenya's Food Policy."

[159] International Trade Centre, *The Market for Fresh Horticultural Products.*

Table 45—Official prices for selected minor crops, 1970/71-1980/81

Crop	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76
			(KSh/bag)			
Dry edible beans						
Canadian Wonder	76.00	85.00	65.00	75.50	120.00	150.00
Red Haricot	56.00	70.00	65.00	75.50	120.00	150.00
Rosecoco	76.00	90.00	65.00	60.50	120.00	150.00
Grams						
Black	73.00	73.00	60.00	65.50	70.00	70.00[c]
Green	75.00	95.00	90.00	75.50	100.00	100.00[c]
Yellow	90.00	90.00	65.00	90.50	100.00	100.00[c]
Bixa[b]	42.00	52.00	58.00	135.50	135.00	135.00[c]
Cashew nuts, Grade I	75.00	75.50	87.00	96.50	98.40	98.40[c]
Groundnuts, South Nyanza	106.00	108.00	110.00	30.50	40.00	40.00[c]
Bulrush millet	25.00	30.00	30.00	50.50	80.00	80.00[c]

Crop	1976/77	1977/78	1978/79	1979/80	1980/81
			(KSh/bag)		
Dry edible beans					
Canadian Wonder	170.00	170.00	170.00	190.00	300.00
Red Haricot	170.00	120.00	120.00	150.00	250.00
Rosecoco	170.00	170.00	165.00	185.00	300.00
Grams					
Black	216.00	200.00	200.00	200.00	200.00[a]
Green	220.00	160.00	200.00	200.00	200.00[a]
Yellow	164.00	200.00	200.00	200.00	200.00[a]
Bixa[b]	240.00	370.00	370.00	370.00	370.00[a]
Cashew nuts, Grade I	98.40[a]	98.40[a]	140.00	140.00	140.00[a]
Groundnuts, South Nyanza	245.00	300.00	403.00	420.00	420.00[a]
Bulrush millet	60.00	60.00	60.00	60.00	60.00[a]

Sources: Maize and Produce Board, *Annual Report*, 1970/71-1978/79 (Nairobi: Government Printer, 1971-79) and price lists issued by the National Cereals and Produce Board for 1979/80 and 1980/81.

Notes: The dates that the prices were announced in the years before 1975/76 are not available. But the prices for 1975/76 were announced on August 1, 1975. For 1976/77, the date was December 1, 1976. For 1977/78, it was July 11, 1977; for 1978/79, it was October 1, 1978; for 1979/80, it was February 12, 1979; and for 1980/81, it was September 23, 1980.

[a] As a price was not given in the price lists of the NCPB, it was assumed that no change occurred.

[b] Bixa, also known as annatto, is a fruit from which a dye is made that is used as food coloring in cheese and margarine.

the listing. The chief horticultural products of the 30 countries by weight in 1980 were green beans, pineapples, eggplants, chillies, and mangoes. Small amounts are airfreighted to the Gulf States. Exports to Saudi Arabia by airfreight, for example, were 324 tons in 1980 and made up 2 percent of total airfreighted horticultural crops by weight in that year.[160] The major items being airfreighted to Saudi Arabia were mangoes and pineapples, which together accounted for 80 to 90 percent of total horticultural produce by weight airfreighted to Saudi Arabia in each year between 1978 and 1980.[161] The major limiting factor is availability of airfreight space to the Gulf. Owing to the lack of possible backloads, it is unlikely that this constraint can be lifted even in the medium term; most fruit and vegetables are relatively low value items and thus special charters are not viable.

There is potential to transport fresh fruit and even certain vegetables to the Gulf by seafreight. The major constraint to the use

[160] These data are taken from the Horticultural Crops Development Authority export statistics for fresh fruit, vegetables, and cut flowers airfreighted in 1980.

[161] Ibid.

Table 46—Indexes of price changes for pulses and some competing crops, 1970/71-1972/73 average and 1974/75-1982/83

Crop	Average 1970/71-1972/73	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
Beans										
Canadian Wonder	100	160	199	226	226	226	226	399	439	439
Rosecoco	100	167	209	237	237	230	230	418	460	460
Sugar	100	126	182	213	259	271	271	271	306	347
Maize	100	125	188	207	240	195	204	251	285	389
Grams, green	100	115	115	253	184	230	230	230	n.a.	n.a.
Bulrush millet	100	217	217	163	163	163	163	163	n.a.	n.a.

Sources: Maize and Produce Board, *Annual Report*, 1970/71-1978/79 (Nairobi: Government Printer, 1971-79); price lists published by the National Cereals and Produce Board for 1979/80-1981/82; and for maize and sugar, Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1982* (Nairobi: Government Printer, 1983). The data for sugar are from the Kenya Sugar Authority.

Note: Where n.a. appears, the figure was not available.

of refrigerated (reefer) seafreight for perishables is the irregularity of the service, which in turn stems from inadequate demand for it. In the past some beef and horticultural crops have been shipped this way but not in sufficient quantities to justify frequent calls to Mombasa by the shipping lines. With the sharp fall in beef exports, the frequency of reefer sailings to the Gulf has dropped from every two weeks to every six weeks since 1975.[162] Thus, the freight space problem is really a problem of supply. For example, although total production of mangoes is growing rapidly, production was still under 1,000 tons in 1977,[163] and Kenya's share of the Middle East countries' purchases of fresh mangoes was less than 5 percent in 1978. India, Pakistan, and Egypt were the main suppliers.[164] There is also a lack of technical knowledge on how to store produce in re-

Table 47—Average values of selected fruit and vegetables imported by selected oil-exporting countries, 1976-78

Crop	Gulf States	North Africa	West Africa	Iran	Indonesia	Total
	(U.S. $ million)					
Fruit						
Oranges, clementines, and tangerines	34.6	...	0.1	66.6	2.4	103.7
Apples	27.9	3.0	0.2	40.7	2.7	74.5
Pears	0.7	0.7	...	4.7	1.0	7.1
Grapes	3.3	...	...	...	1.2	4.5
Lemons and limes	1.0	...	...	1.9	...	2.9
Vegetables						
Potatoes	22.4	27.9	0.2	0.8	...	51.3
Onions	17.6	...	0.1	2.8	0.2	20.7
Tomatoes	7.4	...	...	...	...	7.4
Total fruit and vegetables	114.9	31.6	0.6	117.5	7.5	272.1

Source: Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, 1978.

[162] Dodwell Shipping Agency, personal communication, October 1981.

[163] International Trade Centre, *The Market for Fresh Horticultural Products.*

[164] Ibid., p. 14.

Table 48—Kenya's exports of selected horticultural crops, 1976-80

Crop	1976	1977	1978	1979	1980
			(metric tons)		
Quantity					
Tinned pineapple	29,906	45,329	42.082	41,048	38,452
Fresh vegetables	11,835	12,919	12,599	14,400	14,859
Tinned fruit and vegetable juices	1,277	2,388	2,641	2,525	4,475
Fresh tropical fruit	2,287	4,909	5,260	4,526	5,083
Dehydrated vegetables	1,362	1,326	950	1,340	1,044
			(KSh million)		
Value					
Tinned pineapple	139.6	210.3	191.7	186.3	177.1
Fresh vegetables	47.3	57.0	67.8	65.3	96.6
Tinned fruit and vegetable juices	7.3	10.7	12.2	20.0	38.1
Fresh tropical fruit	6.2	15.1	19.0	18.5	26.7
Dehydrated vegetables	15.3	17.7	18.8	23.8	18.3
Total	215.7	310.8	309.5	313.9	356.8

Source: Kenya, Ministry of Finance, Statistical Branch, Customs and Excise Department, *Annual Trade Report*, 1976-80 (Nairobi: Government Printer, 1976-80).

Note: The percentages these crops have in the exports of all horticultural crops are 76.4 for 1976, 76.6 for 1977, 85.6 for 1978, 78.1 for 1979, and 75.2 for 1980.

frigerated storage for the two- to three-week period required to seafreight it to the Gulf, which results in high losses even for mangoes and pineapples. This problem has been the subject of a specific study by the International Trade Centre.[165]

There are several major problems with the supply of fresh fruit and vegetables for export. A major constraint is in the area of research. Apart from a small research station for potatoes at Tigoni, all research on horticultural crops is at the National Horticultural Research Station at Thika or at the Coast Agricultural Research Station at Mtwapa, which is specifically for coastal crops. There has been steady growth in the share of research in both recurrent and development expenditure allocations in the Ministry of Agriculture budgets. For example, recurrent expenditure allocations for research increased from 11 percent to 16.6 percent of the Ministry of Agriculture recurrent budget from 1980/81 to 1981/82,[166] and development expenditure allocations increased from 3.2 percent to 5.7 percent.[167] Nevertheless,

research allocations for horticultural crops are far from the level required to sustain large increases in horticultural exports.

The share of horticulture in the national agricultural research budget in 1979/80 was just 7.8 percent, although research expenditure as a percentage of the value of marketed production is estimated by Omuse to be higher for horticultural crops than for any other commodity (Table 49).[168] However, each horticultural crop—fruit or vegetable—has its own problems relating to varieties, resistance to pests and diseases, date of maturity, and so forth, which require long-term research efforts to achieve sustained increases in yields.

The diversity of Kenya's agroclimatic conditions, encompassing both temperate and tropical zones, makes it possible to grow a wide variety of fruit and vegetables. As many as 15 fruits and 10 major vegetables appear to offer commercial returns to a sustained research effort. Fruits with apparent potential include apples, apricots, avocados, grapes, grapefruit, lemons, limes, mangoes,

[165] International Trade Centre, "Export Development and Diversification."

[166] Kenya, *Estimates of Recurrent Expenditure of the Government of Kenya for the Year Ending June 1983* (Nairobi: Government Printer, 1983).

[167] Kenya, *Development Estimates for the Year 1981/82 of the Government of Kenya* (Nairobi: Government Printer, 1981).

[168] John K. Omuse, "A Review of Strategies for Research into Food Production," a paper presented at the Workshop on Food Policy Research Priorities, Nairobi, June 14-17, 1982.

Table 49—Estimated research expenditure compared to the value of the marketed production of major agricultural commodities, 1979-80

Commodity	Estimated Marketed Production Value	Research Expenditure	Research Expenditure as a Share of the Value of the Product	Proportion of Total Research Expenditure Allocated to the Commodity
	(KSh million)		(percent)	
Coffee	2,124.9	14.6	0.7	26.7
Livestock (beef and milk)	...	9.9	...	...
Range research	...	2.5	...	...
Range research and livestock	1,237.8	...	1.0	22.8
Other food crops	407.1	8.6	2.1	15.7
Maize	187.2	4.6	2.5	8.4
Oil and fiber crops	248.8	4.5	1.8	8.3
Horticulture	85.7	4.3	5.0	7.8
Tea	1,346.8	2.8	0.2	5.1
Sugar	466.0	2.0	0.4	3.7
Wheat	297.7	0.0	0.3	1.4
Total	6,405.8	54.5	0.9	100.0

Source: John K. Omuse, "A Review of Strategies for Research into Food Production," a paper presented to the Workshop on Food Policy Research Priorities, Nairobi, June 14-17, 1982.

melons, oranges, passion fruits, peaches, pears, plums, and strawberries. A list of vegetables might include asparagus, cabbage, carrots, chillies, green beans, garlic, potatoes, onions, sweet peppers, and tomatoes. This list does not include flowers, despite significant exports of cut flowers to Europe by airfreight, particularly roses and carnations. If the horticultural crop research budget of KSh 4.3 million in 1978/79 had been equally divided between these 27 crops, less than KSh 160,000 or U.S. $21,000 at official exchange rates in 1978/79 would have been available for each crop. The setting of priorities to concentrate research effort on one, or at most two, crops is particularly difficult in view of the provincial bias in the benefits from research introduced by such a concentration of effort.

Data were collected on apple production research in New York State in the United States to provide a comparison with research expenditures on mangoes in Kenya.[169] Estimates from the New York State College of Agriculture showed 32.5 technical personnel working fulltime on research on apples in New York State in 1982, the majority on pest

control. There was one professional working for every 16,000 tons of fruit in 1982, or for every U.S. $1 million of gross value. In Kenya, only two technicians were working on mangoes, at a fraction of the cost of professionals in New York. Although the gross value of the crop is difficult to estimate, it is probably well below U.S. $1 million; thus, gross value of output per research worker is probably little different from that in New York State. However, if investment in fruit production depends on a critical minimum effort in research to produce a viable technical package, the allocation of research personnel to mangoes in Kenya may well fall below the minimum required.

One important consequence of the lack of research is a high degree of uncertainty about the size of returns in any large-scale investment in fruit production. Disease and pest problems are a particular problem in tropical and subtropical zones. For example, virus diseases are now widespread in citrus in Kenya with no known treatment. These diseases build up after 10 years, gradually reducing yields and limiting the life of the tree to 20 years. In the early stages it is not

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[169] Cornell University, Department of Pomology and Agricultural Economics, Ithaca, N.Y., personal communication, July 1983.

possible to see the virus with the naked eye.[170] Without extensive field trials and research into pests and diseases, a mango production project based on new varieties must be viewed as a high-risk venture, despite attractive market opportunities for fresh fruit. The only short-run option in the absence of research is to develop domestic production primarily for processing, using locally proven varieties, as one company in Western Kenya has done successfully with papayas.

In addition to the lack of research, there is a major lack of improved planting material, especially fruit trees. It is estimated that as many as 700,000 citrus seedlings were sold from government nurseries in 1982, but only a small fraction were of improved stock, and some may in fact damage existing production by spreading disease.[171] To illustrate the scarcity, the Mtwapa Research Station sold 9,000 seedlings in 1977, of which 6,400 were citrus and 2,300 were mangoes,[172] whereas in 1979, in the Coast Province alone, there was demand for more than 400,000 seedlings—62,000 citrus and 18,000 mangoes.[173]

The problems of nursery production in Coast Province have been well documented by van Eijnatten.[174] The land of some of the 12 nurseries currently existing is too small to allow proper rotation, irrigation equipment is in poor repair, and the recurrent budget for employment of labor and purchase of seeds is low. The potential to increase output substantially is undoubtedly great, given the availability of improved mango varieties, such as the Apple, Boribo, and Ngowe varieties, to graft onto local rootstock. The cost of a major scheme to meet the province's seedling requirements was estimated in 1980

at U.S. $200,000-$300,000 per year for five years, but without a major export-based scheme such as the one described below.[175]

Mangoes appear to offer the most attractive potential prospect for exports to the Gulf States and Iran. Improved varieties exist and seedlings can be made available in large numbers from existing rootstock by budding or grafting. Mangoes do not suffer from serious virus diseases, like citrus fruits, but they are susceptible to fungal diseases if there is heavy rain at the time of flowering.[176] With improved varieties and methods of cultivation, yields can increase from the current average of 250 fruits per tree to about 1,000 fruits per tree a year.[177] In Coast Province there are two seasons of fruit production, May to July and December to February, which correspond with the rains. Some local varieties produce fruit throughout the year. Kenyan mango exports would face no competition from Indian suppliers in Gulf State markets during the period around the end of the year.

A major source of difficulty is management of fruit production when it is scattered among thousands of small farms in an area. Smallholders with only a few trees don't take the time to find out about pruning and spraying for disease control. As a consequence, standards of husbandry are low. This points to the need for consolidating pieces of land and limiting the area to be put under fruit trees to a minimum of 1 hectare, as was required when smallholder tea production was initiated in Kenya. This would also facilitate collective transport and marketing arrangements. A suitable area in Coast Province would probably be the settlement area between Mombasa and Malindi (close to the

[170] Mtwapa Research Station, Mtwapa, personal communication, July 1982.

[171] Kenya, Ministry of Agriculture, Horticultural Crops Development Division, Nairobi, personal communication, March 1982.

[172] Kenya, Ministry of Agriculture, Division of Scientific Research, Annual Report, Coast Province 1977 (Nairobi: Government Printer, 1978).

[173] C. L. M. van Eijnatten and S. J. Karisa, "Proposal for the Development of Nursery Activities in Coast Province and its Cost of Implementation," Coast Agricultural Research Station Communication 9, Mtwapa, March 1980 (mimeographed).

[174] C. L. M. van Eijnatten, "Notes on Treecrop Nursery Activities in Coast Province," Coast Agricultural Research Station Communication 8, Mtwapa, October 1979 (mimeographed).

[175] Ibid.

[176] K. Mwangi, "Problems of Mango Growing in Coast Province," Coast Agricultural Research Station Quarterly Newsletter, March 1982.

[177] Mtwapa Research Station, Mtwapa, personal communication, July 1982.

research station at Mtwapa), where farmers have 5 hectares each and much of the land is left uncultivated at present.

The horticultural industry in Kenya offers great potential to increase Kenya's exports to oil-exporting countries. Fruits offer greater potential than vegetables, because higher unit values lower freight costs as a proportion of the export parity value. However, most fruits are less labor-intensive than vegetables and thus create less employment. Pests and diseases in citrus fruits make mangoes the more promising crop, and underline the need for a greater allocation of research funds to one or two priority horticultural crops to provide a secure basis for future project funding. A mango project in Coast Province appears to be viable immediately.

9

WHO SHOULD PROCESS AND EXPORT?

One of the major issues brought out by the commodity studies is the institutional problem of handling commodity exports. The high costs in the domestic coffee marketing chain, the choices of technology in sugar processing, and the lack of market information for pulses all raise questions about which is the most economically efficient and socially desirable crop marketing system. In the medium term decisions about who should process and export will have to be made for each of these crops with export potential. Decisions will also be required on the balance between estates and smallholder production, especially since in Kenya the estates and large farms produce higher yields per hectare for coffee, tea, and sugar but not for maize and beans.

Five major types of marketing institutions that are involved in the processing and export of these crops will be considered. Expatriate-controlled businesses, Asian-owned businesses, and small African-owned businesses are usually all lumped together as "the private sector."[178] But, these three major components of the private sector differ in their objective functions, their economic performance, and their social linkages. In general, all are economically efficient, but concern has been expressed in Kenya about the distribution of power and wealth that may result from these forms of ownership.[179] Two more socially desirable institutions—parastatals and cooperatives—may not threaten the social fabric in the same way, but questions have been raised about their efficiency.[180] The dilemma is this: there is no institution available to develop export potential that combines efficiency and social acceptability.

Expatriate-Controlled Enterprise

Expatriate-controlled enterprise includes all firms that are effectively controlled by those whose citizenship and residence are outside of Kenya. These are primarily local branches of large multinational companies. At present, the major agricultural export-related activities in which such companies predominate are buying of coffee and tea crops at auction; production of coffee and tea on estates; management of the large sugar companies that are government-owned; and production, processing, and export of pineapples, the major horticultural crop. Often these international companies are the end-users of the commodity, so it is natural for them to want to move into production and processing. With such a high degree of concentration of Western manufacturers and distributors, it is often impossible to develop agricultural exports without the direct participation of such companies in primary production and processing if they want it. Such companies offer technology, international marketing expertise, and opportunities for Africans to gain training and commercial and manufacturing experience in industrial production and agricultural exports. So why are they so unpopular in Kenya?

Some suspicion surrounds the activities of expatriate-owned companies. The International Labour Organisation Mission in 1972 estimated that in 1967 foreign-owned manufacturing firms had a share in gross profits before taxes 1.28 times their share in the gross product.[181] High capital requirements, small market size, and lack of competition have led to high margins in Kenyan

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[178] For example, see World Bank, *Accelerated Development in Sub-Saharan Africa* (Washington, D.C.: World Bank, 1981).

[179] National Christian Council of Kenya, *Who Controls Industry in Kenya?* (Nairobi: East Africa Publishing House, 1968).

[180] Kenya, Working Party on Government Expenditures, *Report and Recommendations;* and Goran Hyden, *Efficiency Versus Distribution in East African Cooperatives: A Study in Organizational Conflicts* (Nairobi: East African Literature Bureau,1973).

[181] International Labour Organisation, *Employment, Incomes and Equality. A Strategy for Increasing Productive Employment in Kenya* (Geneva: ILO, 1972), p. 442.

manufacturing. A second major problem is the outflow of foreign exchange associated with their activities through management fees and dividends, and also less legally through practices such as transfer pricing and overinvoicing.[182] From dividend payments, management fees, and other forms of remittance alone, Leys estimates that these companies were responsible for a capital outflow of KSh 2.4 billion from 1964 to 1970, or more than three times the private foreign investment during that period, including reinvestment of local profits.[183] The exact amount of the outflow associated with such practices, however, is impossible to establish, which serves to exacerbate suspicion.

But, the most significant negative aspect of these companies is perceived to be their effects on the social fabric of Kenyan society. Leys argues that Kenyanizing the ownership of shares in these companies and their highly paid management positions and directorships has led to an African elite, which has interests closely allied with those of the expatriates who control these companies.[184] This elite is said to have established long-term hegemony by buying heavily into land and property, using the income derived from it or the property itself as collateral for bank credit. Thus, social stratification among African Kenyans appears to be an inevitable consequence of the activities of expatriate-controlled companies, whereas traditional societies in East Africa were characterized by a relative absence of elitism.[185]

Non-African Local Companies

The largest group of non-African citizens in Kenya are of Indian or Pakistani extraction. Although almost all of those who live there today were born in Kenya and thus have Kenyan citizenship, they have been referred to since 1947 as "Asians." The number of Asians has fallen from 139,000 in 1968 to 78,000 in 1979,[186] but their economic influence appears to have grown. Leys estimates that in 1971 Asians owned 65 percent of total private nonfarm assets in Kenya.[187] They dominate both urban and retail distribution and manufacturing. In the agricultural export commodities their main activities have been in coffee and tea exports, horticultural exports by airfreight, private slaughterhouses for meat products, and white sugar processing. Cultural and religious affinity with the Arab world may give Asians some advantages in developing agricultural exports to oil-exporting countries in the Middle East and North Africa.

Despite their citizenship status, there is deep-rooted resentment among Africans against the Asian community. Marris and Somerset argue that Asian competition is more obtrusive than European competition, because in capital and range of activities it is closer to the level African businessmen can aim for.[188] During an attempted coup in 1982, it was the Asian community that suffered most severely from looting of homes and businesses.[189] As a consequence, many believe Asians are trying to take their assets out of the country. Newspaper stories refer to large amounts of cash found "under the bed" in describing thefts from Asian homes, and they frequently tell of Asians caught smuggling large amounts of foreign currency out of Kenya at the international airport. Charges of transfer-pricing, overinvoicing, nonpayment of local taxes, and other forms of "corruption" are also frequently levied against the Asian community.

The dominance of the Asian community in trade and the high liquidity of their assets means they are likely to be the prime beneficiaries of any liberalization of internal or external trade in agricultural commodities. However, it is precisely in agricultural trade

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[182] When a company sells a product or service to its own foreign branch or subsidiary at an artificially low price, so that profits are made outside of the country, it is called transfer pricing. When a company buys a product or service from its foreign branch or subsidiary and prices it artificially high, that is overinvoicing.

[183] Colin Leys, *Underdevelopment in Kenya* (London: Heinemann, 1975), pp. 137-138.

[184] Ibid., p. 124.

[185] See, for example, Jomo Kenyatta, *Facing Mount Kenya* (London: Martin, Secker, and Warburg, 1938).

[186] Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1981*, p. 12.

[187] Leys, *Underdevelopment in Kenya*, p. 120.

[188] Peter Marris and Anthony Somerset, *African Businessmen: A Study of Entrepreneurship and Development in Kenya* (London: Routledge and Kegan Paul, 1972), pp. 94-98.

[189] *Weekly Review* (Nairobi), August 6, 1982, pp. 3-17.

in rural areas that African businessmen have been able to compete most effectively—in the trading of potatoes and other horticultural crops, for example. African businessmen will need to accumulate the resources necessary to handle higher volume commodities such as maize and beans, and they may also need safeguards to enable them to compete with the more experienced and financially secure Asian community.

Parastatals

The major parastatals involved in agricultural exports of the commodities considered in this report and the proportion of public ownership are shown in Table 50. In addition, a large share of the equity of the 24 tea factories of the Kenya Tea Development Authority is publicly owned, as well as much of the equity of other commodity boards, companies, and financial intermediaries directly involved in agricultural exports. These are listed in the report of the Working Party on Government Expenditures, called the Ndegwa Commission.[190] The Kenya National Trading Corporation has sole responsibility for domestic sugar distribution, and it also exports coffee. The Agricultural Development Corporation became a major horticultural exporter in 1981 and 1982.

The key issues raised by the Ndegwa Commission about parastatals are those of economic efficiency. Regarding return on capital, the Commission points out that on cumulative investments exceeding K Sh 900 million by 1982, including the guaranteed debt of parastatals, at a rate of return of 10 percent the government should be realizing K Sh 90 million per year in dividends. Instead, in 1978/79 dividends paid to the Exchequer amounted to only K Sh 2.2 million and were paid by only six parastatals.[191] The Commission's report also refers to the increase in employment by parastatals and government-owned companies from 114,000 to 230,000 from 1971 to 1981 and the concentration of this employment at lower levels of skill. In March 1982, 90 percent of these employees were in lower skill categories. Meanwhile,

there was an acute shortage of middle- and upper-level management staff. Vacancies were zero for the lower jobs, 32.2 percent for the upper-middle jobs, and 15.2 percent at the highest levels. There are 5,000 vacant posts in the higher cadres.[192]

Lack of qualified accounting staff and other internal auditing and control systems result in a lack of accountability for management. This weakens incentives to achieve high levels of financial performance and often leads individuals to pursue personal rather than corporate goals. Thus, there are frequent charges of misappropriation of funds. Accurate and up-to-date accounting information, on which sound management depends, is not available. The monopsonist position of most parastatals means that there is no competitive pressure to keep operations efficient, whereas their political connections make them immune to the ultimate commercial sanction of bankruptcy and dissolution.

The Cooperative Movement

The cooperative movement in Kenya dates back to the 1930s, but it has expanded greatly since independence in 1963. Its two major activities are agricultural marketing and provision of urban and rural credit. It plays a major role in the processing of export crops—notably coffee, pyrethrum, and cotton—but not in the international sale of crops. The cooperatives handle most of the sugarcane and all of the milk produced by smallholders. In addition, they are the major agency for distribution of credit and inputs in the smallholder sector of the economy. The annual sales of the cooperatives handling coffee alone were close to K Sh 1.3 billion in 1981, and total turnover handled by cooperatives in 1981 was more than K Sh 2.0 billion, including sales through cooperatives in 1981 of milk, K Sh 274 million; of pyrethrum, K Sh 144 million; of cotton, K Sh 78 million; and of sugarcane, K Sh 38 million (Table 51). This is more than 50 percent of the total value of smallholder marketed production of these crops. The ef-

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[190] Kenya, Working Party on Government Expenditures, *Report and Recommendations,* pp. 93-95.

[191] Ibid., p. 41.

[192] Ibid., pp. 71-78.

Table 50—Degree of public ownership in agricultural marketing institutions, 1982

Institution	Government Institutions Participating	Share of Public Ownership
		(percent)
Commodity Development Authorities		
Cereals and Sugar Finance Corporation	GOK	100.0
Kenya Tea Development Authority	GOK	100.0
Horticultural Crops Development Authority	GOK	100.0
Kenya Meat Commission	GOK	100.0
Marketing Boards		
National Cereals and Produce Board	GOK	100.0
Kenya Coffee Marketing Board	GOK	100.0
Sugar Companies		
Chemelil Sugar Company	ADC	97.0
East Africa Sugar Industries	ADC	74.2
Mumias Sugar Company	GOK	82.8
Nzoia Sugar Company	IDB	3.0
	GOK	93.3
South Nyanza Sugar Company	GOK	91.3
	ICDC	5.1
	IDB	3.6

Source: Kenya, Working Party on Government Expenditures, *Report and Recommendations of the Working Party* (Nairobi: Government Printer, 1982), pp. 93-95.

Notes: GOK stands for Government of Kenya; ADC for Agricultural Development Corporation; IDB for Industrial Development Bank, and ICDC for Industrial and Commercial Development Corporation.

ficiency of cooperative structures, though of little importance to the estates and large farms, is of critical importance to low-income groups among smallholders in Kenya.

The rationale for cooperative organization is based on producer ownership of the cooperative's assets, producer control through democratic election procedures, and close government supervision through the Ministry of Cooperative Development. However, in practice, the owners (farmers) lack effective systems for holding cooperative managers accountable. Since 1981 there has been much public discussion of the effects of

Table 51—Role of cooperatives in the agricultural marketing system, 1981

Cooperative	Number of Societies	Number of Members	Cooperative Sales of Farm Produce	Market Share	Turnover by Type of Society
		(1,000)	(KSh million)	(percent)	(KSh million)
Coffee	169	513	1,322	64	1,492
Cotton	40	120	78	84	56
Pyrethrum	54	76	144	60	71
Sugarcane	64	30	38	6	77
Dairy	103	80	274	54	89
Multiproduce[a]	335	110	n.a.	n.a.	270
Other agricultural	332	58	n.a.	n.a.	
Farm purchase	219	40	...	...	...
Total	1,316	1,027	1,856	54	2,055

Source: Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Economic Survey 1983* (Nairobi: Government Printer, 1983), pp. 29-46.

Note: Where n.a. appears, the figure was not available.

[a] Part of the sales of agricultural produce for a specific commodity such as pyrethrum or sugarcane go through multiproduce societies, which handle several commodities, rather than through societies specializing in just one.

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cooperative inefficiencies on smallholder incomes.

The cooperatives are faced with substantial shortages of trained manpower. Out of an estimated 19,472 employees in 1979/80, cooperatives had only 197 university graduates.[193] This was approximately one graduate for every U.S. $1 million of turnover at the official exchange rate in 1981. In 1981 the Ministry of Cooperative Development had only one team of inspectors—six people for 2,400 societies and 36 unions. In part, the manpower shortages can be traced to recruitment. Cooperatives find it difficult to pay competitive salaries, to provide adequate housing and other facilities, and to avoid remote locations. The Ministry of Cooperative Development faces long bureaucratic delays in making appointments and also cannot offer high salaries.[194]

A second problem is management training. The Cooperative College of Kenya provides the main source of training for the movement, but in 1981 only 25 percent of agricultural cooperative managers had attended even the short course for managers of 13 to 26 weeks and a much smaller proportion the full two-year course.[195] The College's facilities are inadequate. For example, in 1981 the College was training just 15 people a year in cooperative banking, so that it would take 15 years to train all those dealing with savings and loans in one union alone.[196]

The consequences of the lack of trained manpower are many. Hyden notes, "One of the fundamental weaknesses in cooperative societies has been the inadequate maintenance of proper records and books of accounts. Inefficiency has to a considerable extent been facilitated by poor bookkeeping."[197] However, as Marris and Somerset note, it is not the qualifications of the bookkeeper but the quality of the bookkeeping that is crucial.[198] This may be related as much to management motivation to obtain accurate records as to the training of personnel.

Without bookkeeping records at the grass roots, local cooperative clerks and managers operate outside any effective system of financial accountability. The effects of this on society finances have been discussed in Kenya's press repeatedly since 1981.

In seeking a longer-term framework within which to understand the efficiency problems of cooperatives, Hyden argues that it is only possible to secure a rational and hierarchical type of bureaucracy as long as kinship ties are relatively insignificant in determining social relations. The "mechanical solidarity" of clan and tribe has to give way to the "organic solidarity" of shared economic interests.[199] Even if policymakers accept this change as desirable for the social structure, the problem remains of what time horizon is reasonable. While kinship ties still predominate, there are high short-term costs in imposing "organic" institutional forms, such as the cooperatives and parastatals, which are not built on traditional kinship loyalties. This cost can be measured in exports forgone and the slowing of industrial growth.

Those closely involved in the cooperative movement recommend five ways to reform it for the medium term:

1. Increase the number of trained bookkeepers. Much of the training provided by donors has concentrated on top-level management and credit disbursement, while the primary need is to train bookkeepers who handle crop payments at the grass roots.

2. Separate the credit and marketing functions of the movement. This would mean channeling credit through a separate institutional network of savings and credit societies so that crop marketing is not complicated by credit collection and disbursement problems. The advantages of combining smallholder credit with marketing to ease loan recovery depend on the institutional capacity to handle the complexities of loan disbursement and recovery pro-

[193] Rex B. Schultz and Jack M. Gay, "Professional and Subprofessional Manpower Requirements for the Cooperative Sector in Kenya, 1988," Agricultural Cooperative Development International, Washington, D.C., 1980 (mimeographed), p. 16.

[194] Ibid., p. 10.

[195] Cooperative College of Kenya, personal communication, June 1981.

[196] Ibid.

[197] Hyden, *Efficiency Versus Distribution in East African Cooperatives*, p. 170.

[198] Marris and Somerset, *African Businessmen*, p. 220.

[199] Hyden, *Efficiency Versus Distribution in East African Cooperatives*, pp. 218-219.

cedures on top of more important crop-handling functions. Cooperative loans to smallholders are less than KSh 100 million annually, with poor repayment records; the gross value of produce marketed is KSh 2 billion.[200] Scarce skilled manpower should not be diverted from the major task of efficient crop marketing to the complex but relatively unimportant task of credit disbursement.

3. Allow cooperatives to go into liquidation in cases of extreme financial mismanagement, as in the early period of cooperative development. From 1932 to 1969, 443 of the 1,894 societies registered went into liquidation.[201] Scarce capital resources can then be channeled to societies that have proven management capability. This would place cooperative managers in the same position as business managers.

4. Allow farmers to sell to any cooperative, not only to the one where they are registered. This would be possible only if the credit function had already been removed, so that farmers would not change to another society to avoid repaying loans. Competition among cooperatives to obtain the farmers' produce would serve as an incentive to increase efficiency.

5. Move toward a polyopsonistic marketing structure by licensing African businessmen to compete with cooperatives if they are able to offer better prices to the farmer. This would again require separating the credit and savings functions of the cooperatives from the marketing functions.

The African Business Sector

Both large, privately owned manufacturing enterprises and small family businesses, such as retail shops and shoe repair stands, are included in the African business sector. Although the larger firms seldom involve

kinship, the smaller businesses have high participation by the extended family network.[202] Manufacturing concerns are operated like Western capitalist firms, whereas the family firm "so allocates costs, benefits and risks as to maximise expected utility to the household, not profits to the enterprise."[203]

Although the African business sector plays only a small role in agricultural processing and exporting, its role in the economy as a whole is significant. In horticultural exports by airfreight, 10 African-owned businesses out of a total of about 30 (excluding the Agricultural Development Corporation) were active in 1982, but they accounted for only an estimated 10 percent of total exports.[204] Nine percent of coffee exports were handled by three African-owned private exporters in 1982/83, and a further 2.5 percent by the Kenya National Trading Corporation, a parastatal.[205] In sugar processing almost all of the 120 jaggery factories are owned and operated by African businessmen; however, many of these factories were not built by Africans but taken over from Asian sugarcane growers. No white sugar factories are in private African ownership. In the local marketing of agricultural products, African businesses trade in horticultural crops; some, like potatoes, are major commodities in the domestic market. They are also involved in transport of commodities handled by the NCPB and intradistrict trading in cereals.

In the rest of the economy there are a small number of African owned and managed manufacturing ventures under the sponsorship of the Kenya Industrial Estates, which is a government sponsoring agency to encourage the African business sector in manufacturing. In rural areas 20 percent of African businesses found by the ILO were tailoring businesses, sawmills, and maize mills.[206] Construction, transport, and hotelkeeping are other important activities. There were 51,000 businesses in the rural nonagricultural

[200] Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Economic Survey 1983*, pp. 40-41.

[201] Hyden, *Efficiency Versus Distribution in East African Cooperatives*, pp. 24-25.

[202] Marris and Somerset, *African Businessmen*, pp. 132-150.

[203] Michael Lipton, "Family, Fungibility and Formality," a paper presented at the International Economics Association Conference, Mexico City, August 1980, p. 2.

[204] Horticultural Crops Development Authority, personal communication, August 1983.

[205] Coffee Board of Kenya, "Kenya Coffee Sales for Coffee Year 1982/83 to 31.6.83," Nairobi, 1983 (mimeographed).

[206] International Labour Organisation, *Employment, Incomes and Equality*, p. 225.

sector in 1968, of which 75 percent were owned by farmers either individually or in partnership.[207]

Why is African business participation relatively insignificant in agricultural processing and exporting, despite this substantial small business activity? This is of special concern because agricultural processing provides opportunities to develop experience in management and more advanced technology. Small industries can be developed using local raw materials, such as milk, oilseeds, pulses, sugarcane, cotton, animal skins, and wheat. Technology for small-scale production for such industries is available from Asia, and high costs of transport for agricultural raw materials give cost advantages to decentralized processing units. The processed product often has a ready market in the domestic economy, as well as export potential to neighboring states and beyond.

There are five main barriers to entry into agricultural processing and exporting for African businessmen: legal barriers, bureaucratic requirements, start-up delays, access to technology, and existing large firms.

First, the legal barriers are acute. For many commodities, marketing and processing functions have been conferred by statute to either a parastatal or the cooperative movement. African businessmen may not legally buy from the farmer or process coffee, tea, dairy products, cereals, oilseeds, pulses, white sugar, or most spices. These commodities made up 80 percent of the estimated gross value of marketed agricultural production in 1980.[208]

Second, the maze of bureaucratic requirements is a major barrier to entry. For an African businessman to initiate production and export of processed agricultural goods, he must obtain a manufacturer's license from the Ministry of Industry, an export license from the Central Bank, and a certificate of clearance from the Ministry of Health. In addition, he needs wholesaler and retailer licenses for local sales from the Ministry of Commerce and special licenses for specific commodities, such as sugar or coffee, generally issued by the Ministry of Agriculture. He must also comply with industrial standards of the Kenya Bureau of Standards, annual weights and measures inspections, and required statistical information reporting.

In order to export, he has to complete a large amount of documentation. These include "CD-3" forms, which show the value of goods and their destination. These have to be certified by a commercial bank. He must also complete the customs entry forms (six copies) and obtain a certificate of origin from the Chamber of Commerce, or statutory authority for the crop. For goods being exported to most Arab countries, invoices must also be certified by the embassy of the importing country. All these procedures are a formidable barrier to entry for the new African export business.

In addition, the manufacturing or exporting businesses must pay a wide variety of taxes. These include an annual tax return, Pay as You Earn tax, contributions to the National Social Security Fund and the National Hospital Insurance Fund, contributions for employees earning over KSh 1,000 per month, sales tax on sales over KSh 200,000 per month in the local market, a training levy if the firm employs more than 50 employees, a levy to the Kenya Bureau of Standards, vehicle taxes, and a small tax on the invoiced value of export goods to the Port or Airport Authority. In addition, there are taxes relating to specific commodities, such as the cess on horticultural products payable to the Horticultural Crops Development Authority. In summary, for most businesses there are licenses to be obtained from 6 different arms of government, 10 different taxes to be paid, and a wide range of other forms to be completed.

Many of the required documents and licenses can be obtained only in Nairobi, the capital, which is often up to 500 kilometers from the location of the plant. Lack of systems of accountability and difficulty in obtaining redress can lead to exaggerated payment demands by those issuing the required licenses and documents. This led the ILO to recommend a drastic reduction in the number of licenses required and the maintenance of standards by inspection of operations rather than by issuing licenses.[209] The Kenya External Trade Authority has also attempted to simplify export procedures but

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[207] Ibid., p. 37.

[208] Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1980*

[209] International Labour Organisation, *Employment, Incomes and Equality,* p. 229.

their recommendations have not been implemented.[210]

Third, two major sources of delay affect the starting up of new agricultural projects. New, large-scale projects or those involving foreign capital must be approved by the New Projects Committee, an interministerial committee that meets quarterly to examine investment proposals. Approval often takes two years. And new firms often find it difficult to acquire land or a building. Sites for agricultural processing are scarce because there are often particular requirements for water and power. It may take up to five years to complete the procedures for acquiring an industrial site, even for companies already operating in the export sector, despite the priority attached to such industries in government planning documents. The final decisions are not made by local institutions, but by those in Nairobi; difficulties of communicating, especially by telephone, greatly exacerbate administrative delays.

Fourth, the technological know-how to set up a plant for food processing—such as oilseed crushing, dairy products manufacturing, fruit juice canning, and so forth—would normally be obtained from work experience in an operating plant, from high-level academic training, or from machinery suppliers. The bueaucratic barriers to entry for small-scale processors are so pervasive that machinery suppliers have not imported machinery with small-scale capacity, so there is little opportunity for Africans to obtain technological know-how through work experience. The applied academic training necessary to instill confidence to set up a production plant is hardly available in Kenya and only available overseas in conjunction with schemes to provide work experience. Thus, technological know-how is another major barrier to entry for African businessmen, even for the relatively low-technology processes involved in agricultural processing.

And finally, for a number of products, large expatriate-owned firms, many of which existed prior to Independence, effectively block entry for the African businessman. For oilseed crushing, for example, the operations of large companies using imported raw materials have made it difficult for local sunflower-based oil extracting industries to compete. Large bakeries in Nairobi, with capital costs written off long ago and considerable economies of scale, have made it difficult for local bakeries to compete, even with the substantial support of the Kenya Industrial Estates. The advantages of large firms often include easier access to import licenses for imported components, spare parts, and raw materials, and easier access to subsidized raw materials that must be provided by the government, such as wheat for bread or dry milk for babyfood.

Marris and Somerset analyzed the problems faced by African businessmen in all sectors of the economy in 1970.[211] They concluded that the chief problems of business growth lay not in access to capital but in reconciling traditional expectations of working relationships with the demands of hierarchical and bureaucratic management. In small businesses traditional relationship patterns serve well, but with growth businessmen "stood on a threshold of development in organisation which they did not know how to cross."[212] They conclude that the primary need is for management training services that emphasize the structure of internal and external relationships in business rather than accounting techniques.[213]

The strongest argument raised against encouraging African business is its contribution toward social stratification. Theoretically, the emergence of an elite is regarded as a greater problem for private businesses than for parastatals and cooperatives, although in practice an elite may emerge as readily from administrative or cooperative monopolies, as experience in Tanzania has demonstrated.[214] Leys theorizes that those with assets and relatively high incomes are the most likely to obtain commercial loans. In turn, they are able to acquire land, which gives them further access to credit. Gradually an elite emerges, which buys up and consolidates the land of smallholders, leading

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[210] Kenya, Ministry of Commerce and Industry, External Trade Authority. *Trade Facilitation in Kenya: Aligned Documents and Streamlined Procedures for Imports and Exports* (Nairobi: Kenya Literature Bureau, 1979).

[211] Marris and Somerset, *African Businessmen.*

[212] Ibid., p. 107.

[213] Ibid., p. 235.

[214] See, for example, Jonathan Barker, "The Debate on Rural Socialism in Tanzania," in *Towards Socialism in Tanzania,* ed. Bismarck U. Mwansau and Cranford Platt (Dar-es-Salaam: Tanzania Publishing House, 1979), pp. 95-124.

to a small but affluent bourgeoisie and a landless urban and rural proleteriat.[215]

There are, however, several ways to prevent this cycle from emerging. One is to expand African business ownership from the individual to the extended family or clan. Although problems of financial accountability have occurred with clan ownership where this has been tried,[216] there are many cases where extended family participation in both labor and capital provision has been highly successful. Greater control over the buying and selling of land also can play a major role, both in safeguarding the holdings of smallholders and preventing the all-too-frequent drain of resources from successful African business enterprise into land as a more secure form of holding wealth.

Research is needed to identify an institutional form that will encourage collective family ownership and yet meet the management requirements of larger-scale economic enterprise. Partnership arrangements, for example, encourage annual distribution of earnings between all those who are classified as partners. It thus combines ownership and management in a way that cooperatives and limited liability companies fail to achieve. If the Partnership Act[217] could be modified to allow limited liability, at least in regard to rural land, and taxes on partnerships could be made to conform to present corporate tax rates, this might be an ideal form for collective family enterprise. An alternative might be to establish "family associations" based on the Lebanese model.[218]

This brief discussion illustrates the size of the institutional problems underlying development of Kenyan agricultural exports. None of the institutional categories satisfies all of the criteria: African ownership and control, access to international markets and technological know-how, economic efficiency, and social integration rather than divisive influence. The acute shortage of trained manpower and entrenched interest groups are problems that further complicate policy decisions on appropriate institutional forms. To achieve vigorous export performance, management of existing institutions will have to improve and the role of African business will have to be expanded by relaxing the regulatory structure, so as to encourage African businesses to participate in the domestic and international marketing of agricultural products.

[215] Leys, *Underdevelopment in Kenya.*

[216] For example, Jan J. de Wolf, *Differentiation and Integration in Western Kenya* (The Hague: Mouton, 1977), p. 61.

[217] Kenya, Laws of Kenya, *The Partnership Act,* Chapter 86 (Nairobi: Government Printer, 1972).

[218] Samir Khalaf, "Family Associations in Lebanon," *Journal of Comparative Family Studies* 2 (Autumn 1971): 235-250.

10

THE POLITICAL ECONOMY OF FOOD EXPORTS

Kenya's low level of food exports in the 1970s must be attributed in part to government policy. In 1975, the government prohibited meat exports because the KMC was unable to obtain enough meat. In 1980, the government put a ban on all food exports (except horticultural products) following a severe shortage of maize. The National Food Policy Paper of 1981 mentions briefly the possibility of exports, but there was little discussion of food export potential in the national or provincial workshops held to discuss the paper.[219] The goal of food policy was to achieve self-sufficiency, ending food imports.

Senior and middle levels of the Civil Service may underestimate the importance of increasing export earnings for good reasons. Although there was an acute shortage of foreign exchange in 1974, buoyant coffee and tea prices in 1977 led to a buildup of reserves equal to six months of imports in 1978.[220] Since 1978 there have been rising inflows of aid into Kenya, which amounted to U.S. $700 million in 1981.[221] Earnings from tourism have also risen, reaching U.S. $180 million in 1981—25 percent higher than in 1978.[222] These factors have softened the effects of falling commodity prices. As a consequence, there was little evidence until late in 1982 of a scarcity of imported goods available to consumers, either in direct imports, such as drugs or spare parts for vehicles, or indirectly through a shortage of raw materials and spare parts for domestic manufacturing industries. With adequate foreign exchange availability, increasing foreign exchange earn-

ings has seemed unimportant compared with the political and economic risks of encouraging increased food and beverage exports.

Economic Risks in Expanding Beverage Exports

Two main arguments are commonly used in Kenya against expanding coffee and tea exports. Increased emphasis on just two commodities will further destabilize export earnings, and thus the whole economy. If petroleum products are excluded, on which domestic value-added is low, more than 50 percent of gross foreign exchange earnings came from coffee and tea in every year of the 1970s (Table 1). Prices of coffee and tea fluctuated enormously in the period 1973/74 to 1980/81. In 1977, prices for the Kenyan quality of coffee were 95 percent higher than 1980 prices and those for tea were 71 percent higher in real terms.[223] The effects of such price instability have been to destabilize government revenues, private and public investment, and domestic rates of inflation. Because the short-run supply elasticities of coffee and tea are high, production has also been unstable. This has been much discussed in Kenya.[224]

It is also doubtful whether the terms of trade are favorable for beverage exports in the long run. The quantity of coffee that Kenya must export to purchase one tractor is steadily rising. Coffee prices declined by

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[219] Kenya, Ministry of Agriculture, Development Planning Division, "National Food Policy Seminar. Summary Report," Nairobi, October 1981 (mimeographed); Kenya, Ministry of Agriculture and Ministry of Livestock Development, "Action Recommendations for Increasing Food Production in the Republic of Kenya. Summary Recommendations Drawn from the Provincial Workshops on Increasing Food Production Held in all Eight Provinces, November-December 1981," Nairobi, 1982 (mimeographed).

[220] See Tony Killick and Maurice Thorne, "Problems of an Open Economy: The Balance of Payments in the Nineteen Seventies," in *Papers on the Kenya Economy*, ed. Tony Killick (Nairobi: Heinemann, 1981).

[221] Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Economic Survey, 1982*, p. 30.

[222] Ibid., p. 6.

[223] World Bank, *Commodity Trade and Price Trends*, pp. 36 and 38.

[224] See, for example, Kenya, National Assembly, *Sessional Papers, 1982*, Paper No. 4, "Development Prospects and Policies."

0.26 percent per year relative to the average of machinery prices during the period 1960-72, but rose by 1.74 percent per year for the longer period 1960-77.[225] However, the latter result is affected by the exceptionally high coffee prices in 1976/77. Tea prices fell by about 5 percent per year during both periods relative to machinery prices. As noted in the Kenya government's sessional paper on development prospects and policies in 1982, Kenya's terms of trade fell by 27.5 percent from 1976 to 1982 "due largely to weakness in coffee and tea prices since the coffee boom of 1977, and the rising cost of oil."[226] The widespread belief that the terms of trade for beverage exports are adverse in the long run is an important factor in discouraging a focus on beverages in export policy.

Political Problems in Expanding Food Exports

The political risks of allowing urban populations to suffer food price inflation and food shortages are widely recognized. Kenya is no exception. The lack of adequate food storage capacity and the administrative difficulties associated with organizing rapid food imports make it politically hazardous for government policymakers to export food staples. In Kenya, the risks inherent in food exports were underlined by the food queues in 1980. Following a large maize surplus in 1977/78, a decision was reached to export maize in early 1979, and 198,000 tons were exported from February to September 1979.[227] By November, there was an acute domestic shortage, and it became clear that there had been some misjudgment about the size of the new crop and about the availability of stocks in the country. Official purchases of the 1979 crop from November 1979 to April 1980 were the lowest since 1964/65 (Table 30). It took 6 to 12 months before sufficient imports—some purchased commercially and some provided by donors—arrived and were distributed. Since then, there has

been reluctance to authorize food exports for any commodity with significant domestic demand. Also, administrative delays in arranging rapid imports and distribution of maize in 1980, in what amounted to a national emergency, undermined the confidence of policymakers that they could rely on food imports to alleviate domestic shortages.

Political risks in liberalizing food exports also arise from the probability that consumer prices will increase. Two important groups may suffer: high- and middle-income urban consumers and rural consumers in regions that have a deficit of the product exported. Sheep and goat exports are a good example. It has been estimated that exports of just 7 percent of the annual slaughtered stock would raise consumer prices in the short term by 5 percent.[228] Because export parity prices are 40 percent above domestic border prices (Chapter 6), even with high supply elasticities, domestic prices would be unlikely to revert to earlier levels. Anticipation of a significant rise in meat prices, which make up an estimated 16 percent of the food expenditures of upper-income urban consumers and 18 percent of middle-income consumers, may be a significant constraint on liberalizing exports.[229] In addition, smallholders who live in meat-deficit areas would pay a higher price for sheep and goat meat. Because such areas are occupied by ethnically identified populations, the political risks are increased. Quotas on exports initially could alleviate this problem by ensuring a gradual adjustment in the market.

Price-policy and investment decisions also have regional effects, because the cropping pattern differs from region to region for agroclimatic reasons. This further complicates political decisions. For example, a rise in sheep and goat prices will raise the incomes of pastoral producers in Rift Valley and Eastern provinces and lower the incomes of consumers in urban areas and the rural deficit areas of Central Province. A rise in the maize price will benefit producers in the major maize-exporting districts (see Table 31), but lower incomes in the maize-deficit

[225] Jabara, *Terms of Trade for Developing Countries*, pp. 9-10.

[226] Kenya, National Assembly, *Sessional Papers, 1982*, Paper No. 4, "Development Prospects and Policies," p. 3.

[227] *Weekly Review* (Nairobi), July 4, 1980, p. 5.

[228] Reusse, "Consultant's Report on the Potential Export of Kenyan Sheep and Goats," p. 9.

[229] The weights used by the government are given in Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1981*, pp. 280-281.

areas, which are mainly the cities of Nairobi, Mombasa, and Kisumu, and Central and Eastern provinces (Table 52). Also, a large investment in new processing facilities in sugar-producing zones will be of greater benefit to one region than another, which makes it difficult to maintain a regional balance in public investment, as discussed by Bigsten.[230]

Exchange rate decisions also have the effect of redistributing incomes among ethnic groups. A devaluation of the currency benefits export crop producers, because it raises prices for those export crops with prices that are not set directly by the government. For both coffee and tea, the payment to farmers is a residual after deducting marketing costs, so the full benefit of devaluation should automatically be passed on to the producer. Coffee production is concentrated in Central and Eastern provinces and tea production in Rift Valley and Central provinces (see Tables 11 and 13). However, the total regional impact of exchange rate adjustments depends on the extent to which the government raises food prices to compensate for the rise in prices of imported inputs and for the general rise in inflation. The regional effects of price policy and exchange rate decisions is an issue that requires further research.

Price and exchange rate policies also affect the distribution of income between the estates, the large farms, and the small-holders, as the proportion of marketed production from the smallholder sector differs among crops (Table 53). An increase in maize or pulse prices, for example, will shift income toward smallholders more than a price increase for sugarcane. Similarly, coffee prices are more critical to smallholder incomes than tea prices, because the value of total coffee production is higher than that of tea and also because the proportion of coffee production from smallholdings is greater than that of tea.

In addition to the risks for political leaders, senior civil servants also take risks in authorizing the export of food products. Like all other agricultural commodities, food products suffer from sharply fluctuating prices in international markets, so that exports by parastatal institutions like the NCPB, which handles exports of maize, pulses, and spices, and the Kenya National Trading Corporation, which handles sugar distribution and exports, may sometimes be at a loss (see Table 25). If there are profits, they are immediately channeled to the Treasury, but if losses arise, a painful process of seeking additional funds from the Treasury must be followed. If sufficient funds are not forthcoming, the losses have to be made good out of the recurrent (operating) budget. This affects the running of the whole para-statal, and makes life difficult for senior civil servant managers. Aside from the risks of cash losses, there are concerns attached to exports of specific commodities. In the case of sheep and goats, officials are concerned about possible loss of breeding stock. If there are either cash losses or shortages of breeding stock, the civil servant who authorized the exports may be held accountable for the decision to export.

The political and economic risks of food exports are reflected in the unwillingness of even senior civil servants to authorize exports of specific commodities within their jurisdictions. Permission to export has to go to the very highest levels of government for approval. Authorization to export even a single stud animal has to be signed by the highest civil servant in the Ministry of Livestock Development. The more vital the food-stuff, the higher in the system must the decision be made, so that it is doubtful if any group but the Cabinet could approve exports of major foodstuffs like cereals, pulses, and meat, and such a situation is by no means unique to Kenya. The pressures on the time of senior politicians make for slow decisions, whereas the availability of the crop itself, and the international prices offered, may change rapidly. Often the decision is delayed to the point that losses result, and this only serves to discourage further exports. The government's experience with authorizing maize exports in 1978/79 is a case in point.

Weak Agricultural Producer and Export Lobbies

Several groups would benefit from export liberalization or from improvements in the efficiency of marketing channels for coffee. These major beneficiaries include a relatively

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[230] A. Bigsten, *Regional Inequality and Development: A Case Study of Kenya* (Gothenburg, Federal Republic of Germany: University of Gothenburg, 1978).

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Table 52—Sales of maize by the Maize and Produce Board, selected years, 1974/75-1980/81

Province/District	1974/75	1975/76	1977/78	1978/79	1979/80	1980/81
			(1,000 bags)			
Each sale less than 1,000 bags						
Nyanza Province	115.5	93.0	19.0	93.7	284.1	341.4
Kipkelion	9.7	4.2	0.8	3.3	4.8	2.9
Kisumu, Yala, Kisii	86.3	67.1	14.9	86.2	250.8	290.0
Kilgoris	2.9	1.6	. . .	0.2	0.4	0.8
Homa, Kendu, Muhoro Bay	16.6	20.1	3.3	4.0	28.1	47.7
Western Province	27.8	29.6	3.2	27.4	63.2	104.1
Webuye, Lugazi	5.0	8.4	0.7	7.0	10.8	27.8
Butere	8.9	10.9	1.1	11.2	23.0	28.1
Malaba	1.5	0.4	0.1	1.5	7.1	38.0
Myanga, Bungoma	12.4	9.9	1.3	7.7	24.3	10.2
Eastern Province	297.7	429.3	12.7	28.3	149.3	292.0
Kitui, Kibwezi, Mwingi	98.4	177.8	4.6	3.9	26.5	89.5
Konza, Machakos	182.3	224.1	5.9	12.6	52.3	131.1
Meru	17.0	27.4	2.2	11.8	70.5	71.4
Coast Province	235.7	179.1	10.0	546.3	310.7	75.0
Mombasa	179.1	116.0	6.2	545.2	303.4	67.2
Voi	56.6	63.1	3.8	1.1	7.3	7.8
Rift Valley Province	42.1	51.2	25.3	54.8	124.5	276.4
Moi's Bridge, Kitale	3.7	0.1	7.7	16.8	40.9	13.4
Kericho	0.2	1.1	0.6	4.0	15.4	58.4
Turbo, Kipkarren	1.6	0.4	0.3	1.6	5.3	4.4
Nanyuki	17.3	15.6	6.0	11.2	16.1	63.8
Nakuru	12.4	15.9	7.2	14.3	41.3	132.3
Eldoret	6.9	18.1	3.5	6.9	5.5	4.1
Central Province	156.1	189.2	12.3	67.7	131.9	219.9
Thika	49.4	74.4	3.0	12.3	47.5	66.9
Sagana, Nyahururu	95.1	105.6	2.1	52.8	72.8	138.8
Nairobi	11.6	9.2	7.2	2.6	11.6	14.2
Each sale of 1,000 bags or more						
Nairobi	2,110.5	1,136.4	565.3	2,384.3	2,847.9	1,752.9
Other credit sales	534.9	2,011.2	756.5	931.6	366.1	490.8
Total	3,520.3	4,119.0	1,404.3	4,134.1	4,277.7	3,552.5

Source: Data were provided by the National Cereals Produce Board from its book of accounts.
Notes: The years used here run from August to July, whereas the crop year runs from July to June. For 1980/81, data were only available from August to June, so each total was multiplied by 12/11 to obtain annual estimates, as there is little seasonal change in demand. Sales of 1,000 bags and more are usually to millers. Sales of smaller amounts are usually for direct consumption.

small group of large farmers, a large number of smallholder producers, and the pastoralists who are primarily producers of marketed food export items, rather than consumers. If exports were liberalized and a number of institutions were permitted to process and export, these groups would benefit primarily from higher prices but also potentially from improved marketing services such as transport, payment, and information.

Larger farmers protect their interests through the Kenya National Farmers Union (KNFU). Although they comprise less than 1 percent of agricultural producers, in 1971/72 they accounted for 50 percent of the membership of the KNFU and paid more than 80 percent of its subscriptions.[231] This means the KNFU defends large farm concerns, like maize, wheat, and beef prices, more than pastoralist and smallholder concerns, like prices of pulses and sheep and goats. Although the KNFU was a powerful lobby in the mid-1970s, internal problems have weakened its capacity to influence decisions since then; even large farmers have had a weak lobby in the early 1980s.

[231] Bates, *Markets and States in Tropical Africa*, pp. 93-95.

Table 53—Share of marketed output of large and small farms, by crop, selected years

| Crop | Year | Marketed Output | |
		Share of Estates and Large Farms	Share of Small Farms
		(percent)	
Pulses	1974/75	17	83
Maize	1974/75	20	80
Coffee	1981/82	26[a]	74
Sugarcane	1982	43	57[b]
Tea	1982	58[a]	42

Sources: Kenya, Ministry of Finance and Planning, Central Bureau of Statistics, *Integrated Rural Survey 1974-75, Basic Report* (Nairobi: Government Printer, 1977); unpublished data provided by the Kenya Sugar Authority; unpublished data provided by the Kenya Tea Board; Kenya Tea Development Authority (KTDA), *Annual Report and Statement of Accounts, 1980/81* (Nairobi: KTDA, 1981); KTDA, *Annual Report and Statement of Accounts, 1981/82* (Nairobi: KTDA, 1982); and Coffee Board of Kenya, *Annual Report, Balance Sheets, and Statement of Accounts for the Year Ending 30th September, 1974-81* (Nairobi: CBK, 1975-82).

Note: Small farms are defined as less than 5 hectares.

[a] This refers entirely to production on estates.

[b] Production by cooperative societies and settlement schemes is included.

Smallholders and pastoralists have no institution safeguarding their interests, apart from their Members of Parliament, who generally have limited access to information governing civil service decisions. Moreover, for the members, the personal and political risks of raising price issues in election campaigns are often too great to justify the possible benefits.[232] There are difficulties in organizing small farmers politically, because they are geographically scattered and do not have homogeneity of interests in food and cash crops produced. Lack of education and poor access to information add to the smallholders' inability to articulate their frustrations and make them vulnerable to policymaking that is contrary to their interests by those who control administrative decisions and marketing institutions.

The weakness of the smallholder lobby relative to the industrial lobby was well illustrated in June and July 1982. The decision to abolish the export rebate on manufactured exports in the budget, which had transferred KSh 200 million per year to industry, was widely protested in the press, but at the same time the decision to lower the price paid to the farmer for mixed beans from KSh 330 to KSh 170 per bag passed without a single comment in the press. This decision took away from smallholders an estimated KSh 100 million on the basis of 600,000 bags purchased in 1982/83.

The other major group to benefit from the liberalization of food exports would be the recipients of the increased imports paid for with increased foreign exchange earnings. Given the priority attached to oil, food, and defense imports, marginal imports arising from increased exports would probably be capital goods, industrial raw materials, and transport equipment. The share of industrial raw materials, machinery, and other capital and transport equipment declined from 64 percent to 51 percent of total imports from 1977 to 1981, when oil and food supplies were given priority.[233]

No particular institution has specific responsibility for promoting agricultural exports in Kenya, so the agricultural export lobby is still weak. The Kenya External Trade Authority promotes all exports, but it is small in terms of manpower and financial resources, with a budget less than 3 percent that of major ministries. For 1981/82 the total approved estimates for Kenya External Trade Services, including the Kenya External Trade Authority, commercial attachés, and the External Trade Policy Relations Division of the Ministry of Commerce, was just KSh 15.6 million.[234] The Central Bank of Kenya monitors both imports and exports, but its role does not include export expansion. The Horticultural Crops Development Authority plays an important role in promoting horticultural exports, but for many items like sheep and goats and pulses, which are directly controlled by parastatal institutions or government ministries, the civil servant,

[232] Ibid., p. 117. Bates discusses similar problems in Ghana.

[233] Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Economic Survey, 1982,* Table 7.9.

[234] Kenya, *Estimates of Recurrent Expenditure for the Year Ending June 1982,* p. 417.

to limit the possibility of cash losses, may often be more interested in restricting exports than in promoting them.

The Development Planning Division of the Ministry of Agriculture and Livestock Development could address issues of export promotion, but it does not have the staff to cope with the wide range of issues for which it is responsible. In 1982 the staff of the Development Planning Division of the Ministry of Agriculture numbered only 22, including technical assistance personnel.[235] Among its responsibilities were the annual price review; daily monitoring of local produce markets; quarterly review of the food situation; monitoring of importation and distribution of seed, credit, and agricultural chemicals; allocation and monitoring of import licenses for fertilizers; monitoring of crop performance, including activities of related parastatals; individual commodity studies; and project preparation.

Policy Implications

Several implications may be drawn from this brief analysis for those concerned about promoting food and beverage exports. To strengthen the pro-export lobby, institutions like the Kenya External Trade Authority and the Development Planning Division of the Ministry of Agriculture and Livestock Development need to be enlarged so as to increase their analytical capacity to examine export potential. This should be done primarily at the regional level to prevent further centralization of decisionmaking in Nairobi. High- and middle-income groups need to be educated about the potential benefits of exports, and informal channels need to be found to brief Members of Parliament from rural constituencies that stand to benefit substantially from proposed export liberalization schemes. Other groups that will need to be briefed about the benefits of exports are the large farmers' groups such as the Kenya National Farmers Union and the Agricultural Society of Kenya.

Every effort must also be made to minimize the genuine political and economic risks involved in exporting food products. To reduce the political risks on crops that can be easily stored, like maize and beans, the obvious solution is to increase strategic reserves to levels that allow adequate time for food to be imported, with generous allowances for administrative delays. Ironically, a food export strategy requires an increase in the amount of domestic reserves. Schemes that call for restricted export quotas or licenses in the early stages are likely to be better received, as the political risks are reduced, and an important additional group of potential beneficiaries can identify the advantages of the policy.

To reduce the risks of foreign exchange losses, minimum export prices need to be established for products like sheep and goats, so as to demonstrate clearly the size of benefits in foreign exchange earnings. Other ways to ensure that foreign exchange earnings are maximized could be considered, such as auctions for livestock at the port of exit, with the requirement of payment in foreign exchange. Donors could also assist by providing technical assistance to strengthen the monitoring capacity of the Central Bank on foreign exchange repatriation from exports.

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[235] Kenya, Ministry of Agriculture, Nairobi, personal communication, 1982.

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IMPLICATIONS FOR KENYA'S DEVELOPMENT STRATEGY

High-Value Versus High-Volume Agricultural Exports

A major constraint on developing maize exports was found to be the relatively high road and rail transport costs in Kenya. High internal transport costs are also a problem with other commodities considered, such as sugar and pulses. Exports of low-value agricultural products from countries like the United States probably represent as much a return to capital invested in the physical infrastructure as a return to resources employed on the farm.

The issue this raises extends to the whole of agricultural export policy for countries that are landlocked or with major production areas far from the sea. The alternatives are either to concentrate attention on a broad range of high-value, low-volume agricultural commodities, often with relatively small international markets, or to seek to develop exports of lower-value, large-volume commodities with much larger markets. For specific commodities, the choice typically is between exports of beverages, meat, and processed horticultural products, on the one hand, and cereals, sugar, and oilseeds, on the other. Whereas low-cost, bulky items make large demands on physical infrastructure, and hence on capital availability, more diversified high-cost items make demands on resources such as trained manpower for research, production institutions, and export promotion. The more diversified product range also makes public ownership and control more difficult. Neither group of commodities is necessarily more labor-intensive, as items in the low-value group, such as root vegetables and sugar, may sometimes be more labor-intensive than those in the high-value group, such as orchard fruits.

To pursue an approach that encourages the development of more diversified, high-value agricultural exports will place especially high demands on the agricultural research system. This issue was discussed chiefly in the context of the potential for increased horticultural exports (Chapter 8), and in the role research has played in sheep and goat production, which is clearly a major factor in its export potential today. The number and diversity of potential export crops in Kenya and the relatively low production of many of these at present make it difficult to adequately fund research for any one crop. However, the large-scale production of commodities such as fruits and vegetables in Western countries has been achieved by sustaining a large research effort for each commodity. Given the additional disease problems in tropical or semitropical zones, this research effort is likely to be at least as critical in a developing country as in the West.

To obtain the necessary allocations for research on minor crops, which have relatively low priority owing to their small share of the value of total agricultural output, will require a large increase in the allocation of funds to agricultural research as a whole. Given the shortage of locally trained manpower for research, the donors can play a particularly important role in facilitating the training of Kenyan research personnel and in providing expatriate specialists to fill the gap until enough Kenyans have completed their training. In summary, a high-value product approach to agricultural exports will require larger allocations to research and smaller allocations to physical infrastructure.

The Importance of Vertical Linkages

Weak institutional linkages in the production chain for individual commodities, between the research system at one end and the international buyer at the other, serve as a major constraint in realizing Kenya's food export potential. These weaknesses can be identified in the production system of several of the crops studied here. For pulses, grams,

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and fruit crops, there is a major institutional gap between the research station and the farmer in Kenya. Seed companies are unwilling to multiply the improved seeds for grams and the established nurseries are inadequate to sufficiently increase the numbers of seedlings for improved or selected varieties of fruit trees.

For pulses and meat, linkages are weak because the NCPB and the KMC are responsible only for output marketing. Other institutions handle research, distribution of inputs, and teaching methods of cultivation to farmers. The NCPB has no institutional capacity to convey information about market size for different varieties, price movements, and quality specifications to the research station, the farmer, or the extension staff. Nor does the NCPB's price structure signal to the farmer the requirements of the domestic or international markets. The research program on grain legumes has been carried out with no information about the export market, despite the large potential for exports of pulses. A similar absence of institutional links exists in the livestock industry, where the output marketing agency, the KMC, has no formal channel to feed back market information to the extension staff or directly to the livestock producer.

Where vertical linkages have been strong in Kenya, crop production has improved markedly. Strong linkages have been limited so far to industries seeking a particular product. These industries undertake a formal contractual relationship with the farmer and provide credit and extension information to him. Examples include barley production for Kenya Breweries, tobacco production for the British-American Tobacco Company, tea production for the Kenya Tea Development Authority, and more recently sunflower production for East African Industries. The vertical integration of these agencies is not the only secret of their success. The incentives they offer and the persuasion they use to increase production are also a contributory factor. This emphasis on vertical linkages goes against the current vogue, particularly in extension, which stresses the administrative advantages of horizontal integration. For example, one extension agent is expected to convey information on all crops to the farmer.[236]

Improved vertical linkages could be achieved in several ways. The role of crop parastatals like the NCPB could be expanded to include credit supply and extension. However, the lack of trained manpower and experienced management available to public institutions suggests that substituting the NCPB for the Ministry of Agriculture is unlikely to produce a dramatic improvement over the present system. An alternative might be to license private agencies to export agricultural products currently controlled by the NCPB on condition that they make contracts with producers and are responsible for seeing that adequate credit, inputs, and information are supplied, either directly to the farmer or through the government agencies responsible. The role of the NCPB for minor crops could then become supervisory rather than administrative, similar to that of the Horticultural Crops Development Authority for horticultural crops.

The Need for Input Supply Push

Improved vertical linkages are in most cases a necessary but not sufficient condition for achieving rapid growth of high-value export crops. A second and related condition is the availability of the means to encourage farmers to increase the use of inputs to maximize production. Whereas the incentives provided by the output marketing agency aim to motivate the farmer to increase output or to improve quality, it is the persuasion applied by agencies that supply inputs or information that convinces farmers to raise productivity by such means as increasing fertilizer use or improving pruning methods. Although incentives affect farmers' willingness to change input practices, Desai's work suggests that persuasion can be an important and independent means of increasing agricultural production.[237]

There are many examples in this report where the supply push for the commodities considered is absent. The lack of adequate supplies of fertilizers was noted for production of maize and pulses. The Kenya Farmers Association, with 80 percent of the market in 1981, can take the attitude that the farmer should come looking for fertilizer, rather

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[236] For example, see Daniel Benor and James Q. Harrison, *Agricultural Extension: The Training and Visit System* (Washington, D.C.: World Bank, 1977).

[237] Desai, "Fertilizer Use on India's Unirrigated Areas," pp. 10-11.

than trying to persuade him to use more. There is no advertising to promote fertilizer use in Kenya, while beer, soft drinks, soap, and cigarettes are promoted vigorously. It is the inadequacy of retail margins, the lack of field sales personnel for both seeds and fertilizers, and the low levels of fertilizer imports that have resulted in the absence of supply push for key yield-increasing inputs.

Several mechanisms exist to increase input supply push and the amount of persuasion applied to the farmer. In other countries, availability of surplus fertilizer stocks has helped to boost consumption even in periods of unfavorable input/output price relationships. This is because large fertilizer stocks generate pressure on the distribution agencies to increase consumption through product promotion.[238] Competition between input marketing agencies has been effective in creating persuasive pressure on farmers to increase consumption of pesticides in Kenya, so that imports increased 2.5 times in constant prices from 1972 to 1980, while chemical fertilizer imports stagnated.[239] The Kenya Tea Development Authority is an example of how highly motivated management, willing to set detailed production targets and follow them up, can put effective pressure to produce at the linkage point between the extension agent and the farmer. The successes of Kenya Breweries and British-American Tobacco also seem to be related to their input supply services as much as to their output pricing and marketing systems.

Specific recommendations, then, include building up large fertilizer stocks, increasing margins to both wholesalers and retailers in the fertilizer distribution chain, and budgeting for advertising and promotion in the setting of prices for fertilizer by the Ministry of Agriculture and the Price Controller. Unless fertilizers are more widely available to farmers and financial incentives are adequate to distribution agencies, fertilizer consumption in Kenya will continue to stagnate.

The Need for Incentives and Demand Pull

A recent and striking example of an attempt to create demand pull in the production chain was the change in the marketing arrangements for maize in 1980/81 in the face of an acute national shortage. As discussed earlier, not only was the price raised, but the NCPB undertook to bear all drying and transport costs and set up hundreds of additional buying centers closer to the farmer. These additional services effectively raised the price further. Clearly the aim was to increase demand pull on the crop, and production increased dramatically. There have been negative side effects of this strategy, however. The resulting collection costs and NCPB overheads have been so high that it has reduced the potential to export surplus maize without large losses to the Treasury. Demand pull should not be abandoned because of this experience, but its implementation should be reconsidered.

On many crops other than maize, there is also an acute lack of demand pull. NCPB sees its role as mopping up surpluses rather than in generating them, and therefore it puts no pressure on the farmer, the extension personnel, or input supply agencies to increase output. In fact, given its collection and handling costs and its lack of orientation toward export markets, NCPB purchases almost invariably result in losses. For these reasons NCPB's interests may lie in avoiding surpluses. Similarly, the lack of institutional linkages between KMC and the livestock producer and the lack of other livestock exporters, due to license restrictions, weakens the demand pull for livestock. Perhaps most significantly in the short run, the delays in smallholder payments for coffee and tea and the disproportionate and uncertain deductions levied from coffee payments greatly weaken incentives to beverage producers.

There are a number of ways greater demand pull can be applied to the production system. Prices are clearly a major factor, and encouraging exports is a major way to raise prices for products like sheep and goats and pulses. Another way to increase demand pull is to allow competition between marketing agencies so that the farmer can choose the agency he wants to sell his crop to. A third way is to allow higher profits to private output marketing agencies. This seems to have mobilized institutions like British-American Tobacco and Kenya Breweries to provide effective services to farmers.

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[238] Ibid.

[239] Kenya, Ministry of Economic Planning and Development, Central Bureau of Statistics, *Statistical Abstract, 1981,* p. 69; constant prices are derived from World Bank, *Commodity Trade and Price Trends,* p. 30.

This analysis again points to the need for change. Sheep and goat products and pulses can be exported from Kenya in large quantities if the government provides attractive prices to producers. This can only happen if exports are liberalized and business is able to develop long-term export markets in areas like the Gulf States and North Africa.

The Importance of Food Security

Export growth will require increased regional specialization in production. For export crop and meat producers, this implies growing dependence on the market to meet basic food needs. The problem of maize availability and the rise in prices in informal markets in 1980 appear to have led to a fall in tea yields among smallholders as labor was diverted into food production. A single year of high maize prices in informal markets because availability is inadequate through formal channels may affect export production for a number of years, as smallholders switch to food production to reduce income uncertainty. Similarly, reliable maize supplies are critical if pastoralists in range areas are to increase herd and flock productivity by reducing the numbers of animals held for security. Even in the worst drought years, the supplies of basic foodstuffs must be plentiful. This is particularly difficult for Kenya to achieve when all the neighboring countries are likely to be hungry at the same time.

In analyzing optimal stocking policies, the export factor needs to be explicitly taken into account. The high costs in export earnings forgone for several years as the result of a single year of maize shortages raises the returns to high food stocks. An agricultural export strategy, ironically, may require larger food stocks than other forms of development strategy.

Conclusions

There is great potential for Kenya to increase agricultural exports to the selected oil-exporting countries, especially those in North Africa and the Gulf States. This is summarized in Table 54, which shows significant negative nominal protection coefficients even at the overvalued exchange rate during the period 1980-82 for sheep and goat meat, pulses, and sugar. This negative protection is due to the government restricting exports and pegging domestic prices below export parity prices for many food products. For coffee, tea, and horticultural crops, there is no protection, as variable producer prices ensure that export parity prices are equal to domestic border prices at prevailing exchange rates.

The high cost of improving physical infrastructure suggests that Kenya should focus on low-volume, high-value items, and because man-land ratios are likely to be high in the long run, the focus should be on labor-intensive items in most provinces. The biggest obstacles are likely to be the political difficulties involved in permitting food exports and in allowing nongovernment agencies the opportunity to handle exports. The willingness to tackle these problems is only likely to develop as foreign exchange shortages strengthen the export lobby during the next few years.

The success of a food export strategy will then depend on whether two critical constraints have been overcome. The first is the problem of arranging input delivery, crop collection, and producer payments to hundreds of thousands of small peasant producers in such a way that there is no disincentive to production. Such an administrative task is daunting to the most highly trained public or cooperative bureaucracy, and points toward using the more flexible and motivated African business sector as the main institutional mechanism.

The second key constraint is the difficulty of creating vertically integrated linkages in the agricultural production system, from the international market back to the farmer through marketing institutions, the extension system, and input supply agencies, in such a way as to create the incentives and persuasion required to maximize output from the limited resource and technology base. This again points to changes in the institutional structures as the most critical factor in enabling Kenya to produce the surpluses that are necessary to achieve export growth in highly competitive international markets.

Table 54—Nominal protection for Kenya's potential agricultural exports at official exchange rates, June 1982

Commodity	Domestic Border Price	Export Parity Price	Nominal Protection
	(KSh/metric ton)		(percent)
Sheep and goat meat[a]			
Chilled exotic-cross lambs	18,000	26,700	−32.6
Chilled local-bred sheep	15,000	20,100	−25.4
Frozen goat meat	15,000	16,300	−8.0
Beans, Canadian Wonder[b]	4,367	5,628	−22.5
Sugar, plantation white	3,282[c]	3,869[d]	−15.0
Beef, frozen[e]			
High grade	15,300	15,350	−0.3
Low grade	12,000	11,300	+6.2
Maize[f]	2,241[g]	1,466[h]	+52.9

Sources: Central Bank of Kenya, "Selected Foreign Exchange Mean Rates," *Economic and Financial Review* 14 (October-December 1981); International Sugar Organization, *Statistical Bulletin*, various issues; *Kenya Gazette*, various issues; Kenya Meat Commission, unpublished data; Kenya Sugar Authority, unpublished data; National Cereals and Produce Board, unpublished reports; Schluter and Maack, market reports, Hamburg, various dates; and World Bank, *Price Prospects for Major Primary Commodities*, World Bank Report 814/82, 5 vols. (Washington, D.C.: World Bank, 1982).

[a] These figures are for meat shipped by air to the Gulf States.

[b] These prices are for March 1982.

[c] This figure is for September 1981.

[d] This is the World Bank's estimated long-term equilibrium price with constant 1981 prices.

[e] These figures are for frozen meat shipped by sea to the Gulf States.

[f] These are the prices of maize at Mombasa, which are the prices used to measure export potential in the long term. The domestic border price is higher and the export parity price is lower than the prices at Nairobi, the major center for consumption, which would be the better prices to use to measure protection on imports.

[g] This figure is for white maize. It includes the transportation costs shown in Table 38.

[h] This figure is for yellow maize. It is the World Bank's estimated long-term equilibrium price with constant 1981 prices.

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