# AN APPRAISAL OF AFRICAN SETTLEMENT SCHEMES IN THE KENYA HIGHLANDS

A Thesis

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Doctor of Philosophy

by

Richard Hayes Clough

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# VITA

Richard Hayes Clough was born on January 13, 1937 in Hornchurch, England. He attended Wye College, London University, England from 1955 to 1958 and St. Edmund Hall, Oxford University, England from 1958 to 1959. He received the degree of Bachelor of Science in Agriculture from London University in 1958 and the Diploma in Agricultural Economics from Oxford University in 1959.

In 1960 he went to Kenya to work as a farm economist with the Kenya Ministry of Agriculture. The work was concerned with conducting farm management surveys both on large-scale European operated farms and on small-scale African farms.

In 1961 he was appointed Lecturer in Agricultural Economics and Farm Management at Egerton Agricultural College, Njoro, Kenya. At Egerton College he was involved primarily in teaching agricultural economics although some farm management survey work was undertaken. Most of the farm management surveys were concerned with small-scale African farms on settlement schemes in the former "White Highlands."

In September 1965 he entered the Graduate School of Cornell University, majoring in agricultural economics under Professor K. L. Robinson. He completed studies at Cornell University in December 1967 and returned to Kenya to take up an appointment with the British Ministry of Overseas Development as Agricultural Advisor, Kenya Ministry of Economic Planning and Development.

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TABLE OF CONTENTS

# AN APPRAISAL OF AFRICAN SETTLEMENT SCHEMES IN THE KENYA HIGHLANDS

## CHAPTER 1

## INTRODUCTION

Large-scale farms in the "White Highlands" of Kenya have produced most of the farm products sold commercially since European settlement began in 1902. Although the importance of the large-scale farms has declined recently, these farms still produced 80 percent of all marketed agricultural production in 1960. This included the bulk of the food consumed by the rapidly growing urban population and the majority of exports. In addition, the large-scale farms were a major source of employment (1, pp. 24, 58-62).

For a long while the European settlers were able to resist efforts to redistribute their land to Africans because there are large areas of land in African ownership that afford substantial scope for development. However, political pressures to redistribute European owned land to Africans continued to mount. In 1960, with the prospect of Independence near at hand, the law was amended to allow Africans to own land in the "White Highlands."

The "White Highlands" encompass about seven and one half million acres of land. About half of this land is in areas where the average annual rainfall is low (less than 35 inches). Large-scale ranches

occupy most of this land. The land which receives high rainfall has been used either for plantations or mixed arable/livestock farms. Neither the ranches nor the plantations are very suitable for African farmers. They cannot be subdivided easily and they require a very large capital investment if they are to be operated as complete entities. Thus African settlement has been confined thus far largely to the mixed farming areas. These areas contained about 3.4 million acres of land. By 1965 about half of this land had passed into African occupation (2, pp. 148-149).

African settlement took two main forms: Africans were settled on small-scale farms created through the subdivision of large-scale farms and they were permitted to purchase large-scale farms intact.

The process of subdividing large-scale farms into small farms was an intensively planned operation which took place as a result of a policy decision on the part of the Kenya Government. A new government department, the Department of Settlement, was established and this department was charged with the task of carrying out the so-called "Million Acre Settlement Scheme."[1/] This scheme, which was expected to have been completed during 1967, involved the purchase of about 800 large-scale farms, including about one million acres of land, and the subsequent resettlement of this land with over 30,000 African small-scale farmers (2, p. 358).

The purchase of large-scale farms intact also took place as a result of policy decisions made by the Kenya Government. But for the

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1/ The "Million Acre Settlement Scheme" was the final outcome of several earlier proposals; smaller schemes were suggested initially.

most part this form of African settlement was planned much less intensively than was the "Million Acre Settlement Scheme." By June 1965 more than 700 large-scale farms, including an area of 550,000 acres of land, had been purchased by Africans for continued operation as large-scale farms (2, p. 357). More than 200 of these farms were transferred with the assistance of the Department of Settlement under what became known as the "Assisted Owners Scheme" and the "Compassionate Farms." Most of the remaining 500 farms were transferred to Africans with the assistance of the Land and Agricultural Bank (Land Bank). Probably these farms were transferred to Africans, not because the Kenya Government had established any detailed plan for their takeover but because the Land Bank, through its normal operations, assisted the transfer once the racial barriers to land ownership were removed.

As a result of the transfer of European owned land to Africans, the Kenya Government has borrowed a substantial amount of money from overseas.[2/] African settlement has also affected the use of an important part of the high quality land in Kenya. The Kenya Government is concerned because neither the large nor small-scale African farms appear to be as successful as originally anticipated. Thus, while there is continuing political pressure to extend the various schemes for African settlement, the rate of transfer has slowed down recently. Some new forms of settlement are now being introduced and measures are being taken to improve the performance of the existing African farms (2, pp. 127-128, 150-159).

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2/ The "Million Acre Settlement Scheme" involved the Kenya Government in borrowing from abroad about £14 million. No comparable figure is available for the large-scale African farms.

The recent performance and prospects for further development of both large and small-scale African farms are discussed in the pages which follow. The primary objective of this analysis is to assist the Kenya Government in formulating future settlement policies. An attempt has been made to determine the profitability and debt repayment abilities of individual settlement farms based on sample surveys of large and small-scale farms conducted by the writer between 1963 and 1966. In addition, individual farms are examined to determine what changes might be made to improve output, efficiency and profitability. Comparative figures also are presented for the two predominant forms of African settlement to determine which form contributes most to net national product, employment, the balance of payments and food production. This comparison should provide information which will help the Kenya Government in making policy choices between alternative forms of African settlement for future extension of settlement in the former "White Highlands."

In the succeeding chapter the economy of Kenya and the reasons for African settlement in the "White Highlands" are discussed. This is followed by a description of African settlement and plans for its extension. In Chapter 4 possible criteria which may be used to appraise the African settlement schemes are discussed. In the subsequent chapters the alternative forms of African settlement are examined based on the criteria suggested in Chapter 4. A summary of the findings and tentative conclusions regarding the alternative forms of settlement are presented in the final chapter.

## CITATIONS

1 Kenya, Ministry of Economic Planning & Development, Statistics Division, Statistical Abstract, 1965.

2 Kenya, Development Plan, 1966-1970 (Nairobi, 1966).

# CHAPTER 2

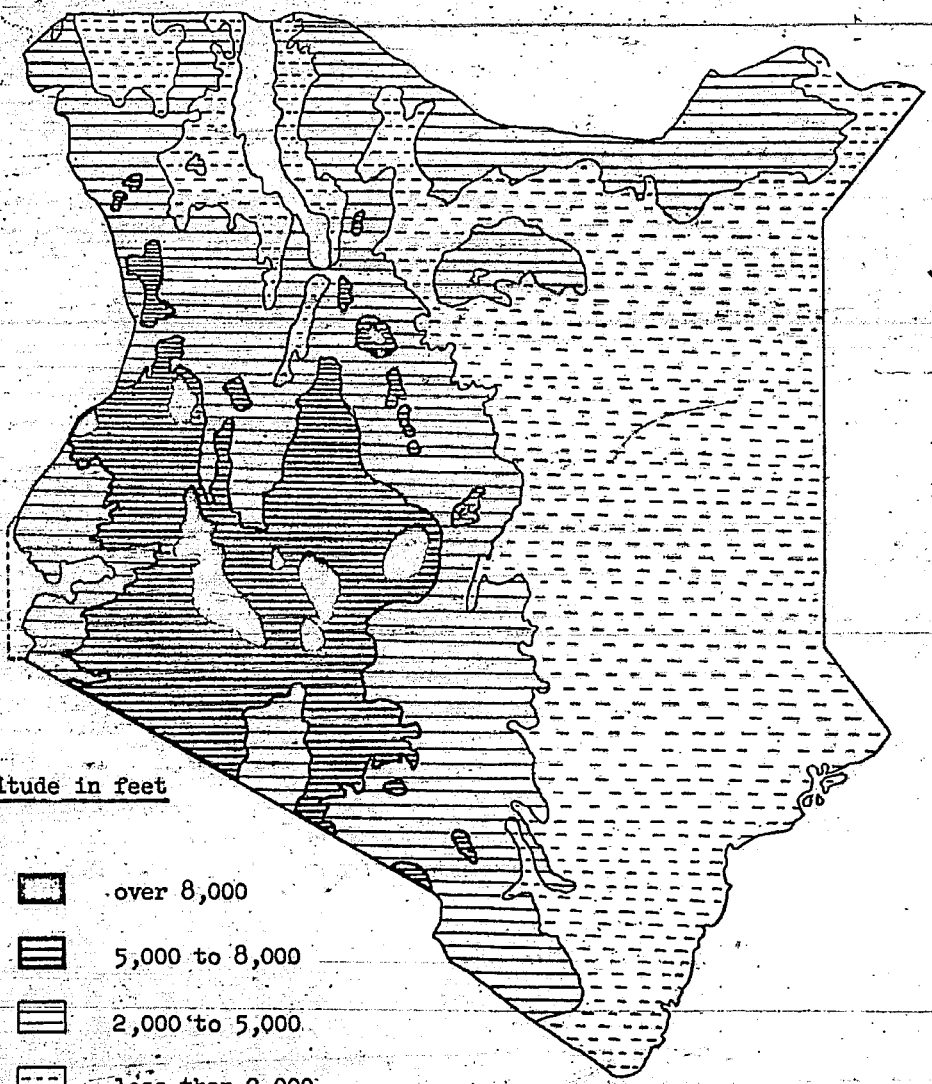
## THE NATIONAL SETTING

### The Land and the People

Kenya covers a land area of 220,000 square miles (1, p. 1). It is a little larger than France or over twice the size of the United Kingdom. While Kenya is astride the equator on the East Coast of Africa it is not entirely a tropical country. Altitude varies from sea level to over 17,000 feet above sea level on Mount Kenya. Part of the country has a temperate climate on account of the high altitude. The broad altitude differences within Kenya are shown in Map 1. Map 2 shows the distribution of rainfall in Kenya. If these two maps are compared it can be seen that most of the areas of Kenya which receive a high average annual rainfall are high altitude areas. However, high rainfall is also received in the medium altitude area next to Lake Victoria in the West and in the Coastal Belt in the East. Map 3 shows the approximate distribution of the population throughout Kenya. A comparison of the rainfall distribution in Map 2 and the population distribution in Map 3 shows that most of the heavily settled areas are high rainfall districts.

The heavily settled high rainfall areas occupy a relatively small part of Kenya. The majority of the country is arid and very sparsely populated. Table 1 shows the average population density in each of the seven major administrative districts. The location of these districts is shown in Map 4. Apart from the urban area around Nairobi, the two

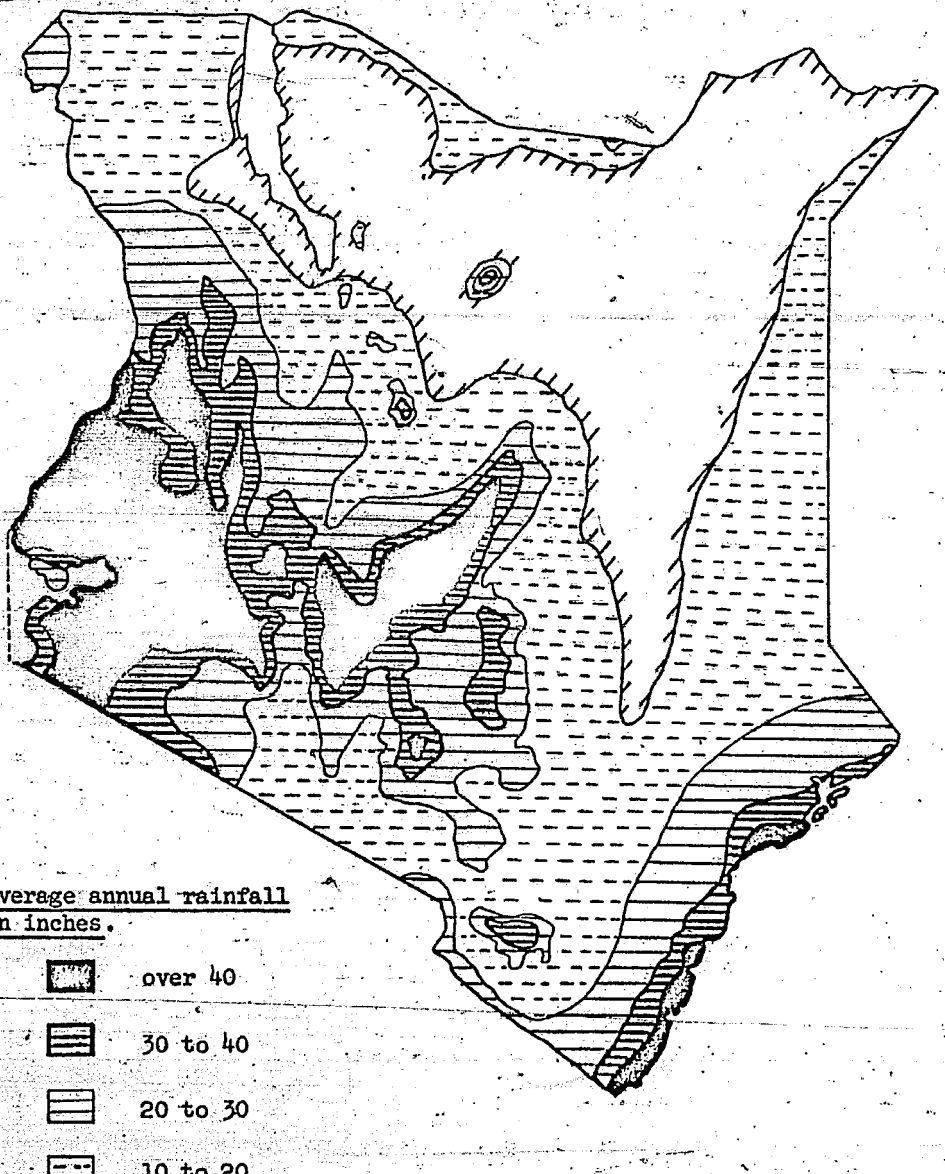
Map 1. TOPOGRAPHICAL MAP OF KENYA*




Scale 1 : 6,000,000

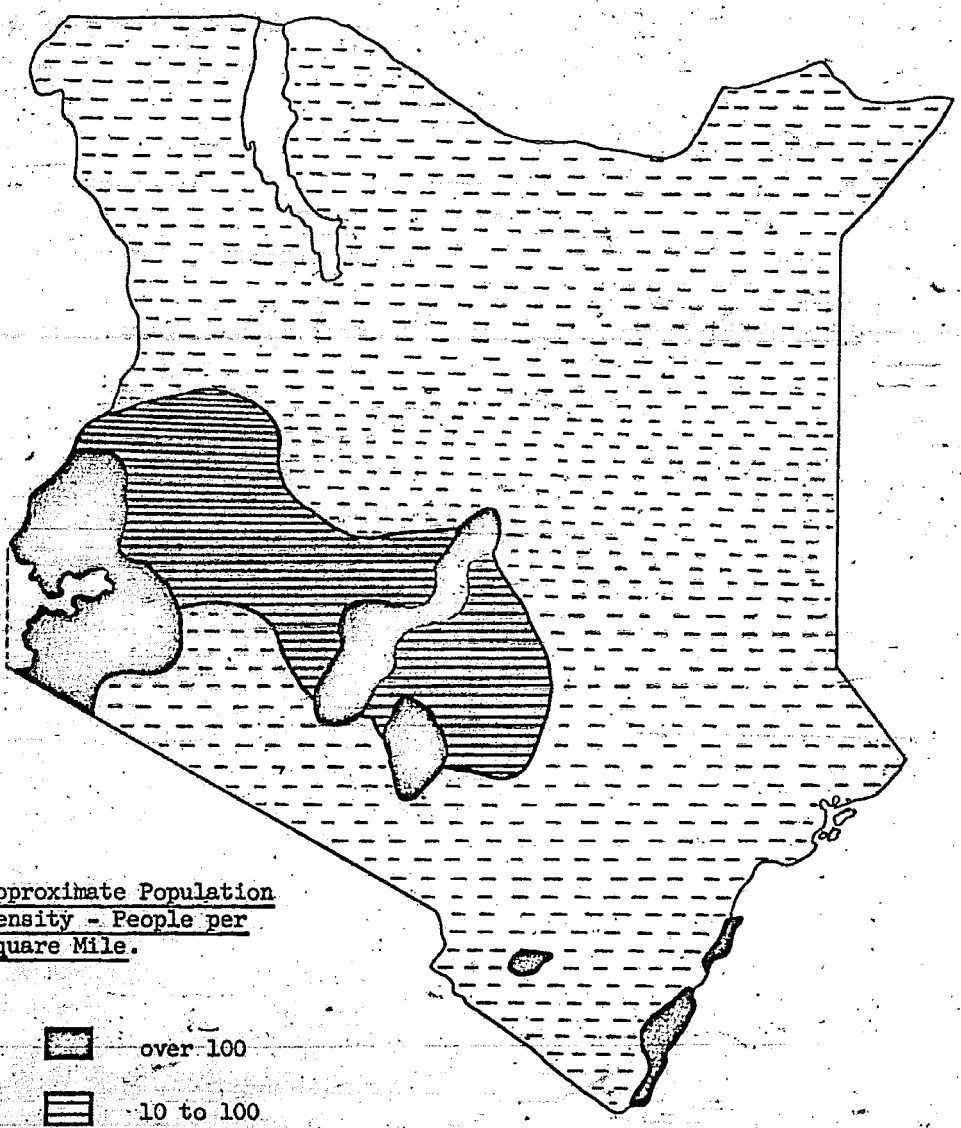
* Based on The International Bank for Reconstruction and Development, The Economic Development of Kenya, page 63 (John Hopkins, 1963).

Map 2. RAINFALL MAP OF KENYA*




* Based on Survey of Kenya, Mean Annual Rainfall Map, 1959.

Map 3. KENYA, SKETCH MAP OF POPULATION DENSITY*




* Based on Population Map of Kenya prepared by The Department of Geography, University College, Nairobi, 1963.

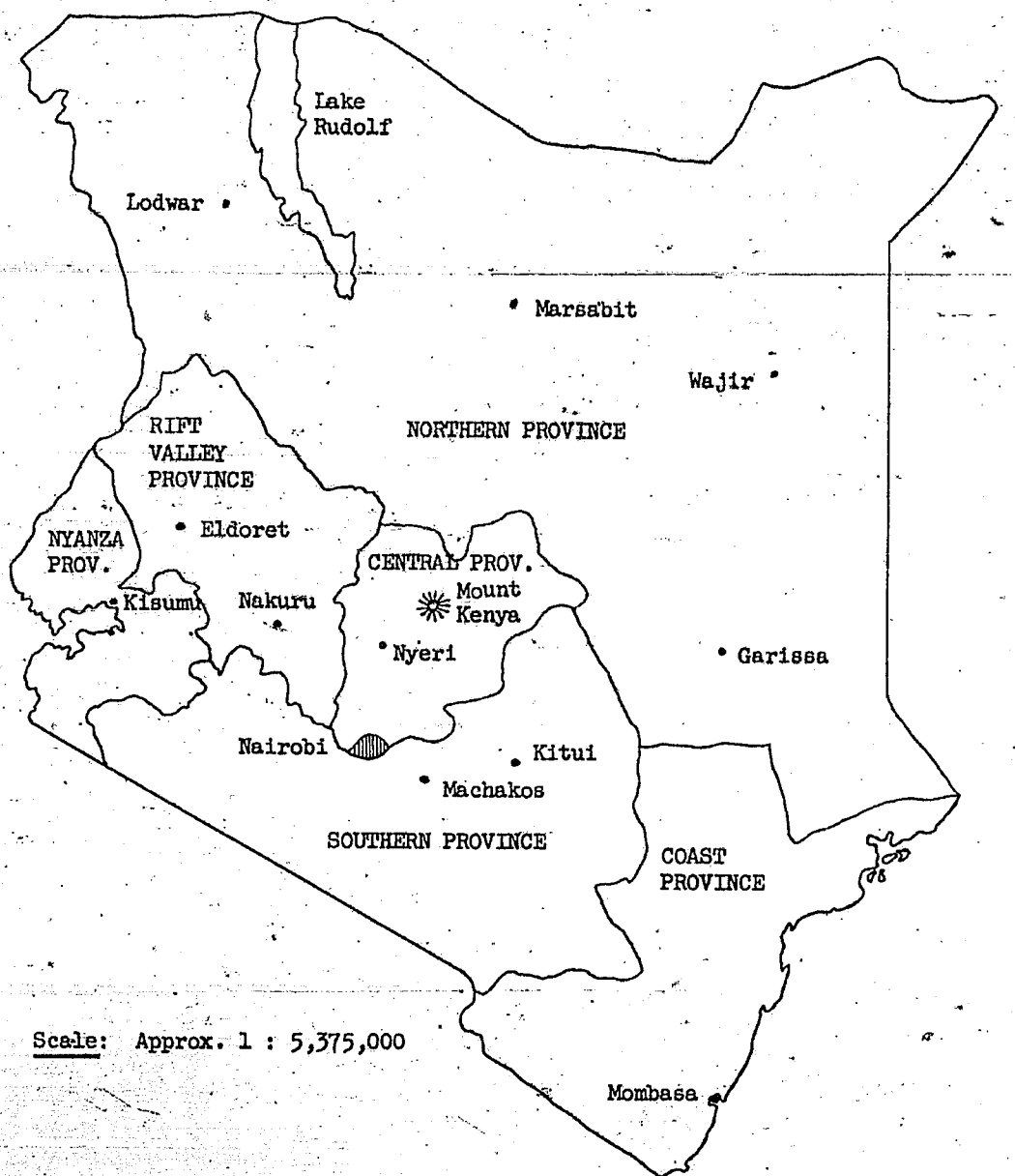
TABLE 1. KENYA: POPULATION BY RACE AND DISTRICT, 1962 *

| Province or District | Population (Thousand persons) | Percentage Composition | | | Land Area (Thousand sq. miles) | Density per sq. mile |
|---|---|---|---|---|---|---|
| | | African | Asian | European | | |
| Nairobi | 315 | 62.9 | 28.2 | 8.9 | .2 | 1,387 |
| Nyanza | 3,012 | 99.4 | 0.5 | 0.1 | 11.0 | 272 |
| Central | 1,925 | 99.2 | 0.5 | 0.3 | 11.0 | 174 |
| Rift | 1,049 | 97.6 | 1.5 | 0.9 | 17.1 | 61 |
| Southern | 1,014 | 99.7 | 0.2 | 0.1 | 32.8 | 31 |
| Coast | 728 | 92.5 | 6.5 | 1.0 | 25.9 | 28 |
| Northern | 590 | 99.9 | 0.1 | - | 126.8 | 5 |
| Total a/ | 8,634 | 97.3 | 2.1 | 0.6 | 225.0 | 38 |

* Data from Kenya , Ministry of Finance and Economic Planning, Economics and Statistics Division, Kenya Population Census, 1962 and ibid., Statistical Abstract, 1963.

a/ Excluding people in transit.

Map 4. KENYA, ADMINISTRATIVE AREAS, 1960*




Scale: Approx. 1 : 5,375,000

* Based on Kenya, The Treasury, Economics and Statistics Division, Statistical Abstract, 1961, p. 3.

most heavily settled provinces, the Central and Nyanza Provinces, support over 50 percent of the population yet include only 10 percent of the land area. In contrast, the Northern Province which covers more than 50 percent of Kenya's land area includes only seven percent of the population.

When the last population census was taken in 1962 there were 8.6 million people in Kenya. Ninety-seven percent of the population were Africans, the remaining three percent being either Europeans or Asians (Table 1). Largely as a result of improvements in medical facilities, the population is increasing at an annual rate of about three percent. The exact rate is unknown for the majority of births and deaths are not registered. The estimate of three percent was obtained by comparing the two most recent censuses (1948 and 1962) and from data obtained from sample censuses (2, pp. 51-53).

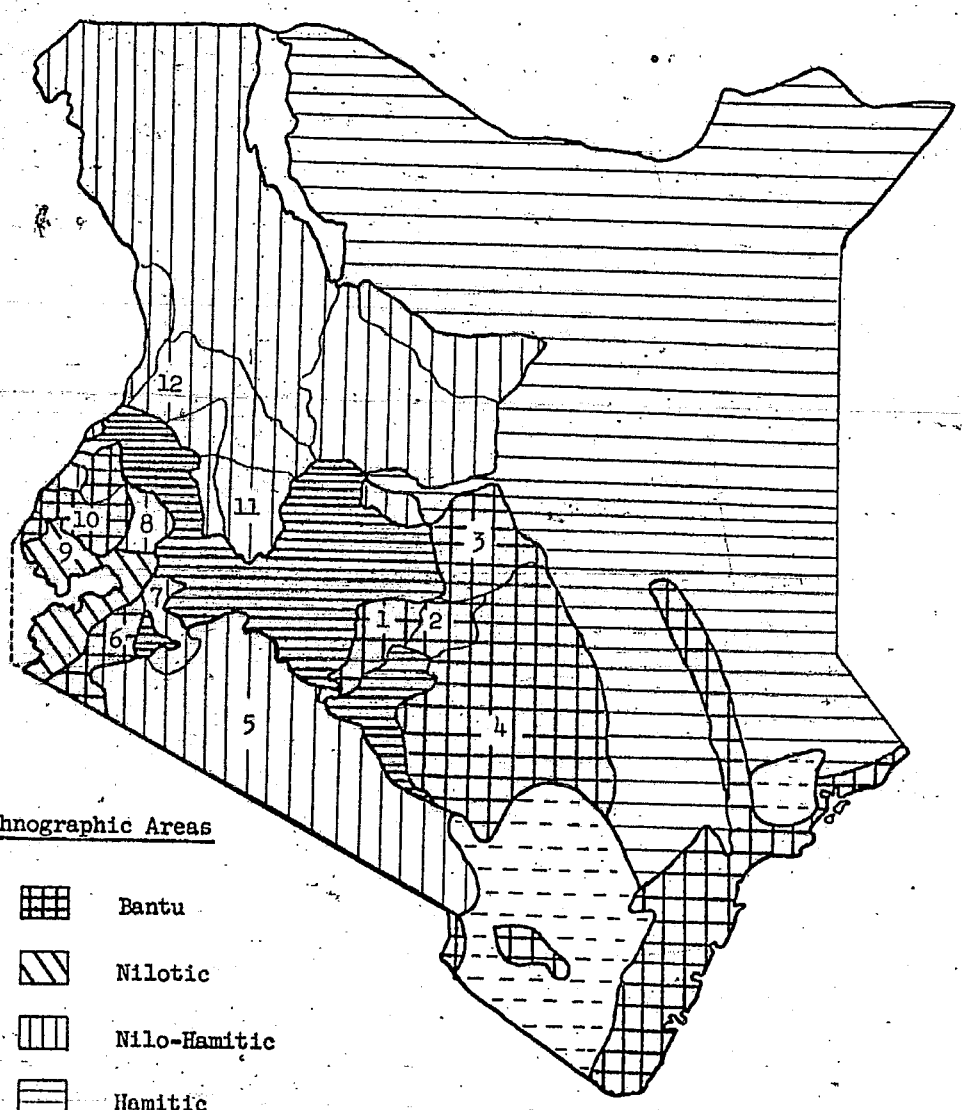
The African people of Kenya fall into four broad ethnic groups -- the Bantu, Nilotic, Nilo-Hamitic, and Hamitic people. Usually there are several distinct tribes within each of these major ethnic groups. The 1962 Kenya population census separates a total of 40 different tribes, although some authorities prefer to subdivide more than this (3, p. 2). Each of the four major ethnic groups speaks a distinct language. Within each ethnic group the different tribes usually speak different but related languages. As communication between people of different tribes is difficult, Swahili, a language originating from the Kenya Coast, has become the lingua franca. However, Swahili is not spoken by everyone, especially in the remote areas. Both English and Swahili are used as official languages.

Kenya is not a natural entity. Its boundaries were fixed by the former colonial powers, often in a very arbitrary fashion. Sometimes the arbitrary nature of the boundaries leads to tension, especially as many of them do not coincide with the natural ethnic regions. For example, the Somali people in the North East of Kenya are engaged at present in a terrorist movement, for they want to secede from Kenya and join the Somali Republic.

When the British first arrived in Kenya at the end of the nineteenth century there was almost no market economy; inter-tribal warfare was common, as was slave-trading. Partly to try to prevent fighting between different tribes, each major tribe was allocated a tribal reserve to which its people were more or less confined. The major tribal areas are shown in Map 5 which also shows the major ethnic regions of Kenya. The reserves which were allotted to the different tribes were normally the areas that these tribes happened to be occupying at the time when the tribal boundaries were fixed early in this century. Subsequently it became apparent that the areas which were given to the different tribes bore little relation to their future land needs. As the population continued to grow some tribal reserves began to suffer from extreme population pressure while other tribes continued to possess ample land.

In addition to the land which was allocated to Africans an area of about 12,000 square miles of apparently unoccupied land was reserved for European use. In allocating this land to European settlers it was hoped that the Europeans, in developing a commercial agriculture, would make use of the railway which had been constructed from the Kenya Coast to Uganda. This would help to make the railway a commercially viable enterprise.

Map 5. KENYA, THE MAJOR ETHNOGRAPHIC AND TRIBAL AREAS*




Ethnographic Areas

- Bantu
- Nilotic
- Nilo-Hamitic
- Hamitic
- European
- Unclassified

Tribal Areas

| | | | | | |
|---|---|---|---|---|---|
| 1 | Kikuyu | 5 | Masai | 9 | Luo |
| 2 | Embu | 6 | Kisii | 10 | Luhya |
| 3 | Meru | 7 | Kipsigis | 11 | Tugen |
| 4 | Kamba | 8 | Nandi | 12 | West Pokot |

Scale 1 : 6,000,000

* Based on Survey of Kenya, Tribal and Ethnographic Map, 1959.

Since European settlement first began in 1902, the large-scale European farms and plantations have become dominant in agriculture's market sector. Similarly, the non-agricultural sector of the monetary economy has been operated primarily by Europeans and Asians. Thus a dual economy has developed in Kenya; a small proportion of the population is engaged in the relatively productive large-scale farming, commercial and industrial sectors, while the majority of the population continues to depend on subsistence agriculture.

## The Economy

Kenya is still a predominantly agricultural country. Probably more than 75 percent of the population are directly dependent on agriculture. The exact proportion is unknown, for, in particular, there are insufficient statistics available on the amount of non-agricultural employment outside of the major centres. An approximate calculation may be made as follows. In 1965 the total population of Kenya was 9,365,000, of whom 384,000 people were employed in the non-agricultural sector (4, pp. 9, 122). If it is assumed that each one of those employed supports 4.3 people (the average ratio of the total population to the number of adult males), then 1,652,000 people are supported by the non-agricultural sector (3, p. 6). This is about 18 percent of the total population. Possibly undercoverage of non-agricultural employment in the national statistics would increase the proportion of people dependent on the non-agricultural sector. However, even allowing for this undercoverage, it seems likely that at least 75 percent of the population depend on agriculture. Much of the non-agricultural employment is directly associated with agriculture, either in marketing, transporting or processing

agricultural products. As no substantial mineral deposits have been found in Kenya, mining is an unimportant sector of the economy. There is no heavy industry although light industries, such as processing wool, cotton, leather, etc., are becoming increasingly important. The tourist industry which relies primarily on Kenya's magnificent wildlife resources is an important and rapidly growing industry.

The composition of Kenya's Gross Domestic Product (GDP) for the years 1956 to 1965 is shown in Chart 1.[1/] Of the four sectors shown in Chart 1, about 45 percent of GDP is produced by private sector commerce and industry. This is slightly more than the total contribution of commercial agriculture and subsistence agriculture combined, which together account for about 40 percent of GDP. Of the 40 percent of GDP which comes from the agricultural sector, about 60 percent is produced from subsistence agriculture, the balance from commercial agriculture. The remaining sector, the public sector, produces about ten percent of GDP.

The value of GDP increased fairly steadily throughout the period from 1956 to 1965. During this time the relative contributions of the four sectors shown in Chart 1 have remained much the same, except for a slight swing towards the public sector. Probably the latter item results from the fact that government salaries have increased more than other salaries during this period. While the value of GDP increased from 1956 to 1965, average real per capita incomes during this period remained fairly static at about £30 per annum (Table 2).

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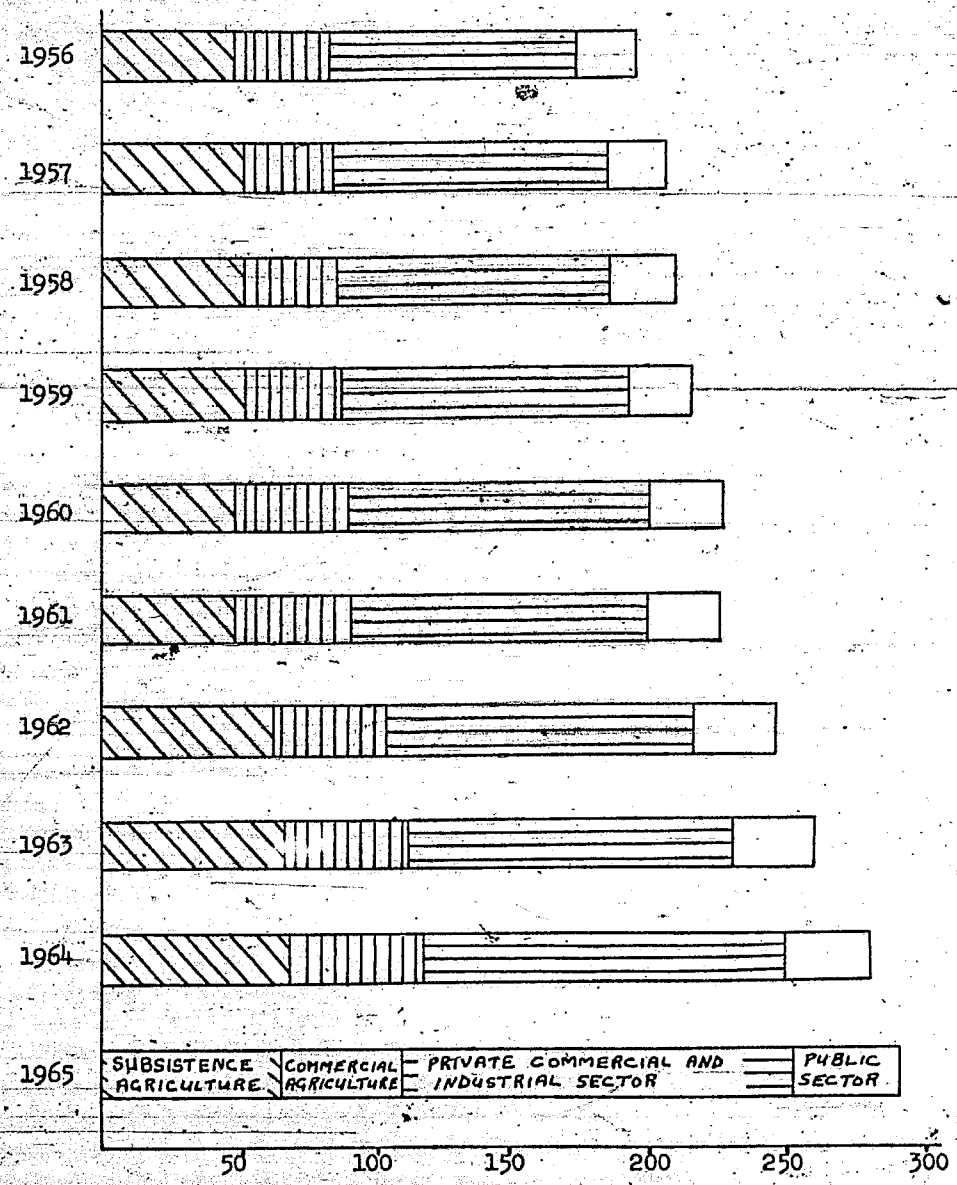
1/ Gross Domestic Product is shown rather than Gross National Product (GNP); GNP is not calculated in Kenya because the statistics on income transfers between Kenya and the rest of the world are incomplete. GDP is calculated at Factor Cost, not at Market Prices.

Chart 1. KENYA, COMPOSITION OF GROSS DOMESTIC PRODUCT, 1956-1965*




* Based on data from Kenya, Ministry of Economic Planning and Development, Statistics Division, Statistical Abstract, 1966, page 109.

TABLE 2. KENYA: REAL PER CAPITA INCOMES, 1956-1965*

| Year | Gross Domestic Product a/ (£ million) | Cost of Living b/ Index | GDP at 1965 Prices (£ million) | Population c/ (Thousands) | Real Per Capita Income (£) |
|---|---|---|---|---|---|
| 1956 | 193.15 | 279 | 234.00 | 7,209 | 32.46 |
| 1957 | 205.91 | 288 | 241.66 | 7,432 | 32.52 |
| 1958 | 208.10 | 288 | 244.23 | 7,652 | 31.92 |
| 1959 | 214.79 | 290 | 250.34 | 7,880 | 31.77 |
| 1960 | 225.51 | 292 | 261.03 | 8,115 | 32.17 |
| 1961 | 224.70 | 299 | 254.00 | 8,352 | 30.41 |
| 1962 | 244.09 | 315 | 261.91 | 8,595 | 30.47 |
| 1963 | 259.09 | 317 | 276.24 | 8,847 | 31.22 |
| 1964 | 281.32 | 324 | 293.47 | 9,104 | 32.24 |
| 1965 | 287.64 | 338 | 287.64 | 9,365 | 30.71 |

* Data from Kenya, Ministry of Economic Planning and Development, Statistics Division, Statistical Abstract, 1966 and ibid., 1965. Real per capita income is defined here as Gross Domestic Product, at Factor Cost, in 1965 prices, divided by population.

a/ The 1965 figure is provisional.

b/ The Cost of Living Index is the only index available with which to adjust the national income data for price changes. Unfortunately, it is not a very suitable index for it is based on the patterns of consumption of European civil servants. Hence the figures in the table must be regarded as approximations only.

c/ The population estimates are based on the 1962 census. It is assumed that the African population has changed at an average annual rate of 3.0 percent, and the Asian population at a rate of 2.5 percent a year. The actual numbers of Europeans are known exactly for each year.

From Chart 1 it might appear that Kenya is a relatively highly commercialized country. It is not. The apparently high proportion of GDP which comes from the commercial and industrial sectors is a result of several causes, both real and 'statistical'. The output of commerce and industry are relatively easy to measure, whereas that from subsistence agriculture is not. There is little doubt that the value of subsistence agriculture is underestimated in the national accounts.2/ However, productivity is genuinely higher in the non-agricultural and commercial agricultural sectors, partly because of the higher capital-labor ratios in those sectors. An indication of the disparity in income levels between the commercial and subsistence sectors can be obtained from the national accounts, although no detailed income distribution statistics are available. In the period between 1956 and 1965 about 75 percent of the total GDP was derived from the commercial sectors of the economy, which together supported less than 30 percent of the population. In contrast, the subsistence sector produced only about 25 percent of GDP but occupied about 70 percent of the population. While these figures are only approximations, they do give an indication of the dual nature of the economy.

## External Trade

Kenya, like most low-income countries, depends largely on imports to obtain its manufactured goods and exports agricultural goods to obtain foreign exchange. The composition of Kenya's exports to countries outside of East Africa is shown in Table 3. Most of these exports consist

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2/ c.f. (5) for a description of how the national accounts are calculated. Many of the calculations, especially for subsistence agriculture, are based on bold assumptions.

TABLE 3. KENYA: EXPORTS OUTSIDE OF EAST AFRICA, 1956-1965*

(Millions of £ E.A.)

| Item | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 |
|---|---|---|---|---|---|---|---|---|---|---|
| Coffee | 13.7 | 10.8 | 10.4 | 10.6 | 10.3 | 10.6 | 10.6 | 11.0 | 15.4 | 14.1 |
| Tea | 2.6 | 2.9 | 3.2 | 3.6 | 4.4 | 4.0 | 5.2 | 5.7 | 6.1 | 6.1 |
| Sisal | 2.1 | 2.1 | 2.2 | 3.5 | 4.6 | 4.2 | 4.3 | 7.5 | 6.0 | 3.9 |
| Pyrethrum | 1.2 | 1.1 | 1.8 | 2.2 | 3.0 | 3.1 | 3.2 | 3.0 | 2.5 | 2.2 |
| Wattle | 1.5 | 1.5 | 1.0 | 1.0 | 0.7 | 0.9 | 0.9 | 0.8 | 1.1 | 0.8 |
| Hides & skins | 1.2 | 1.5 | 1.0 | 1.6 | 1.8 | 1.6 | 1.4 | 1.2 | 1.3 | 1.8 |
| Meat | 0.2 | 0.4 | 1.2 | 2.0 | 1.8 | 2.3 | 2.8 | 2.6 | 2.2 | 2.5 |
| Butter | 0.6 | 0.5 | 0.9 | 0.7 | 0.7 | 0.6 | 0.9 | 0.8 | 0.8 | 0.3 |
| Cotton | 0.9 | 0.4 | 0.5 | 0.7 | 0.8 | 0.6 | 0.4 | 0.4 | 0.6 | 0.7 |
| Maize | 0.1 | 0.5 | 1.9 | 1.1 | 0.2 | - | 1.0 | 1.6 | - | - |
| Canned fruit | 0.8 | 0.6 | 0.6 | 0.5 | 0.4 | 0.4 | 0.7 | 0.8 | 0.9 | 0.8 |
| Sodium Carbonate | 1.5 | 1.4 | 1.2 | 1.7 | 1.3 | 1.6 | 1.2 | 1.2 | 0.7 | 0.8 |
| Cement & Petroleum | - | - | - | 0.1 | 0.2 | 0.4 | 0.5 | 0.6 | 3.0 | 5.6 |
| Other | 2.6 | 2.7 | 3.4 | 4.1 | 5.0 | 5.0 | 4.8 | 6.6 | 6.5 | 7.6 |
| Total | 29.0 | 26.4 | 29.3 | 33.3 | 35.2 | 35.3 | 37.9 | 43.8 | 47.1 | 47.2 |

* Data from Kenya, Ministry of Economic Planning and Development, Statistics Division, Statistical Abstract, 1966, page 27.

of agricultural products. About 60 percent of total exports come from four products: coffee, tea, sisal, and pyrethrum. Coffee is the single most important export, accounting for about 30 percent of the total value of exports. Recently some non-agricultural exports, especially cement and refined petroleum, have become more important.3/

In addition to exporting to countries outside of East Africa, Kenya exports to the other East African countries, Uganda and Tanzania.4/ Today this trade has increased to such an extent that Kenya's exports to the rest of East Africa are worth almost half as much as her exports outside of East Africa. Ten years ago this trade was very small. Slightly less than half of the exports to Uganda and Tanzania consist of agricultural products. These are mostly products that can best be grown at high altitude, such as wheat, vegetables, and milk, for Kenya has an advantage over Tanzania and Uganda in the production of these products. More than half of these local exports consist of manufactured goods. These are the products of a diverse collection of light industries, including various consumer goods, cement, and refined petroleum (1, pp. 40-43).

Imports from outside of East Africa consist mostly of manufactured goods; only about ten percent of the total is accounted for by agricultural products, the most important being wheat, vegetable oils, sugar, maize, rice, and dried milk. Most of these products could be produced locally. Some of them are imported because the imported product is of higher quality

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3/ All of the crude petroleum is imported. No oil has been discovered in Kenya so far.

4/ Tanzania was, until recently, two separate countries, Tanganyika and Zanzibar. In most of the statistical references quoted in this thesis the original names are used.

than the locally produced alternative. In addition to importing some food products, Kenya imports certain processed raw materials, notably cotton cloth and paper. Kenya hopes to be able to produce most of these materials internally in the future.

Imports from Uganda and Tanzania consist of agricultural products and manufactured goods in about equal proportions. The largest items are sugar and cotton cloth, both from Uganda (1, pp. 44-45).

Kenya has had a persistently unfavorable balance of trade with countries outside of East Africa. Recently Kenya has developed a very favorable trade balance with the other East African countries but this has been insufficient to eliminate the overall trade deficit (Table 4). No statistics for Kenya's balance of payments were available before 1963. Kenya has not experienced a balance-of payments deficit in any of the years for which statistics are available. However, this has been possible only because Kenya has been receiving considerable assistance from overseas governments (4, p. 113). While there is considerable uncertainty about possible future changes in the balance of payments, Kenya expects to incur a substantial payments deficit by 1970 (2, p. 96).

## East African Co-operation

For many years there has been a high degree of co-operation among the three East African countries. Several important services are operated on an East African basis under the control of the East African Common Services Organization. These include the railways and airways, the postal services, income tax and some statistical and research services. Until recently there was also a common East African currency under the control of the East African Currency Board. However, all three countries now

TABLE 4. KENYA: EXTERNAL TRADE AND TRADE WITHIN EAST AFRICA, 1956-1965*

(Millions of £ E.A.)

| Item | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 |
|---|---|---|---|---|---|---|---|---|---|---|
| Imports from outside of East Africa | 69.8 | 72.0 | 60.9 | 61.5 | 70.1 | 68.9 | 69.5 | 73.7 | 76.6 | 89.0 |
| Exports to outside of East Africa[a] | 33.0 | 31.2 | 33.2 | 38.4 | 40.2 | 41.7 | 45.1 | 51.0 | 53.5 | 52.0 |
| External Trade Deficit | 36.8 | 40.8 | 27.6 | 23.1 | 29.9 | 27.2 | 24.3 | 22.7 | 23.0 | 37.0 |
| Exports to rest of East Africa | 9.0 | 11.4 | 12.9 | 12.3 | 13.8 | 15.9 | 17.3 | 19.8 | 25.9 | 29.4 |
| Imports from rest of East Africa | 4.0 | 4.5 | 5.4 | 5.5 | 7.0 | 7.0 | 7.3 | 9.2 | 11.4 | 11.7 |
| Favorable Balance with rest of East Africa | - | 4.9 | 6.9 | 7.5 | 6.8 | 9.0 | 10.0 | 10.6 | 14.5 | 17.7 |
| Overall Trade Deficit | 31.8 | 33.8 | 20.1 | 16.3 | 23.1 | 18.2 | 14.4 | 12.1 | 8.5 | 19.3 |

* Data from Kenya, Ministry of Economic Planning and Development, Statistics Division, Statistical Abstract, 1966, page 25.

a/ Including re-exports.

have separate currencies. The possibility of forming an East African Federation has been the subject of almost continuous discussion. However, there seems to be little prospect that a Federation will be formed within the near future.

## Employment

The majority of Kenya's labor force is employed in subsistence agriculture. Perhaps 25 percent of the labor force is employed as wage earning labor, although the exact proportion is unknown. In 1965 the total known employment outside of subsistence agriculture was 594,000 people. The large-scale agricultural sector employed 210,000 people, the private commercial and industrial sector 206,000 people and the public sector 174,000 people. While the statistics on employment are reasonably satisfactory, there are no usable statistics for the level of unemployment. However, unemployment, especially in urban areas, and underemployment in the agricultural sector are known to be severe problems. These problems have been aggravated by the political uncertainty which occurred during the period of Kenya's transition to independence. During this period there was a large decline in the annual level of capital investment, especially after 1961. This trend in capital investment was followed closely by a decline in the level of employment. While the levels of capital investment and employment began to increase again in the mid-1960's, both capital investment and employment were lower in 1965 than in 1960. During this period of falling employment, the population has continued to grow at about three percent each year. Thus, unemployment is a severe problem (4, pp. 9, 112, 122).

## The Agricultural Sector

Less than ten percent of the land area of Kenya receives an average annual rainfall of 35 inches or more (6, p. 8). Intensive agriculture is possible only in this high rainfall zone. While crops can be grown in areas where the annual rainfall is slightly less than 35 inches, cropping is unreliable in these areas, especially if they are at the lower altitudes where evaporation is much higher. About one-fifth of the high rainfall land (35 inches or more) is found in the "White Highlands;" the remaining four-fifths being in the African reserves (Appendix I, Table I).

Until recently the land in the African areas was devoted almost entirely to subsistence agriculture, either mixed cropping and livestock farming in the high rainfall areas, or nomadic pastoralism in the arid areas. The large-scale farms in the "White Highlands" were the major source of marketed agricultural production, either food crops for the local market, or, in the case of exports, mostly the products of plantation agriculture. The proportion of marketed agricultural production coming from the large and small-scale farms is shown in Table 5. Recently the small-scale farms have produced a higher proportion of marketed agricultural production, although in 1965 the large-scale farms still produced almost three-quarters of the total marketed agricultural production.5/

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5/ While most of the increased production on the small-scale farms represents an increase in the level of productivity of the traditional small-scale farming areas, part of this increase results from the fact that, beginning in 1961, some of the large-scale farms have been split up into small-scale farms as a result of the African settlement schemes.

TABLE 5. GROSS VALUE OF AGRICULTURAL MARKETED PRODUCTION, 1956-1965*

| Year | (Millions of £ E.A.) Large Farm Sector | Small Farm Sector[a] | Percentage Share of the Small Farm Sector |
|---|---|---|---|
| 1956 | 32.6 | 5.9 | 15.3 |
| 1957 | 32.4 | 6.9 | 17.6 |
| 1958 | 33.4 | 7.6 | 18.5 |
| 1959 | 33.9 | 8.4 | 19.9 |
| 1960 | 37.7 | 9.5 | 20.1 |
| 1961 | 35.7 | 10.4 | 22.6 |
| 1962 | 37.1 | 10.5 | 22.1 |
| 1963 | 40.9 | 11.6 | 22.1 |
| 1964 | 42.0 | 13.9 | 24.9 |
| 1965[b] | 36.9 | 14.5 | 28.2 |

* Data from Kenya, Ministry of Economic Planning and Development, Statistics Division, Economic Survey, 1966, page 28.

a/ The figures for agricultural production from the small-scale farms include only produce sold outside of the producing area. Hence total marketed production by these farms is greater than these figures show. The above figures will probably also be slightly underestimated through poor statistical coverage. It is possible that some of the increase shown in the table results from an improving statistical coverage. However, the major products sold outside of the African areas, coffee, milk, pyrethrum, and tea, are sold through centralized agencies which keep accurate records.

b/ Provisional figures.

Before about 1950 the government's efforts to develop African agriculture were often half-hearted. Most of the attention was concentrated on the European farms.[6] While the demonstration effect of the European farms was undoubtedly beneficial to African farmers, the interests of the European settlers sometimes conflicted with those of the Africans. For example, until the early nineteen fifties Africans were not allowed to grow coffee; the European settlers had been able to persuade the Government that if Africans were allowed to grow coffee they would produce low quality coffee which would spoil the high reputation of Kenya's coffee on the world market. The most significant change in government policy occurred in 1954 with the publication of the so-called Swynnerton Plan (8). Following the adoption of this plan substantial development took place in the African areas of Kenya, especially in the more favored areas such as the Kikuyu Reserve. Usually this development took the form of consolidation of fragmented holdings, registration of freehold title deeds, introduction of high value cash earning farm products, such as coffee, tea, pyrethrum and high grade dairy cattle, and a considerable expansion of the agricultural credit and extension programs. Land consolidation and the registration of freehold title deeds was seen as the key to the successful development of these areas, for it was only when this process had been completed that the other developments could take place. From the beginning of the consolidation and registration scheme up to 1965 about 1.6 million acres of land were consolidated and the title deeds issued (2, p. 353). During this same

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6/ See, for example, the discussion in the introduction of (7).

period sales from the African farms increased threefold (Table 5). While it is not possible to say how much of this increased productivity stems from the fact that many of the farms were consolidated, it is felt that land consolidation was an important factor. Thus land consolidation remains a major component of government plans for developing African farming (2, p. 127).

The Large-Scale Farming Areas

In 1960 there were 3,609 large-scale farms in Kenya. Apart from 47 farms along the coast and a few Asian operated sugar estates in the highlands, all of these farms were located in the "White Highlands" (9, p. 3). The average size of these farms was 2,142 acres, although the median farm size was only 889 acres (9, pp. 4, 5). This skewed distribution of farm size is a function of the fact that many of the farms in the "White Highlands" are located in dry areas where the dominant system of farming is based on large-scale cattle ranches. European farms in the high rainfall areas are commonly less than 1,000 acres in extent. On the better land in the high rainfall areas there are two main types of farm: First, there are plantations growing coffee or tea and second, there are mixed farms producing maize, wheat, pyrethrum and milk as their major products. The other major product is sisal. While this can be grown on good land in high rainfall areas, usually it is grown in low rainfall areas where other more valuable crops cannot be grown. Although the large-scale farms can be separated into mixed farms, plantations and ranches, this distinction is not always clear-cut. For example, many coffee estates also grow maize and keep dairy cattle, some mixed arable and dairy farms have a small acreage of coffee or even tea, and some

ranches grow a small amount of arable crops. In addition to the major products mentioned so far the large-scale farms produce a variety of other farm products. These include sugar, wattle, barley, potatoes, vegetables, sheep, pigs, and poultry. The value of the sales of these products from the large-scale farms in shown in Appendix Table II.

The Small-Scale Farming Areas

In the old African reserves or small-scale farming areas, as they are now called, there are estimated to be about 950,000 small-scale farms. The average size of farm is about ten acres, although this varies widely from one district to another and within districts (10, p. 17). Most of these farms are found in the high rainfall areas around Lake Victoria, around the Nairobi/Mount Kenya area or along the coast. Much of the rest of the country is arid and is sparsely inhabited by nomadic pastoralists.

Almost all of the small-scale farms concentrate on the production of subsistence crops, notably maize. Many other subsistence crops, such as millets, sweet potatoes, cassava, various vegetables and beans are grown, although maize is usually the dominant crop. In most areas, except those where population pressure is extremely high, livestock, either cattle, sheep, or goats, are kept as well. Most of these livestock are indigenous types although high grade dairy cattle are now being kept by an increasing proportion of the small-scale African farmers. Since the implementation of the Swynnerton Plan in 1954 some of the African farming areas have developed very rapidly. For example, the Kikuyu, Kipsigis and Kisii areas, where land consolidation has taken place, are probably some of the most productive small-scale farms in sub-Saharan Africa.

These small-scale farms sell a variety of agricultural products. Coffee is the most important crop, although maize, dairy products, sisal, cotton, and pyrethrum are sold in substantial amounts from the better small-scale farming areas (Appendix I, Table III). Kenya can sell only a limited amount of coffee under the International Coffee Agreement and she expects to have a substantial coffee surplus in the next few years. There has been a great deal of new coffee planted in the last few years and this coffee is now coming into production (2, p. 176). Thus Kenya has been obliged to prohibit all new coffee planting. This has been a major blow, especially to many small-scale farmers. It is expected that tea will be planted extensively in the next few years and this will help to overcome the problem created by the coffee surplus. While a number of other countries are also increasing tea production, it is hoped that this increased production will not affect world tea prices adversely.

In contrast to the rapidly developing small farming areas such as the Kikuyu, Kipsigis, and Kisii areas, many of the African areas have progressed very little from the basic pattern of traditional subsistence agriculture. This is especially true of the heavily settled areas close to Lake Victoria, in the Kamba area and along the coast. The majority of the pastoral areas have shown almost no improvement. In fact, soil erosion is so severe in some of these areas that total production may have declined in recent years. This is speculation, however, for there are no reliable statistics on the volume of subsistence production either in the small-scale farming areas or in the pastoral districts.

The African farming areas thus present a very diverse picture. Significant development has taken place in some areas, but not in others.

Possibly between two-thirds and three-quarters of the rural population live in areas where little development has occurred.

## The Role of Agriculture in Economic Development

Because of the rapid rate of population growth and the limited availability of agricultural land it is desirable that Kenya should develop its non-agricultural sector. This would help to overcome the tremendous problem that Kenya has at present with urban unemployment. However, Kenya can develop its non-agricultural sector only if, among other things, enough capital and enough skilled manpower are available. While it is extremely difficult to make predictions on the basis of present trends, it would seem that shortages of capital and skilled manpower will prevent rapid non-agricultural growth in Kenya. It has been estimated that the rural population will be about 70 percent higher in 1980 than it was in 1962 (11, p. 7). This increasing population pressure on the land will necessitate extending the area of cultivation to poorer quality land and raising yields on the land already being farmed. As the majority of the population will continue to depend on agriculture, development of rural resources will be a key issue in determining the course of economic progress in Kenya.

Within agriculture there are many alternative ways of trying to bring about development. In this thesis the discussion is confined to those alternatives that involve the transfer of European owned land to Africans. This has been done, not because African settlement on European owned land is the ideal form of organization, but because African settlement is politically desirable and therefore it appears to be legitimate to restrict the discussion to this specific issue.

## Land Availability: The Need for African Settlement in the "White Highlands"

Within any one tribal area land can change hands through the normal market channels, if it is individually owned. Normally land cannot be purchased in one tribal area by a person from a different tribe. Hence there is relatively abundant good land in some tribal areas whereas it is very scarce in others, for the tribal boundaries were fixed more by right of conquest than by the needs of the people for land.

It is difficult to obtain reliable information on the availability of the different grades of agricultural land in Kenya. However, the differences between tribal areas are so great that even an approximation is valuable. This has been done in Table 6. The most noticeable feature is the relative abundance of good land in the European areas and in the Masai reserve and a few of the African areas in the Rift Valley Province. In contrast the people in the Northern Province have no good land whatsoever, the Kamba have very little, while there are moderate amounts in the Coastal, Central, and Nyanza Provinces. However, most areas have relatively abundant acreages of poor grade land.

The Northern Province is quite distinct from the other Provinces except in a few places where it adjoins them. It is a vast arid area which supports a small population of nomadic pastoralists. Even though the population density is extremely low much of the land is overstocked and famines occur periodically. It will be difficult to develop this land without using the irrigation potential that exists in a few areas. There have been instances where it has been shown that substantial increases over the original carrying capacity can be obtained simply by removing the livestock for a brief period so that native species of grass

TABLE 6. KENYA: LAND AVAILABILITY PER AGRICULTURAL HOLDING BY DISTRICT, 1960-1962*

(Acres)

| District | Type of Land | | | | |
|---|---|---|---|---|---|
| | High Potential | Medium Potential | Low Potential | Poor Ranching | Total |
| European Areas | 775.6 | 871.9 | 516.0 | - | 2,163.6 |
| African Areas | | | | | |
| Masai District | 63.0 | 8.1 | 56.5 | 102.3 | 229.9 |
| Rift Valley Province | 26.4 | 37.0 | 18.4 | 9.3 | 91.1 |
| Coast Province | 11.1 | 12.2 | 18.8 | 107.0 | 149.1 |
| Nyanza Province | 9.4 | 3.5 | - | - | 12.9 |
| Central Province | 4.9 | 3.2 | 6.4 | - | 14.5 |
| Kamba District | 2.2 | 17.3 | 20.8 | 19.2 | 59.4 |
| Northern Province | - | 0.1 | 0.6 | 585.1 | 585.6 |
| Total | 11.7 | 9.8 | 10.1 | 83.9 | 115.4 |

* Based on Appendix I, Table I, the footnote of which describes the method of calculation and the method of land classification.

can develop. Livestock then can be brought back under controlled conditions. However, as might be expected in an area where the land is communally owned, grazing schemes have not been successful for the people will not co-operate in controlling the grazing. Many people feel that, especially in the very dry areas, this poor quality arid land could be used better for ranching wild game animals. Apparently the wild game animals are able to manage with less water than domestic stock, produce more meat per acre, and do not cause such severe erosion.7/

While the average amount of high potential land per farm is much larger in the European areas than in any of the African areas, the European farms support a large labor force while the African farms support few people apart from their owners. In 1960, for example, the average area of land of all grades per farm worker was only 28 acres for the European areas taken as a whole. However, in the principal mixed farming areas of the "White Highlands," the only areas which are really suitable for African settlement, the average area of land per worker was about 35 acres. Only about 65 percent of these workers were adult males (9, pp. 45-46). Thus, the mixed farming areas of the "White Highlands," which consist largely of high potential land, apparently supported one adult male worker (roughly one family) on each 54 acres of land. Table 6 shows that the Masai District was the only African district where the high potential land was less densely settled than the mixed farming land in the "White Highlands." In addition, of course, the Masai District is devoted to a type of agriculture which produces almost no market surplus. Thus, economic reasoning alone would suggest that gains from developing

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7/ For a good review of this subject see (12).

the Masai District more intensively would probably be greater than those derived from transferring European farms in the "White Highlands" into African settlement schemes.8/

If the high potential land in Masai District were to be settled at the same density as the present "Million Acre Settlement Scheme" in the "White Highlands," the number of people that could be absorbed is about equal to those that could be settled on all of the mixed farming land in the "White Highlands." The small-scale farms which comprise the present "Million Acre Settlement Scheme" have an average size of about 30 acres (2, p. 358). Thus, as the former European farms in the mixed farming areas supported one family on about 54 acres of land, the process of African settlement should increase the population density by about 80 percent. If the small-scale farms were to support some hired laborers in addition to their owners, the effect on population density would be somewhat greater. However, this possibility will be neglected primarily because most of the African settlement schemes are high-density schemes which do not appear to support many people apart from their owners.

For the present "Million Acre Settlement Scheme" the 80 percent increase in the number of families supported represents about 14,000 families. If all of the 3.4 million acres of mixed farming land in the

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8/ This was the attitude of the Colonial Government, at least until immediately prior to independence. This is illustrated by the following quotation from a report made by Sir Philip Mitchell when he was Governor of Kenya in 1951 (13, p. 6):

> "And, thirdly, the expropriation of land properly farmed by one man in order to hand it over for destruction by others would be not only an act of gross and indefensible injustice but of egregious folly. If it were not that one party is white and the other black, no one would suggest such a solution, unless of course land were held in very large areas and were not properly used. But by that criterion expropriation would begin with the Masai."

"White Highlands" were settled on a similar basis, this mixed farming land would support a total of 110,000 families, roughly 50,000 more families than was the case when this land was operated by European farmers. However, this figure would have to be reduced by about 10,000 families if the mixed farming land in the former "White Highlands" which is presently owned by African large-scale farmers was excluded from the calculation. Thus if all of the mixed farming land in the former "White Highlands," apart from that presently operated by African large-scale farmers, were settled with Africans on 30 acre farms, the "White Highlands" could support about 40,000 more families than were supported by the European farms in these areas.

The data which are presented in Table I, Appendix I, suggest that if the high potential land in the Masai District were to support one family on every 30 acres, this high potential land could support about 45,000 more families than the present total number of families in Masai District. Thus Masai District alone could support as many extra families as all of the mixed farming land in the "White Highlands."

In 1962 the adult male population of Kenya was about two million (3, p. 6). If it is assumed that this group of people is increasing in size at the same rate as the total population, three percent per annum, and that these people comprise the labor force, then the number of workers is increasing by about 60,000 each year. If, as seems likely, most of these people will have to be absorbed into the agricultural sector, it is clear that neither African settlement in the "White Highlands" nor heavier settlement in thinly populated areas such as Masai District is going to be anything more than a very temporary relief to growing

population pressure, at least if these extra people are absorbed on to farms as large as 30 acres each. Certainly the population pressure on the land will mount and eventually the existing tribal land barriers must break down. However, in the present political circumstances in Kenya, re-allocation of land between different tribes is not feasible while African settlement in the "White Highlands" is extremely attractive politically. It satisfies the Africans who for many years have cast envious eyes on the Europeans' broad acres while at the same time it enables European farmers to sell their land and leave Kenya if they wish to do so.

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# CHAPTER 3

## AFRICAN SETTLEMENT IN THE "WHITE HIGHLANDS"

This chapter describes the various forms of African settlement in the "White Highlands." In part, this description is given to provide a background for the later discussion of some particular African farms. However, some of the information which is presented in this chapter will be directly useful at a later stage when the effects of alternative settlement arrangements on Kenya's economy are discussed.

### The Extent of African Settlement

In 1960, the last year before African settlement began, there were almost 3,600 large-scale European farms in the "White Highlands." These farms covered an area of about 7.5 million acres of agricultural land. Table 7 shows that by June 1965 about 1,600 of these large-scale farms covering an area of about 1.8 million acres of land had been purchased for African use.[1/] About half of the farms which were purchased were split up into small-scale farms and made into settlement schemes. The other half are still operated as large-scale farms by their new African owners.

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1/ These statistics include only farms which were bought either by the Kenya Government or with the help of loans from government agencies. A small but unknown number of Africans have bought or rented European farms without having received any financial assistance from the Kenya Government.

TABLE 7. KENYA: LAND PURCHASED IN FORMER "WHITE HIGHLANDS" FOR AFRICAN OR GOVERNMENT USE TOTAL UP TO 30th JUNE, 1965 *

| Type of Scheme | Number of Large-Scale Farms Purchased (Number) | Total Area (Thousand acres) | Cost to Public Agency b/ (Thousand £ E. A.) |
|---|---|---|---|
| Small-Scale Farms a/ | | | |
| High-Density and Low-Density Settlement Schemes | 800 | 1,084 | 10,038 |
| Large-Scale Farms | | | |
| Co-operative Farms; Ol'Kalou | 84 | 120 | 888 |
| Privately Operated (Land Bank) | 488 | 393 | 2,051 |
| Privately Operated (Dept. of Settlement) | 226 | 158 | 1,433 |
| Total Large-Scale Farms | 798 | 672 | 4,371 |
| Government Farms | 26 | 32 | 318 |
| Nandi Salient | 21 | 17 | 180 |
| Total | 1,645 | 1,805 | 14,907 |

* Data from Kenya, Development Plan, 1966-1970, page 357.

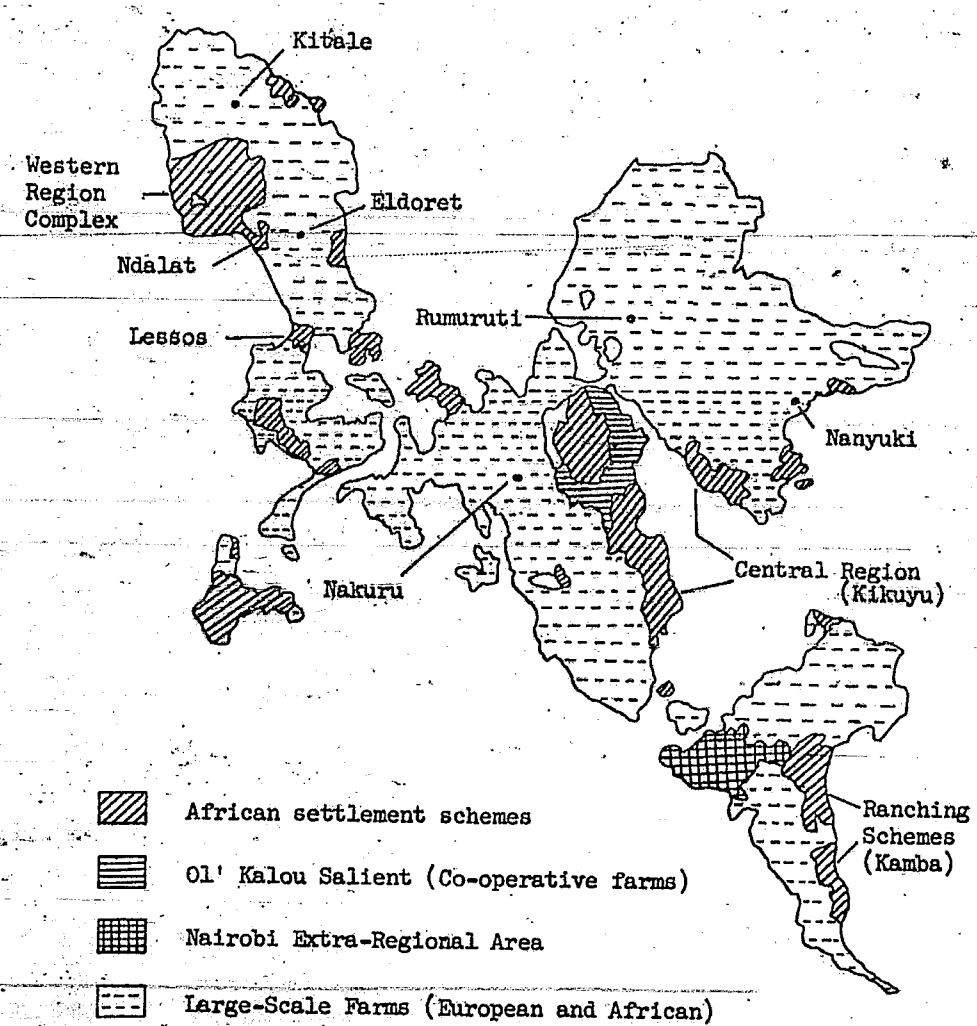
a/ This includes about 12 large-scale co-operatively operated ranches. These are officially classified as High-Density settlement schemes.

b/ This includes only the cost of the land and permanent improvements. It does not include administration expenses or development loans to individual farmers.

About 3.4 million acres of land in the "White Highlands" is in areas where mixed livestock and arable farming is the major farming system. So far almost all of the farms which have been re-settled with Africans are in the mixed farming areas. About half of all the mixed farming land in the "White Highlands" had been taken over by Africans by June 1965. The balance of the land in the "White Highlands," 4.1 million acres, is devoted to large-scale ranches or plantations. Very few of these ranches or plantations have been affected by African settlement (1, pp. 148-149).

The "White Highlands" of Kenya and the areas which were taken up by settlement schemes at the end of June 1965 are shown in Map 6. Most of the African operated farms, both on settlement schemes and individually operated large-scale African farms, are located in the Western and Central parts of the "White Highlands." The farms which are operated by Africans as large-scale farms are not shown separately in Map 6 for most of these farms were bought on an individual basis and are scattered throughout the "White Highlands." However, most of the African large-scale farms are located in the major mixed farming areas; the Trans Nzoia District around Kitale, the Uasin Gishu District around Eldoret, and the Nakuru District. The majority of the Eastern part of the "White Highlands" is devoted to large-scale ranches and plantations. All of the large block of land around Rumuruti and Nanyuki, apart from a few places along its southern edge, are used entirely for very large-scale ranches. The area to the east of Nairobi contains very few mixed farms but is used for ranches and plantations. Thus, most of the large-scale farms in the eastern part of the "White Highlands" are still operated by Europeans.

Map 6. KENYA, THE WHITE HIGHLANDS; THE EXTENT OF AFRICAN SETTLEMENT SCHEMES IN 1965*




Scale 1 : 2,500,000

* Based on Survey of Kenya, Settlement Progress Map, 1964 and Map of Kenya Land Settlement Schemes, 1965.
State Forest Reserves which occur within the White Highlands are excluded from the map.

Table 7 shows that 1,645 large-scale European farms had been purchased by June 1965. The majority of these farms will pass or have passed into African ownership. However, 26 of these large-scale farms, those shown as Government Farms in Table 7, probably will remain in government possession. Some of these farms are being kept for an afforestation scheme in connection with a proposed paper pulp mill. Most of the others will form National Farms. These will be administered by a newly formed Agricultural Development Corporation which will operate the farms as livestock breeding or crop seed producing farms. As a result of the process of splitting up European farms and settling African farmers on small-scale farms many of Kenya's best livestock breeding and seed producing farms have been disbanded. Also, given the current political uncertainty, many of the remaining European farmers appear to be unwilling to engage in such long-term activities as the production of high quality breeding livestock. The Kenya Government hopes that some of this damage can be repaired through the operation of the National Farms.

Twenty-one of the large-scale farms which have been purchased from Europeans, the Nandi Salient farms, have been given back to the Nandi people for incorporation in the Nandi Reserve. Apparently these farms were occupied by the Nandi when the first European settlers were given rights to this land. The Government has now returned these farms to the Nandi to compensate them for the original "wrongful" settlement by Europeans.

Apart from the 47 farms mentioned above, all of the remaining 1,598 large-scale farms which have been purchased from Europeans are being or will be farmed by African farmers, either as complete large-scale farms

or as small-scale farms created through subdivision of the original large-scale farms.

The Large-Scale Farms

Table 7 shows that by 30th June 1965 nearly 800 farms had been purchased for use by Africans as large-scale farms. In fact, there were slightly more than this for about 12 large-scale co-operative ranches are included together with the small-scale high-density settlement scheme farms in Table 7. These co-operative ranches are officially classified as high-density settlement schemes, primarily because they were financed with British Government funds under the same terms as the rest of the high-density small-scale farms. The government was anxious that all of the small-scale farms on settlement schemes should be organized on a tribal basis and, if possible, be situated on land adjacent to the existing tribal reserve. Unfortunately, in the European areas adjacent to the Kamba reserve there was very little high-rainfall land suitable for subdivision into small-scale farms. In order to overcome this problem the Kenya Government decided to set up a special category of settlement scheme, the co-operative ranches, so that the Kamba could have settlement schemes in the European areas next to their existing land unit.

Eighty-four of the large-scale farms shown in Table 7 occur in one block of land, the Ol'Kalou Salient. The Kenya Government intends that these farms will be converted into 18 large-scale co-operative farms, each with 100 member settlers (2, p. 53). The Department of Settlement will help to administer these co-operatives for the first few years until the co-operative societies are sufficiently well organized to operate everything themselves. This land was purchased in the early part of

1965. So far most of the land is still being farmed by the Department of Settlement for there has been insufficient time to get all of the co-operative societies established. These farms will not be included in the analysis.

All of the remaining large-scale farms are operated privately. These farms may be operated by individual Africans, by partnerships, by limited companies or through co-operative societies. There are no statistics available to show how many of these farms fall into each of these categories. However, most of these farms are either individually owned or operated by private partnerships. Only these two types of organization will be dealt with in this study.

The majority of these farmers were financed through the Land and Agricultural Bank of Kenya. The Land Bank allowed farmers to borrow a maximum of 60 percent, or in special cases 80 percent, of the cost of the farm and permanent improvements. Most of these loans are repayable over a period of 20 years with interest charged at six and one-half percent per annum. By 30th June 1965 the Land Bank had helped to finance 488 African large-scale farms and had lent over £ 2 million for this purpose.

The remaining 226 large-scale farms were bought through the Department of Settlement. These farms came under two separate schemes: the "Assisted Owners Scheme" and the "Compassionate Farms." Under the "Assisted Owners Scheme" 90 large-scale farms were purchased by the Department of Settlement. A few of these farms were split up into two or more farms and finally 125 large-scale farms were resold to African buyers (3, p. 8). Each of these farmers was able to borrow up to 90 percent of

the farm's purchase price, the loan to be repaid over 30 years and carrying interest at six and one-half percent per annum. The remaining 136 large-scale farms, the "Compassionate Farms," were sold intact to African buyers. After the first constitutional conference was held in London in 1960 the market for land in the "White Highlands" collapsed. At the same time there were a number of people who, through old age or disability, needed to sell their farms. These farms were officially listed as "Compassionate Farms" and the British Government provided funds so that they could be purchased. A total of 160 large-scale farms were bought in this way and 136 of these farms were re-sold to African farmers (3, p. 7). The land purchase loans were made on the same conditions as those for the Assisted Owners.

By 30th June 1965 over 700 large-scale farms had been purchased by Africans through either the Land Bank or the Department of Settlement. These farms cover a total area of 550,000 acres of land and average about 770 acres in size. After allowing for the fact that a few of these farms were split up by the Department of Settlement, the average size of these privately operated African large-scale farms is about 740 acres. This is considerably smaller than the average size of all large-scale farms in these areas. Most of these farms are in the Nakuru, Uasin Gishu or Trans Nzoia areas. In 1960, before African settlement began, the average farm sizes in these three areas were 1,487, 1,594, and 1,282 acres, respectively (4, p. 4). Thus most of the private African buyers have tended to buy the smaller large-scale farms. This is understandable in view of most Africans' lack of capital.

All of the farms which were bought by the Kenya Government for subsequent resale to Africans were bought on the basis of 1959 land values. This meant that the farms were valued on the basis of the land values which prevailed in the last year before the land market collapsed in 1960. The "Compassionate Farms" were resold to Africans at 50 percent of their cost to the Government. Those under the "Assisted Owners Scheme" or the large-scale co-operative farming schemes organized by the Department of Settlement were resold at two-thirds of their cost to the Kenya Government. In each case the subsidy element was paid with a grant from the British Government. While the subsidies quoted apply to all of the farms in each category taken as a whole, individual farms may have received more or less subsidy than the percentage applicable to all of the farms in the particular category.

All of the farms which were bought from their previous owners on a private basis through the Land Bank were bought on the basis of a privately negotiated free market price. However, at the time of purchase the Land Bank made an official valuation of the farms using 1959 values. Frequently this valuation formed the basis for negotiation between the buyer and the seller. There was no element of subsidy involved in the purchase of any of these farms.

From Table 7 it can be seen that almost £4.5 million of government funds have been used to finance the transfer of the large-scale farms. In addition to this more public funds have been made available to these African farmers for development loans for buying livestock, machinery and equipment, and also for short-term cropping loans. Unfortunately there are no statistics available showing the extent of these loans.

The Small-Scale Farms

All of the small-scale African-operated farms in the former "White Highlands" are found in groups or settlement schemes, each scheme being created through the sub-division of one or more large-scale farms. All of these settlement schemes are administered by the Department of Settlement, which was created especially for this purpose. There are two main types of settlement schemes, distinguished primarily on the basis of the target incomes which settlers were expected to obtain. Table 8 shows the number of settlement schemes and the number of settlers on these settlements. When the present settlement scheme is completed in 1967 slightly more than one million acres of land will have been re-settled with 32,000 African families. For this reason the whole settlement scheme is referred to as the "Million Acre Scheme." It is appropriate to point out here that the figures in Table 8 for the area of land involved in the settlement schemes are not directly comparable with those in Table 7. Table 8 shows that 1,087,000 acres of land are expected to be used for the "Million Acre Scheme" (including the 12 large-scale ranches). Table 7 shows that 1,084,000 acres of land had been purchased for this purpose by 30th June 1965. That is nearly all of the land required for the whole settlement scheme had been bought by 1965. However, there is always a delay between the time when the government purchases the land and the time when it can get the settlers onto the settlements. This is reflected in Table 8 which shows that re-settlement had started on only 878,000 acres of land by 30th June 1965.

Apart from the co-operative ranches, all of the settlement schemes are based on individual ownership of the small-scale farms. There are two major types of settlement scheme --

TABLE 8. KENYA: MILLION-ACRE SETTLEMENT SCHEME: PROGRESS UP TO 30th JUNE, 1965 AND PROJECTED FIGURES FOR WHOLE SCHEME *

| | Low Density | High Density | Co-operative Ranches | Total |
|---|---|---|---|---|
| Number of Schemes | | (Number) | | |
| Actually started by 30th June, 1965 | 28 | 58 | 6 | 92 |
| Total Projected | 36 | 76 | 12 | 124 |
| Area | | (Thousand acres) | | |
| Actually started by 30th June, 1965 | 141 | 595 | 141 | 878 |
| Total Projected | 184 | 737 | 166 | 1,087 |
| Number of Settlers[a/] | | (Number) | | |
| Actually settled by 30th June, 1965 | 3,311 | 20,606 | 626 | 24,969 |
| Total Projected | 5,347 | 25,896 | 1,052 | 32,295 |
| Average Farm Size | | (Acres) | | |
| Projected | 34.5 | 28.1 | - | - |

* Data from Kenya, Development Plan, 1966-1970, page 358.

a/ The projected total number of settlers on the High-Density and the Co-operative Schemes is slightly underestimated, for a few of the schemes which have not been started yet have not been fully planned and the expected number of settlers is unknown.

1. High-Density Settlement Schemes: These are intended for people who are both landless and unemployed. The individual farms on these schemes average 28 acres in size although there is considerable variation in size among the settlement schemes. Each settlement scheme is planned on the basis of a specific target income. The average farm size on any particular settlement is fixed so that, given the agricultural potential of the land on that settlement, settlers ought to be able to achieve the expected target incomes. On High-Density Settlement Schemes the target incomes vary from £25 to £70 per annum. These incomes are expected to be cash surpluses after settlers have repaid their loan installments and obtained their own subsistence. The smallest farms on any one of these high-density settlement schemes average only 11 acres with target farms incomes of £25. The largest farms on any high-density settlement average 66 acres each with target farm incomes of £70.

Each high-density settlement scheme comprises an average of about 10,000 acres of land. The majority of the settlement schemes are high-density schemes. When the "Million Acre Scheme" is completed there should be about 26,000 settlers on this type of scheme.

2. Low-Density Settlement Schemes: These are intended for Africans with some farming experience. Apart from one scheme with an average farm size of 140 acres and a target income of £250, all of these settlement schemes have target farm incomes of £100. The small farms average 34 acres in size although this varies from as low as 12 acres on one scheme to as much as 56 acres on another (2, pp. 51-53). When the "Million Acre Scheme" is completed there should be about 5,000 settlers on these low-density settlements. Each low-density settlement comprises

an average of about 5,000 acres of land. These schemes are only half the size of the high-density settlements primarily because the agencies which lent the money for the development loans insisted on their being smaller and receiving more intensive supervision.

Although both the high-density and the low-density settlement schemes are based on individually owned small-scale farms, most of the farms are too small to be able to provide all of the services that the farmers need. Thus each settlement scheme or group of settlement schemes has a central co-operative society which operates some services such as marketing farm produce, dipping cattle, operating an artificial-insemination service, running a tractor cultivating service, etc. Normally, when the settlement scheme is started these services are provided by the Department of Settlement through the settlement officer who lives on each scheme. As the co-operative becomes established the settlement officer hands over these services gradually until the co-operative is able to manage them by itself. However, certain services, notably tractor cultivation and cattle dipping, may be provided by an outside contractor.

Originally the government intended that the settlement officers would stay on each scheme for the first two and one-half years. Later it became apparent that most settlement schemes could not function properly if the settlement officers left so soon. The Kenya Government is trying now to keep the settlement officers on the schemes for the first five years. This has posed problems, for no financial provision was made for doing this when the original plans for settlement were drawn up. Recently about 60 American Peace Corps Volunteers have been helping to provide an extended amount of supervision.

Land purchase loans were available to all settlers. These loans were repayable over 30 years and like all government loans carried interest at six and one-half percent per annum. On high-density schemes settlers could obtain 100 percent of the farm's purchase price as a loan. On low-density schemes settlers had to deposit 10 percent of the purchase price. Recently, settlers on low-density schemes have had to deposit some working capital as well. They are able to withdraw this money whenever they can show that they need to purchase something for their farms. In addition to the farm purchase price, all settlers had to pay a small fee, usually about £5, to cover the legal expenses involved in transferring the title deeds of the land. All settlers could obtain development loans for buying livestock, building materials, equipment and for some short-term cropping expenses. These development loans were usually large enough to enable settlers to completely equip, stock, and operate their farms for the first year or so. Once these development loans were issued at least some of the settlers were able to obtain short-term credit from their co-operative society, usually against the security of their expected monthly milk check. If their co-operative society was well organized the settlers could obtain short-term government loans for expenses incurred in planting maize. These loans were obtainable only through the co-operative society and were made as advances against the Minimum Financial Return on maize. Apart from this, most settlers were unable to obtain much credit from commercial sources; they were too indebted to the Department of Settlement to be suitable candidates for commercial credit.

Originally all settlers were able to obtain two development loans. One was intended primarily for buying livestock, building materials and equipment and was repayable over 15 years. The other was intended for short-term cropping expenses and was to be repaid over five years. However, it became apparent that if settlers had to repay part of their loan over five years there was a very heavy burden of loan repayments during the first few years. Thus the Department of Settlement decided to consolidate all five and 15-year loans into one 10-year loan. This also helped to simplify accounting procedures within the Department of Settlement.

When a group of large-scale farms was purchased for a settlement scheme they were bought on the basis of 1959 values. In arriving at the price of a small-scale farm to a settler the following procedure was adopted. First, the total purchase price of the large-scale farms was reduced by one-third. This was paid with a grant from the British Government and was intended to cover the cost of expensive permanent improvements, such as the houses of European farmers, which were not directly valuable to the new settlers. This one-third subsidy applied to all settlement schemes taken together. Individual settlement schemes may have received more or less than one-third, depending upon the special circumstances on the particular settlement. Then, having deducted the one-third grant, 10 percent was added to the remaining two-thirds and the resulting figure divided by the number of small farms to get the average purchase price per farm. This extra 10 percent was intended to cover the Kenya Government against any possible loss through late repayment or default on loan repayments by settlers.

All of the land which was bought for settlement schemes was purchased with money provided by the British Government, one-third as a grant, two-thirds as a loan. After the large-scale farms were purchased more money had to be spent on soil conservation, road building, farm planning, etc. before the farms could be subdivided. The cost of this work was paid with a grant from the British Government. This grant also paid for all of the costs of administering the settlement schemes for the first two and one-half years of their existence. Most of the funds for settlers' development loans were borrowed from overseas. However, when the European large-scale farms were purchased by the Government, some of the European farmers had to settle outstanding loans with government credit agencies such as the Land Bank. The proceeds of these loan repayments were used to help finance development loans for settlers on high-density settlement schemes. The rest of the money for development loans on high-density schemes was obtained as loans from either the British Government or the West German Government. The development loans for low-density settlement schemes were financed through loans from either the Commonwealth Development Corporation (CDC) or the World Bank (IBRD). There was no subsidy element in any of the development loans. A summary of the expected total cost of the Million Acre Settlement Scheme and the source of the funds is given in Table 9. The whole of this scheme was expected to cost about £23 million of which about £9 million was a grant from the British Government.[1/]

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1/ This is intended only as a brief description of African settlement in the former "White Highlands." A more detailed description of the "Million Acre Scheme" is given elsewhere (3). Also, much useful information on the settlement schemes which are organized by the Department

TABLE 9. KENYA: MILLION ACRE SETTLEMENT SCHEME: TOTAL COST AND SOURCES OF FINANCE *

(Thousands of £ E.A.)

| | Low-Density Schemes | High-Density Schemes a/ | Total |
|---|---|---|---|
| Land Purchase | | | |
| Grant from U.K. | 627 | 3,180 | 3,807 |
| Loan from U.K. | 1,258 | 6,359 | 7,617 |
| | 1,885 | 9,539 | 11,424 |
| Development Loans | | | |
| U.K. Government | - | 2,497 | 2,497 |
| C.D.C. | 824 | - | 824 |
| I.B.R.D. | 1,647 | - | 1,647 |
| West German Government | - | 1,218 | 1,218 |
| Other b/ | - | 1,422 | 1,422 |
| | 2,471 | 5,137 | 7,608 |
| Administration | | | |
| Grant from U.K. | 1,221 | 4,286 | 5,507 |
| Total Cost c/ | 5,577 | 17,540 | 23,117 |

* Data from Kenya, Development Plan, 1966-1970, page 358.

a/ The high-density settlement schemes include 12 large-scale co-operative ranches which are officially classified as high-density settlements for financial purposes.

b/ This item is the proceeds obtained from loans which were repaid to the Kenya Government by European farmers whose farms were purchased.

c/ i.e., the total cost to the Kenya Government, not including the item b/ which, of course, is just a bookkeeping arrangement within the Kenya Government.

## Possible Future Extensions of African Settlement

The Kenya Government is anxious that the rest of the European owned land which is suitable for mixed farming in the "White Highlands" be transferred to African farmers. However, the Government realizes that a rapid transfer of this land may be detrimental to the economy, for it would be expensive and there are few Africans with sufficient experience of commercial agriculture to farm the land successfully. The Kenya Government is not happy with the progress of either of the existing forms of African settlement. Production from the small-scale settlement schemes has not been as high as was expected and a large proportion of the settlers have not repaid their loan installments on time (1, pp. 150-156; 2, p. 62). Similarly, the large-scale African farms are generally considered to be badly run, although there is little factual information available. Thus the Kenya Government has decided that the pace of land transfer shall be slowed down. At the same time the Government is considering introducing new ways of effecting the land transfer which, hopefully, will be more successful than the previous ones.

During the period of the current development plan from 1966 to 1970, the Government expects that another 400,000 acres of land will be transferred to Africans. About 80,000 acres of this land will be settled on lines similar to the existing low-density settlement schemes. Probably

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of Settlement is given in that Department's annual reports (2, 5, 6, 7). The annual reports of several other government agencies which deal with the small-scale settlement schemes contain useful information (8, 9, 10). Very little information is available concerning the privately owned large-scale African-operated farms, although there is some in the annual reports of the credit agencies which deal with these farmers (11, 12). A statement of the Kenya Government's attitude towards the process of African settlement in the former "White Highlands" is contained in the current development plan (1, pp. 150-160).

another 200,000 acres will be bought privately by African farmers who wish to farm large-scale farms. The balance of the land, 120,000 acres, will be taken over by the recently established Agricultural Development Corporation (ADC). Some of this land will be farmed as National Farms by the ADC with the intention of producing breeding livestock or high quality crop seeds. The rest of the land to be administered by the ADC will probably be operated as "Transitional Farms." These will be large-scale farms leased to African tenants. They will be supervised by a manager who will be employed by the ADC. If, after a few years, it appears that the African tenants can operate the farms on their own, they will be given the opportunity to purchase the farms. The total cost of transferring from European to African ownership this 400,000 acres of land is expected to be about £6.4 million during the period of the current development plan (1, pp. 156-160).

By 1965 about 1.8 million acres of land had been purchased from European farmers, for either African use or, in the case of a few farms, for use by the Kenya Government (Table 7). Of this land about 1.7 million acres was in the mixed farming areas, the balance being in ranching districts. During the period of the current development plan, from 1966 to 1970, another 400,000 acres of European land will be purchased, most of it for use by Africans. Almost all of this land will be in the mixed farming areas. Thus, by 1970 a total of about 2.1 million acres of land will have been purchased in the mixed farming areas of the "White Highlands." As there are about 3.4 million acres of mixed farming land in the "White Highlands," about 1.3 million acres of this land will remain in European occupation in 1970. Apart from about 100,000

acres of land which has been purchased already in the ranching areas, the majority of the four million acres of land in the ranching and plantation areas of the "White Highlands" will remain in European use in 1970. At present there are no definite proposals for taking over the land which will remain in European occupation in 1970, although, presumably, the Kenya Government would prefer to see all of this land in African occupation, providing a satisfactory method of African settlement could be found.

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# CHAPTER 4

## CRITERIA FOR APPRAISING ALTERNATIVE FORMS OF SETTLEMENT

### Introduction

This chapter begins by examining some theoretical considerations which are involved when investment criteria are chosen. It then goes on to discuss how these principles can be applied to the task of choosing suitable criteria for appraising alternative forms of African settlement in the Kenya highlands.

### Some Theoretical Considerations

Interest in the subject of investment criteria has arisen for several reasons, two of which appear to be of major importance. First, any society has to make investments in areas such as health, education and defense, where the market mechanism cannot be expected to act as a guide for making investment decisions. Second, even in those sectors of the economy where the market mechanism plays a dominant role, returns obtained by private investors may diverge from those which accrue to society as a whole.[1/] Thus a need has been felt for investment criteria which could be used to appraise alternative investment projects.

In choosing between alternative investment projects a country will be trying to reach several objectives, such as higher national income,

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1/ cf. (1, Chapter 4) for a good discussion of the reasons why social and private returns may be different.

more employment and a better distribution of income. If an investment program which makes the maximum possible contribution to these objectives is to be chosen, certain conditions will have to be fulfilled. For example, the objective of higher national income implies that resources should be used in an economically efficient manner. This would require that all resources in limited supply be used up to the point where the ratios of their marginal contributions to national income and social opportunity costs are equated. In practice sufficient data are not available to determine whether these conditions are met. The process of choosing between alternative investments must be simplified. Investment criteria should be selected so that they can be used with the data available but still lead to a choice which approximates to the ideal investment program. Clearly there is a danger that too high a degree of simplification will be involved.

In the literature on investment criteria there has been considerable disagreement, much of which has been concerned with the problem of trying to choose one single best investment criterion. If one single criterion is to be used to appraise the effects of alternative investments in reaching more than one objective, several procedures are possible:

First, all of the objectives, except for one, can be neglected and a single criterion which relates to the single objective may be used. For example, Kahn has suggested that the Social Marginal Productivity Criterion be employed (2, pp. 38-61). This criterion, among other things, assumes that the country has only one objective, maximizing the value of national income in the immediate future. Other people have suggested that maximizing national income in some more distant period in the future

is the important objective and thus, that the effect of a project on capital investment is what should be studied. For example, Galenson and Leibenstein have suggested that projects which involve production with capital intensive methods should be encouraged, for if capitalists have a higher than average propensity to save, this will encourage capital investment (3, pp. 343-370). In contrast, others have proposed that projects which employ capital extensive methods should be adopted since capital is usually the scarcest resource (4). No doubt some of these differences may be explained because there were legitimate differences in the objectives which were appropriate for the situations under review. Nevertheless, it is apparent that much of the confusion has arisen because each of the suggested criteria was designed to help reach one objective when in fact there are many.

This has led to the second method of approach. This procedure accepts that there is more than one objective, assigns weights to the different objectives and then tries to maximize the degree to which one single combined objective is reached. For example, many investment criteria, such as the Benefit-Cost Ratio used by Eckstein, use an interest rate to calculate the present value of future incomes (5, pp. 55-57). In other words, the interest rate is being used to weight several objectives, incomes in different time periods, in order to reach one single combined objective, the present value of the future income stream. To cite another example, Chenery has proposed that in using the Social Marginal Productivity Criterion a project's performance should be measured by adding its contribution to national product and the product of a weighting factor multiplied by the project's effects on the balance of payments (6, pp. 80-81).

A third approach accepts that there are several objectives, chooses a criterion that leads to maximum possible attainment of one of these objectives but imposes restraints to ensure that the other objectives are reached to some specified degree. For example, projects may be chosen on the basis of their Benefit-Cost Ratio but subject to restraints which require that a certain measure of employment or equality of income distribution be obtained. Although this approach has not been used widely, it has been discussed by several writers, including Tinbergen and King (7), (8).

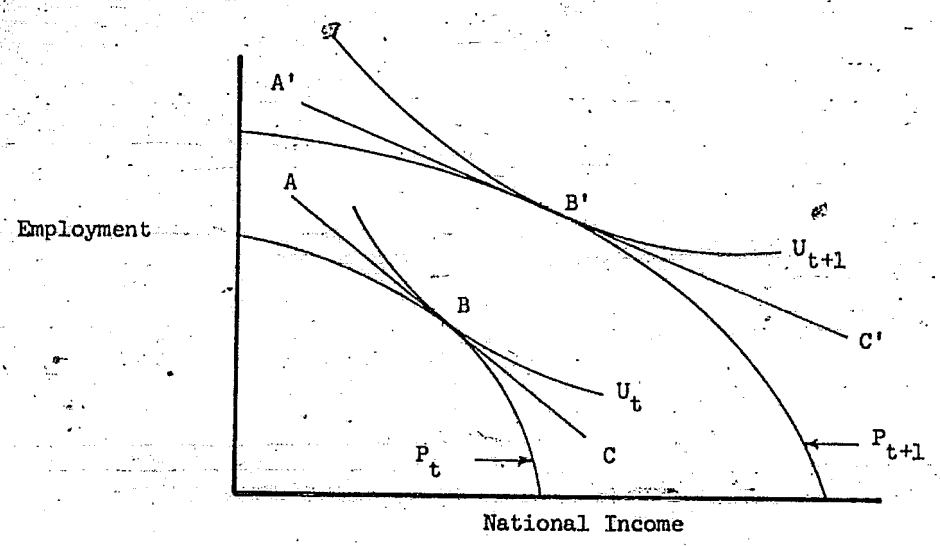
Closer examination of these three procedures shows that they all depend on one basic principle, namely weighting the different objectives in order to obtain one single combined objective. The difference lies in the system of weighting. The first method assigns zero weights to all of the objectives except for one; the third method assigns a constant weight to the main objective while the objectives which are incorporated into the restraints are assigned infinite weights until the restraints are satisfied and zero weights thereafter. Thus the first and third methods are special cases of the second method in which very arbitrary systems of weighting are used. The basic question in all three methods, therefore, is can weights be attached legitimately to the different objectives? If they cannot, one single criterion cannot suffice to appraise the extent to which an investment project meets several objectives.

Suppose, ~~to~~ take a hypothetical example, that a country has only two objectives, higher total employment and more national income. Further, suppose that all of the feasible combinations of employment and national income that can be obtained from national resources can be shown as a

production possibility set. Then if the national social welfare function is represented as an indifference map, policy decisions should be made in such a way that they lead to a position where the efficient frontier of the production possibility set is tangential to the highest possible social utility contour. In Diagram 1 two production possibility sets, with efficient frontiers labelled $P_t$ and $P_{t+1}$, and two social utility contours, labelled $U_t$ and $U_{t+1}$, are shown. The subscripts, t and t+1, represent different times, the beginning and end of a planning period. Clearly, in Diagram 1 policy decisions should be designed to lead to point B at the beginning of the planning period and point B' at the end of the period. If the policy decisions are to be made by the economist he should assign weights to the two objectives and these weights must be proportional to the slope of the line AC at time t and A'C' at time t+1. But the diagram has been constructed in such a way that AC is not parallel to A'C'. In other words, the relative utility of given units of extra income and extra employment is not the same at the beginning of the planning period (when it might be known by the economist) as it is at the end of the period. In this instance the economist cannot make policy decisions using a constant set of weights for the whole of the planning period.

Although Diagram 1 is entirely hypothetical, the situation which it represents appears to be realistic. The relative degree to which a country derives satisfaction from the attainment of different objectives is constantly changing, as to use the previous example, the levels of national income and employment change. Therefore the weights which have to be placed on the different objectives cannot be known in advance by the

Diagram 1




economist. He can only point out the relative effects of alternative policies with respect to several criteria; the policy decision must be a political decision governed by the conditions which prevail at the time when the decision is made. These arguments appear to be especially relevant to land settlement policy decisions in Kenya for this policy will affect an important part of Kenya's resources. Thus, in this thesis, alternative types of African settlement will be appraised using several criteria but no attempt will be made to give an overall ranking to the alternatives.

## Criteria for Appraising African Settlement Schemes

This thesis has two objectives: first, to examine the levels of individual farm profits and suggest ways of improving them; second, to compare alternative forms of African settlement with respect both to

gains to the individual farmers and to the nation. Appraising the success of the settlement farms in meeting the first objective clearly requires that some form of profitability criterion be employed. This would also help to appraise their success in meeting the second objective. However, a profitability criterion would not be sufficient to appraise the relative gains to the nation from alternative forms of settlement. Other criteria will be needed for this purpose for high individual farm profits do not necessarily indicate that national resources are being used in an economically efficient way; also, some national problems such as unemployment and possible shortages of foreign exchange, government revenue and food would not be taken into account directly by a profitability criterion.

Individual Farm Profits

In using a profitability criterion the analysis will try to see whether farmers are able to organize production efficiently and obtain reasonable incomes and sufficient cash to repay their loans. An important part of this study will be concerned with examining the factors which prevent farmers from organizing production more efficiently, such as their inability to accumulate farm capital or their inability or unwillingness to adopt improved farming practices.

It is clearly desirable that the individual settlers should repay their loans to the Kenya Government. If they cannot do so, considerable social unrest may ensue if the Government attempts to insist on obtaining full repayment. Also, if the Government cancels loans the Government itself will be placed in a difficult position; whether or not the settlers repay the Government, the Kenya Government is still obligated to repay the overseas institutions which helped to finance the settlement

schemes. Nevertheless, it should be pointed out that the repayment of loans by individual settlers is not an essential condition for a settlement scheme to be considered successful. If a settlement scheme performs much better than others with respect to certain other criteria, such as the effects on national income or employment, it may still be desirable even though settlers are unable to repay their loans. If this were the case, some of the financial burden would have to be removed from the settlers and met from government revenue.

Economic Efficiency

The next criterion will relate to the economic efficiency with which national resources are used under alternative types of land settlement. If the economy of Kenya fulfilled all of the conditions of the perfectly competitive model, as used in economic theory, resources would be allocated optimally and each farmer would be using his resources in such a manner as to maximize profits. But there are imperfections in the economy and profit maximized for the individual may not lead to the optimum use of national resources. In Kenya there is widespread unemployment and this suggests that the social opportunity cost of labor is lower than the market wage rate. Thus a farmer would tend to employ less labor than would best suit the needs of the nation for he would base his use of labor on the market wage rate, not on the social opportunity cost of labor. Many other instances of divergence between private and social returns could be noted. In the case of land settlement schemes, the inflexibility of farm sizes, once they have been established initially, and the artificially controlled nature of some farm product prices would be other factors contributing to this divergence.

For national resources to be allocated efficiently all scarce resources should be used in such a way that the ratios of their marginal additions to national income and social opportunity costs are equated. As noted previously it is not possible to determine whether this criterion is being met in practice and a simpler criterion must be employed. Two important problems arise in trying to find a criterion for this purpose: first, how should the social benefits or net addition to national income be estimated; second, which are the most important scarce resources.

In estimating the net effects of alternative settlement schemes on national income both farm profits and labor income will be counted as benefits. Labor income will be included primarily because the social opportunity cost of labor is less than the market wage rate and thus, at least some, if not all, of labor income is a net addition to national income. This amounts to measuring the value added by the settlement schemes. The value added by the settlement schemes is not, however, the net addition to national income. The settlement schemes will have some secondary effects on national income; also, the government provides some services to these farmers at no cost to the farmers themselves.

In this analysis no attempt will be made to account for the secondary effects on national income of the settlement schemes. There are two reasons for doing so. First, both types of settlement produce very similar products and use similar farm inputs. Thus, the direct effect on national income should be about the same proportion of the total effect on national income for both types of settlement; they can be ranked just on the basis of their direct effects. Second, all of the African settlement farms have replaced farms which produced rather similar

products. Hence, the secondary effects of changing ownership and operation of such units on national income should be small.

The African settlement farms receive some services, such as agricultural extension and administration of settlement schemes, for which no charge is made to the farmers. The cost of these services will be deducted from the value added in order to estimate the net effect on national income. This assumes that government expenditure on these services reflects the social opportunity cost of providing them. In view of the fact that most of the cost of these services is for skilled manpower and imported machinery and equipment, this assumption appears to be realistic.

At present the most limited resources in Kenya appear to be capital, skilled manpower and high quality land. The settlement schemes involve mainly the transfer of land ownership. Thus this study will concentrate on the efficiency with which this resource is used. The second criterion to be used will be the contributions of the settlement farms to national income per unit of land. Ideally, it would be desirable to ascertain the marginal rather than the average product per unit of land, but this could not be done because of the lack of data.

The settlement schemes do not involve any large new capital investment: for this reason, the efficiency with which capital is employed will not be singled out for study. There may be differences between settlement schemes in the rates at which farmers are able to accumulate farm capital. This will be discussed in relation to the profitability criterion. Similarly the settlement farms do not involve the use of much skilled manpower apart from that used by the government services provided to farmers. For this reason no detailed analysis will be made of relative returns to skilled manpower. A study of the efficiency with

which skilled manpower is used by the agricultural extension services would in fact be a most valuable area for research. However, this study was not designed for that purpose.

Effect on Employment

In initiating the various schemes for African settlement, the major objective of the Kenya Government was to transfer the control of the large-scale farms from Europeans to Africans. While this transfer was desirable mainly for political reasons, excessive population pressure on the land in some of the African farming areas and urban unemployment were economic factors which reinforced the need for African settlement on European land. There was a need to undertake settlement in such a way that a large number of people could be given the opportunity to farm. For this reason, when the high-density settlement schemes were established they were designed to absorb a large number of people, all of whom were selected from the landless and unemployed. Although there is probably some preference for adopting types of settlement which involve Africans in land ownership rather than in being employed as wage earners, it would seem that the best criterion for assessing the success of alternative types of African settlement in meeting the above objectives is the number of people employed per unit of land. Even though this criterion would be misleading if Kenya were to reach a condition of full employment, it will be used in this study since full employment is unlikely in Kenya within the foreseeable future.

Effect on Balance of Payments

Apart from a substantial amount of foreign exchange required to finance the land transfer, the establishment of African settlement

schemes does not require that Kenya use an appreciable quantity of foreign exchange. The amount of foreign exchange required to finance the land transfer is not noticeably affected by the subsequent type of land use. Thus, this aspect of the effect of alternative forms of African settlement on the balance of payments will not be stressed. However, there may be differences between the different forms of settlement in the extent to which they use or produce foreign exchange as a result of normal operations, either for imported farm inputs or through the production of exports or import substitutes. For this reason and because it appears likely that Kenya will experience some balance of payments problems in the future, comparisons will be made between the different forms of African settlement with respect to the effects of their normal operations on the balance of payments. Again the comparison will be made in terms of the effects of transferring a unit of land from one type of African settlement to another and not between European and African ownership.

Effect on Food Output and Market Food Supplies

In appraising the different forms of African settlement the writer believes that their effects on food production should be taken into account. Recently Kenya has experienced several serious food shortages, especially maize shortages. While it may be argued that additional food could be imported, provided that Kenya does not have a serious balance of payments problem, this is not always a realistic solution to the problem. Food shortages may not be anticipated sufficiently far in advance and before imported food arrives in Kenya serious hardship may result for a large number of people. Thus, in this analysis the effects of transferring a unit of land into alternative forms of African settlement on the

value and composition of total food production, food used by farmers for their own subsistence and food sales will be studied.

Effect on Government Revenue

The alternative forms of African settlement may be expected to have different effects on the amount of government revenue collected. In particular, splitting up large farms into small ones should have an adverse effect on the amount of revenue obtained from income tax. Although this could be an important problem it will not be considered in this study. All of the settlement schemes involve the freehold ownership of land. Thus, if tax receipts are reduced as a result of African settlement, the Government could introduce a land tax to meet the deficiency. In other words, the system of taxation could be chosen to suit the best type of settlement and not vice-versa.

In order to appraise different types of African settlement in the former "White Highlands" of Kenya five criteria have been suggested. These are the level of individual farm incomes, net contribution to national income, employment, the balance of payments and food production. In using these criteria somewhat different ordering of the two types of settlement schemes might be expected depending upon the time period on which the comparisons are based. Because data were available only for the period from 1963 to 1966, the analysis will be based largely on that time period.

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# CHAPTER 5

# PRESENT PERFORMANCE AND POTENTIAL FOR INCREASING INCOMES ON THE LARGE-SCALE FARMS

## Introduction

This chapter is concerned with an appraisal of some African-operated large-scale farms using the profitability criterion suggested in Chapter 4. Current levels of farmers' incomes and debt repayment capabilities are examined and possible ways in which farmers might reorganize their resources so as to improve their incomes are suggested. In Chapter 6 a sample of small-scale farms is examined in an analogous manner.

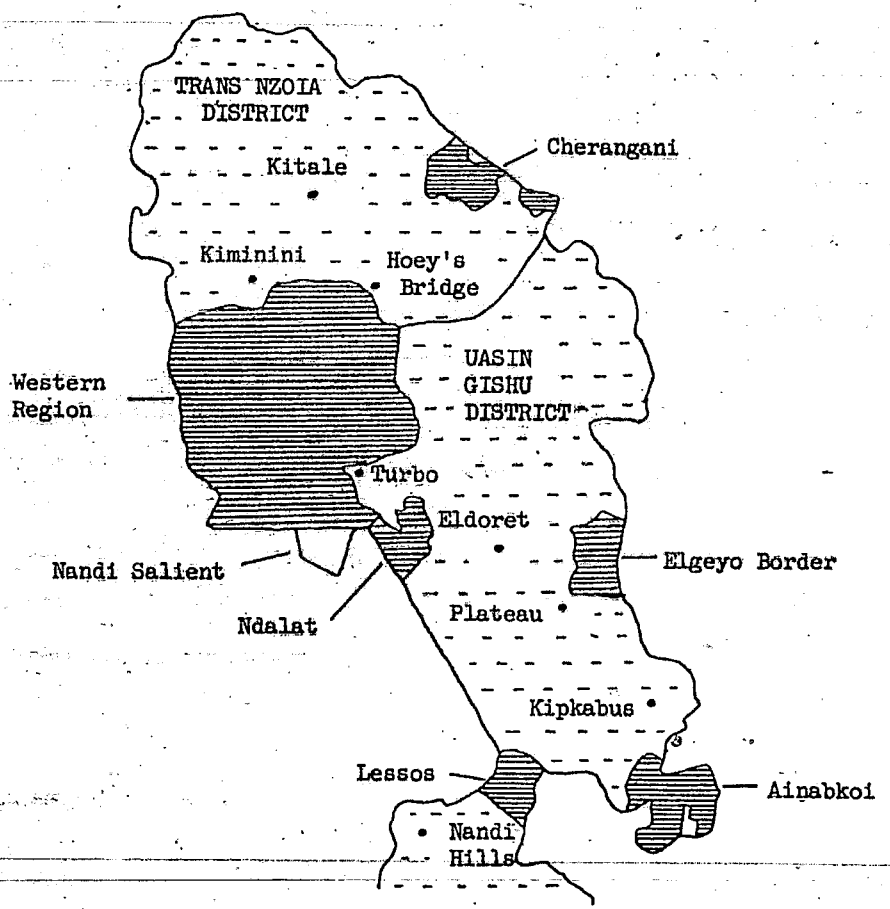
The analysis is based on a detailed examination of three typical farms. These three farms were chosen from a sample of 30 farms included in a farm management study conducted by the writer during 1966 (1). The three farms were selected in such a way that the important types of commercial farms were represented: farms that varied from well below to well above the average farm size, farms that obtained good, average and poor farm incomes and farms that were operated either by individual owners or by groups of partners.

The farms included in the farm management survey were located either in the Uasin Gishu or the Trans Nzoia areas of Kenya. In choosing the sample of farms an effort was made to select farms which were located in an area of similar agricultural potential to the settlement scheme farms which are described in Chapter 6. The large-scale farming areas in the Uasin Gishu and the Trans Nzoia and the neighboring African settlement

schemes are shown in Map 7. The three settlement schemes selected for study were Keben, which forms a part of the Lessos Settlement Complex, Ndalat, and Mautuma which is located in the center of the Western Region Settlement Complex. All three of these settlement schemes are in areas where the dominant farm enterprises are maize and dairy cattle. The agricultural potential in most of the large-scale farming areas is similar to that of the settlement schemes only in those areas which are very close to the settlement schemes. While much of the Trans Nzoia area is devoted to maize and dairy cattle, this system of farming is dominant only along the western edge of the Uasin Gishu area, from Turbo to Lessos. Most of the rest of the Uasin Gishu area is a wheat, maize and dairying area. The large-scale farming area to the South of Lessos is primarily a tea-producing district, Nandi Hills being an important center for Kenya's tea plantation industry. Thus the sample of large-scale farms was chosen from the area around Kiminini and Hoey's Bridge, from the Turbo and Ndalat areas and from an area to the North of and adjacent to Lessos Settlement Complex.

While maize and dairy cattle are the major farm enterprises in the areas studied, some other products are produced on a small scale. These include native cattle, sheep and goats, pyrethrum, wheat, coffee and potatoes. All of these areas receive an average annual rainfall of about 50 inches. However, the altitude tends to decline towards the North, from about 7,000 feet at Lessos to just over 5,000 feet above sea level at Hoey's Bridge. This change in altitude has little effect on the major enterprises, maize and dairy cattle, although maize yields do tend to increase somewhat as the altitude decreases. More important is the

Map 7. KENYA, AFRICAN SETTLEMENT SCHEMES IN THE UASIN GISHU AND TRANS NZOIA AREAS IN 1965*




* Based on Survey of Kenya, Settlement Progress Map, 1964 and Map of Kenya Land Settlement Schemes, 1965.

effect of altitude on the minor farm enterprises. Pyrethrum production is possible only in the high altitude area around Lessos. Wheat can be grown around Lessos and Ndalat although neither of these areas are good wheat areas. Coffee can be grown only around Hoey's Bridge and Turbo although the coffee which is produced in these areas is usually of poor quality.

Many areas of Kenya experienced a severe drought in 1965/66. However, the areas which are included in this analysis received only slightly less than the normal amount of rainfall (2). Probably, in the 1965/66 season, maize yields were somewhat worse and wheat yields a little better than the average yields for these areas. As these areas are too wet for successful wheat production, wheat yields tend to be somewhat better in a drier year like 1965/66. Average milk yields were probably affected very little by the lower rainfall in 1965/66. However, there are no official yield statistics available for these African farms and the preceding remarks are based primarily on the writer's personal knowledge of the area.

Between 1959 and 1961 some European-operated large-scale farms located close to the African farms included in this study were also included in farm management surveys. The yield statistics from these surveys, if compared with those from the survey of the African large-scale farms in the 1965/66 season, suggest that the African farmers obtained maize and milk yields about 25 percent lower than those obtained by the European farmers. While there are obvious difficulties in making a comparison of this sort, these yield statistics do support the widely held view that the African farmers do not obtain such good yields as did the European

farmers. However, a few of the better African farmers obtained maize and milk yields in 1965/66 which were better than those obtained by the average European farmer between 1959 and 1961 (1, pp. 16, 18 and 20; 3, pp. 21-22; 4, p. 24). While the objective of this thesis is not to compare African farms with European farms, it is interesting to observe that the better African farms appeared to have a level of management as good as that found on the European farms which they have replaced.

In recent years considerable progress has been made in Kenya in breeding better varieties of wheat and maize. For example, average wheat yields at the Plant Breeding Station, Njoro, have increased from a five year average of 6.1 bags per acre between 1951 and 1955 to 10.2 bags per acre for the period from 1961 to 1965 (5). The results of maize breeding have been even more spectacular. Several field trials of hybrid maize have produced yields between 30 and 40 bags per acre during the 1965/66 season (6).[1/] These yields are at least three to four times as great as typical commercial maize yields. While these improved varieties of maize and wheat are being introduced on commercial farms, it is uncertain how much effect this will have on average crop yields over the next three to five years.

## The Method of Analysis

For each of the three farms which are examined in detail in this chapter, the analysis starts by describing the pattern of farming and the financial performance of the farm in the 1965/66 season. Then,

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1/ Wheat and maize yields in Kenya are usually expressed in bags per acre. A bag of wheat or maize contains 200 pounds of grain.

bearing in mind the various limitations or resource restraints which control the extent to which farmers can expand their farm enterprises, the analysis proceeds, using budgeting techniques, to see how farmers could improve their incomes if they were to allocate their resources more efficiently. Several farm plans are suggested for each farm. The first of these plans is designed to show how each farmer should allocate his resources if the amounts of resources available to him and the levels of output and resource input per unit of each enterprise remain similar to their 1965/66 levels. Then, where it appears that the farmer may be able to improve his level of management or increase his supply of resources, other farm plans which incorporate these changes are suggested. However, any assumed yield improvements do not raise yields to levels higher than those obtained by the best farmers in the 1965/66 season.

The three farms which are described in this chapter are real farms. However, in order to preserve the anonymity of the farmers concerned, some small changes have been made in the figures pertaining to each farm.

## Case Studies of Individual Farms

### Farm Number One

This farm was chosen because it appeared to be typical of a large-scale African farm which was managed by just one operator. The farm, which includes an area of 550 acres of land, is situated in the area just north of Lessos Settlement Complex. While the farm is smaller than the average size of all African-operated large-scale farms, it appears to be similar in size to the average individually operated African large-scale farm; most Africans can purchase the larger farms only if they

enter into partnership with others.[2/]

The farmer bought the farm in the beginning of 1962. The farm and farming assets were valued at £10,300 in 1966. This represented an investment of about £18 per acre. The farmer had borrowed almost 70 percent of this capital. Both the capital value per acre and the proportion of borrowed capital were a little higher than the average levels for similar farms in this area.

The farmer managed the farm himself and did little manual labor. His wife helped to supervise the dairy, although none of the children provided any farm labor. There were 16 laborers resident on the farm in 1965/66. Six of them worked regularly with the dairy cattle. The farmer tried to employ the other laborers every month although in some months work was not available for them. At the peak seasons of weeding and harvesting, the farmer could obtain additional labor from the families of his regular laborers. However, in practice he needed to employ little extra casual labor for he could obtain most of his requirements from his resident male laborers. Should he have required it, extra labor was readily available from people living in the neighborhood.

The laborers who lived on the farm each had a small piece of land on which they planted their subsistence crops. This land was in bushy or rough patches of the farm where it did not interfere with the cropping program of the farmer. In fact, the farmer would have been able to bring

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2/ The average farm size of all African-operated large-scale farms is about 740 acres. In the farm management survey the 30 farms had an average size of 687 acres, although the median farm size was only 590 acres. Only six of the farms below the median farm size but 11 of those above the median size were operated by groups of partners rather than by individual operators.

extra land into cultivation as a result of the cropping by laborers. Usually the laborers clear this land of bush, tree stumps and rocks, etc. Thus, when they move to a fresh piece of land every three years or so, the land which they vacate is left in a condition which is more suitable for mechanical cultivation. In 1965/66 the farmer allocated about 17 acres of land to his laborers.

After allowing for the land which was taken up by laborers' crops and roads and buildings, etc., about 520 acres of land were available for farming operations. About 265 acres of this land were suitable for arable cultivation although this land could not be cropped continuously. Little is known about how long land can be cropped without impairing productivity. However, successful commercial farmers do crop their land as frequently as four years out of every seven and in this study it is assumed that all farmers can crop their land as intensively as this. Thus the total supply of arable land on this farm is four-sevenths of 265 acres or 151 acres of land. In 1965/66 less than 40 percent of this available acreage was cropped.

The farmer owned one tractor in fair condition and a rather inadequate stock of cultivating machinery. With a good tractor and an adequate supply of implements he could have cropped between 150 and 200 acres of land, that is somewhat more than his total arable area. While the farmer could increase the acreage in crops using his existing machinery, he would be better advised to obtain some more up-to-date equipment. This would require an additional investment of about £1,000. The farmer does not have this much capital available and probably would have difficulty in borrowing it. Hopefully, he may be able to improve his machinery from savings out of future farm profits.

The Performance of the Farm in 1965/66

In 1965/66 the farmer kept 112 livestock units of grade dairy cattle as his major enterprise.3/ His cash crops consisted of 45 acres of maize and 13 acres of pyrethrum (Table 10). In addition he planted six acres of oats for his cattle to graze. He also kept a few native goats and poultry for his own consumption and two work oxen for transport work around the farm.

The farmer made a profit of £1,011 during the 1965/66 season. Not all of this represented a cash income, however, for in calculating farm profits certain non-cash items such as the appreciation in value of the dairy herd and the value of farm produce consumed by the farmer were included. Also, depreciation was deducted in arriving at farm profits while capital repayments of loan principal were not. If these items are taken into account, the farmer made a cash surplus of £778 or about £230 less than his farm profit. Both his farm profit and cash surplus were similar in size to the average levels of farm profits and cash surpluses obtained by the other African farmers who were included in the farm management survey in this area (1, pp. 8 and 14). This farmer's income was sufficient to allow him to repay his loan installments and obtain a reasonable level of living. However, he would have had difficulty in making any capital improvements to his farm. Both his buildings and machinery were in need of improvement.

In 1965/66 the farmer obtained maize and milk yields very similar to the average yields obtained by the other survey farmers in his immediate

3/ For a definition of the term livestock unit (or cow equivalent) see the footnote to Table I, Appendix II.

TABLE 10. LARGE-SCALE FARM NUMBER ONE: ACTUAL USE OF RESOURCES IN 1965/66 AND SUGGESTED CHANGES UNDER ALTERNATIVE ASSUMPTIONS *

| | Actual 1965/66 | Budgeted Plans 1[a] | 2[b] | 3[c] | 4[d] |
|---|---|---|---|---|---|
| Resource Use: | | (Acres or Livestock Units) | | | |
| Total Farm Area | 550 | 550 | 550 | 550 | 550 |
| Maize | 45 | 100 | 100 | 100 | 150 |
| Pyrethrum | 13 | 25 | - | - | - |
| Dairy Cattle | 112 | 98 | 105 | 105 | 92 |
| Financial Results: | | (£ E.A.) | | | |
| Farm Profit | 1,011 | 1,286 | 758 | 1,965 | 2,502 |
| Capital Investment | 10,317 | 11,317 | 11,317 | 11,317 | 11,317 |
| Extra Capital | - | 1,000 | 1,000 | 1,000 | 1,000 |
| Yields: | | (Gallons per Cow, Bags per Acre or Pounds of Flowers per Acre) | | | |
| Milk | 228 | 228 | 228 | 300 | 300 |
| Maize | 6.7 | 6.7 | 6.7 | 12.0 | 12.0 |
| Pyrethrum | 372 | 372 | - | - | - |

* Details of the enterprise costs and returns on which these budgets are based are given in Appendix II.

a/ The first plan is based on the same yields as those which the farmer obtained in 1965/66. The plan involves increasing the maize and pyrethrum enterprises to about twice their 1965/66 levels. This does not represent a substantial improvement.

b/ The second plan is similar to Plan 1 except that pyrethrum is not grown. This returns a profit lower than that obtained in 1965/66.

c/ The third plan is similar to Plan 2 except that the maize and milk yields have been increased to levels similar to those found on the best farms. This provides a substantial improvement in income.

d/ The last plan is similar to Plan 3 except that the maize acreage has been increased to 150 acres. This represents the most intensive and profitable system of farming.

area. He obtained 6.7 bags of maize per acre and 228 gallons of milk per cow compared with average levels of 7.6 bags of maize per acre and 204 gallons of milk per cow. However, his pyrethrum yield, 372 pounds of dried flowers per acre, was the highest yield which any of the survey farmers were able to obtain, the average yield being only 295 pounds of flowers per acre (1, pp. 16, 18 and 20).

There would appear to be considerable scope for improving this farmer's income, both through better husbandry and improved yields and through a more efficient allocation of resources. Before these possibilities are examined the restraints which limit the expansion of the various farm enterprises will be discussed.

Limitations on Expansion

The total size of the farm, the amount of arable land and the farmer's stock of machinery have been mentioned already as being major restraints which limit the expansion of farm enterprises. Labor is not a limiting resource, although the ability of the farmer to manage a large labor force is an important restraint which, unfortunately, is difficult to quantify. The other important restraint is the willingness or ability of the farmer to withstand the risks involved in a high degree of specialization.

Dairy cattle are usually the most reliable of the farm enterprises which this farmer might choose. The only restraints which could possibly limit the size of the dairy enterprise, apart from those mentioned already, are shortages of capital for increasing the stock numbers and difficulties in managing a large milking herd. On this farm neither of these restraints are effective. If he wanted to, which is unlikely, the farmer

could increase his herd size through rearing more young stock. Also, given the total area of this farm, the farmer would never be able to keep a dairy herd so large that it was beyond his management capabilities.

If the farmer wanted to increase the size of his maize enterprise, the major limiting factors would be the availability of land and equipment, the risk involved in placing too much reliance on a single crop, and difficulties of management. Although this farmer does not possess a good set of mechanical equipment, it is assumed here that he will be able to improve his equipment and cultivate all of his arable land. While there is an increased level of risk in planting a larger area of maize, this is not an important consideration on this farm. If the farmer were to suffer a crop failure, he would be able to recover his expenses from the payment for the "Minimum Financial Return" on maize. Also, the maximum possible area of maize on this farm is less than 30 percent of the farm area. Thus, as the farmer should obtain a very reliable income from the dairy cattle which are kept on most of the remaining land, a system of farming which involved planting all of the arable area with maize would not be unreasonably subject to risk. More important, and extremely difficult to quantify, is the ability of the farmer to manage a large area of maize. The writer believes that this farmer would have difficulty in looking after more than 100 acres of maize. Thus, in most of the farm plans that follow, 100 acres will be used as the upper limit for the maize enterprise. However, one plan will be suggested which involves cropping the full 150 acres of arable land with maize. Even though this farmer may not be able to do this, the plan will still be of interest for it should represent what a really good manager could achieve on this farm.

Pyrethrum is an intensive crop which requires a fairly high level of management, especially labor management. While there are risks involved in too high a degree of specialization, these risks do not usually limit the extent of the pyrethrum enterprise; difficulties of management are usually more important. In order to produce pyrethrum a farmer requires a production quota. In the past this has been an important factor limiting pyrethrum acreages. However, this farmer should have little difficulty in obtaining a larger quota for pyrethrum has been under-produced recently. In 1965/66, for example, all growers together produced only 55 percent of their production quotas (7). Thus the only effective restraint limiting the size of the pyrethrum enterprise is the management ability of the farmer. Experience suggests that most African farmers would have difficulty in supervising more than 25 acres of pyrethrum and this will be used as the upper limit for the pyrethrum enterprise on this farm.

This completes the list of restraints which limit the expansion of the enterprises on this farm. Using budgeting techniques, the analysis now proceeds to see how the farmer might be able to improve his income through either a re-allocation of resources or through improved methods of husbandry.[4/] Only three enterprises will be considered -- dairy cattle, maize and pyrethrum. Several other enterprises, including wheat, potatoes, sheep, pigs and poultry, are possible. These will not be considered, however, for they are kept by few farmers in this area and there is no evidence to suggest that this farmer should consider any of them.

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4/ There are so few effective restraints or alternative enterprises that linear programming methods are scarcely appropriate. However, the budgeting techniques which are used will follow the same systematic principles as those involved in linear programming.

Alternative Plans for Improvement

The first plan which is considered shows how the farmer should optimally combine his three enterprises -- dairy cattle, maize and pyrethrum -- assuming that the performances of these enterprises remain at their 1965/66 levels. The results of this plan are shown as Plan 1 in Table 10. This plan involved increasing pyrethrum up to the limit of 25 acres, increasing maize up to the limit of 100 acres and keeping dairy cattle on the remaining land. This plan returns a profit of £1,286, an increase of more than £250 over the 1965/66 farm profit. This is not a substantial improvement and it does require that the farmer obtain some better equipment. However, no additional labor would be required. In fact, this plan could be operated with about 11 full-time laborers if casual labor from the laborers' families were used during peak periods.

Given that uncertainties exist in the world market for pyrethrum, no farmer can have confidence that pyrethrum will continue to be a profitable crop. It is interesting therefore to see how the income of this farmer would be affected if he were unable to grow pyrethrum. A plan without pyrethrum is interesting also for maize and dairy cattle alone are more typical of the African farms in the survey areas. If the farmer were to cease pyrethrum production he may be able to increase the size of his maize enterprise. However, the area of maize will not be increased above 100 acres in the next suggested farm plan, although this will be done at a later stage. One hundred acres of maize is still a large increase over the maize acreage in 1965/66 and even without pyrethrum the management requirements on the farm would be high during the cultivating, planting, weeding and harvesting seasons.

Plan 2 is identical with Plan 1 except that it includes no pyrethrum. The land released by the pyrethrum has been used to increase the size of the dairy herd, from 98 livestock units in Plan 1 to 105 livestock units in Plan 2. The farm profit suggested by Plan 2 is only £758. This is about £500 less than that suggested by Plan 1 and £250 less than that obtained in 1965/66. It is apparent that pyrethrum production enables that farmer to obtain an income appreciably higher than that which maize and dairy cattle alone would provide.

The maize and milk yields which this farmer obtained in 1965/66 were both similar to the average yields on the farms included in the farm management survey. However, the best farmers in this survey obtained appreciably higher yields than these. Thus the third plan which is suggested involves increasing maize and milk yields to levels similar to those obtained by the better farmers. Although it is uncertain whether this farmer will be able to increase his yields to these levels, they are feasible on this farm. Primarily, however, this third plan is suggested because it represents a level of performance similar to that found on the best farms. Pyrethrum is not considered in Plan 3. This particular farmer may have difficulty in improving his yields to the levels suggested if he were to manage three enterprises rather than two. Also, dairy cattle and maize alone are more typical of the majority of farms in this area.

Plan 3 is identical with Plan 2 except that the maize yield has been raised from 6.7 to 12.0 bags per acre and the milk yield from 228 to 300 gallons per cow. While these yields appear to be typical of the best African farms in this area, even higher yields are possible. However, these very high yields will not be considered here. There would appear to be no evidence to suggest that anyone other than the exceptional

farmer can obtain them other than in isolated and especially favorable years.

Based on Plan 3 the farmer might expect to obtain a farm profit of £1,965. By standards prevailing in this area this is a satisfactory level of income for a farm of this size; it is sufficient to allow the farmer to meet his financial obligations, to live reasonably well and to finance, within a few years, most of the capital improvements which his farm requires. Although the yield levels which have been assumed for Plan 3 were very similar to those found on the best African farms in 1965/66, profits are higher than on the best farms; this is due to the fact that a more intensive system of farming is assumed than that prevailing on even the best African farms. On a well-managed African farm of this size an income of about £1,400 would appear to be more usual.

The last plan to be considered represents a more intensive and more profitable system of farming than that found on any of the African farms included in the survey in 1965/66. This plan is probably not within the reach of Farmer Number One. It does represent, however, about the most profitable plan that the best African farmers may expect to attain. This plan, shown as Plan 4 in Table 10, is based on identical assumptions to those used for Plan 3 except that the maize acreage has been increased to 150 acres and the dairy cattle numbers reduced accordingly. This plan suggests a farm profit of £2,502. This is about two and one-half times as great as the profit which this farmer obtained in 1965/66 and is substantially larger than the profits obtained by even the best African farmers. Incidentally, this is the only plan which would provide full-employment for all of the laborers who lived on the farm in 1965/66.

Even then these laborers would have been fully employed only at peak seasons.

If this farmer were to continue to farm in the future as he did in 1965/66 he should be able to meet his loan repayments and obtain a reasonable level of living. However, he would have difficulty in making some necessary capital improvements to his farm. Had he not been able to grow pyrethrum, capital improvement would have been almost impossible. This would appear to be a typical situation on a large number of African farms in this area for the majority of these farms do not grow pyrethrum but depend on maize and dairy cattle alone. The farm plans which have been suggested showed that the farmer could obtain a substantial improvement in his income if he were to improve his maize and milk yields. There would appear to be no opportunity for improving income through substituting new enterprises for existing ones; a re-allocation of resources more in favor of maize would be helpful, however. Two factors make it difficult for the farmer to effect these improvements. The first is his poor stock of machinery; the second and more important is his lack of managerial ability.

Farm Number Two

This is a typical small farm of 250 acres in the Ndalat area. Many of these small farms appear to be better managed than most of the larger African farms. In fact, although a small farm which was less profitable than this one could have been chosen, it would have been difficult to find among the 30 farmers included in the survey in 1966 a small farm where the level of management was as poor as that which is commonly found on larger farms.

The farm and farming assets were valued at about £16 per acre in 1966. While this was about the average level of capital investment per acre on all African farms in this area, it was not perhaps as high as might have been expected for so small a farm. When the farmer took over his farm in 1962, there were virtually no permanent improvements on it. While this was a disadvantage in some respects, it did mean that the farmer was able to construct only those improvements which were of most use to him. In particular, he was able to build a house more in keeping with his own requirements. This was preferable to financing the purchase of a large European-type house as many African farmers have been obliged to do. This farmer, who had no business partners, had borrowed about 65 percent of his farming capital.

Maize and dairy cattle are the major enterprises in this area. However, wheat can be grown although rarely with great success. In 1965/66 this farmer planted 20 acres of maize and 40 acres of wheat and kept 56 livestock units of dairy cattle. Also, his wife cultivated about one acre of mixed vegetables and pineapples next to the house. In 1965/66 his maize and milk yields, 8.8 bags of maize per acre and 210 gallons of milk per cow were somewhat better than the average. However, his wheat yield, 5.2 bags per acre, was not good, especially as the drier weather in 1965/66 tended to favor wheat production in this rather wet area. In 1964/65 he obtained an average wheat yield of only three bags per acre. In view of these poor wheat yields and because he had to rely upon an outside contractor to plant and harvest his wheat, the farmer decided to grow no more wheat after the 1965/66 season. The writer agrees that this was a sensible decision.

In 1965/66 the farmer made a profit of £617, of which £334 was a cash surplus. Although this represented a profit per acre better than the average for all African farms in this area, the absolute size of his income was not sufficient to allow him to make necessary improvements to his farm, at least not without difficulty. For example, neither his machinery nor fencing were adequate. In order for him to buy suitable machinery, even if he were to buy used machinery, he would need about £600. While he may be able to borrow this money, if he were to make repayment over a period of less than five years, as would be usual, his cash surplus would be reduced to an uncomfortably low level.

There were eight laborers resident on the farm in 1965/66. Three of these laborers were employed regularly with the dairy cattle. The other five obtained employment only on an irregular basis. Six of these laborers were allocated one-half an acre of land each for their subsistence crops.

About 240 acres of the farm were available for farming operations, the balance of the land, about ten acres, being taken up by roads, buildings, and laborers' crops. The majority of the farm, about 200 acres, was suitable for arable cultivation. Assuming that the farmer could crop four-sevenths of this land each year, he would be able to plant a maximum of about 115 acres of maize. However, he would be adopting a somewhat risky pattern of farming if he were to do so. The writer believes that this farmer should not plant more than 80 acres of maize. This will be used as the upper limit for maize production in the farm plans which are suggested below.

Table 11 gives a summary of the farm plan which was adopted in 1965/66 and two suggested improved plans. The first plan shows how the farmer's

TABLE 11. LARGE-SCALE FARM NUMBER TWO: ACTUAL USE OF RESOURCES IN 1965/66 AND SUGGESTED CHANGES UNDER ALTERNATIVE ASSUMPTIONS *

| | Actual 1965/66 | Budgeted Plans 1a/ | Budgeted Plans 2b/ |
|---|---|---|---|
| Resource Use: | (Acres or Livestock Units) | | |
| Total Farm Area | 250 | 250 | 250 |
| Maize | 20 | 80 | 80 |
| Wheat | 40 | - | - |
| Dairy Cattle | 56 | 50 | 50 |
| Financial Results: | (£ E.A.) | | |
| Farm Profit | 617 | 869 | 1,410 |
| Capital Investment | 4,086 | 4,686 | 4,686 |
| Extra Capital | - | 600 | 600 |
| Yields: | (Gallons per Cow or Bags per Acre) | | |
| Milk | 210 | 210 | 300 |
| Wheat | 5.2 | - | - |
| Maize | 8.8 | 8.8 | 12.0 |

* Details of the enterprise costs and returns on which these plans are based are contained in Appendix II.

a/ The first plan assumes that the farmer increases his crop acreage a little but plants only maize. The maize and milk yields have been left at their 1965/66 levels. This plan does not represent a substantial improvement.

b/ This plan is identical with the first plan except that the maize and milk yields have been increased to levels similar to those obtained by the best African farmers in 1965/66. This plan returns a farm profit more than twice as high as that obtained in 1965/66.

income would be affected if he were to increase his maize enterprise to 80 acres, grow no wheat, and keep 50 livestock units of cattle on the remaining land. This plan, which assumes that his maize and milk yields remain at their 1965/66 levels, produces a farm profit of £869. While this is £250 more than the farmer obtained in 1965/66, the first plan does not represent a substantial improvement.

The second suggested plan is identical to the first plan except that the average milk yield has been increased to 300 gallons per cow and the maize yield to 12 bags per acre. This plan shows a farm profit of £1,410. This is over twice the level of profit in 1965/66. It is apparent that there is more room for increasing income through improving yields than there is through re-allocating farm resources among enterprises or even increasing the acreage of maize without some increase in yields.

Although the performance of this farm in 1965/66 was not unsatisfactory, the plans which have been suggested show that there is considerable scope for improvement. The writer believes that these plans are within the reach of this farmer and he would not be surprised if the farmer's income were to approach the level suggested by Plan 2 within a few years' time. Both of the suggested plans would require that the farmer increase his labor force by one or two people. This should present no problems.

Farm Number Three

This farm, the last to be discussed in this chapter, is a farm of 1,300 acres in the Ndalat area. The size of the farm and the type of farm organization appeared to be typical of the majority of the larger

African farms.[5/] However, the level of management on this farm was extremely poor and probably below average even for the larger African farms. Nevertheless, despite the poor management, judging by the unfavorable reports contained in the annual reports of the credit agencies which deal with these farmers, many of the problems encountered on this farm were common to a large number of African-operated farms (10, 11).

This farm was operated by 15 partners. All of them, except for one, lived on the farm; one, the senior partner, acted as manager while the others worked as laborers, at least intermittently. In addition, there were four full-time laborers who were not partners in the business. Although there are no suitable statistics available, the number of partners who operated this farm appeared to be fairly typical for a farm of this size. However, very large numbers of partners are involved in some farms. The writer visited one farm where there were 92 partners, all of whom were living on a farm of less than 1,000 acres!

In 1965/66 Farm Number Three was valued at about £13 per acre. This was a little lower than average, mainly because there were few permanent improvements on the farm. The farmers had borrowed only 25 percent of their farming capital. They obtained a loan for 60 percent of the farm's purchase price. However, they were able to obtain only a small development loan, possibly because the agricultural credit agencies

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5/ The reader is reminded of the observation in Chapter 3 that while the average size of all African-operated farms was about 740 acres in 1965, the average sizes of all of the large-scale farms in the Uasin Gishu and Trans Nzoia were, in 1960 before African settlement began, 1,594 and 1,284 acres respectively. Thus, a farm of 1,300 acres is a large farm for an African operator but only a farm of average size for the areas concerned.

would not finance the purchase of high grade dairy cattle on a farm where native livestock were present, as they were on this farm. This was an instance of where the interests of the different partners conflicted. The senior partner was anxious to stock the farm only with high grade dairy cattle. Most of the other partners, however, decided that they would keep native stock and each of these partners brought his own herd of native cattle, sheep or goats onto the farm.

This farm is in an area where maize and dairy cattle are the major enterprises. In 1965/66 the livestock on this farm consisted of 286 livestock units of grade dairy cattle and 160 stock units of native livestock, most of the latter being native cattle although there were a few native goats and native sheep. The grade cattle were kept as one enterprise under the control of the senior partner. The native cattle were kept in separate herds by their several owners. Sixty acres of maize were planted as one single enterprise for the whole farm. In addition, the 13 resident junior partners each planted about two acres of maize for their own subsistence.

In 1965/66 the maize and milk yields were very low, 3.3 bags of maize per acre and only 58 gallons of milk per cow. Although poor husbandry was undoubtedly the main reason why these yields were so bad, there were some special circumstances involved. The maize crop was planted about three months too late. Soon after maize planting began, at the normal time, the tractor broke down. The farmers were unable to repair the tractor for another three months for it took them that long to accumulate sufficient money from their monthly cream checks. Incidentally, had the farmers been willing to make the effort, the maize could have been

planted by hand with little loss of time. Alternatively, some native livestock could have been sold to finance the tractor repair.

Although the average milk yield was extremely low, a part of this low yield could be explained by the fact that about one-third of the milking cows were purchased half way through the 1965/66 season, some of the partners having agreed at this time to sell their native cattle in order to make this purchase possible. However, this was an insufficient reason to explain more than a small part of the low yield. Poor dairy management was more important. The milking herd was comprised of poor grade stock, the farmers having bought the cheapest that they could get. In addition, a large proportion of the herd was dry and the grazing was grossly overstocked. To make matters worse, the farmers sold no whole milk but separated all of the milk and sold in the lower-priced butterfat market.

There was no formal partnership agreement on the farm. The senior partner attempted to operate the farm as a commercial entity. He made most of the management decisions himself, except insofar as he was prevented from doing so by the junior partners; for example, in the case of their refusal to remove their native livestock from the farm. In sharing the farm income the following procedure was adopted. The junior partners obtained whatever income arose from their own native livestock and subsistence crops. Also, whenever the junior partners worked on farm enterprises such as maize and grade dairy cattle, they were paid wages. In addition, each month's cream check was split up between the partners in relation to the size of their shares in the farm. However, the farmers intended that a portion of the receipts from the sale of the cream and

all of the proceeds from the sale of maize should be retained for paying farm expenses. Insufficient cash, in fact, was retained to meet these operating expenses.

The senior partner, who had twice as large a share in the business as did any of the other partners, derived his income primarily from his share of the cream check. However, he was able to obtain his food from the 60 acre block of maize and he lived in the house of the former European owner whereas the junior partners all lived in mud and wattle huts similar to those which farm laborers normally occupy. Only the most rudimentary farm accounts were kept and the majority of the junior partners could not read or write. Thus, the senior partner would have been well placed had he wanted to increase his share of the farm income surreptitiously. Although there is no suggestion that this did take place on this farm, the writer is of the opinion that it is a widespread practice on many farms.

Given the complicated partnership arrangements on this farm, it was difficult to define an entirely satisfactory procedure for calculating the farm profit. To make this farm comparable with the other farms which have been discussed already, the following procedure was adopted. The farm profit was calculated in the usual way except that only the grade cattle, native cattle, sheep and goats, and the 60 acre block of maize were treated as farm enterprises. The junior partners' subsistence maize was not included in farm output but wages paid to them for work on farm jobs was treated as a farm expense. Under these assumptions, the farm made a profit of £1,013 in 1965/66. This performance was unsatisfactory. The profit per acre obtained on this farm was typical of that obtained by the less successful farmer included in the farm management survey conducted by the writer.

The size of the cash surplus or deficit obtained on this farm could not be measured, primarily because the value of the sales of native livestock was not known. However, there was little doubt that the farm business was extremely short of cash. If the native livestock were excluded, the farm incurred a cash deficit of £878. This deficit was in fact made up through the sale of native livestock. However, the senior partner told the writer that, except in a few instances, the junior partners who owned the native livestock could be prevailed upon to sell them and make the money available to the farm business only at times when the farm business was so critically short of cash that its very existence was threatened, such as when a loan repayment installment became overdue.

Although the performance of this farm was distinctly poor, it does not necessarily follow that the farm is a non-viable commercial enterprise. All of the partners seemed prepared to accept a very low level of living. They all obtained their basic food from the farm and they did not have any large financial obligations, especially as only a small amount of credit was involved in financing the business. Thus, despite the poor performance, the writer believes that these people could remain in business even if they did not improve their farming methods. Whether or not the performance of the farm could be improved is questionable, particularly if no steps are taken to improve the management of the farm. Several improved farm plans will be discussed. All of these plans will assume that the farm is managed as a single unit. The means by which the necessary changes in the management structure of the farm might be effected will not be discussed.

In the farm plans which are discussed here only maize and grade dairy cattle will be considered as suitable farm enterprises. Although little

information is available concerning the level of productivity of native livestock, the writer's own estimates support the widely held view that native cattle are not as profitable as grade cattle, unless the grade cattle are managed extremely badly.

The most important restraints which limit the size and performance of the maize and cattle enterprises on this farm are management restraints. Providing that the junior partners' native cattle are sold and the proceeds used to develop the farm, capital is not in short supply. However, the farmers would not have sufficient capital to make some desirable improvements to the permanent improvements on the farm, although these long-term developments could be delayed without impairing the productivity of the farm.

In 1965/66 the farm was grossly overstocked, the stocking rate being about 2.6 acres of grazing per livestock unit. If there had been no native livestock on the farm, the stocking rate would have been about 4.1 acres per stock unit. This figure is similar to the stocking rate which is recommended for this area, four acres to the beast being usual. Thus, in 1965/66 the farm possessed sufficient grade cattle to stock the farm completely, and no more capital would be required to increase the dairy herd. However, as the grade cattle which were on the farm in 1965/66 were of poor quality, a gradual process of herd improvement through selective culling and breeding, together with some outside purchases, is required.

Sufficient land was available to cultivate well over 300 acres of maize. However, the writer does not believe that a farm plan which involves growing more than 300 acres of maize will ever be within the

management capabilities of the operators of this farm. In fact, 300 acres of maize would be feasible on this farm only if there were the most radical improvement in the farm's management.

The first plan which is suggested, Plan 1 in Table 12, represents the greatest degree of improvement which the writer believes is possible if there is no marked improvement in the management of the farm. Even this plan assumes that there is sufficient unity among the partners so that all of the native livestock can be sold. Plan 1 involves growing 100 acres of maize and keeping 280 livestock units of grade cattle on the remaining land. The maize yield has been assumed to be 8 bags per acre and the milk yield 130 gallons per cow. No plan has been suggested which is based on the 1965/66 yield levels for these were so low as not to merit consideration. While the milk yield which is used in Plan 1 is low, 130 gallons of milk per cow was the highest milk yield obtained by any of the farmers on farms of over 1,000 acres in the survey in 1966. Plan 1 returns a farm profit of £1,470. This is a worthwhile increase over the 1965/66 profit level but still is a poor farm profit for a farm of this size. The plan would not require any additional capital but it would require the employment of one or two extra laborers.

The second plan involves growing 200 acres of maize and keeping 256 stock units of grade dairy cattle on the remaining land. The maize yield has been left at eight bags per acre but the milk yield has been increased to 200 gallons per cow. This plan returns a farm profit of £2,876. This is a large increase over the 1965/66 profit level. The writer does not believe that this level of profit can be achieved on this farm unless there is a radical change in the organization of the

TABLE 12. LARGE-SCALE FARM NUMBER THREE: ACTUAL USE OF RESOURCES IN 1965/66 AND SUGGESTED CHANGES UNDER ALTERNATIVE ASSUMPTIONS *

| | Actual 1965/66 | Budgeted Plans 1a/ | 2b/ | 3c/ |
|---|---|---|---|---|
| Resource Use: | (Acres or Livestock Units) | | | |
| Total Farm Area | 1,300 | 1,300 | 1,300 | 1,300 |
| Maize | 60 | 100 | 200 | 300 |
| Native Livestock | 160 | - | - | - |
| Dairy Cattle | 286 | 280 | 256 | 231 |
| Financial Results: | (£ E.A.) | | | |
| Farm Profit | 1,013 | 1,470 | 2,876 | 5,115 |
| Capital Investment | 17,492 | 17,492 | 18,692 | 20,692 |
| Extra Capital | - | - | 1,200 | 3,200 |
| Yields: | (Gallons per Cow or Bags per Acre) | | | |
| Milk | 58 | 130 | 200 | 200 |
| Maize | 3.3 | 8.0 | 8.0 | 12.0 |

* Details of the enterprise costs and returns on which these plans are based are shown in Appendix II. The dairy cattle figures are shown separately in Appendix Table VI. The maize figures are the same as those shown in Table V for Farm Number Two, except that for the lower-yielding enterprise, the yield is eight bags per acre and the output per acre 296/00 shillings.

a/ This plan assumes that no native livestock are kept and that the maize enterprise is increased in size to 100 acres. The maize and milk yields assumed for this plan are higher than those obtained on this farm in 1965/66 but similar to those obtained by typical larger than average sized African farms. This plan does not increase farm income substantially.

b/ The second plan is similar to the first except that the maize acreage has been increased to 200 acres and the milk yield to 200 gallons per cow. This returns profit twice as large as that shown by Plan 1 and similar in size to the farm profits obtained by the most successful of the larger than average African farms in 1965/66.

c/ The third plan is similar to the second except that the maize acreage has been increased to 300 acres and the maize yield to 12 bags per acre. This shows a very large profit. Probably only the very best African farmers could farm as well as this.

farm's management. Nevertheless, the senior partner in the farm should be able to carry out this plan if he can manage the farm without interference. Incidentally, the level of profit returned in Plan 2 is almost identical with that which was obtained by the most profitable of the larger farms in the survey in 1966. However, this particular successful farmer obtained his high profit in a slightly different manner. He had a larger crop acreage than that suggested in Plan 2, but his crop yields were better and his milk yield was worse than those used for Plan 2. The second plan requires an additional investment of about £1,200 for machinery and also would require that seven extra laborers be employed.

The third and last plan represents what the writer believes a really good farmer could achieve. However, the level of profit returned by Plan 3 is considerably greater than the highest of the farm profits which any of the farmers obtained in 1965/66. Plan 3 involves growing 300 acres of maize and keeping 231 livestock units of dairy cattle. The maize yield has been increased to 12 bags per acre but the milk yield has been left at 200 gallons per cow. Although this milk yield is no better than the average level of those obtained by the survey farmers in 1965/66, the writer believes that milk yields higher than this cannot be expected from large dairy herds. Plan 3 returns a farm profit of £5,115. Although this is five times as great as the level of farm profit which was obtained in 1965/66, the writer would emphasize that the maize and milk yields on which this plan is based are no more than those which average dairy farmers and better than average maize farmers were able to obtain in 1965/66. With really good management a much higher farm profit could be expected. Plan 3 assumes that the farmer will invest another

£2,000 in buildings and fences. Also, the plan would require that about 30 laborers be employed, an increase of 13 above the labor force which was present on the farm in 1965/66.

This completes the discussion of the improved farm plans for this farm. These plans illustrate that while a very large increase in farm profit is possible on this farm, very little if any improvement is possible without a major re-organization of the farm's management.

## Conclusions

Three large-scale farms have been discussed in this chapter. They were chosen from a sample of 30 farms which were included in a farm management survey conducted in 1966 in the Uasin Gishu and Trans Nzoia Districts (1). These three farms were chosen to represent the important types of African-operated, large-scale farms in the maize/dairying areas of the Uasin Gishu and Trans Nzoia Districts. Apart from the above farm management survey, little factual information concerning the African-operated, large-scale farms is available. For this reason and because both the discussion in this chapter and the farm management survey itself have shown that there is considerable variability among the large-scale farms, it is hazardous to make dogmatic generalizations about these farms. With this proviso in mind, the following tentative conclusions are suggested.

Most of the African-operated, large-scale farms were able to obtain farm incomes sufficiently large so that they could meet their financial obligations and obtain rather modest personal incomes. Few of the farmers were able to make substantial capital improvements; yet on most farms the machinery, buildings, and fences were inadequate and in poor condition.

The conclusion that most farmers are able to meet their financial obligations is supported by evidence from other sources. For example, if loan repayments which had been overdue for only six months are excluded, by June 30, 1966 the Department of Settlement had received payment for 90 percent of the value of the loan installments that had been billed up to that date to all of the farmers in the "Assisted Owners Scheme;" the comparable figure for the "Compassionate Farms" was 86 percent (12, p. 62). No published statistics concerning African farmers' loan repayments to the Land Bank or the Agricultural Finance Corporation are available. However, the Land Bank informed the writer that most of the African farmers in the Uasin Gishu and Trans Nzoia areas were up to date with their loan repayments.

Among the 30 farms included in the farm management survey there were a few farms which appeared to be non-viable. As might be expected, most of the farmers who had difficulty in repaying their loans were farmers who had borrowed a large proportion of their farming capital and also who farmed badly. Poor management in itself was not sufficient to prevent farmers from repaying their loans. If the farmers were prepared to accept a very low level of income and if they had not borrowed a large proportion of their farming capital they could probably continue to farm even though their management was poor; Farm Number Three was a case in point.

Although most of the farms appeared to be commercially viable there was considerable variation in farm incomes. The median farm size in the 30 farm sample was 590 acres. The discussion of Farm Number One, which was similar in size to the median acreage, illustrated that typical farms

of this size earned incomes of about £800 to £1,000 while better managed farms of the same size earned incomes as high as £1,400. In contrast, there were several poorly managed farms included in the farm management survey and typically a poorly managed farm of median size earned an income no greater than £500. Farm profits were highly variable on farms of other sizes also. However, the smaller farms were often better managed than the larger farms. Not only did the larger farms require more skillful management because of their size, but also many of these farms were operated by partnerships and this made management difficult.

The variability in farm profits was surpassed by the variability in average incomes per farmer. The larger farms tended to be poorly managed and operated by groups of partners rather than single operators. Thus, on these farms the average income per partner was lower than the average level of incomes on the smaller farms with one operator. Many of the partners on the larger farms, such as Farm Number Three, obtained levels of income little better than those obtained by farm laborers. In contrast, a single operator on a farm of average size, such as Farm Number One, might obtain an income of £1,000 or more. In this case the farmer would probably operate a motorcar and live in the previous European owner's house in a manner not very different from that of his European predecessor.

The observed variability in farm incomes and the farm budgets which have been discussed in this chapter suggest that substantial increases in farm incomes could be obtained on most farms. The most important means by which farm incomes could be improved would seem to be through the adoption of better methods of husbandry. In the farm management survey the better farmers frequently were able to obtain maize and milk

yields which were from 50 to 100 percent better than the average yields and even the better farmers did not obtain outstanding yields. A less important but nevertheless worthwhile additional method of raising farm incomes would be for farmers to plant more maize. A shortage of machinery and a lack of managerial ability were the two most important factors which prevented farmers from doing this.

Until recently the agricultural and veterinary extension services which were available to the large-scale African farmers were acknowledged to be inadequate. These services are now being increased partly as a result of the help which Kenya has been receiving from the West German Government and the United States Peace Corps (13, pp. 154-155). Hopefully, the African farmers will be able to increase their incomes along the lines suggested in the farm budgets in this chapter if the increased level of extension advice which they are now receiving proves to be effective. Probably little improvement in farm incomes would take place without this extra extension effort.

Additional measures to improve the agricultural credit services are also being taken. As far as the existing African farmers are concerned, it would seem that the credit agencies could be most helpful if they were to make more money available for the purchase of machinery and possibly for some items of recurrent expenses, such as artificial insemination or veterinary treatment, neither of which are eligible for government sponsored credit in normal circumstances. Extra credit may be helpful in some circumstances, although in others, especially if it is not accompanied by improvements in methods of husbandry or in the intensity of farming, it may be harmful. For this reason, the writer would place

more emphasis on improving the extension services rather than making credit more readily available.

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# CHAPTER 6

# PRESENT PERFORMANCE AND POTENTIAL FOR INCREASING INCOMES ON THE SMALL-SCALE FARMS

## Introduction

In this chapter several small-scale farms are examined. The method of analysis adopted in this chapter is very similar to that used for the analysis of the large-scale farms in Chapter 5.

All of the small-scale farms which are dealt with in this chapter are located on either Keben Settlement Scheme (Low-Density Scheme Number 48), Ndalat Settlement Scheme (High-Density Scheme Number 43), or Mautuma Settlement Scheme (High-Density Scheme Number 22). In choosing these three settlement schemes, an attempt was made to include only farms located in areas where the agricultural potential was similar to that of the large-scale farming areas discussed in the last chapter. It was also convenient to use these farms since data relating to these areas previously had been obtained from farm management surveys. Finally, it was desirable to include at least one typical high-density settlement scheme and one typical low-density scheme.

For the purposes of this analysis, it was essential that detailed individual farm statistics be available. The only individual farm statistics available to the writer were those obtained in a farm management survey of several settlement schemes conducted during the 1963/64 season (1). Thus, this analysis was restricted to the four settlement schemes included in this farm management survey -- the low-density

settlement schemes at Keben and Ainabkoi East and the high-density settlement schemes at Ndalat and Mautuma. Of these four settlement schemes all but Ainabkoi East were located in areas where the agricultural potential was similar to that of the large-scale farming areas described in Chapter 5.

Ideally the writer would have liked to include just one high-density and one low-density settlement scheme in the analysis. However, although Keben Settlement Scheme was fairly typical of all low-density settlement schemes, the farm management surveys suggested that Ndalat was particularly successful while Mautuma was a poor high-density settlement scheme (1, pp. 68-69 and 89-90). Thus both Ndalat and Mautuma Settlement Schemes have been included in the analysis.

Keben Settlement Scheme forms a part of Lessos Settlement Complex. When the settlement scheme at Keben was established in 1962 three large-scale farms including an area of 3,700 acres of land were subdivided to make 146 small-scale farms. In 1963 two more settlement schemes were made from some adjoining land. By June 30, 1966 these three settlement schemes included a total of 362 small-scale farms covering an area of over 14,000 acres of land (2, p. 51). These three settlement schemes share the same co-operative society and much of the field administration of the Department of Settlement is common to the three schemes. Thus they form a convenient administrative block which is known as a settlement complex.

Keben Settlement Scheme is located at an altitude of just less than 7,000 feet above sea level where the average annual rainfall is about 53 inches (3, p. 1). Before the settlement scheme was started maize and

dairy cattle were the major farm enterprises on this land. However, as production conditions were favorable and as tea processing factories were located conveniently in Nandi Hills, the settlement planners expected that most settlers would grow tea, as well as keep dairy cattle and grow maize. Tea is an intensive crop which should produce a much higher income per acre than do either maize or dairy cattle. For this reason the settlement planners expected that the settlers at Keben would be able to obtain the target cash incomes of £100 per annum on farms smaller than those commonly found on low-density settlement schemes. Thus the average size of farm on Keben Settlement Scheme is only 24 acres while the average farm size on all low-density settlement schemes is 34 acres (2, p. 51 and 4, p. 358).

For the purposes of this study it is unfortunate that tea can be grown on Keben Settlement Scheme for not only does this mean that the farms at Keben are smaller than most farms on low-density settlement schemes, but also tea cannot be grown on the nearby large-scale farms; thus, comparison of the large-scale and small-scale farms is made more difficult. Also, very little of the tea on Keben Settlement Scheme is mature and there are no reliable tea production statistics available for this area. Moreover, at Keben some settlers do not grow tea. On some of these farms there is no land which is suitable for tea production. These farms are usually larger than the average size, about 30 acres compared with an average of 24 acres, for the settlers are still expected to be able to obtain the target cash income of £100 per annum even though they have to rely on maize and dairy cattle alone. One of these farms will be included in the individual farm analysis in this chapter primarily

because a farm of this size is more typical of low-density settlement schemes as a whole than is a farm of average size at Keben.

Some farms at Keben do not grow tea even though production conditions are favorable. For example, by 1964 the farmers at Keben had planted only about half of the tea acreage which the settlement planners had expected (1, pp. 54-56; 3, p. 4). This was understandable in view of the fact that tea does not begin to come into production until it is about five years old and requires a substantial investment to bring it to that stage.

On Keben Settlement Scheme several settlers farmed more than one small-scale farm. When settlement began the planners did not intend that this should happen. However, after the settlement scheme was established it became apparent that several settlers were operating more than one small-scale farm although these farms may have been registered in different names. These settlers appeared to be content to exercise the de facto ownership of these farms even though the legal ownership was in other hands. Recently the Department of Settlement has changed the registration of some of these multiple-plot farms so that they are registered in the names of their de facto owners. However, the writer suspects that the Department of Settlement is not aware of all instances where several farms are operated by one person for some of these settlers do not advertise this fact. Thus there are few statistics relating to the problem. In the writer's experience multiple-plot farms are not uncommon on low-density settlement schemes. For example, in the farm management survey at Keben in 1963/64 six of the 27 sample farmers operated more than one small-scale farm (1, p. 41). The largest of these multiple-plot farms included four small-scale farms covering more

than 80 acres of land.

Most farms in the Ndalat Settlement Scheme are located at an elevation of between 6,200 and 6,400 feet. A part of the scheme, however, includes land rising to 7,000 feet above sea level. The average annual rainfall is about 50 inches (1, p. 65; 5, p. 1). Maize and dairy cattle are the only significant enterprises on this scheme, although some settlers do grow a small amount of millet or vegetables primarily for their own consumption.

Ndalat is a high-density settlement scheme which was started in 1962. At that time three large-scale farms including a total area of 5,900 acres of land were subdivided and made into 306 small-scale farms. Since 1962 the scheme has been extended on several occasions and in June 1966 Ndalat Settlement Scheme covered 11,200 acres of land and included 515 small-scale farms. Each of these settlers is expected to be able to earn an annual cash income of £25 to £40. The average farm size is 19 acres. This is somewhat smaller than the average size of the farms on all high-density settlement schemes, the median farm size on all high-density schemes being about 26 acres.1/

Mautuma Settlement Scheme is located at an elevation of about 5,300 feet and it receives an average annual rainfall of about 53 inches (6, p. 1). Maize and dairy cattle are the major farm enterprises although various

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1/ The settlement schemes at Keben, Ndalat and Mautuma are all located in areas where the average annual rainfall is about 50 inches. As most of the mixed farming land in the former "White Highlands" does not receive an annual rainfall as high as this, the land on the settlement schemes discussed here can be farmed more intensively than that on many other settlement schemes. This reason partly explains why the average farm sizes on the three settlement schemes discussed here are all less than the average farm sizes on low-density or high-density settlement schemes taken as a whole.

other products including sisal, vegetables, and several subsistence crops are grown on a small scale. Originally, the Department of Settlement intended that sisal should be one of the major farm products on this scheme. Although sisal was not grown extensively in this area, it happened that Mautuma Settlement Scheme was created out of one of the few sisal estates located in this area. The settlement planners intended that each settler should grow a small plot of sisal and send his leaf into the existing sisal factory for processing. Later it became apparent that few of the settlers were prepared to grow sisal; not only does sisal require several years before it comes into production, but also the price of sisal declined substantially in 1964 and this trend has not yet been reversed (7, p. 64).

When Mautuma Settlement Scheme was planned originally (it was then called Lugari Settlement Scheme) the Department of Settlement intended that each of the small-scale farms should be about 12 acres in size. From these small farms the settlers were expected to be able to obtain annual cash incomes averaging about £25. The settlement scheme was started on this basis and the small-scale farms which were included in the farm management survey in 1963/64 did have an average size of about 12 acres. After the settlement scheme had been started but before all of the small-scale farms had been settled, the Department of Settlement decided that it would increase the average size of the small-scale farms on the portion of the scheme that was unsettled at that time. On some of the larger farms the target cash incomes were expected to be as high as £70 per annum. Thus there is a considerable range in farm sizes on Mautuma Settlement Scheme today. By June 1966 this settlement scheme

covered 10,367 acres of land and included 529 small-scale farms whose average size was 18 acres (2, p. 51).

From the preceding discussion it will be apparent that some difficulty was experienced in choosing suitable settlement schemes. In particular, it was difficult to choose settlement schemes for which detailed statistics were available and where the average farm sizes were close to the average size of all high-density or low-density settlement schemes. However, the individual farms which will be studied in this chapter will range in size from 10 acres for one of the small farms on Mautuma Settlement Scheme to over 30 acres for one of the farms at Keben. This range in farm size is sufficient to include the majority of small-scale farms which are found on existing settlement schemes, apart from some of those which are located in areas where the agricultural potential of the land is lower than found on the settlement schemes discussed here.

## Sources of Data

Throughout this study a major problem has been the lack of suitable data both for the large and small-scale farms. The only detailed individual farm statistics which were available were those collected by the writer in two farm management surveys (1, 7). Unfortunately, the farm management survey of the large-scale farms related to the 1965/66 season while the survey of the small-scale farms covered the 1963/64 crop year. After 1963/64 the farm management survey of the small-scale farms was continued on a greatly expanded scale by the Kenya Government. However, the only additional data published as a result of this expanded survey (at the time of writing) were provisional survey results from the 1964/65 season (8). Clearly, there are difficulties involved if the large and

small-scale farms are compared using data for different seasons. However, there was no alternative course available and the procedure used here has been to compare the different farms using data for the 1965/66 season for the large-scale farms and for the 1963/64 season for the small-scale farms, the latter being updated to 1965/66.

Between 1963/64 and 1965/66 there undoubtedly were changes in yields, prices, crop acreages and livestock numbers on the small-scale farms on settlement schemes. The changes in livestock numbers over this period are known to have been small (1, pp. 55, 75, 96; 2, pp. 51, 54; 9, pp. 15, 20). The changes in maize acreages over this period are unknown. However, they are thought to have been small and this opinion was confirmed by the writer in several interviews with field staff of the Department of Agriculture and with some settlers during 1966. Few significant price changes occurred between 1963/64 and 1965/66. The only price change of any importance was an increase in the price of maize from just over 30/00 shillings per 200 pound bag in 1963/64 to 37/00 shillings in 1965/66.

The most difficult problem is that presented by the yield data. Unfortunately there is only scant evidence of the yield changes that have taken place on the settlement schemes in the past few years (10). Throughout this analysis it will be apparent that yield variability is an important issue. While some cropping seasons produce better average yields than others, very high and very low yields are obtained by some farmers in all seasons. This is true not only of commercial farms but also of experimental stations. For example, in 1965/66 maize yields on experimental plots receiving the same treatment but a few miles apart sometimes

differed from each other by more than 1,000 percent (11). Similarly, the survey samples on the three settlement schemes surveyed in 1963/64 and the sample of large-scale farmers included in the 1965/66 survey both contained farms with widely differing yields. Frequency distributions of the maize and milk yields obtained by these farmers are shown in Chart 2 and Chart 3. There are two reasons for presenting this information. First, it supports the hypothesis that although the survey data refer to two specific years, the range in yields shown in the two charts is sufficient to include the important ranges of yields that may be expected in an average year. Second, it indicates that yields are highly variable within each type of settlement and it is not possible to draw any firm conclusions about whether average maize and milk yields differ between the large and small-scale farms.

Milk yields are shown in Chart 2. Apart from Ndalat, which had somewhat better yields than the other areas, milk yields appeared to be very similar in the different survey areas. However, if the milk yields in Chart 2 are compared with the maize yields in Chart 3, it is apparent that both within and between locations, maize yields were more variable than milk yields. This illustrates the point which was made in Chapter 5, namely that maize is a less reliable enterprise than milk production.

Some of the differences in maize and milk yields between the three different settlement schemes may have resulted from certain activities of the Department of Settlement. When a settlement scheme is started the Department of Settlement usually buys a few large dairy herds, perhaps from the European farmers who farmed the land previously. These cattle are then resold to the settlers. If the Department of Settlement

Chart 2. AVERAGE MILK YIELDS ON SETTLEMENT SCHEMES AND LARGE-SCALE FARMS.

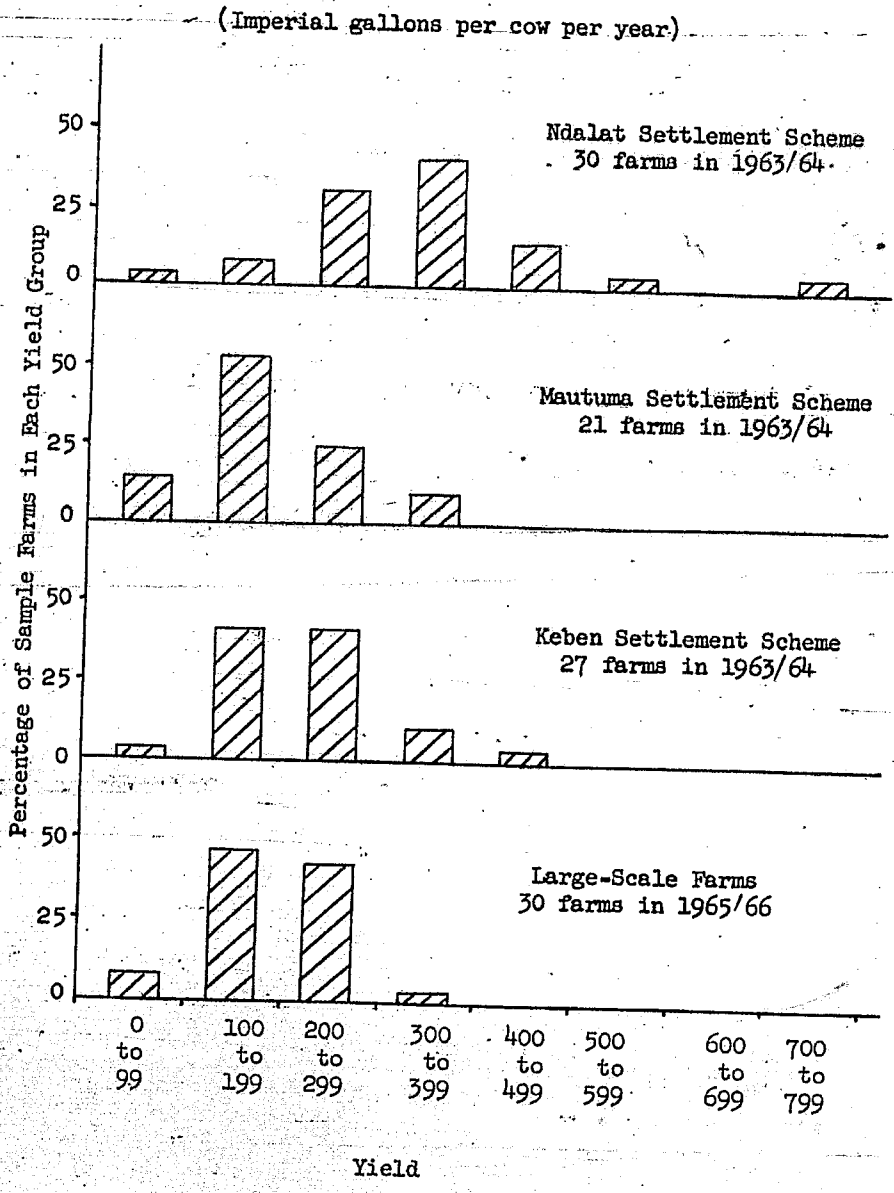
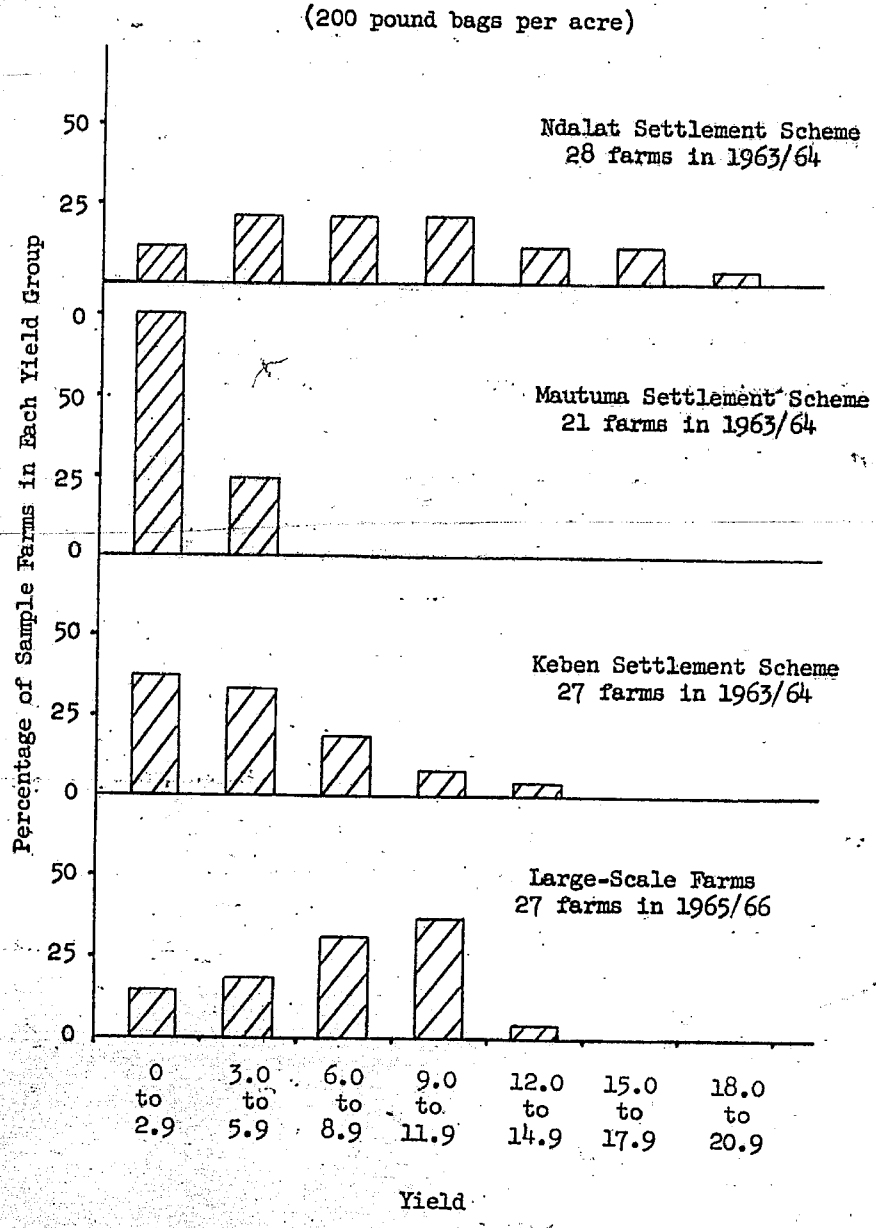


Chart 3. AVERAGE MAIZE YIELDS ON SETTLEMENT SCHEMES AND LARGE-SCALE FARMS.



happens to buy a particularly good herd of cattle then most of the settlers purchasing these cows should obtain better than average milk yields. This may have been the reason why the settlers at Ndalat were able to obtain higher milk yields than were the settlers on the other two settlement schemes which are shown in Chart 2. Similarly, most of the maize on settlement schemes is planted by a contractor; usually, at least in the early years, the Department of Settlement itself provides these services. If the contractor has good equipment or is a particularly good manager then the cultivations will be done well and the maize will be planted on time. The writer believes that the average maize yields at Ndalat were good in 1963/64 (although very variable) partly because the settlement officer who organized the cultivations at that time did supervise the cultivations well. In contrast, the average maize yield at Mautuma was very poor and the writer observed that the cultivations on this scheme were poorly done and the maize was planted too late in 1963/64.

It is not possible to draw any firm conclusions about whether average maize and milk yields differ between the small-scale and the large-scale farms. The information which is presented in the two charts could be used to compare yields in different years although this would be very difficult to interpret. There are insufficient data available to permit computing a statistical test to see whether average maize of milk yields on the large-scale farms differ significantly from those on the small-scale farms, either in any one year or for a period of years. Thus, it is uncertain whether statistically significant differences in average yields were obtained by these two groups of farmers; from the evidence

in the two charts and from local experience the writer believes that average maize and milk yields do not differ greatly between the large and small-scale farms. In the analysis which begins in the next chapter, yield differences may be crucial in deciding which type of African settlement is better with respect to some particular criterion. Should this occur, the final decision will have to rest either on the reader's judgment about the probable level of yields or, hopefully, on the better yield statistics which may become available.

## Case Studies of Individual Farms

### Farm Number One

The first farm selected for detailed analysis is located on the low-density settlement scheme at Keben. In 1963/64 the farm management survey on this settlement scheme included 27 farms. There was so much variability among this group of farmers that it was difficult to choose one typical farm. In most respects, this farm was a typical farm. However, it was a little smaller and somewhat less profitable than the average farm on this settlement scheme in 1963/64.

This farm is exactly 20 acres in size while the average farm size on this settlement scheme is just less than 24 acres. The value of the farm and farming assets was about £540. The farmer had borrowed about 85 percent of his farming capital.

The farmer operated the farm himself with assistance from his wife. All of his children went to school and consequently could provide little farm labor. In fact, the farmer did little work on the farm. The only regular work on the farm, at least until the small plot of tea matures, was with the dairy cattle. Most of this work was done by the farmer's

wife. The farmer did some work with the maize and with developing the small plot of tea. However, some of this seasonal work was done by hired laborers. Hired labor is readily available if the farmer requires it.

All of the major cultivations were done mechanically. Most settlers employ a contractor with a tractor. However, in 1963/64 this farmer was able to do his cultivations with work oxen borrowed from friends in the adjoining Nandi District. The writer expects that the farmer has been obliged to use a tractor since 1963/64 for it was illegal to bring work oxen onto the settlement scheme and the authorities have been more successful in controlling stock movement since then; livestock movement between the settlement scheme and other areas was controlled to prevent the spread of disease.

In 1963/64 the farmer kept five cows and their followers and grew three acres of maize and about one-third of an acre of tea. He made a profit of £30 of which £16 represented a cash surplus (in 1965/66 prices). In the 1963/64 farm management survey of this settlement scheme the average farm made a profit of £50 but made almost no cash surplus. Thus, this farmer obtained a below average farm profit but a better than average cash surplus. These calculations assume that the farmer paid his loan repayment installments on time. Accounting difficulties within the Department of Settlement prevented the writer from ascertaining the loan repayment position of individual settlers.[2/] Clearly, this farmer's

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2/ The writer does not wish to appear unreasonably critical of the accounting staff of the Department of Settlement, for the task of establishing an accounting system to deal with over 30,000 settlers was not easy, especially in view of the shortage of trained accountants. However,

cash surplus of £16 was not adequate to support a family, especially since he had to pay school fees for his children. Thus the writer would be surprised if this settler had paid his loan installments at the right time. During the first ten years his annual loan repayment, including both interest and principal, amounts to £59. If he were not obliged to pay this his farm income would have been sufficient to allow him to live satisfactorily.

In 1963/64 the settler obtained maize and milk yields which were very similar to the average levels of maize and milk yields on this settlement scheme; he obtained 5.7 bags of maize compared with the average of 5.0 bags per acre and 226 gallons of milk compared with the average milk yield of 230 gallons per cow. The most important reason why his profit was below average was that one of his cows died. The loss of even one cow, of course, has an appreciable effect on incomes on farms of this size. In addition to this loss, the farmer sold cattle worth £32 during the year. He did this mainly to obtain a larger cash income. Certainly he did not sell just the natural increase from his cattle for his livestock valuation decreased in value by £51 during the year. Incidentally, it is illegal for most settlers to sell mature cattle for these animals comprise a major part of the Department of Settlement's security for the development loans.

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although the writer understands that considerable improvement in the accounting system has been made since 1963/64, the accounts were unsatisfactory in that year.

For example, in June 1964 the Controller and Auditor General reported that 15,000 discrepancies had been discovered in the Department's accounts. In his words "The correction of all these defects will be a major task but until it has been completed it will not be possible to say that the accounts are satisfactory and that all amounts due have been billed to settlers." (12, p. 3)

If the death of one of his cows is neglected, both his profit and cash surplus were similar to the average levels of farm profits and cash surpluses on this settlement scheme. However, the average farmer made almost no cash surplus on this settlement scheme while the settlement planners expected that each settler would be able to obtain an annual cash surplus of £100. There were several reasons for this. The farm budgets which the settlement planners suggested for the majority of these farms were based on the assumption that each settler would plant two acres of tea and that this would produce an annual net income of about £50.3/ In 1963/64 none of the tea was mature and thus the settlers were not able to derive any income from this source. However, the majority of the settlers had not planted two acres of tea, so they will not derive substantially higher incomes in the future. Farm Number One, for instance, had planted only one third of an acre of tea.

The other reasons why this farmer's cash income was lower than that expected by the settlement planners were that he derived no cash income from his maize, while the planned budgets were based on the assumption that he would obtain £37 from maize sales. Furthermore, he realized only two-thirds of the expected income from the sale of dairy products. This farmer planted a little more than three acres of maize and obtained a yield of less than six bags per acre, while the budgeted amounts were six acres of maize with an average yield of 10 bags per acre. This

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3/ Settlers have never been forced or coerced into following the planned budgets. However, the development loans were designed to support the planned budgets and thus the availability of these loans encouraged farmers to farm in a manner similar to that proposed in the farm budgets.

farmer, in fact, kept an average of five cows, while the budgets were based on an average of only four cows. However, his yield of saleable milk was only 226 gallons per cow and he consumed in his own home about one-third of his total milk production; in contrast, the budgets expected that his cows would yield an average of 300 gallons of milk and that all of this would be sold, the farmer presumably consuming only skimmed milk (3, p. 4).

The farm planners expected that the settlers would sell only butterfat. At the current price of about 3/00 shillings per pound of butterfat, depending on grades received and various bonuses, milk which is separated yields a return of about 1/20 shillings per gallon, plus the skimmed milk. This, of course, represents the return if the settlers were to sell their milk direct to the creamery. In fact, they sell through their co-operative society and by the time the co-operative has deducted its charges, the settlers receive only about 80 cents for each gallon of milk sold. At this price most settlers seem unprepared to sell butterfat. Fortunately the settlers' co-operative society holds a substantial milk quota (over 400 gallons of milk per day in 1965/66 plus a variable amount of contract milk). In 1965/66 less than 20 percent of all the milk sold through the settlers' co-operative society was sold as butterfat. The co-operative society received an average price for whole milk of 2/08 shillings per gallon in 1963/64 (2/07 shillings in 1965/66). However, in 1963/64 they paid out to the settlers an average price of only 1/38 shillings per gallon of whole milk. Thus the settlers received an average return for their milk somewhat higher than that expected by the settlement planners. However, if

the co-operative society were to be organized a little more efficiently, a higher milk price could be paid out to the settlers.

The writer believes that the farming systems which were suggested by the settlement planners were realistic. However, the yields which were expected in the farm budgets were too high; only a few of the settlers were able to obtain these high yields in 1963/64.[4/] The suggested farm plans were based on the assumption that each settler would keep four cows and grow six acres of maize and two acres of tea. This will form the basis of the farm budgets which will be suggested here although as Farm Number One is smaller than average, three cows not four will be proposed.

The tea enterprise has been restricted to two acres partly because of the difficulty of managing a larger enterprise. However, a larger tea enterprise has not been suggested because the Kenya Government is not keen on encouraging small-scale farmers to plant large areas of tea. The Government would prefer that the benefits from new tea production be spread over a large number of small-scale farmers.

This farm has sufficient land to grow about ten acres of maize. If the farmer were to plant all of this land to maize, the writer believes

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4/ When the farm budgets were drawn up there were no settlement schemes in existence and the settlement planners had to operate with very limited information. The maize and milk yields which the planners expected were, in fact, very similar to the yields obtained by European farmers in areas of similar agricultural potential, cf. (13, pp. 24 and 35). Also, the people who designed the farm budgets had little to do with arrangements for financing the settlement schemes. The financial arrangements which were made necessitated that each settler should make a large annual loan repayment. Thus the farm planners were obliged to suggest intensive farming systems with moderately high yields, for it was only in this way that settlers could hope to be able to repay their loan installments.

that he would be adopting an unreasonably high risk system of farming. For this reason, the crop enterprises have been restricted to a total area of not more than eight acres. This assumes that the farmer can obtain sufficient working capital to plant a larger area of maize. He should be able to obtain this as an advance on MFR through his co-operative society.5/ Also, sufficient machinery must be available. This could be an important weakness for, in the past at least, some settlers have experienced difficulty in obtaining a machinery contractor at the right time.

These plans assume a stocking rate of about 2.6 acres per livestock unit (assuming that three cows plus their followers are equivalent to 4.6 livestock units). In the 1963/64 farm management survey at Keben, the average stocking rate was only 2.5 acres per stock unit, while the average stocking rate on the large-scale African farms which were included in the farm management survey in the area close to Lessos in 1965/66 was 3.8 acres per stock unit (1, p. 55 and 7, p. 2). The writer does not believe that sufficient evidence is available to draw any firm conclusions about the relative carrying capacities of these two farming areas. However, the above figures appear to be realistic for the small-scale farms at Keben receive more rainfall than the nearby large-scale farms, the smaller paddocks on the settlement scheme make it easier to manage the grazing, and most settlers can obtain some grazing from the roadsides for every settlement scheme is interspersed with a large number of roads.

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5/ In the event of a crop failure each farmer is paid compensation at a fixed rate, usually about £5 per acre for non-hybrid maize. This so-called Minimum Financial Return constitutes the security against which advances on MFR are made.

Four improved farm plans are shown in Table 13. The first two plans involve planting six acres of maize and two acres of tea and keeping three cows plus their followers on the remaining land. Plan 1 assumes that the farmer will obtain an average milk yield of 226 gallons per cow, which is the same as his milk yield in 1963/64. The maize yield, however, has been raised to eight bags per acre. While average maize yields were only five bags per acre on this settlement scheme in 1963/64, they appear to have been unusually low in that year. The Department of Settlement estimated that the average maize yield was eight bags per acre in 1965/66 and the writer believes that this is a reasonable average yield to expect on this settlement scheme, given the average levels of husbandry which prevail at present (10).

No tea yield statistics were available for this settlement scheme. The original farm budgets for this settlement scheme were based on the assumption that settlers would obtain an average yield of about 1,000 pounds of tea per acre. The Kenya Development Plan, on the other hand, suggests that they can expect to obtain only 300 pounds per acre (3, p. 4 and 4, p. 381). Surveys of small-scale farms in the Nyeri area of Kenya have shown that actual average yields of about 800 pounds of tea per acre were obtained from five year old tea (14, p. 40). Tea production conditions at Keben are not as favorable as they are at Nyeri. The writer believes that 700 pounds of tea is a reasonable yield to expect at Keben and this figure has been confirmed by the Agricultural Department (15).

Plan 1 returns a farm profit of £136. While this is a substantial improvement over the farm profit which the farmer made in 1965/66, it

does not quite meet the income target for this settlement scheme, for after allowing for the farmer's own food consumption and repayments of loan principal, etc., this plan suggests a cash surplus of about £85.

The second plan which is considered here is identical with the first plan except that the milk yield has been raised to 300 gallons per cow and the maize yield to 12 bags per acre. These yields are similar to those which the best farmers on this settlement scheme were able to obtain in 1963/64. Plan 2 returns a farm profit of £181. This is equivalent to a cash surplus of about £130. Thus Plan 2 more than meets the £100 cash income target.

The third and fourth plans assume that no tea is grown. These plans involve planting eight acres of maize and keeping three cows plus their followers on the remaining land. These plans are suggested partly because many of the farms on Keben Settlement Scheme do not grow tea even though they have suitable land available. However, these two plans would also be appropriate for many other settlement schemes where maize and dairy cattle are the only farm enterprises. In fact, these two plans are very similar to those which would be suitable for a farm on Ndalat Settlement Scheme. For this reason, no farm at Ndalat will be singled out for discussion in this chapter.

Plan 3 assumes the same milk and maize yields as those which were used for Plan 1, i.e., yields similar to the average yields on this settlement scheme in 1965/66. This plan returns a farm profit of £70 or a cash surplus of about £20. This is only a little better than the average performance of these small-scale farms in 1965/66. The only reason that it is at all better than the actual performance is that this

TABLE 13. SMALL-SCALE FARM NUMBER ONE: ACTUAL USE OF RESOURCES IN 1963/64 AND SUGGESTED CHANGES UNDER ALTERNATIVE ASSUMPTIONS *

| | Actual 1963/64 | 1[a] | 2[b] | 3[c] | 4[d] |
|---|---|---|---|---|---|
| Resource Use: | (Acres or Livestock Units) | | | | |
| Total Farm Area | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| Maize | 3.3 | 6.0 | 6.0 | 8.0 | 8.0 |
| Tea | .3 | 2.0 | 2.0 | - | - |
| Dairy Cattle | 6.7 | 4.6 | 4.6 | 4.6 | 4.6 |
| Financial Results: | | (£ E.A.) | | | |
| Farm Profit | 30 | 136 | 181 | 70 | 126 |
| Capital Investment | 637 | 767 | 767 | 637 | 637 |
| Extra Capital | - | 130 | 130 | - | - |
| Yields: | (Gallons per Cow, Bags per Acre or Pounds of Made Tea per Acre) | | | | |
| Milk | 226 | 226 | 300 | 226 | 300 |
| Maize | 5.7 | 8.0 | 12.0 | 8.0 | 12.0 |
| Tea | - | 700 | 700 | 700 | 700 |

* Under the heading "Actual 1963/64" all of the figures are 1963/64 figures except for those for the Farm Profit and the Capital Investment, both of these items having been adjusted to 1965/66 price levels.

The enterprise costs and returns on which these plans are based are shown in Appendix III.

The extra capital required for Plan 1 and Plan 2 represents the cost of establishing the extra acreage of tea, less the value of the cattle which are not required for these plans.

a/ The first plan involves increasing the acreages of maize and tea. The maize yield has been increased a little but the milk yield has been left at the 1963/64 level. This plan returns a substantially improved income, but still does not meet the income target.

b/ This plan is identical with Plan 1 except that the maize and milk yields have been increased. This is the only plan that meets the income targets.

c/ This is identical with Plan 1 except that the two acres of tea have been replaced with maize.

d/ This is the same as Plan 3 except the yields have been increased.

plan includes more land in maize than was found on the average farm on this settlement scheme in 1965/66.

Plan 3 is of interest also because it is quite similar to the observed performance of a typical farm at Ndalat. The major differences between Plan 3 and the typical farm at Ndalat were that the latter was about one acre smaller and planted only three acres of maize, not eight as shown in Plan 3. However, the farm income at Ndalat was almost as high as that in Plan 3 for despite the smaller maize acreage at Ndalat average milk yields were substantially higher than those at Keben. Also, the land at Ndalat was cheaper than that at Keben and the capital value of the typical farm at Ndalat would be only about £350. The target income at Ndalat was only £40 not £100 as at Keben. Even so the typical farm at Ndalat obtained little if any cash surplus; neither would Plan 3 do so.

The last plan to be considered is identical with Plan 3 except that the maize yield has been increased to 12 bags per acre and the milk yield to 300 gallons per cow. This plan returns a profit of £126 or a cash surplus of about £75. This represents what a good farmer who did not grow tea could achieve. In fact, a few of the farmers included in the farm management survey in 1963/64 did achieve incomes as high as this. This plan also is similar to the performance of a good farm at Ndalat. The farm at Ndalat, however, would have a somewhat smaller maize acreage and would obtain a slightly lower income. Nevertheless the good farm at Ndalat would achieve the target income of £40.

In the four plans which have been discussed it has been assumed that no labor would be hired unless the family labor was fully occupied. Only

the first two plans required any hired labor and even for these only a small amount of hired labor was needed during the peak period from April to August. In the past, this farmer has hired labor even though his family labor was not fully employed. If he continues to do this in the future then the farm plans suggested here would return somewhat smaller profits than those shown in Table 13.

The farm plans discussed above illustrate that settlers at Keben can expect to obtain the target cash incomes only if they plant at least two acres of tea, obtain good maize and milk yields and do not hire excessive amounts of labor (Plan 2). The writer believes that it would be unreasonable to expect more than a few of the settlers to do this. Incomes sufficient to allow settlers to repay their loans and obtain moderate levels of personal income could be obtained either if settlers planted two acres of tea and obtained only average maize and milk yields (Plan 1) or if settlers planted no tea but obtained good maize and milk yields (Plan 4). If settlers at Keben continue to farm as they did in 1963/64, the writer does not believe that a large proportion of the settlers will be able to repay their loans to the Department of Settlement.

Farm Number Two

This farm also is on the low-density settlement scheme at Keben. The farm is 31 acres in size and thus is considerably larger than the average farm at Keben. The farm was made larger than average for there was no land suitable for tea production on this farm; yet the farmer was still expected to be able to obtain the target cash income of £100 per annum.

The farm and farming assets were valued at £426 in 1965/66. Thus, despite the larger size of this farm it was valued at less than Farm Number One. The purchase price of this farm was lower than that of Farm Number One mainly because it had no land suitable for tea production. The farmer had borrowed 93 percent of his farming capital.

A summary of the farm plan which was adopted in 1963/64 (updated to 1965/66 price levels) and some suggested improvements are presented in Table 14. In 1963/64 the farmer planted 3.6 acres of maize and kept seven cows plus their followers. He made a farm profit of £60. This was slightly higher than the average level of farm profits among the sample of farmers included in the farm management survey on this settlement scheme. The farmer obtained a better than average maize yield, 6.9 bags per acre, but a poorer than average milk yield, 147 gallons per cow. Thus the farmer's profit was above average mainly because his farm was above average in size, not because of high yields.

Although the farmer made a somewhat better than average farm profit, his farm incurred a cash deficit of £25 (assuming that he repaid his annual loan installment of £48). His poor cash position was due to the fact that he consumed rather a large proportion of his milk and maize and he still had some unsold maize in his store at the end of the year. However, even a generous allowance for these two factors would not allow him to make a cash surplus if he continues to farm in the future as he did in 1963/64. In 1963/64 his cash shortage was alleviated through selling some native cattle which he owned in Nandi District. As he no longer owns any native cattle, he will not be able to rely upon this source of extra income in the future. Clearly, his income was unsatisfactory in

TABLE 14. SMALL-SCALE FARM NUMBER TWO: ACTUAL USE OF RESOURCES IN 1963/64 AND SUGGESTED CHANGES UNDER ALTERNATIVE ASSUMPTIONS *

| | Actual 1963/64 | Budgeted Plans 1[a] | 2[b] |
|---|---|---|---|
| Resource Use: | (Acres or Livestock Units) | | |
| Total Farm Area | 31.4 | 31.4 | 31.4 |
| Maize | 3.6 | 10.0 | 10.0 |
| Dairy Cattle | 9.5 | 7.7 | 7.7 |
| Financial Results: | (£ E.A.) | | |
| Farm Profit | 60 | 145 | 221 |
| Capital Investment | 426 | 426 | 426 |
| Yields: | (Gallons per Cow or Bags per Acre) | | |
| Milk | 147 | 200 | 300 |
| Maize | 6.9 | 8.0 | 12.0 |

* The actual 1963/64 figures are adjusted to 1965/66 price levels where appropriate.

The budgeted plans are based on the same enterprise costs and returns as those which were used for Farm Number One.

a/ The first plan involves increasing the maize acreage substantially. Also, the maize and milk yields have both been assumed to be slightly higher than their 1963/64 levels. This plan suggests an income which is considerably higher than that obtained in 1963/64 but still not high enough to meet the target income level.

b/ This plan is identical with the first plan except that the milk and maize yields have both been increased to levels similar to those which the best farmers were able to obtain in 1963/64. This plan suggests an income higher than the target level.

1963/64 and the writer would be surprised if he had repaid his loan instalments to the Department of Settlement.

The farm budget which was designed for this farm by the Department of Settlement suggested that the farmer should grow 10 acres of maize and keep six cows plus their followers. The milk yield was expected to be about 300 gallons per cow and the maize yield 10 bags per acre (3, p. 4). The writer believes that this suggested budget represents a level of performance similar to that which a good farmer could achieve on this farm. Two budgets will be suggested here. They will both include 10 acres of maize but the number of cows will be five not six as suggested by the settlement planners; with six cows the farm would be stocked at a rate of about 2.3 acres per stock unit and this appears to be too high a level of stocking.

Plan 1 which is shown in Table 14 assumes that the farmer can obtain a maize yield of eight bags per acre and a milk yield of 200 gallons per cow, i.e. about the average levels of maize and milk yields on this settlement scheme. This plan returns a farm profit of £145. This is equivalent to a cash surplus of about £75. Thus, while this plan represents a considerable improvement over the farm's actual performance, it does not meet the target cash income of £100 per annum.

The second and last plan is identical with Plan 1 except the milk yield has been increased to 300 gallons per cow and the maize yield to 12 bags per acre. This plan returns a profit of £221 which is equivalent to a cash surplus of about £150. Thus, this plan more than meets the target cash income.

The two plans which have been suggested here show that the farmer can attain the target cash income only if he farms intensively and obtains

high yields (Plan 2). If he farms intensively but obtains only average yields, he will not be able to meet the target income but he would be able to repay his loans and live moderately well (Plan 1). If he does not improve on his 1963/64 performance he will have difficulty in repaying his loans to the Department of Settlement.

The writer would be surprised if this farmer can raise his income to the level suggested by Plan 2. However, one or two of the 27 farmers who were included in the farm management survey in 1963/64 were able to farm as well as this. This farmer should be able to achieve an income level as high as that suggested by Plan 1. However, in order for the farmer to do this he must be prepared to work harder than he has in the past; in addition, he must be able to obtain sufficient short-term credit and sufficient machinery services to allow him to plant as much as ten acres of maize.

Farm Number Three

This farm, the last to be discussed in this chapter, is a farm of 10 acres on the high-density settlement scheme at Mautuma. This farm was typical of the average farm in the farm management survey of this settlement scheme in 1963/64.

The farm and farming assets were valued at £183. The farmer had borrowed from the Department of Settlement a total of £146 or 80 percent of his farming capital. The percentage of his capital which was borrowed would have been 100 percent had it not been for the fact that the farmer was able to construct most of the buildings he required with his own family labor and because his livestock had increased in value since he started farming.

A summary of the farm plan adopted in 1963/64 is shown in Table 15. The farmer, like most of the farmers included in the farm management survey, kept as his major enterprises two cows and two and one-half acres of maize. The two and one-half acre plot of maize was cultivated and planted with a tractor which was operated by the Department of Settlement. In addition to the two and one-half acre plot of maize the farmer cultivated another three-quarters of an acre of land entirely by hand. On about half an acre of this land the farmer planted maize although this was interplanted with finger millet and beans. The other quarter of an acre was planted with a diverse collection of crops, including cassava, sweet potatoes, onions and cabbages. These crops were grown primarily for subsistence although the farmer did obtain a small cash income from selling vegetables. He also kept about 30 native poultry.

The farmer made a profit of £21.6/ However, assuming that he had paid his loan installments to the Department of Settlement, he would have incurred a cash deficit of £8. This unfortunate situation occurred primarily because the farmer obtained poor yields, especially from maize. In 1963/64 he obtained 3.0 bags of maize per acre and 188 gallons of milk per cow; these yields were very similar to the average levels of maize and milk yields (2.5 bags of maize per acre and 185 gallons of milk per cow) obtained by the 21 farmers in the farm management survey.

While the average milk yield which this farmer obtained was not

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6/ Strictly speaking, the farm profit should be a little higher than this for the settler did obtain some income from green vegetables, etc., which he consumed in his own home. Although the major items of home consumed food, maize and milk, were included as a part of farm income, various vegetables, etc. were not included for the quantities could not be measured accurately and most of these products do not have well-established market prices.

TABLE 15. SMALL-SCALE FARM NUMBER THREE: ACTUAL USE OF RESOURCES IN 1963/64 AND SUGGESTED CHANGES UNDER ALTERNATIVE ASSUMPTIONS *

| | Actual 1963/64 | Budgeted Plans 1 b/ | Budgeted Plans 2 c/ |
|---|---|---|---|
| Resource Use: | (Acres or Livestock Units) | | |
| Total Farm Area | 10.0 | 10.0 | 10.0 |
| Maize | 3.0 | 3.0 | 3.0 |
| Mixed Subsistence Crops | .3 | .3 | .3 |
| Dairy Cattle a/ | 2.3 | 3.1 | 3.1 |
| Financial Results: | (£.E.A.) | | |
| Farm Profit | 21 | 55 | 80 |
| Capital Investment | 183 | 183 | 183 |
| Yields: | (Gallons per Cow or Bags per Acre) | | |
| Milk | 188 | 200 | 300 |
| Maize | 3.0 | 8.0 | 12.0 |

* The actual 1963/64 figures are adjusted to 1965/66 price levels where appropriate.

For the budgeted plans the enterprise costs and returns on which the plans are based are shown in Appendix III. The maize costs and returns are identical with those shown in Table II for Farm Number One; the dairy cattle figures are shown separately in Table IV.

a/ All of the plans are based on a dairy herd of two cows. In 1963/64 the farmer had two cows and one heifer calf. This is equivalent to 2.3 livestock units. By the time the farmer has reared sufficient youngstock to maintain his dairy herd at a permanent level of two cows, he should have livestock equivalent to 3.1 livestock units.

b/ This plan is very similar to the actual plan adopted in 1963/64. However it assumes a slightly better milk yield and a much higher maize yield.

c/ This plan is identical with Plan 1 except that the maize and milk yields have been increased.

especially poor, his maize yield in 1963/64 was disastrous. This resulted primarily from the extremely poor standard of the cultivations and planting which were done mechanically by the Department of Settlement. The weather was very wet during the planting period. The cultivations were done too late and because of the muddy conditions, the maize planter was blocking up continually and leaving large gaps of unplanted land. Unfortunately, because of poor relations between the settlers and the Settlement Officer, these unplanted gaps were not filled in. The settlers maintained that they had paid the Department of Settlement to do this work and thus the Department should do the job properly. The Settlement Officer maintained that he could not organize the extra work so he issued more seed to the settlers asking them to fill in the gaps themselves. Regrettably, both sides stuck to their original positions and thus the gaps remained unplanted.

The farm budgets which were suggested by the settlement planners expected that each settler would obtain a cash income of £25 per annum as a result of planting five acres of sisal and two acres of maize and keeping two cows (6, pp. 5-6). For reasons which have been mentioned, few of the settlers at Mautuma planted any sisal. Two farm budgets will be suggested here. Both will be based on the assumption that this farmer will plant three acres of maize and keep two cows; three acres of maize is about the maximum acreage which is consistent with this farmer's ability to withstand risks. Also, the writer expects that the farmer will continue to hand cultivate a small plot of land on which he will plant a wide variety of subsistence crops. Thus the two budgets presented here rely upon a system of farming almost identical with that which the

farmer adopted in 1963/64. The only important differences between the suggested farm budgets and the farmer's actual performance in 1963/64 are that the budgets assume that the farmer's maize and milk yields will be somewhat higher than those which he was able to obtain in 1963/64.

The first budget shown in Table 15 assumes that the farmer's milk yield will be 200 gallons per cow and his maize yield eight bags per acre. Although these yields are higher than those which the farmer obtained in 1963/64, the writer believes that they are similar to the average yields which farmers at Mautuma have been able to obtain after 1963/64. This opinion is based primarily on the result of a visit which the writer made to Mautuma in 1966 for no yield statistics are available. Plan 1 returns a farm profit of £55. This represents a cash surplus of about £21 and thus this plan does not quite meet the income target of £25.

The second plan assumes that the milk yield will be 300 gallons per cow and the maize yield 12 bags per acre. In the farm management survey of this settlement scheme in 1963/64 only two of the farmers were able to obtain milk yields as high as 300 gallons per cow. None of these farmers obtained a maize yield higher than five bags per acre, although this was primarily the result of the especially unfavorable conditions which prevailed in that year. Plan 2 represents what the writer believes a good farmer could achieve. This plan returns a farm profit of £80 and about £46 of this would be a cash surplus.

From the previous discussion it appears that this farmer could achieve a cash income almost as high as that which the settlement planners expected if he continues to farm in the same way that he did in 1963/64 but he obtains an average maize yield of eight bags per acre and an

average milk yield of 200 gallons per cow (Plan 1). This would appear to be a reasonable expectation. The better than average farmer would be able to exceed the target cash income (Plan 2) but the results of Farm Number Three's operations in 1963/64 illustrate that many settlers will have difficulty in repaying their loans to the Department of Settlement in years when production conditions are unfavorable. Even in good years it seems that some of the poorer farms will not be able to obtain any cash surplus.

## Conclusions

Three small-scale farms have been discussed in this chapter. These farms were chosen from three samples of farmers included in farm management surveys in 1963/64 on the high-density settlement schemes at Ndalat and Mautuma and on the low-density settlement scheme at Keben. The farms examined in this chapter ranged in size from 10 to 30 acres. This size range was sufficient to include the important farm sizes found on settlement schemes in areas of high agricultural potential.

Only a limited amount of information was available concerning the small-scale farms. Thus, the conclusions suggested here, like those suggested in the previous chapter for the large-scale farms, must be regarded as tentative.

All of the farms described in this chapter were chosen to represent typical farms with average levels of farm profits. Some of the farm budgets suggested for these farms were used to represent situations similar to those found on the most successful farms. Many farms which were far less successful than any of those described in this chapter could have been used for the analysis. However, as the subsequent

discussion will show, this would have served only to emphasize the conclusions suggested below. Generally the less successful farms were those which obtained poor yields. Also, most of the farmers at Keben who operated more than one small-scale farm were rather unsuccessful.

The three farmers described in this chapter made cash incomes which were so low that it would have been very difficult for them to pay their loan installments to the Department of Settlement. However, their cash incomes would have been sufficient to provide them with reasonable levels of living if they had not repaid any money to the Department of Settlement. None of the three farmers made a cash income which even approached the target levels set by the settlement planners. Among the whole sample of farmers studied in 1963/64 a few were able to attain the target incomes. If allowance is made for the fact that the tea at Keben was not in production in 1963/64 and for the exceptionally low maize yields obtained by some farmers in that year, especially those at Mautuma, perhaps 20 percent of the settlers would be able to meet the target income requirements. In 1963/64 several farmers were observed to have sold mature dairy cattle, a capital asset, and this may be regarded as further evidence of their inability to meet their cash needs.

Although the discussion in this chapter was restricted to the achievements of settlers as farmers, mention should be made of the fact that some settlers were able to obtain extra income in addition to that which was obtained from their farms. In particular, when a settlement scheme is created a whole new community comes into being and this creates new opportunities for employment. By far the major source of employment for settlers is their co-operative society. However, probably less than five

percent of the settlers can obtain extra income in this way and thus, these additional sources of income are insufficient to materially affect the ability of settlers to repay their loans.7/

Further evidence that settlers have difficulty in repaying their loans to the Department of Settlement is available from the Department's statistics. For example, if repayments which had been outstanding for only six months are neglected, all settlers together had repaid only 64 percent of the total value of the loan installments which the Department of Settlement had billed to them up to June 30, 1966. If the loan repayments which had been billed to settlers within the six months prior to June 30, 1966 are included, only 39 percent of the total value of the loan repayments which had been billed to settlers had been repaid (2, p. 62). Thus there would seem to be little doubt that a large proportion of the money which settlers owe to the Department of Settlement will not be repaid.

Most settlers had borrowed between 80 and 100 percent of their farming capital. This has meant that the settlers have to make a large repayment to the Department of Settlement each year. Generally, settlers can do this only if they farm intensively and obtain good yields. Most of the settlers do not have the management ability to obtain sufficiently high yields and some of the settlers find it difficult to farm intensively because they cannot obtain enough short-term capital or machinery services.

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7/ The Department of Settlement is also an important employer in the early stages of settlement. On high-density settlement schemes all settlers are offered employment with the Department of Settlement for the first six months after their arrival. This is primarily a welfare measure and is paid for with a grant from the British Government.

Difficulties over obtaining a machinery contractor at the right time may also cause maize yields to be low as a result of late planting. Most settlers do not suffer from a shortage of long-term capital for the loans which were issued to them when they started farming were sufficient to enable them to obtain most of the livestock, permanent improvements and equipment which they needed. However, Kenya is now experiencing an acute shortage of mature dairy stock and new settlers may not be able to obtain the dairy cattle which they require despite the fact that loans may be available to allow them to purchase the animals (2, p. 2).

Although the better farmers may be able to repay their loans and obtain the target cash incomes, even these farmers may experience difficulty in a poor year. This was illustrated in the discussion of the farm at Mautuma. Among the settlers who were included in the farm management survey at Mautuma in 1963/64, the highest maize yield which any farmer obtained was only five bags per acre and none of the farmers was able to attain the target cash income of £25.

The poor standard of farming which was practiced by many settlers appears to be not entirely due to a lack of managerial ability but partly a result of the fact that the majority of settlers have come from an environment which is entirely different from that found on the settlement schemes. Most settlers have never been involved in a cash economy such as that on the settlement schemes. Probably few farmers understand that intensive farming with high levels of management is necessary if their loan repayments are to be made; most settlers will learn this only from experience. Furthermore, some settlers hold political opinions which discourage them from making payments for land which they believe is theirs by right. However, this attitude is perhaps less true of settlement

schemes in Western Kenya than of those in the central part of the country.

These conclusions appear to be applicable both to the high-density and to the low-density settlement schemes. Although the settlers on the low-density settlement schemes were supposed to have been selected from people with farming experience while those on high-density schemes came from the ranks of the landless and unemployed, there did not seem to be any noticeable difference between the farming performances of these two groups of settlers. However, the evidence on this point was scanty.

The farm budgets reviewed in this chapter illustrated that considerable improvements in farm incomes could be obtained by settlers. Improvements in the agricultural extension services, the machinery contracting services, the availability of short-term credit and the organization of settlers' co-operative societies would be helpful in enabling settlers to increase their incomes. Also, if settlers were to work harder themselves they could reduce their dependence on hired labor and increase their cash incomes. Similarly, many settlers could sell more farm produce if they chose to consume less themselves. Some improvement has taken place in the last few years. For example, there is evidence that an increasing number of settlers are now using improved varieties of maize seed and using artificial insemination rather than natural breeding (2, pp. 4-8). However, the writer finds it hard to believe that these improvements will be adopted sufficiently rapidly or by enough settlers to materially alter the major conclusions of this chapter, namely that a substantial proportion of the settlers will not be able to repay their loans and that only a few of them will be able to attain the target income levels.

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# CHAPTER 7

## THE EFFECT OF AFRICAN SETTLEMENT ON FOOD PRODUCTION

In this chapter an attempt is made to compare the African operated large-scale farms and the small-scale farms on the settlement schemes with respect to their effects on food production. The data which are used for this analysis are drawn from the farm management surveys which have been referred to previously (1, 2). While the data for the small-scale farms relate to the 1963/64 season and those for the large-scale farms to the 1965/66 season, the writer believes that these two sets of data can be compared without seriously prejudicing the analysis.

Some adjustments to the data were made, however, in order to place the two groups of farms on a comparable basis. The most important of these adjustments were as follows: First, the large-scale farms all employ laborers who plant subsistence crops of their own. Estimates of the laborers' subsistence food production and consumption were made and the data for the large-scale farms which are presented in this chapter include food produced both by the farmers themselves and by their farm laborers.

Second, in order to compare the extent of food production per unit area of land on the two groups of farms, it was necessary to adjust the sizes of the small-scale farms on the settlement schemes. On the three settlement schemes which are discussed here, between six and 12 percent of the land area was used for non-farm uses such as community centres and roads, etc. (3, p. 51). Thus, in order to make the land areas of

the small-scale farms and the large-scale farms comparable, the acreages of the small-scale farms have been increased from between six to 12 percent, depending upon which particular settlement scheme was involved.

Finally, where the large-scale and the small-scale farms were producing identical products but were selling them at different prices, one single price has been used for all of the farms. This adjustment was important only in the case of milk. In 1965/66 the small-scale farmers received a lower milk price than the large-scale farmers, primarily because the settlers' co-operative societies deducted their margin from the final milk price before paying the settlers. In fact, the average price received by the settlers' co-operative societies was higher than that which the large-scale farmers received for the latter sold a smaller proportion of their milk in the higher priced whole-milk market. In this analysis interest is centered on milk production from a national viewpoint rather than from that of the individual farmers; thus it seemed appropriate to use one single price for all of the farms (1/80 shillings per gallon, the overall average price which was received by all farmers together). Also, there would appear to be no inherent reason why the farmers on the settlement schemes should be able to sell a larger proportion of their milk in the whole-milk market.

Table 16 contains a summary of the values, in 1965/66 prices, of food production on the sample of large-scale farms in 1965/66 and the three samples of small-scale farms in 1963/64. The value of total food production per acre on the three settlement schemes at Keben, Ndalat and Mautuma was greater than that on the large-scale farms. The two settlement schemes at Keben and Ndalat each produced food worth 121

TABLE 16. FOOD PRODUCTION FOR SALE OR SUBSISTENCE: LARGE-SCALE FARMS IN 1965/66 AND SMALL-SCALE FARMS IN 1963/64 *

| | Large-Scale Farms (30 farms) | Settlement Schemes: Keben (27 farms) | Ndalat (30 farms) | Mautuma (21 farms) |
|---|---|---|---|---|
| | | (Shillings per Acre) | | |
| Total Food Production: a/ | | | | |
| Maize | 16 | 34 | 43 | 24 |
| Wheat | 6 | - | - | - |
| Milk | 39 | 83 | 74 | 51 |
| Cattle b/ | 16 | 1 | 2 | 7 |
| Other c/ | 3 | 3 | 2 | 19 |
| | 80 | 121 | 121 | 101 |
| Saleable Surplus: | | | | |
| Maize d/ | 3 | 20 | 22 | (12) |
| Wheat | 6 | - | - | - |
| Milk | 37 | 63 | 42 | 40 |
| Cattle | 16 | 1 | 2 | 7 |
| Other | 1 | 2 | - | 8 |
| | 63 | 86 | 66 | 43 |
| Subsistence: e/ | | | | |
| Maize | 13 | 14 | 21 | 36 |
| Milk | 2 | 20 | 32 | 11 |
| Other | 2 | 1 | 2 | 10 |
| | 17 | 35 | 55 | 57 |

* All of the food has been valued using 1965/66 price levels. Milk which was sold was valued at 1/80 shillings per gallon and all maize was valued at 37/00 shillings per 200 pound bag. Milk which was consumed by farmers was valued at 1/50 shillings per gallon. This is a somewhat arbitrary valuation but it does represent the approximate sale value of the milk if it is assumed that about half of the milk could be sold as whole milk and the other half as butterfat.

a/ This is the total amount of food which is available for use as human food. Farm requirements for use as seed or stockfeed have been deducted.

(continued)

b/ Some of this item represents an increase in dairy herd valuations. As most of the farms are fully stocked, the portion of this item which represents the appreciation in livestock values could be regarded as a saleable surplus.

c/ The category "Other" includes primarily native poultry, potatoes and vegetables.

d/ The figure in parentheses is a deficit.

e/ All of this food was produced by the farmers or the laborers except for a portion of the maize at Mautuma (the deficit of 12/00 shillings per acre). The values which are shown for farmers' consumption of food are based partly on detailed figures available from the farm management surveys and partly on estimates. The values shown for farmers' milk consumption are based entirely on detailed figures from the farm management surveys. Some of the farmers' and laborers' maize and poultry consumption was based on estimates. The most important estimate involved the assumption that one family consumes 12 bags of maize each year.

shillings per acre. Thus, as the average value of food production on the large-scale farms was only 80 shillings per acre, both of these settlement schemes produced about 50 percent more food than did the large-scale farms. Mautuma settlement scheme produced only 101 shillings worth of food per acre. Although this was about 25 percent higher than the value of food production per acre on the large-scale farms, food production at Mautuma in 1963/64 appears to have been unusually low on account of the very poor maize yields which the settlers obtained in that year. If the farmers at Mautuma had received an average maize yield of eight bags per acre, rather than two and one-half bags per acre as was the case in 1963/64, the value of food production at Mautuma would have been about 155 shillings per acre. Thus, in a more normal year, the value of food production at Mautuma should approach almost twice the level of food production per acre on the large-scale farms. Mautuma Settlement Scheme includes the smallest farms of any which are discussed here; the land is farmed more intensively at Mautuma than is the case in the other areas which are the subject of this analysis; thus it would appear to be realistic to expect that Mautuma Settlement Scheme would produce the greatest amount of food per acre.

Not only was the total value of food production per acre higher on the small-scale farms but the total values of each of the two major products, milk and maize, were higher on the small-scale farms as well. Both Keben and Ndalat Settlement Schemes produced about twice as much maize and milk per acre as did the large-scale farms. Although milk production at Mautuma was only about 30 percent greater than that on the large-scale farms, if the settlers at Mautuma had received an average maize yield of eight bags per acre, maize production at Mautuma would

have been at least four times as great as that on the large-scale farms.

Aside from the effects on total food production, subdividing large-scale farms into small farms may affect the composition of farm output; the two groups of farms may produce the same products but in different proportions or one group of farms may produce some products which the other group does not produce. In the areas which were covered by the writer's farm management surveys, maize and milk were the major farm products both on the large and small-scale farms. The data which are presented in Table 16 show that the average total value of milk production per acre was about twice the average total value of maize production per acre, both on the three settlement schemes at Keben, Ndalat and Mautuma and on the large-scale farms. Thus, in the survey areas, the composition of farm output is quite similar on both groups of farms. The large-scale farms, however, did produce a small amount of wheat, none of which was produced by the small-scale farmers. Also, cattle production was more important on the large-scale farms.

In the mixed farming areas of the "White Highlands" the major farm products are milk, maize, wheat and pyrethrum (Table II, Appendix I). All of these products, apart from wheat, are suitable for production on both large and small-scale farms. It would seem that if large-scale farms are subdivided into small farms, the composition of farm output would be changed appreciably only in those areas where wheat can be produced.

In the areas which were included in the writer's farm management surveys, both wheat and maize can be grown, although wheat production conditions are not good on account of the high rainfall; the net returns per acre from wheat are usually less than those from maize (2, pp. 18 and 20). In addition, on small-scale farms, wheat production is difficult to

mechanize. These two reasons probably explain why none of the small-scale farmers in the survey areas had planted any wheat. On the large-scale farms, however, even in the relatively high-rainfall areas which were covered by the writer's surveys, some farmers may grow wheat as well as maize. Probably the reason for this is that wheat production on a large scale is easier to manage than maize production, for maize requires a much higher labor input than does wheat. However, the data in Table 16 show that this factor was not important in the survey areas (only seven of the 30 sample farmers grew wheat and one of these farmers produced more than half of the total).

Apart from the areas which are the main subject of this analysis, it is interesting to observe how the composition of farm output may change if large-scale farms are subdivided in other wheat producing areas. In Kenya wheat is usually produced in areas which receive an average annual rainfall of between about 30 and 40 inches and where the altitude is between about 6,000 and 9,000 feet above sea level. So far, the only wheat producing areas in which settlement schemes containing small-scale farms have been created are in the higher altitude areas (the Kikuyu settlement schemes around Thompson's Falls and in the Kinangop, where the altitude is generally above 8,000 feet). At these high altitudes maize can be grown only with difficulty; it is subject to frost damage and it takes a very long time to mature. Perhaps for this reason, wheat is still grown by the small-scale farmers on these settlement schemes (3, pp. 60-61). It would seem that at very high altitudes where maize cannot be grown, small-scale farmers will continue to grow wheat despite the difficulties of mechanizing the production of this crop.

In the other wheat producing areas of Kenya, most of which are at about 7,000 feet above sea level, the situation may be quite the reverse of that in the higher altitude areas. This, however, is only an opinion for there are very few small-scale African farms in these areas. For example, in the Uasin Gishu Plateau and the Njoro area (near Nakuru), both of which are major wheat growing areas, some samples of European farmers were included in farm management surveys between 1958 and 1962. Maize and wheat were the major crops planted by these farmers, although they had planted more wheat than maize. Even though the farmers concentrated on wheat production, the farmers' average net returns per acre from wheat were lower than those from maize. They appeared to concentrate on wheat, not because it returned the highest profit per acre but because it is easier to manage on a large scale (4, pp. 21, 22 and 57; 5, pp. 23, 25 and 59). There is no reason to believe that African large-scale farmers would behave differently. However, if Africans were to be re-settled on small-scale farms in these areas, the writer believes that they would concentrate on maize production and plant little if any wheat. Maize returns a higher income per acre than wheat; it is the staple food crop and usual cash crop of these people and on small-scale farms the high labor requirement of maize presents few problems while it would be difficult to mechanize wheat production. Thus it would seem that when large-scale farms are subdivided the composition of farm output would be changed substantially only if the re-settlement were to take place in areas where wheat is the major crop but where maize can be grown successfully as well.

There is one other factor which may have some effect on the composition of farm output. Table 16 shows that cattle production was more

important on the large-scale farms. This occurred mainly because a few of the large-scale farms kept native cattle while very few native cattle were found on the small-scale farms. On small-scale farms native cattle are not suitable primarily because they return only a small income per acre; high-grade dairy cattle are more profitable and can be managed without great difficulty. On the large-scale farms, however, especially on the larger farms, there are two reasons why some cattle, in addition to dairy cattle, may be kept: First, on some of the farms although very large dairy herds could be kept, these large herds would be difficult to manage; thus, some of the land may be used either for rearing dairy steers or for native cattle. Second, on those farms which are operated by large groups of partners, and these again are usually the larger farms, some of the partners may decide to keep native cattle, regardless of the interests of the farm as a whole. The main reason for this is probably that when a partner keeps his own herd of native stock, he derives all of the income from these cattle himself; if high grade dairy cattle were kept, they would be run as one enterprise for the whole farm and each partner would obtain only a share of the income.

In the survey areas, not all of the food which farmers produced was available for sale. Most farmers consumed some of their own maize and milk and possibly some native poultry or native sheep or goats as well. Most farm laborers on large-scale farms produced their own subsistence crops and native poultry and perhaps were able to obtain some skim milk or whole milk from their employers. Table 16 shows the extent of farmers' and laborers' consumption of the major food products. On the three settlement schemes the farmers consumed food worth between two and three times as much as that which was consumed on the large-scale

farms. The higher level of consumption of milk was especially noticeable on the small-scale farms, the average level of milk consumption per acre being from five to 15 times as great on the settlement schemes as on the large-scale farms. A small part of this difference probably is due to deficiencies in the data, for it was not possible to measure or estimate the extent of laborers' milk consumption on the large-scale farms. However, very little milk is consumed by these farm laborers for milk is the major source of cash income for the large-scale farmers and they do not provide milk to their laborers in normal circumstances.

Table 16 also shows the extent of the farmers' production of a saleable surplus of food. Although the figures which are shown under the heading of a saleable surplus are not appreciably different from the farmers' actual sales of food, there are some differences between these two categories. The figures for the saleable surplus include several items which had not been sold but which farmers could have sold had they elected to do so. Stocks of maize surplus to farmers' own requirements and increases in livestock numbers were the most important items. Even though the small-scale farmers consumed a higher proportion of their total food production than the large-scale farmers, the value of the saleable surplus of food from the small-scale farms was not lower than that which was available from the large-scale farms, except in the case of Mautuma Settlement Scheme. At Mautuma the value per acre of the saleable food surplus was only two-thirds as high as that on the large-scale farms. This was entirely a result of the poor maize yields at Mautuma in 1963/64. In that year, the settlers at Mautuma did not produce sufficient maize to meet their own requirements let alone produce a saleable surplus.

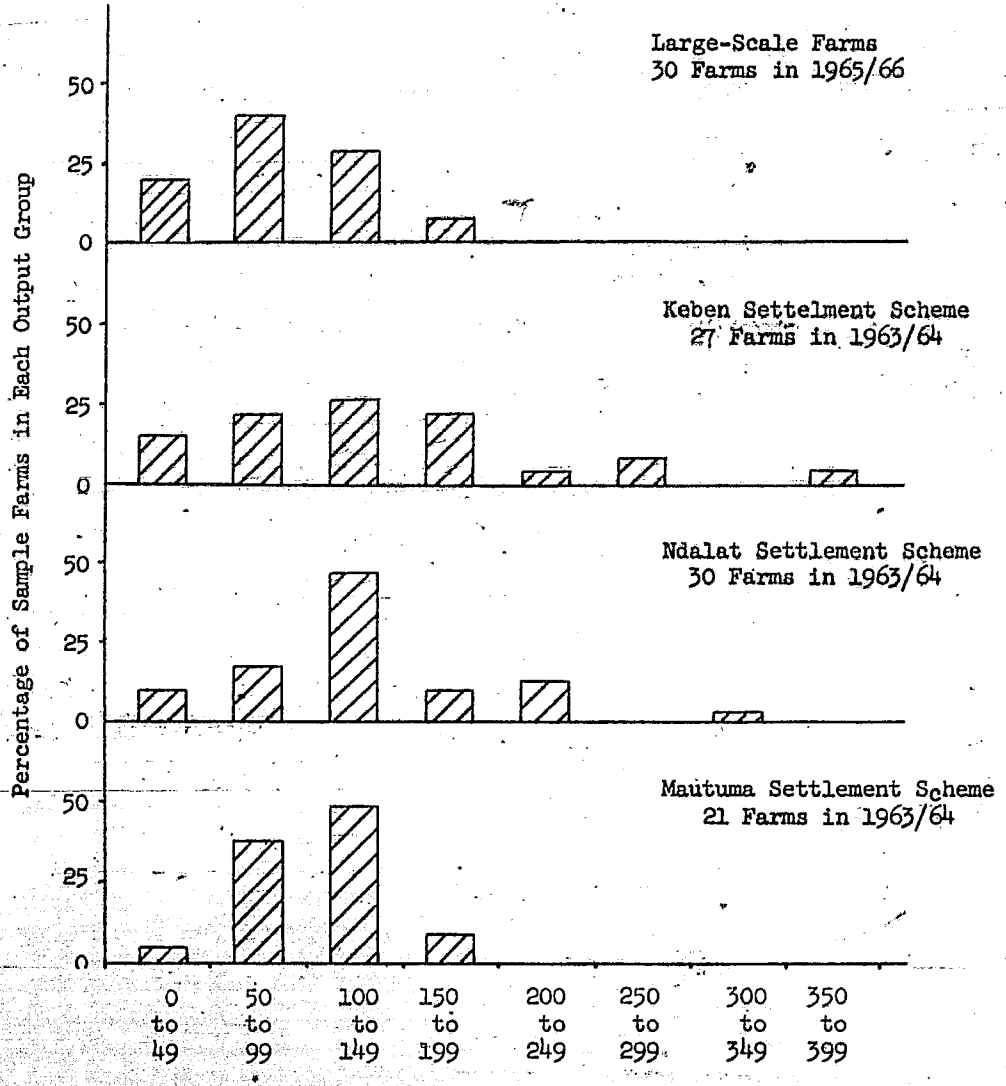
However, had the settlers at Mautuma obtained a more normal maize yield (eight bags per acre), the saleable surplus of food from this settlement scheme would have been at least 50 percent greater than that which the large-scale farmers produced in 1965/66.

The value of the saleable surplus of food at Ndalat, 66 shillings per acre, was only a little better than that which the large-scale farmers produced, 63 shillings per acre. However, the settlers at Keben produced a saleable surplus of food worth 86 shillings per acre, or about 35 percent more than that which the large-scale farms produced. Thus from the evidence which is available here it would appear that the small-scale farmers on the settlement schemes are able to produce a saleable food surplus at least as great as that which the large-scale farmers produce and perhaps as much as 50 percent larger.

The analysis so far has been confined to a discussion of the average levels of food production on the different farms. However, these averages conceal a large measure of variation. This is illustrated in Chart 4 which gives frequency distributions of the total values of food production on the individual farms in the four areas which were included in the farm management surveys. On all three of the settlement schemes the modal values of total food production were between 100 and 150 shillings per acre. On the large-scale farms the modal value of food production was between 50 and 100 shillings per acre. These figures correspond with the average figures which were presented in Table 16. However, it is apparent from Chart 4 that many of the small-scale farms produce no more food per acre than do the large-scale farms. Also, some of the large-scale farms produce as much food as the small-scale farms.

Chart 4. FOOD PRODUCTION ON SETTLEMENT SCHEMES AND LARGE-SCALE FARMS.

(Shillings Per Acre)



In the sample of 30 large-scale farms, 12 farms produced food worth more than 100 shillings per acre. These 12 farms included almost all of the smallest farms in the sample. Only two of these farms were larger than the median farm size and one of these farms was managed by a farmer who had an exceptionally high ability as a farmer and a larger than average amount of capital available. In Chapter 5 some of the difficulties which prevented the larger of the large-scale farms from being farmed intensively were mentioned. These included management problems, especially as many of the larger farms were operated by groups of partners rather than individual operators, and shortages of machinery. It appears that these factors prevent the larger of the large-scale farms from producing as much food as the average farms on the settlement schemes. However, the smaller large-scale farms (especially those less than 350 acres) were able to produce as much food as the average level of food production on the small-scale farms.

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## CHAPTER 8

## THE EFFECT OF AFRICAN SETTLEMENT ON NET NATIONAL PRODUCT

In this chapter the small-scale farms on the settlement schemes and the large-scale farms are compared with respect to their effects on value added or Net National Product (NNP). Both the method of analysis and the sources of data which are used in this chapter are similar to those which are described in Chapter 7.

The procedure which was adopted in order to estimate the individual farms' contributions to NNP was as follows: The value of farm output in 1965/66 prices was calculated for each farm. Then, the value added by each farm was estimated through deducting from the value of farm output all expenses for purchased farm inputs, except the amounts spent for labor, interest and land rent. Finally, the cost of the government operated agricultural extension and credit services, etc., was deducted from the value added in order to arrive at each farm's contribution to NNP.

In order to ensure that the data for the two groups of farms were placed on a comparable basis, several adjustments were made to the data. Three of these adjustments were described in Chapter 7. These involved: first, including laborers' subsistence production together with the other large-scale farm data; second, increasing the size of the small-scale farms to allow for the land which is used for non-farming purposes such as community centres; and finally, for both groups of farms, valuing farm output on the same basis regardless of the actual prices which were

received by the different farmers. In addition to these three adjustments, one other adjustment was made to the data which are used in this chapter. This was necessary in order to allow for the effects of the co-operative societies on the settlement schemes.

On the three settlement schemes which are the subject of this analysis, those at Keben, Ndalat and Mautuma, the co-operative societies provided a range of services to the settlers. All three of the co-operatives collected, transported and sold the settlers' milk. Also, they provided some machinery contracting and cattle dipping services for the settlers. However, in no case was the co-operative society the only machinery contractor for private contractors were operating as well. Also, the cattle dipping service at Ndalat has been taken over by a private contractor recently. These three services, selling milk, operating cattle dips and machinery contracting, were the most important services which the co-operative societies provided to settlers. However, some of the co-operatives provided additional services such as selling maize, repaying settlers' loan installments through regular deductions from their monthly milk receipts and administering short-term credit.

In order to estimate the value added by each farm, the individual farmers' expenses for purchased inputs and the co-operative societies' expenses, other than for labor and interest, have been deducted from the figures for the value of farm output (in such a manner that no double counting was involved). In deducting the co-operative societies' expenses, several problems arose and some arbitrary decisions had to be made. These problems stemmed primarily from a lack of data although another problem was presented in that the co-operative societies' expenses could

be allocated to individual farms only in an arbitrary manner. No data were available concerning the financial operations of the private contractors who operated the tractor cultivating or cattle dipping services. Audited accounts for the co-operative societies at Keben and Ndalat were available although only estimates of the financial accounts of the co-operative society at Mautuma could be obtained (1, 2, 3).

Because of the incomplete information available concerning the costs of operating the cattle dipping and machinery cultivating services, the procedure used here has been to deduct from the value of farm output on each farm the prices which the small-scale farmers actually paid for these services. Possibly, this procedure has penalized the small-scale farms for part of the price which settlers pay for these services should represent either wages or profits. However, the lack of data necessitated this approach and if the small-scale farms have been penalized the effect will have been small; the cattle dipping services represent only a small item of expense (three to four shillings per acre) and there is evidence to suggest that the private contractors do not earn a large surplus from their operations.1/

The costs which were incurred by the co-operative societies both in connection with their administration and with their handling of milk were obtained from their accounts and these costs were charged to the individual farms. As most of these expenses are of an overhead nature,

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1/ While no figures relating to private contractors' expenses are available, several contractors have discontinued operations which suggests that they do not earn large profits. The writer discussed the matter with one contractor and he expressed the opinion that it was difficult to cover more than his costs.

they were allocated equally to each farm and not on the basis of each farm's acreage or volume of business.

Table 17 contains a summary of the average values added per acre by the large-scale farms and the three samples of farms on the settlement schemes at Keben, Ndalat and Mautuma. No account of the costs of the government operated services which are provided to these farmers has been taken at this stage although this will be discussed later in this chapter. The figures presented in Table 17 conform to a pattern quite similar to that shown by the statistics for food production given in Table 16, Chapter 7. The average values added per acre by the two settlement schemes at Keben and Ndalat were substantially higher than the average value added by the large-scale farms; the average value added at Keben, 100 shillings per acre, was almost twice as high as that which the large-scale farms produced, 51 shillings per acre. Ndalat with an average value added of 89 shillings per acre was not quite as good as Keben but even so this was still 75 percent higher than the average value added by the large-scale farms. However, the average value added at Mautuma, 56 shillings per acre, was only a little better than that which the large-scale farms produced.

Due to the special circumstances which prevailed in 1963/64, some of the figures for the values added on the settlement schemes appear to be lower than may be expected in the long term. This is especially true of Mautuma on account of the very low maize yields which the settlers at Mautuma obtained in 1963/64. If these farmers had obtained an average maize yield of eight bags per acre rather than two and one-half bags per acre, as was the case in 1963/64, the average value added at Mautuma

TABLE 17. VALUE ADDED: LARGE-SCALE FARMS IN 1965/66 AND SMALL-SCALE FARMS IN 1963/64 *

| | Large-Scale Farms (30 farms) | Settlement Schemes | | |
|---|---|---|---|---|
| | | Keben (27 farms) | Ndalat (30 farms) | Mautuma (21 farms) |
| | (Shillings per Acre per Annum) | | | |
| Farm Output | 83 | 128 | 121 | 101 |
| Expenses: | | | | |
| Machinery a/ | 15 | 3 | 14 | 21 |
| Depreciation b/ | 5 | 12 | 7 | 9 |
| Purchased Requisites c/ | 12 | 9 | 9 | 12 |
| Co-operative | - | 4 | 2 | 3 |
| | 32 | 28 | 32 | 45 |
| Value Added | 51 | 100 | 89 | 56 |

* All of the data is in 1965/66 prices (see the footnote to Table 16).

a/ Machinery expenses include the cost of fuel and oil, spares and repairs, depreciation and any machinery contracting.

b/ This includes depreciation on everything except machinery.

c/ This item consists mainly of fertilizer, purchased cattle feed, dip fluid or veterinary expenses.

would have been about 110 shillings per acre, i.e. more than twice the level which the large-scale farms produced. Similarly the settlers at Keben obtained an average maize yield of only five bags per acre in 1963/64 and if they had received eight bags per acre they would have produced an extra value added of 21 shillings per acre. Probably an even more important addition to the average value added at Keben will be obtained when the tea which these settlers have planted comes into production. However, estimating the possible increase in value added from this source is somewhat speculative.2/

From the above discussion it would seem fair to conclude that the average value added by the small-scale farms on the settlement schemes is of the order of twice that which the large-scale farms produce. Table 17 illustrates that this situation has arisen largely because of differences in levels of farm output for the expenses for purchased inputs incurred on the settlement schemes were not very different from those on the large-scale farms. There was a tendency for the level of expenditure on purchased inputs to be a little higher on the small-scale farms. This was most noticeable at Mautuma where the average level of expenditure, 45 shillings per acre, was about 40 percent higher than that found on the large-scale farms. At Ndalat and Keben the level of expenditure was either the same or lower than that on the large-scale farms. However, the expenses at Keben appear to have been unusually low in

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2/ On Keben Settlement Scheme there are 131 plots with land suitable for tea production (4, p. 10). If it is assumed that each of these settlers plants one acre of tea and obtains an average yield of 700 pounds of made tea per acre then, basing the calculations on the tea enterprise costs and returns which are shown in Appendix III, Table III, the average value added at Keben would increase by 31 shillings per acre when the tea comes into production.

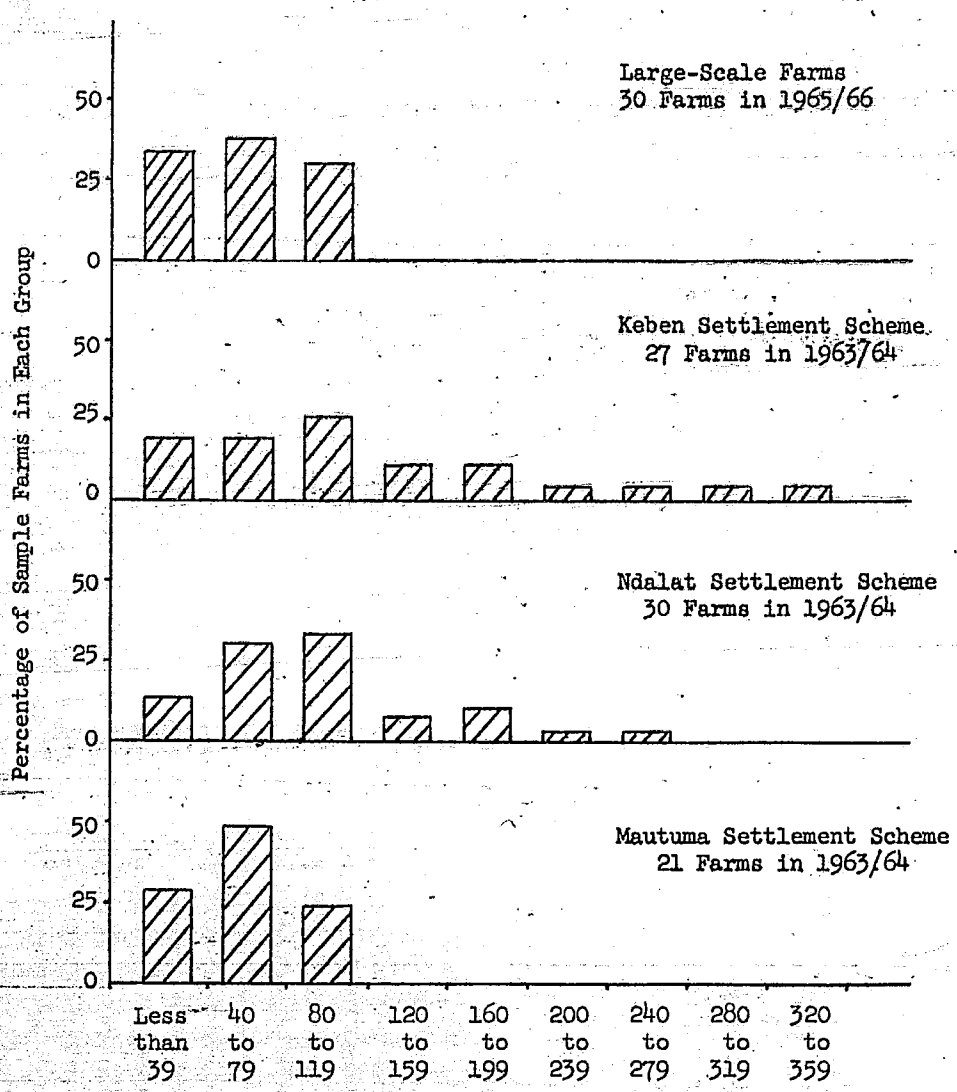
1963/64 primarily because many of the settlers at Keben used work oxen to do their cultivations in that year. If these settlers had used tractors instead of work oxen, as they are obliged to do now, the level of expenditure at Keben would have been about 15 shillings per acre higher than the level shown in Table 17.

Differences in farm output were the most important factors contributing to the higher average levels of value added on the small-scale farms. As the majority of farm output consisted of food products, the discussion in Chapter 7 which examined the reasons for the differences in the levels of food output between the large and small-scale farms is relevant here also. In Chapter 7 it was noted that there was considerable variation among all of the samples of farmers and that several of the large-scale farmers, especially the smaller ones, were able to produce as much food per acre as the average farm on the settlement schemes. In Chart 5 frequency distributions of the value added per acre on the large-scale farms and the small-scale farms on the settlement schemes at Keben, Ndalat and Mautuma are shown. These frequency distributions are quite similar to those which were shown for food production in Chart 4. On the large-scale farms the modal value of value added per acre was between 40 and 80 shillings. At Keben and Ndalat the modal values of value added were higher than on the large-scale farms, both of them being between 80 and 120 shillings per acre. However, at Mautuma the modal value of value added per acre was the same as that on the large-scale farms although this was primarily a result of the exceptionally low maize yields which the farmers at Mautuma received in 1963/64.

Only nine of the 30 large-scale farms produced a value added higher

Chart 5. VALUE ADDED BY LARGE-SCALE FARMS AND SETTLEMENT SCHEMES*

(Shillings per Acre per Annum)




* The lowest class interval is open-ended. On one of the large-scale farms and on three farms at Keben and three farms at Ndalat the values added were negative.

than 80 shillings per acre. All of these farms, except for one, were below the median farm size of the 30 farm sample; even the one exception was less than 700 acres in size. Thus the conclusions to Chapter 7 appear to be equally applicable here: The large-scale farms do not perform as well as the small-scale farms but the smaller of the large-scale farms are able to achieve levels of performance as good as that which the average small-scale farm achieves. Again, the reasons for this appear to be that the larger of the large-scale farms do not have either the management or capital resources to enable them to farm their land as intensively as the smaller farms are able to do.

So far the discussion has been confined to an examination of the values added by the individual farms, based on actual farm data and excluding the costs of the government operated services provided to these farmers. One further step in the analysis will be made. The contribution of the farms to NNP will be estimated through deducting from the previous value added figures the costs of the government services. However, the actual figures for value added will be adjusted to remove some of the differences which appeared to be peculiar to the years in which the data were collected. This adjustment will involve primarily changing the actual figures for value added under the assumption that all of the farmers, both large and small-scale, receive an average maize yield of eight bags per acre, for this level of yield appears to be the best estimate of the long run expected yield on these farms given the present level of husbandry. However, the figures for value added at Keben will also be adjusted both to allow for the increase in production which should take place when the tea at Keben comes into production and also to provide for the extra costs which these farmers now have to pay for tractor cultivations.

Table 18 contains a summary of the contributions to NNP of the large-scale farms and the three settlement schemes. The footnote to the table contains a description of the sources of data for the estimates of the costs of the government services. On a settlement scheme, as opposed to a large-scale farm, the need for government services is much higher during the first few years when the settlement scheme is being established. During the first two and one-half years, the period of so-called "Normal Supervision," the costs are highest. In addition to the usual expenses for agricultural extension, etc., the Department of Settlement has to place new settlers on their farms, issue loans and help to supervise some of the services such as marketing produce, operating tractor cultivations and dipping cattle, which in the long run will be controlled by the settlers' co-operative societies or private contractors. Originally, the Department of Settlement intended that all of these services should be taken over by the co-operatives or the private contractors before the end of the two and one-half year period. However, after the settlement schemes had been established for some while it became apparent that in many cases a two and one-half year period was insufficient to allow the settlement schemes to become well established. Thus, another two and one-half year period of "Extended Supervision" was introduced. During this period of "Extended Supervision" the Department of Settlement's expenses would be lower than in the initial period of "Normal Supervision" but still not as low as in the long term when the settlement schemes would have no need for any administrative assistance from the Department of Settlement.

TABLE 18. THE EFFECT OF AFRICAN SETTLEMENT ON NET NATIONAL PRODUCT *

| | Large-Scale Farms (30 farms) | Settlement Schemes | | |
|---|---|---|---|---|
| | | Keben (27 farms) | Ndalat (30 farms) | Mautuma (21 farms) |
| | (Shillings per Acre per Annum) | | | |
| **Value Added:** | | | | |
| Actual [a] | 51 | 100 | 89 | 56 |
| Plus Extra Maize [b] | 4 | 21 | (3) | 54 |
| Plus Extra Tea [c] | - | 31 | - | - |
| Less Extra Tractor Costs | - | 15 | - | - |
| | 55 | 137 | 86 | 110 |
| **Government Services** [d] | | | | |
| Normal | 4 | 21 | 10 | 10 |
| Extended | 4 | 9 | 5 | 5 |
| Long Run | 4 | 5 | 3 | 3 |
| **Contribution to NNP:** | | | | |
| Normal | 51 | 116 | 76 | 100 |
| Extended | 51 | 128 | 81 | 105 |
| Long Run | 51 | 132 | 83 | 107 |

* All of the data is in 1965/66 prices.

a/ From Table 17.

b/ The figure in parentheses is negative.

c/ See footnote 2/ in this chapter for the calculations.

d/ The statistics for the cost of the government services on the settlement schemes are based on the detailed estimates of the Ministry of Lands and Settlement (5). Only the cost of the field services has been included, i.e. the cost of the agricultural and veterinary extension services and the Department of Settlement's administration on the settlement schemes. None of the Department of Settlement's head office expenses have been included.

The figures shown for the government services on the large-scale farms comprise the expenses of the Ministry of Agriculture's field

(continued)

services and the expenses of the Land Bank and the Agricultural Finance Corporation. Few detailed statistics were available for any of these items. The costs of the extension services provided by the Ministry of Agriculture were based partly on figures available in the Kenya Development Plan (6, p. 160) and on information obtained from the District Agricultural Office at Eldoret. The cost of the services provided by the Land Bank were obtained from that organization's Annual Accounts (7). The cost of the services which were provided by the Agricultural Finance Corporation could not be obtained accurately for the Agricultural Finance Corporation's accounts are published in such a manner that it is impossible to allocate their expenditure between the large-scale farms and the other farms with which they deal (8). However, the field services of the Agricultural Finance Corporation are almost identical with those of the Land Bank and thus, it has been assumed that the services which are provided by the Agricultural Finance Corporation cost the same as those of the Land Bank.

During the period of "Normal Supervision" all of the expenses of the Kenya Government on the settlement schemes are paid with a grant from the British Government. After this period the Kenya Government is responsible for meeting these expenses although the writer believes that the Kenya Government is trying to obtain overseas assistance to help meet some of these costs. The Kenya Government is responsible for the expenses of the services which are provided to the large-scale farmers although overseas assistance from several sources, including the British and West German Governments and the United States Peace Corps, does help to pay for some of these expenses.

During the period of "Normal Supervision" Table 18 shows that the Government's expenditure on a low-density settlement scheme such as Keben is about five times as great as that on the large-scale farms. On the high-density settlement schemes the Government's expenses are only about half as much as those on a low-density settlement scheme but they are still about two and one-half times as great as those on the large-scale farms.3/ However, as the value added by the settlement schemes was much higher than that which the large-scale farms produced, the settlement schemes contributed more to NNP than the large-scale farms even during the period of "Normal Supervision" when the Government's expenses were highest. At Keben, during the period of "Normal Supervision," the average contribution to NNP, 116 shillings per acre, was more than twice that of the large-scale farms, 51 shillings per acre. Mautuma Settlement Scheme contributed 100 shillings per acre to NNP, about twice the level of the large-scale farms' contribution and Ndalat which contributed 76 shillings per acre was 50 percent better than the large-scale farms. Once the settlement schemes become established and the Government's expenses have been reduced to the expected long-term level, the relative position of the settlement schemes may be even better. In the long run, Ndalat Settlement Scheme should contribute 83 shillings per acre, Mautuma 107

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3/ When a settlement scheme is established the Department of Settlement incurs some expense for capital development in addition to the expenses for administration and extension, etc., which are shown in Table 18. This capital expense, which is estimated to cost about 27 shillings per acre, is associated with the extra road building, soil conservation and survey work, etc., which has to be done before the large-scale farms can be subdivided (9, p. 24). If this expenditure had been included here through charging interest on the capital used at six percent per annum, less than two shillings per acre would have been added to the costs of the government services which are shown in Table 18. All of these costs, of course, are paid with a grant from the British Government.

shillings per acre and Keben 132 shillings per acre. These figures represent improvements over the long run performance of the large-scale farms of 63, 110 and 159 percent respectively. However, if the output from tea at Keben is neglected, the average contribution to NNP at Keben falls to 101 shillings per acre in the long run and this is almost 100 percent better than the performance of the large-scale farms.

From the above discussion it appears that in areas where maize and dairy cattle are the dominant farm enterprise the small-scale farms on the settlement schemes contribute from between 50 to 100 percent more to NNP than do the large-scale farms. However, the proviso that some of the smaller large-scale farms are as successful as the average farm on the settlement schemes still applies.

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## CHAPTER 9

## THE EFFECT OF AFRICAN SETTLEMENT ON EMPLOYMENT

In this chapter the small-scale farms on the settlement schemes and the large-scale farms are compared with respect to their effects on employment. As in the previous two chapters, most of the data which are used for the analysis are drawn from the farm management surveys of large-scale farms in the Uasin Gishu and Trans Nzoia Areas and small-scale farms on the settlement schemes at Keben, Ndalat and Mautuma (1, 2).

In trying to compare the levels of employment which the small-scale and the large-scale farms provided, several problems arose. These stemmed partly from a lack of data although difficulties in defining and measuring employment were important also. In measuring the amount of employment which the farms provide, the extent of employment may be related either to the number of people who are supported by the farms or, alternatively, to the amount of actual work which is done. In this analysis the former definition of employment will be stressed, partly because it is easier to measure, but mainly because the major concern or item of interest in this analysis is the number of people who are supported or maintained on the land.

On the large-scale farms there was little difficulty in measuring the size of the labor force for, as mentioned in Chapter 5, the large-scale farms employ only those laborers who live on the farms, at least in normal circumstances. On the small-scale farms the problem is more difficult. On the two high-density settlement schemes at Ndalat and

Mautuma, none of the farmers included in the farm management surveys employed any laborers on a regular basis. However, almost all of these farmers employed some casual labor. At Ndalat in 1963/64 the average annual expenditure on labor was only 73 shillings per farm and 88 percent of the farm work was done by family labor. At Mautuma the average farmer in the survey sample in 1963/64 spent 83 shillings on hired labor and 96 percent of all farm work was done by family labor (2, pp. 73, 80, 92 and 102). The writer believes that most of this casual labor was obtained from other settlers and their families. Thus, in this analysis the small-scale farms at Ndalat and Mautuma have been assumed to support only the settlers themselves.

On Keben Settlement Scheme several of the settlers provided regular employment to laborers, although frequently these laborers did not live on the settlers' farms. In the farm management survey at Keben in 1963/64 the average annual expenditure on hired labor was 559 shillings per farm and only 42 percent of the farm work was done by family labor (2, pp. 51 and 60). Thus, on Keben Settlement Scheme the problem of defining what constituted a regular laborer arose. The procedure adopted here has been to assume that if a farmer employed a person for more than six months, then that person was a regular laborer who was supported by his employment. Anyone employed for less than six months, and frequently the periods involved were very short, was considered to be either another settler or a member of another settler's family and thus, he was not supported by his short-term employment.

Under the above assumptions, Table 19 shows the number of male workers who were supported by the large-scale farms and the settlement schemes at Keben, Ndalat and Mautuma. These figures include only employment provided

TABLE 19. EMPLOYMENT: LARGE-SCALE FARMS IN 1965/66 AND SMALL-SCALE FARMS IN 1963/64

| | Large-Scale Farms (30 farms) | Settlement Schemes: Keben (27 farms) | Ndalat (30 farms) | Mautuma (21 farms) |
|---|---|---|---|---|
| | | (Number of Adult Male Workers) | | |
| Workers Supported Per Farm: [a] | | | | |
| Farmers | 7.7 | 1.0 | 1.0 | 1.0 |
| Laborers | 12.9 | 1.4 | - | - |
| | 20.6 | 2.4 | 1.0 | 1.0 |
| | | (Acres) | | |
| Average Farm Size [b] | 687.3 | 32.8 | 20.9 | 12.5 |
| | | (Number of Adult Male Workers) | | |
| Workers Supported Per 1,000 Acres | 30.0 | 74.4 | 47.7 | 80.1 |

a/ Ascertaining the exact number of partners in some of the farm business was difficult. On some farms some of the people who were described as laborers may have had an undisclosed financial interest in the farm.

b/ The average farm sizes shown for the small-scale farms are not the actual average farm sizes for they have been increased to allow for the land which is used for non-farming purposes.

At Keben the 27 farms which are mentioned in the table included 35 small plots; six of the farmers operated more than one plot.

by the farms themselves and they do not include any additional employment provided by, for example, the co-operative societies on the settlement schemes. On the large-scale farms, the average farm supported nearly 21 people, of whom about eight were farmers or partners and the remainder laborers. All of the small-scale farms supported their owners and, in addition, the small-scale farms on the low-density settlement scheme at Keben supported an average of 1.4 laborers. If these figures are placed on a comparable basis, and the extent of employment is measured in terms of 1,000 acres of land, the large-scale farms supported 30 people per 1,000 acres.[1/] All of the settlement schemes supported more people than this. The high-density settlement scheme at Ndalat supported 47.7 people per 1,000 acres or almost 60 percent more than the large-scale farms. The settlement scheme at Keben supported 74.4 people and the scheme at Mautuma 80.1 people per 1,000 acres. The latter figures represent, respectively, 148 and 167 percent more employment than that which the large-scale farms provide.

The settlement schemes would appear then to support from 60 to 160 percent more people than the large-scale farms. However, the figure which is shown for Keben Settlement Scheme in Table 19 is higher than

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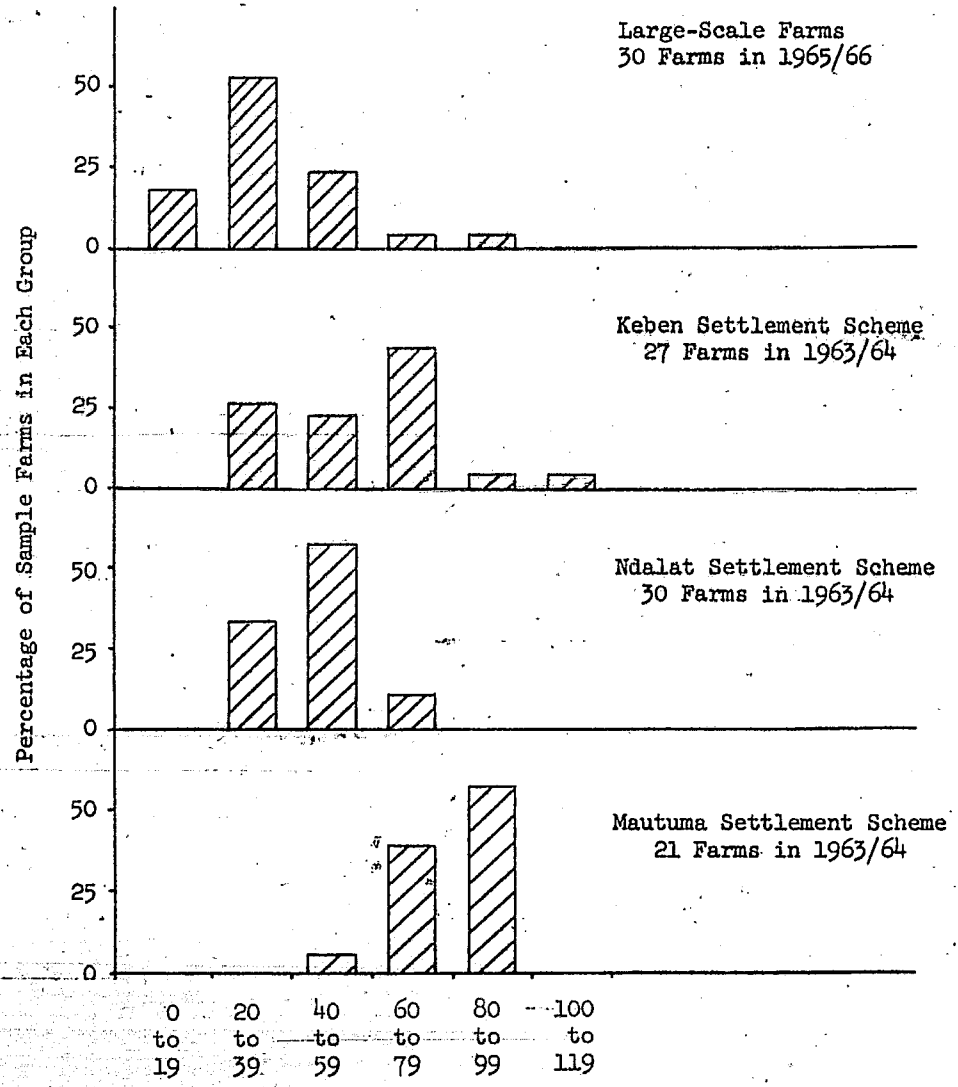
1/ In Chapter 2 it was observed that the European large-scale farms in the mixed farming areas of the "White Highlands" employed about one adult male worker per 54 acres of land, or about 19 adult male workers per 1,000 acres of land. The African large-scale farms which are discussed here supported about 30 adult male workers per 1,000 acres. However, some of these farms are operated by partnerships and many of the junior partners in these businesses do little farm work. If each African large-scale farm had supported only the hired laborers who were resident on the farm and one owner, these farms would have supported, on the average, only 20 adult males per 1,000 acres. This figure is very similar to the 19 adult male workers per 1,000 acres supported by the former European farms.

would be expected for most settlement schemes with farms of the size of those at Keben for the tea at Keben is an intensive crop which increases the farms' labor requirements. In the farm management survey on Keben Settlement Scheme in 1963/64, the tea enterprise used 52 percent of the labor which was hired (2, p. 60). If this employment is neglected, the number of laborers supported at Keben would be reduced to 52.2 laborers per 1,000 acres of land, not 74.4 as shown in Table 19. However, even this level of employment would be somewhat greater than that which Ndalat Settlement Scheme provides.

Throughout this thesis the variability in individual farms' statistics has been stressed. The statistics for employment are no exception. Frequency distributions of the amounts of labor supported per 1,000 acres of land on the individual farms in the four survey areas are shown in Chart 6. In each of the four areas the modal range of employment corresponds with the average figures which are shown in Table 19. However, the range in the levels of employment which the individual farms provided was sufficiently large so that some of the small-scale farms at Keben and Ndalat supported, per unit land area, no more people than did the average large-scale farm. None of the small-scale farms at Mautuma supported so few people. This was entirely a result of the very small farm sizes at Mautuma. At Keben the farms which supported few people tended to be those which were either larger than average or which grew little or no tea. At Ndalat the farms with a low labor to land ratio were the larger farms. In fact, as the small-scale farms at Ndalat and Mautuma supported only one adult male worker each, the frequency distributions which are shown in Chart 6 for these two settlement schemes are only

Chart 6. WORKERS SUPPORTED BY THE LARGE-SCALE FARMS AND THE SETTLEMENT SCHEMES

(Workers per 1,000 Acres)



distributions of the reciprocals of the farm sizes. On the settlement schemes the larger than average farms are generally (except for the multiple plot farms at Keben) farms which include some poor quality land.

Nine of the 30 large-scale farms provided a level of employment equivalent to 40 or more people per 1,000 acres of land. Of these nine farmers, seven employed between 40 and 60 people per 1,000 acres of land, i.e. the same level of employment as the modal level of employment at Ndalat, the settlement scheme with the lowest labor to land ratio. Four of these seven farms were below the median farm size of the large-scale farm sample and these smaller farms tended to be operated more intensively than the larger farms. The three farms which were above the median farm size and which employed between 40 and 60 people per 1,000 acres were all operated by partnerships (60 partners in one case!). Of these three farms the level of employment was high, not because the farms were operated intensively, but because the partners had acquired residence rights through virtue of their being part-owners of the businesses.

Only two of the large-scale farms provided a level of employment greater than 60 people per 1,000 acres. Both of these farms were well below the median farm size. In addition, the one that provided the highest level of employment was quite exceptional in that it was a small farm (350 acres), yet it was owned by a large group of partners (24 partners and five laborers).

From the above discussion and from some of the remarks which were made in Chapter 5, many of the large-scale farms appear to support more people than the number for which they can provide employment. Whether

these surplus workers can continue to live on these farms is questionable although the farmers would have difficulty in persuading many of them to leave. However, in the case of the farms operated by large groups of partners, the management problems have been so severe that official policy will probably place increasing pressure on these farmers to simplify their management structure and allow only those partners who are willing to work and who can be usefully employed to live on the farms.[2/]

On some of the settlement schemes underemployment could be considered a problem also, although in this case much of the underemployment is voluntary and there is little risk that it will lead to the farmers losing their means of support (unless, of course, they are evicted for non-repayment of their loans). On Ndalat Settlement Scheme, for example, the average labor input per farm in 1963/64 was only 186 man-days (defined as being eight hours' work) and only 73 of these days were provided by the settlers themselves, as opposed to other members of the family or hired labor. On Keben Settlement Scheme the average settler in 1963/64 provided only 57 days of work although at Mautuma the average settler put in 179 days of work (2, pp. 61, 75, 80, 81, and 103).[3/] In view of the small labor inputs which many of the settlers put into

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2/ cf. some proposals which were made by the Agricultural Extension Service in the Trans Nzoia (3).

3/ The settlers at Ndalat and Keben are all members of the Nandi Tribe. Traditionally the Nandi were livestock keepers and most of the work with the livestock was done by the women, children or old men. Possibly their traditions discourage the farmers at Ndalat and Keben from working hard. The settlers at Mautuma, however, are all Maragoli or Bunyore people. Traditionally these people have been cultivators and the men are accustomed to working. Perhaps this explains the higher level of labor input which the farmers at Mautuma provided.

their farms, some of them have time to work elsewhere if other forms of employment were available.

On all of the settlement schemes some employment, in addition to that which the farms provide, is available. During the early stages of settlement the Department of Settlement is the major employer although as the settlement schemes become established the settlers' co-operative societies assume this role. Most of these jobs, however, are occupied by settlers, for employers do not need to engage outsiders when there are so many settlers with free time available. Thus, even though the settlement schemes do provide some employment in addition to farm work, if this extra work were taken into account in this analysis, it would tend to overstate the extent of employment on the settlement schemes. For example, in 1966 the co-operative society at Ndalat employed 21 people but only one of these employees was not a settler. The co-operative at Ndalat caters for the settlers at both Ndalat and Sosiani Settlement Schemes, which together cover 16,523 acres of land (4, p. 51). Thus, the one job which was not held by a settler represents an amount of employment equivalent to less than one-tenth of one person per 1,000 acres of land. At Mautuma the co-operative society employed 12 people in 1966 and eight of these people were not settlers. As Mautuma Settlement Scheme includes 10,367 acres of land, this extra employment represents less than one person per 1,000 acres. No comparable figures could be obtained for Keben Settlement Scheme. However, in view of the very small labor input which the settlers put into their own farms the co-operative society at Keben is unlikely to employ many people who are not settlers. Thus no adjustment will be made to the figures for employment which are shown in Table 19.

for apart from the settlers themselves and the people who are regularly employed by them, very few other people are employed on the settlement schemes.

The conclusions of this chapter may be summarized as follows: All three of the settlement schemes discussed in this chapter supported more people per unit land area, on the average, than did the large-scale farms. In the case of Mautuma Settlement Scheme, where the farms were very small, about 12 acres each, or in the case of Keben Settlement Scheme, where the farms were larger but an intensive crop, tea, was grown, the number of settlers supported per unit area of land was about two and one-half times the number which the large-scale farms supported. However, in the case of Ndalat Settlement Scheme, where the farms were intermediate in size between those at Mautuma and Keben and where maize and dairy cattle were the dominant enterprises, the level of employment per unit of land was only 60 percent greater than that on the large-scale farms. Although there was considerable variation in each of the four groups of farms, only one or two of the large-scale farms were able to support as many people per unit of land area as did the average farm on the two settlement schemes at Mautuma and Keben. About one-quarter of the large-scale farms were able to support as many people per unit of land as the average farm at Ndalat. These labor-intensive large-scale farms tended to be either the smaller and more intensively operated farms or farms where there were large groups of partners. Underemployment was quite common in all of the areas which were studied although only in the case of the large-scale farms was this likely to lead to a reduction in the number of people supported by the farms.

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## CHAPTER 10

## THE EFFECT OF AFRICAN SETTLEMENT ON KENYA'S BALANCE OF PAYMENTS

In this chapter the small-scale farms on the settlement schemes and the African operated large-scale farms are compared with respect to their effects on Kenya's balance of payments. As in the previous chapters most of the data which are used for this analysis are drawn from the writer's farm management surveys (1, 2).

The farms which are the subject of this analysis affect the balance of payments in several ways: first, imported farm inputs are used; second, exports or import substitutes are produced; third, the people who live on the farms spend a part of their personal income on imported goods; and finally, the transfer of ownership from Europeans to Africans involved substantial capital transfer.

No account will be taken in this study of the imported goods which are used for personal consumption by the families who live on the farms. This has been neglected primarily because no suitable data are available. However, in the writer's experience the people who live on these farms spend very little money on imported goods.

The effect on the balance of payments of the various international financial transactions which were associated with the land transfer will not be examined in detail. All types of African settlement involve Kenya in borrowing from abroad in order to transfer from European to African ownership assets which already exist in Kenya. For land of the

same quality, the land and other assets (notably permanent improvements and livestock) which are transferred will be worth about the same amount of money, per acre, regardless of which type of settlement is established. Perhaps the majority of the European farmers who have sold their land have left Kenya and taken their money with them. However, no statistics are available on this subject. If all of the money used to finance the transfer had been borrowed from overseas and if all of the Europeans who were bought out had taken their money out of Kenya, then for all types of African settlement this land transfer would have adversely affected Kenya's balance of payments to the full extent of the cost of the assets transferred together with any interest due on the loans (spread over a number of years, of course). If this had been the case the effect on the balance of payments would have been substantial. In the case of the land and other assets transferred to Africans under the "Million Acre Scheme" these assets were worth about £19 million in total or about £17 per acre (Table 9, Chapter 3). No comparable figures are available for the African large-scale farms although the cost per acre should have been quite similar to that on the "Million Acre Scheme."

In actuality the effect of the land transfer on the balance of payments will not have been as severe as the hypothetical situation depicted above. A few of the European farmers whose land was purchased have stayed in Kenya and not taken their money out of the country. Part of the money received for their farms was paid to the Land Bank in order to pay off agricultural loans. Part of the money used to finance the land transfer, especially to African large-scale farmers, was obtained from sources in Kenya and part of that used to finance the "Million Acre Scheme"

was a grant from overseas, not a loan (Tables 7 and 9, Chapter 3). Thus, if the transfer of land to African farmers in different types of settlement has had different effects on Kenya's balance of payments, these differences have arisen largely as a result of the particular financial arrangements which happen to have been made in order to finance the settlements, not as a result of inherent differences in the types of farm organization. This study is concerned primarily with systems of farm organization not with international finance. Thus the effects on Kenya's balance of payments of the various international transactions involved with the land transfer will not be discussed; instead, the different farms will be compared with respect to their use of imported farm inputs and their production of exports or import substitutes for these effects are a direct result of the types of farming which are practiced.

In the farm management studies from which the individual farm data were drawn, detailed figures for farmers' expenditure on the major items of purchased input were available. However, considerable difficulty was experienced in trying to calculate the foreign exchange content of these costs. Thus the figures which are presented here for farmers' use of foreign exchange are only informed estimates. The procedure which was used to make these estimates is described in the footnote to Table 20.

Similarly, although farmers' production of different commodities was known in detail, deciding which of them constituted exports or import substitutes was sometimes difficult. In the case of pyrethrum, coffee and tea there was no problem for these products are exported from Kenya each year in large quantities and clearly they are exports. The other products, maize, wheat, milk and butter were more difficult to

classify. Maize is exported from Kenya in some years and imported in others. In the past maize has been imported less frequently than it has been exported although the future pattern of maize trade is very uncertain (3, pp. 27 and 33; 4, pp. 193 and 194). In this analysis several estimates of the farms' effects on Kenya's balance of payments will be made. One of these estimates will assume that the farmers' market surplus of maize is an export while another will assume that this surplus is an import substitute.

Kenya imports wheat in small quantities in most years and does not export any to countries outside of East Africa. However, the wheat obtained from other countries is imported primarily because it has a higher baking quality than that which Kenya produces. Thus the wheat which the African farms produce is not an import substitute. Kenya does export wheat regularly to Uganda and Tanzania. In 1965, for example, Kenya exported to these two countries wheat worth £1.7 million. This was more than 10 times the value of the wheat which Kenya imported from outside of East Africa (3, pp. 35, 43, and 45). Clearly then, wheat is an export although whether it is a source of desirable foreign currency is another question. Until 1965 all three of the East African countries used a common currency administered by the East African Currency Board. Today all three countries have their own separate currencies. These all exchange at par with each other and with Sterling. However, should either of the other two East African countries experience a foreign exchange crisis or if the East African Federation comes into being and the East African Currency is restored, then Kenya's exports to the rest of East Africa may not be a source of foreign exchange. Thus in this analysis

the effects on Kenya's balance of payments of alternative settlement schemes will be examined both under the assumption that exports to the other East African countries provide foreign exchange and alternatively that they do not.

In trade with countries outside of East Africa Kenya is a net exporter of dairy products. In 1965, for example, Kenya exported dairy products worth £0.36 million, butter being the largest item (3, p. 27). In this analysis the farmers' market surplus of milk will be treated as a source of foreign exchange equivalent to the foreign exchange earnings of the butter which could be made from this milk. A word of caution is called for, however, for as Kenya's exports of dairy products to countries outside of East Africa are worth considerably less than the total value of the dairy products which are produced on all of the African farms in the "White Highlands" the results of this analysis could be misleading if they were used to appraise very large new settlement schemes.[1/]

Kenya does export both wholemilk and butter to Uganda and Tanzania. In 1965, for example, Kenya exported dairy products worth £1.4 million to these two countries. About 41 percent (by value) of these exports consisted of butter (3, pp. 43 and 45). In terms of the return per gallon of milk from which it is produced, butter exports to Tanzania and Uganda are worth substantially less than wholemilk exports. Thus any marginal changes in Kenya's exports of dairy products would presumably

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1/ There are no statistics available for the value of milk production on the African large-scale farms. However, in 1965 the small-scale farms on the settlement schemes sold through their co-operative societies dairy products, which in terms of the export price of butter were worth £0.51 million. Thus the small-scale farms alone produce more dairy products than Kenya's total exports to countries outside of East Africa (5, p. 61; 3, p. 27).

affect the butter market and not the wholemilk market. Butter which is sold to Tanzania and Uganda obtains a slightly higher price than that which is sold outside of East Africa. In this analysis the different effects on Kenya's balance of payments of alternative settlement schemes will be studied first under the assumption that the farmers' milk surplus is sold as butter in the Uganda and Tanzania markets and second under the assumption that this butter is sold outside of East Africa.

Table 20 contains a summary of the effects on Kenya's balance of payments of the three settlement schemes at Keben, Ndalat and Mautuma and the sample of large-scale farms. The total value of the foreign exchange used for farm inputs was essentially the same in all four areas; Keben Settlement Scheme used a total of 13 shillings per acre while the other three areas each used 11 shillings worth of foreign exchange per acre.

In all four areas more than half of the foreign exchange used for farm inputs was associated with the use of machinery. These machinery costs were quite similar in all four areas, although, of course, the large-scale farmers used their own equipment while the small-scale farmers employed contractors. Although the production techniques which are employed on the large-scale farms are almost identical with those used on the small-scale farms, it may perhaps be expected that the machinery costs would be much higher on the small-scale farms; these farms are cropped more intensively than the large-scale farms; also, the fields are much smaller on the small-scale farms. But these effects may be offset, in part by more efficient use of equipment, since contractors who operate on the small-scale farms appear to work their equipment for longer hours

TABLE 20. THE EFFECT OF AFRICAN SETTLEMENT ON KENYA'S BALANCE OF PAYMENTS *

| | Large-Scale Farms (30 farms) | Settlement Schemes | | |
|---|---|---|---|---|
| | | Keben (27 farms) | Ndalat (30 farms) | Mautuma (21 farms) |
| | (Foreign Exchange in Shillings per Acre per Annum) | | | |
| **Used for Farm Inputs:** | | | | |
| Depreciation of Machinery & Equipment | 4 | 2 | 2 | 2 |
| Fuel, Spares & Repairs | 2 | - | - | - |
| Machinery Contractors | - | 6 | 4 | 6 |
| Total Machinery | 6 | 8 | 6 | 8 |
| Dip & Veterinary | 2 | 3 | 2 | 2 |
| Fertilizer [a] | 2 | - | 2 | - |
| Other | 1 | 2 | 1 | 1 |
| Total Foreign Exchange Used | 11 | 13 | 11 | 11 |
| **Exports:** | | | | |
| Butter | 34 | 62 | 42 | 39 |
| Maize [b] | 2 | 18 | 19 | (10) |
| Wheat | 7 | - | - | - |
| Pyrethrum | 2 | - | - | - |
| Coffee | 2 | - | - | - |
| Total Foreign Exchange Produced | 48 | 80 | 61 | 29 |
| Foreign Exchange Surplus | 37 | 68 | 50 | 18 |

* The large-scale farm data relate to 1965/66 and the small-scale farm data to 1963/64 although both sets of data are in 1965/66 prices.

The foreign exchange values of exports were obtained from the Statistical Abstract, 1966 and from the Maize Commission of Enquiry (3, pp. 27-48; 4, pp. 193-194).

The foreign exchange content of farm costs was obtained through multiplying the major items of imported farm input expenditure by standard percentages which were the estimated proportions of these costs which represented foreign exchange.

(continued)

These percentages were as follows:

| Item | Percentage of Farm Price which represents Foreign Exchange |
|---|---|
| Drugs & Chemicals | 50 |
| Fertilizer | 90 |
| Fuel | 15 |
| Machinery Spares | 50 |
| Machinery Repairs | 25 |
| Machinery Depreciation | 70 |
| Building Depreciation | 10 |
| Machinery Contract & Hired Transport | 30 |

Many of these figures are based largely on local experience and judgment for few statistics are available and merchants in Kenya will not usually divulge the landed cost of the items which they sell. However, in the case of the major items, tractors, fuel and fertilizers, information contained in the Statistical Abstract, 1966 was helpful. The foreign exchange content of machinery contracting services was estimated by applying the percentages shown above for fuel, spares and repairs, and depreciation, to the breakdown of contractors' expenditure as published by the World Bank in their bulletin Agricultural Mechanisation in East African Countries (3, pp. 33-38; 6).

a/ The farmers at Mautuma did use some fertilizer although this is not shown in the table. At Mautuma the Department of Settlement planted two and one-half acres of maize for each settler, charging them 250 shillings for this. This charge included the cost of the complete operation including the cost of the fertilizer which was used. It was not possible, however, to discover how much fertilizer was used and thus the total charge was treated as a charge for machinery hire.

b/ The figure in parentheses is a debit, i.e. the farmers at Mautuma did not produce sufficient maize to meet their own food requirements.

each year. For example, in 1964/65 the Department of Settlement was able to use each of its tractors for an average of 763 hours per year while the writer's farm management survey suggested that the African large-scale farmers used their tractors for an average of only 528 hours each per year (6, Table 4B). However, while the machinery costs per acre may be quite similar on both the large and small-scale farms, the writer believes that these costs will increase on both groups of farms in the future. In view of the apparent shortage of machinery contractors on some settlement schemes and because some contractors have apparently not been able to operate profitably, the small-scale farmers may have to pay higher contracting fees in the future. Likewise, on the large-scale farms much of the equipment is in poor condition and in need of replacement.

In addition to their use of foreign exchange for machinery, all of the farms used foreign exchange for other farm inputs such as drugs and dip fluid for livestock and fertilizer for crops. Again, the levels of expenditure on these items were quite similar on both the large and small-scale farms (although no fertilizer was used at Keben). As with the machinery expenses, the writer would expect that, on both groups of farms, the use of foreign exchange for fertilizer will increase in the future as the farmers gradually adopt improved methods of maize husbandry. However, even if in the future all of the farms use more foreign exchange for machinery and fertilizer, the effects of the alternative African settlement schemes on the balance of payments will not be altered substantially; as the subsequent discussion will show, differences in the use of foreign exchange for purchased inputs in alternative types of

African settlement are small; the effect on the balance of payments of their production of export products is of far greater importance.

There were more noticeable differences between the large and small-scale farms in the amounts of foreign exchange which they earned from the production of exports. If East African trade is included and if maize is treated as an export, the average foreign exchange value of the exports which were produced by the large-scale farms was 48 shillings per acre. The two settlement schemes at Keben and Ndalat both produced more than this; Keben produced 80 shillings worth and Ndalat 61 shillings worth of foreign exchange per acre. Mautuma Settlement Scheme, however, which produced only 29 shillings worth of foreign exchange per acre was worse than the large-scale farms. This poor performance was entirely the result of the low maize yields and the consequent maize deficit at Mautuma in 1963/64.

After deducting the farms' use of foreign exchange for purchased inputs from their foreign exchange earnings from exports, the farms' foreign exchange surpluses were calculated. The large-scale farms which earned an average foreign exchange surplus of 37 shillings per acre were not as successful as the settlement schemes at Keben and Ndalat. These two settlement schemes earned surpluses which, respectively, were 84 and 35 percent greater than that on the large-scale farms. Mautuma Settlement Scheme, however, produced a foreign exchange surplus only half as large as that on the large-scale farms. If, however, as shown in Table 21, the figures are adjusted under the assumption that the farmers all received an average maize yield of eight bags per acre, the position changes somewhat. All three settlement schemes now earn foreign exchange

TABLE 21. THE EFFECT OF AFRICAN SETTLEMENT ON KENYA'S BALANCE OF PAYMENTS: SOME CHANGES UNDER ALTERNATIVE ASSUMPTIONS *

| | Large-Scale Farms (30 farms) | Settlement Schemes | | |
|---|---|---|---|---|
| | | Keben (27 farms) | Ndalat (30 farms) | Mautuma (21 farms) |
| | (Foreign Exchange Surpluses in Shillings per Acre per Annum) | | | |
| Foreign Exchange Surpluses Assuming a Maize Yield of Eight Bags Per Acre But Otherwise: | | | | |
| Actual | 41 | 88 | 48 | 56 |
| Actual and tea mature at Keben a/ | 41 | 174 | 48 | 56 |
| Actual with East African trade excluded | 29 | 80 | 44 | 51 |
| Actual with maize imported | 44 | 110 | 58 | 71 |

* The general footnote to Table 20 applies to this table also.

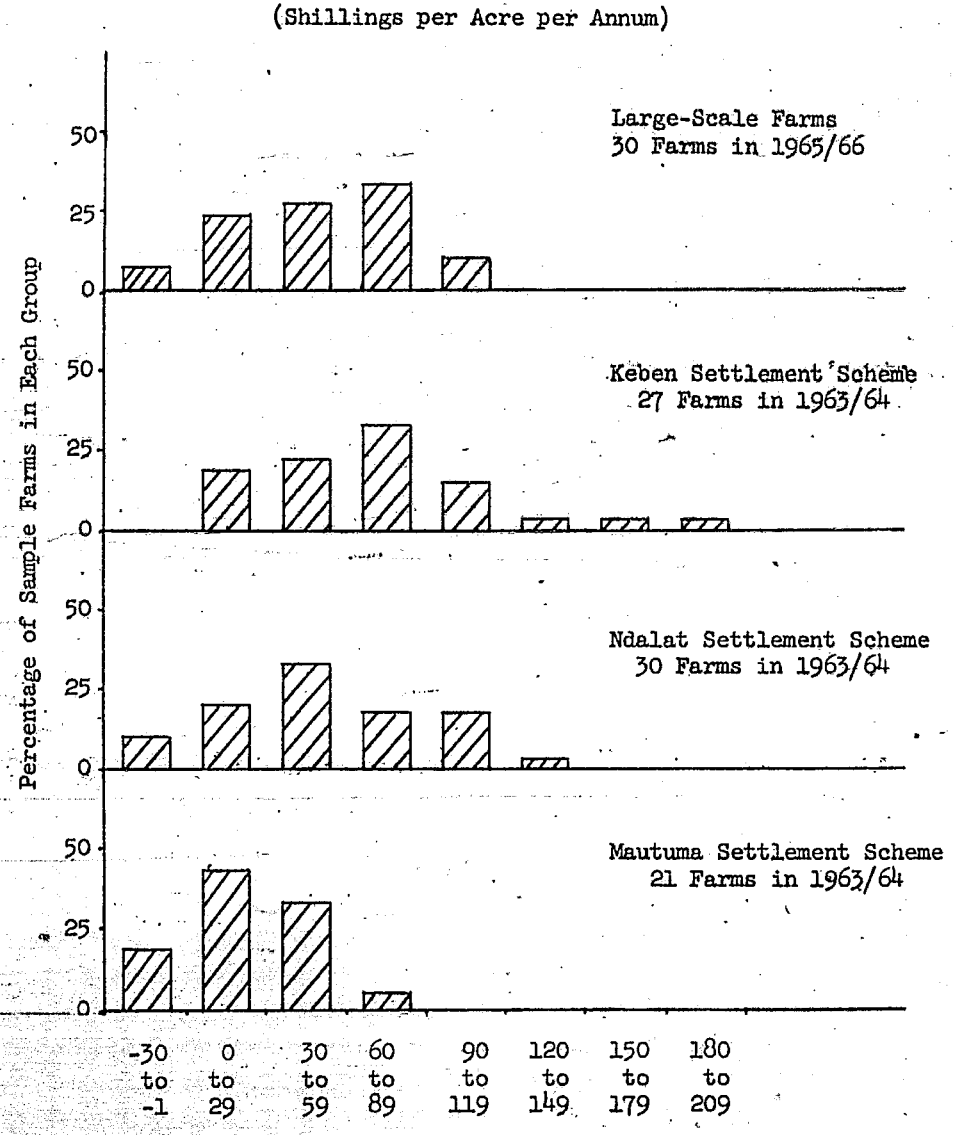
a/ The figure which is shown for the foreign exchange produced by the tea at Keben is based on the assumption that the 131 small-scale farms at Keben which have land suitable for tea production will each have one acre of tea yielding an average of 700 pounds of made tea per acre. In the farm management survey at Keben in 1963/64 the median tea acreage per farm was 0.9 acres.

surpluses greater than that found on the large-scale farms. However, the surplus at Ndalat, 48 shillings per acre, is only a little better than that on the large-scale farms, 41 shillings per acre; that at Mautuma is 56 shillings per acre or a little better than Ndalat, while that at Keben, 88 shillings per acre is over twice the level of the foreign exchange surplus on the large-scale farms. The position at Keben becomes even more favorable if allowance is made for the foreign exchange which the tea at Keben should earn. When this tea comes into production the average foreign exchange surplus at Keben should be more than four times as great as that on the large-scale farms.

Table 21 shows that if the extra export earnings from East African trade are excluded from the calculations or if maize is treated as an import substitute rather than as an export, the relative positions of the large-scale farms and the three settlement schemes remain the same as those which occurred when the actual figures were adjusted on the basis of a common maize yield; the absolute magnitudes of the foreign exchange surpluses do not change much either. In the case where the extra earnings from East African trade are excluded, all of the farms produce smaller foreign exchange surpluses. However, as wheat is excluded and as this crop is grown only on the large-scale farms, these farms suffer more from this adjustment than do the small-scale farms. In the case where maize is treated as an import substitute, which, of course, means that a given quantity of maize is equivalent to more foreign exchange than would be the case if it were exported, all of the farms produce higher foreign exchange surpluses. However, as the maize surpluses on the small-scale farms were, in physical units, greater than those on the large-scale farms, this adjustment also favors the small-scale farms.

From the above discussion it appears that all three of the settlement schemes produce larger foreign exchange surpluses than the large-scale farms. Although these surpluses at Ndalat and Mautuma were not much greater than those on the large-scale farms, the average surplus at Keben was more than twice as large as that on the large-scale farms or, four times as great if allowance is made for the extra foreign exchange earnings which should be produced by the tea at Keben. These conclusions are based entirely on the average figures shown in Tables 20 and 21. However, these average figures conceal a large amount of variability. In Chart 7 frequency distributions of the foreign exchange surpluses on the individual farms in the four survey areas are shown. These distributions are based on the actual surpluses earned, i.e. they include trade with Uganda and Tanzania, they treat maize as an export, they have not been adjusted for possible changes in maize yields and they take no account of the extra foreign exchange earnings at Keben when the tea matures. Examination of these frequency distributions suggests that the conclusions mentioned above, based on average figures, cannot be supported with any confidence. In Chart 7 the general positions of the frequency distributions and the modal levels of the individual farms' foreign exchange surpluses do not correspond at all well with the average figures shown in Table 20. The modal level of foreign exchange surplus per acre on the large-scale farms, between 60 and 90 shillings, is as high as that at Keben and higher than those at Ndalat and Mautuma. Although the poor performance at Mautuma may be explained in terms of the very poor maize yields which were obtained in 1963/64, this explanation will not suffice at Ndalat. If the results at Mautuma are neglected, Chart 7 shows that

Chart 7. FOREIGN EXCHANGE SURPLUSES ON LARGE-SCALE FARMS AND SETTLEMENT SCHEMES



the frequency distributions of foreign exchange surpluses on the large-scale farms and the settlement schemes at Keben and Ndalat are quite similar in appearance, although the modal level of surplus at Ndalat is lower than those at Keben and on the large-scale farms.

Clearly, the evidence in Table 20 and Chart 7 is insufficient to allow any firm conclusions to be drawn. The writer believes that the best interpretation that can be placed on these data is that, if the possible earnings from tea at Keben are neglected, there is essentially no difference between the large-scale farms and the small-scale farms in the foreign exchange surpluses which they earn. Certainly, any possible differences between these farms are very dependent on the level of yields obtained and the yield data available are not accurate enough to allow any firm assertions to be made about differences in average yields between the different farms. However, there can be little doubt that the foreign exchange surplus at Keben will be higher than that in any of the other areas when the tea at Keben matures.

Whether, on the average, there are differences between the large-scale farms and the settlement schemes in the foreign exchange surpluses which they produce, or not, Chart 7 shows that some of the large-scale farms were able to produce foreign exchange surpluses as high or higher than the modal levels of surpluses earned by the small-scale farms on the three settlement schemes at Keben, Ndalat and Mautuma. Thirteen of the large-scale farms earned surpluses greater than 60 shillings per acre. Three of these farms earned surpluses worth between 90 and 120 shillings per acre. All three of these farms were well below the median farm size, the largest one being only 310 acres. The 10 large-scale farms which

earned surpluses worth between 60 and 90 shillings per acre included eight farms which were below the median farm size. Thus, the most successful large-scale farms appear to be the smaller ones, whether judged from the standpoint of their effect on the balance of payments or on net national product or employment.

Although the conclusions in this chapter are based almost entirely on data taken from one particular area of Kenya, the writer believes that they would be applicable to other areas also. In Chapter 7 it was noted that when large-scale farms are subdivided, substantial changes in the composition of farm output would probably take place only in those areas where wheat was the major crop but where conditions were suitable for the production of maize also. However, even if this substitution of maize for wheat were to take place, Kenya's balance of payments would not be materially affected for the foreign exchange earnings of an acre of wheat are very similar to those of an acre of maize.

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# CHAPTER 11

## SUMMARY AND CONCLUSIONS

In this thesis an attempt has been made to appraise the economic effects of different forms of African settlement in the former "White Highlands" of Kenya. Two main forms of African settlement were studied; these were the large-scale farms operated by Africans as complete entities and the small-scale farms on settlement schemes created through the subdivision of former large-scale farms. Primarily because of a shortage of data, only a few farms of each type were studied. All of these farms were located in the Uasin Gishu and Trans Nzoia areas of western Kenya. In choosing these farms an effort was made to select farms from an area of uniform agricultural potential. Although it was not possible to find an area which contained all of the desired types of farm and where the agricultural potential was completely uniform, all of the farms which are included in the study are located in areas where maize and dairy cattle are the major enterprises, where the average annual rainfall is about 50 inches and where the altitude ranges from about 5,500 to 7,000 feet above sea level.

Most of the data for the large-scale farms used for this study were obtained from a group of farms included in a farm management study conducted by the writer during 1966. The farms covered by this study included farms ranging in size from 200 to over 2,000 acres and farms operated either by individual operators or by groups of partners.

Most of the small-scale farm data were obtained from farm management studies which the writer conducted during 1963/64 on the high-density settlement schemes at Ndalat and Mautuma and the low-density settlement scheme at Keben. These small-scale farms ranged in size from 10 acres for the smallest farm at Mautuma to over 30 acres for the largest farm at Keben. However, some of the settlers at Keben operated more than one small-scale farm as one unit. The largest of these multiple plot farms included four small-scale farms covering a total area of 80 acres of land.

There were two reasons for making the economic appraisal of the African settlement farms. First, it was hoped that the results of this appraisal would be helpful to the Kenya Government in formulating policies for future extension of African settlement. Second, the results of the analysis should be of use to the Kenya Government in trying to take measures to improve the economic performance of the African farms which exist already in the highlands. Hopefully, the analysis will be helpful in meeting both of these requirements. However, some caution is required in interpreting the results of the analysis.

Only a limited amount of data was available and much of the individual farm data exhibited a high degree of variability. Most of the data related to small samples of farms. Thus it would have been hazardous to have restricted the analysis to a comparison of the mean levels of performance of the different types of settlement; clearly, sample means cannot be expected to be good estimates of population means if small samples are chosen from highly variable populations. For this reason, the important characteristics of the different types of farm were examined both through comparing the sample means and through observing the behavior of frequency

distributions of the data. In many instances the frequency distributions were quite well-behaved and examination of the sample means alone would have been sufficient. But in other cases this might have been misleading. For example, in Chapter 10 the foreign exchange surpluses per acre produced by three settlement schemes and one group of large-scale farms were compared. If the foreign exchange surpluses of these four samples were compared using the sample means the order of ranking was different from that suggested by the modal values of the four samples. Thus there are difficulties involved if farm management data from small samples of farms are used to appraise large-scale agricultural developments such as African settlement. Nevertheless, this type of data is often all that is available. Useful results can be obtained if the data are used with caution.

Several criteria were used in order to make an economic appraisal of the alternative types of African settlement. The first criterion was the level of profits. This was not a sufficient criterion, however, since the type of organization which leads to high individual farm profits would not necessarily be superior from the standpoint of society as a whole. Other criteria were needed primarily because Kenya's economy does not fulfill all of the conditions of the perfectly competitive model and imperfections within the economy may cause the interests of profit maximizing individuals and the nation as a whole to diverge. The most important of these imperfections were the inflexible nature of farm sizes once they have been established initially and the positive market wage rate which prevails in Kenya despite the high level of unemployment. The other criteria which were suggested, in addition to the profitability criterion,

were the effects of alternative forms of African settlement on food production, employment, net national product and the balance of payments.

Farm Profits

In using a profitability criterion to appraise the alternative forms of African settlement interest was centered on comparing the levels of income, the debt repayment capabilities and the possibilities for organizing farm production more efficiently and thus for improving farm incomes on the different types of farms.

Both the samples of large and small-scale farms included units where income levels, based on current yields and conditions, were insufficient to allow the farmers to remain in business. Few of the large-scale farmers were unable to meet their financial commitments; however, a large proportion of the small-scale farmers could not do so. This conclusion was supported both by the farm management survey data and by other published statistics which show the extent of loan repayments made by the different types of farmers to public agencies. Not only was default on loan repayment more common on the small-scale farms but also many of these farmers were observed to have sold capital assets, notably mature dairy cattle, in order to increase their cash incomes. Few of the large-scale farmers sold capital assets in this way. The techniques of production and the yields obtained were essentially the same on both groups of farms. Probably the most important reason for the financial difficulties of the small-scale farmers was that they had borrowed a much higher proportion of their farming capital than had the large-scale farmers. On the average the large-scale farmers had borrowed only about 50 percent of their capital while the small-scale farmers had borrowed about 90 percent. This meant that

the small-scale farmers could meet their financial obligations only if they farmed intensively and obtained quite high yields. In contrast, the large-scale farmers were not under so much pressure to farm more intensively.

Even though default on loan repayment was widespread on the small-scale farms a few of these farmers were able to obtain the target incomes suggested by the settlement planners. During the years covered by the farm management survey there were some particular circumstances which tended to lower farm incomes on some of the settlement schemes (especially the very low maize yields at Mautuma and the fact that the tea planted at Keben was not then in production). If allowance is made for these factors perhaps 20 percent of the small-scale farmers should be able to obtain the target incomes. The less successful small-scale farmers were usually those who planted small crop acreages and obtained poor yields. However, employment of excessive amounts of hired labor and consumption of a high proportion of farm-produced output in the home were important factors contributing to low cash incomes on some farms. Also, on Keben Settlement Scheme those farmers who operated more than one small-scale farm as one unit were usually not very successful.

On the large-scale farms, although most farmers were able to meet their financial commitments, few were able to invest in any capital improvements on their farms. On most of these farms the machinery and buildings were in poor condition and the machinery insufficient to handle all the acreage that might have been cultivated. The few farmers who were able to make capital improvements to their farms were usually those who obtained high yields and planted large crop acreages. Also, these

farms were usually operated by a single owner rather than by a group of partners.

Most of the smaller of the large-scale farms were more successful than the larger ones. There were several reasons for this. Large farms are more difficult to manage and management skills were limited. Perhaps more important was the fact that many of the larger farms were operated by groups of partners while the smaller farms tended to be owned by single operators. The African farmers appeared to have been able to obtain the capital required to operate the larger farms only if they entered into partnership with others. But few of these partnership groups were able to organize management effectively. Thus there were large differences in incomes between farmers. A typical single operator on a smaller farm (say about 500 acres) obtained an income of about £800 to £1,000 per annum. He operated a motor car and lived in a large house in a manner similar to that of his European predecessor. In contrast, on a large farm operated by a group of partners each partner might have obtained an income similar to that of a farm laborer.

On both the large and small-scale farms, incomes could be improved substantially. On both groups of farms raising yields through the adoption of better methods of husbandry would be the most important means of increasing incomes. However, farming more intensively through planting larger acreages to maize or export crops also would be helpful. Probably the farmers' lack of management skills is the most important single factor preventing them from raising their incomes. Thus making better extension services available to these farmers and helping them to organize paetnership groups more effectively and perhaps the best ways in which the Government can help. Also, farmers would be able to plant larger crop

acreages and time their operations better if more machinery were available. On the large-scale farms increased availability of intermediate-term credit for machinery purchase would help. On the small-scale farms measures should be taken to improve the availability of machinery contracting services and short-term credit for the purchase of these machinery services and seeds, fertilizer, etc.

Although substantially improved incomes are feasible and the measures suggested above would be helpful in attaining this end, farmers will make the effort to improve their incomes only if given sufficient incentives to do so. Probably these incentives are not as high as the Government would like. For example, some African farmers believe that the land in the former "White Highlands" is theirs by right. Thus they do not feel any strong obligation to repay to the Government money borrowed for the purchase of this land. If they obtain profits insufficient to enable them to repay their loans they may decide that it is not worth their while to make the effort and adopt improved farming practices if the major benefit from doing so is simply to enable them to repay their land purchase loans rather than to improve their standard of living.

Food Production

On the three settlement schemes at Keben, Ndalat and Mautuma the total value of food production per acre was about 50 to 100 percent greater than that on the large-scale farms. This occurred primarily because the land on the small-scale farms was farmed more intensively than that on the large-scale farms. The evidence available suggests that on a high-density settlement scheme such as Mautuma, where the average farm size was only about 12 acres, the land was farmed more intensively than in the

other areas and the average value of total food production per acre was about twice as high as that on the large-scale farms. On the other two settlement schemes at Keben and Ndalat, both of which had average farm sizes close to 20 acres, the land was not farmed as intensively as that at Mautuma and the average value of food production per acre was about 50 percent higher than that on the large-scale farms. However, the value of food production per acre on the smaller of the large-scale farms was as high as that on the average small-scale farm.

The composition of farm output was similar in all of the areas studied. However, in an area where both wheat and maize could be grown, the large-scale farms would probably emphasize wheat production while the small-scale farms would concentrate on maize.

The total value per acre of the food consumed by the people living on the land was about two to three times as great on the small-scale farms as on the large-scale farms. Especially noticeable was the higher level of milk consumption on the small-scale farms. On the settlement schemes at Keben, Ndalat and Mautuma the average value of milk consumption per acre was about five to 15 times as great as that on the large-scale farms. But despite the higher level of food consumption on the small-scale farms, these farms produced a market surplus of food per acre as large as or slightly larger than that produced by the large-scale farms.

Employment

The large-scale farms included in the survey supported, on the average, 30 workers per 1,000 acres of land. Almost one-third of these people were owners or part-owners, the remainder being hired laborers. The small-scale farms supported more people than this per equivalent area of land. Ndalat Settlement Scheme supported 47, Keben 74 and Mautuma 80 workers per

1,000 acres. Thus the average level of employment on these three settlement schemes was between 60 and 160 percent higher than that on the large-scale farms. On the high-density settlement schemes at Ndalat and Mautuma few if any people apart from the settlers themselves were employed. On the low-density settlement scheme at Keben, however, more than half of the people employed were hired laborers.

The level of employment per acre was highest at Mautuma, primarily because this settlement scheme contained the smallest farms of any of those studied. The level of employment at Keben was almost as high as that at Mautuma only because tea, a labor intensive crop, was grown. Had no tea been grown at Keben the level of employment on this settlement scheme would probably have been similar to that at Ndalat. Some of the large-scale farms supported as many people per unit of land as Ndalat Settlement Scheme, although few supported as many people as either Keben or Mautuma Settlement Schemes. The large-scale farms which provided the highest level of employment were either the intensively operated smaller farms or those on which a large number of partners resided.

On many of the farms, both large and small-scale, the people supported by the land were not fully employed. But only in the case of the large-scale farms is this likely to lead to a reduction in the numbers employed. The problem of under-employment was most acute on those large-scale farms which were operated by groups of partners. On some of these farms a large number of people had acquired residence rights as a result of their part-ownership of the farm; but the farm could not provide employment for all of them. In view of the considerable management problems which have been experienced on these farms, measures may be taken to reduce the number

of partners and this would lead to a reduction in the level of employment.

Net National Product

For each of the farms studied in this thesis the value added was estimated through deducting the cost of purchased inputs (not including hired labor) from the value of farm output. Then the contributions of the farms to net national product (NNP) were calculated through subtracting the cost of the government services provided to farmers from the figures for value added.

Expenditure per acre for purchased inputs was quite similar on the large and small-scale farms although the government services provided to farmers were much more expensive on the small-scale farms, at least during the first few years when the settlement schemes were being established. However, the expenditure on government services was equivalent to only a small proportion of the value of farm output. Thus differences between the large and small-scale farms in the levels of their contributions to NNP were due primarily to differences in the value of farm output. On all of the farms studied most of farm output consisted of food products. Thus the remarks made above concerning differences in the level of food production between the large and small-scale farms are applicable here also.

On the three settlement schemes at Keben, Ndalat and Mautuma the average contributions to NNP per acre were about 50 to 150 percent greater than those of the large-scale farms. On Ndalat Settlement Scheme, where the average farm size was almost 20 acres, the average contribution to NNP per acre was about 50 percent larger than that of the large-scale farms. At Mautuma where the average farm size was only 12 acres the land was farmed more intensively than that at Ndalat and the average

value of the contribution to NNP per acre was about twice as large as that of the large-scale farms. On Keben Settlement Scheme the average contribution to NNP per acre was about 150 percent larger than that of the large-scale farms. However, the especially good performance of the farms at Keben was due partly to the fact that tea is produced on this settlement scheme. If tea had not been produced at Keben the average value of the contribution to NNP per acre would have been somewhat less than that at Mautuma.

A few of the large-scale farms did contribute as much to NNP per acre as the average small-scale farm. Once again the better large-scale farms were the smaller ones.

Balance of Payments Effects

In studying the effects of alternative types of African settlement on the balance of payments the objective was to see whether there were differences between farms in the extent to which they used foreign exchange for purchased inputs or earned foreign exchange through supplying export products. Substantial capital transfers between Kenya and the rest of the world did accompany the transfer of European owned land to Africans. However, the effect of external financing on the balance of payments was not studied for it was largely independent of the subsequent type of land use. Also, in the case of the existing settlement schemes, the effects of these capital transfers are of historical interest only.

The data available did not indicate that the large and small-scale farms had significantly different effects on the balance of payments, except in the rather special case of Keben Settlement Scheme. At Keben there was little doubt that the foreign exchange surplus per acre should

be at least twice as large as that in any of the other areas. This was due to the fact that tea had been planted at Keben. If tea production at Keben is neglected, the data suggest that the average foreign exchange surpluses produced by the large-scale farms and the three samples of small-scale farms were all quite similar and in the range from 40 to 80 shillings per acre.

The amounts of foreign exchange used per acre for purchased inputs were very similar on the large-scale farms and the three settlement schemes. Although the production techniques employed by both groups of farmers were much the same, it might have been expected that the small-scale farms would have used more foreign exchange on account of their using tractors to cultivate small fields. However, it appeared that machinery costs per acre were quite similar on both groups of farms. While the small-scale farms did use tractors for cultivating small fields, this disadvantage was apparently offset by the fact that the contractors who provided these services were able to use their equipment for longer periods each year than were the large-scale farmers.

Similarly the amounts of foreign exchange earned through the production of exports were much the same on both groups of farms. This was due primarily to the fact that the value of the farm output marketed by both the large and small-scale farmers was essentially the same, as was the composition of this output.

In this instance also, the large-scale farms which contributed most per acre to the balance of payments were the smaller of this type of farm.

Implications for African Settlement Policy

If the average performances with respect to the five criteria adopted

in this thesis of the large and small-scale farms were used to choose between establishing either new large-scale or new small-scale farms, the choice would not be easy to make. From a national standpoint the most important considerations are the effects on net national product, employment, the balance of payments and food production. As the average small-scale farm performed better than or as well as the average large-scale farm with respect to these four criteria, the national interest would appear to be better served if small-scale farms are chosen. But there would be little point in establishing new small-scale farms if they were to encounter the same financial difficulties as those experienced by the existing small-scale farms.

It may be possible to avoid the problem of default on loan repayment on small-scale farms if new farms are settled only with farmers who themselves can provide a substantial proportion of their farming capital. This, in fact, is being tried on the small-scale farms which are being established during the period of the current development plan, i.e. from 1966 to 1970. An alternative approach would be for the Government to reduce the capital needs of the settlers through increasing the proportion of the purchase price of each farm which is paid with a government grant. The writer would prefer the first approach. This would mean that no added government expense was necessary. Also, farmers with some capital of their own might be expected to be more capable farmers than those with no capital, especially if the latter also are unemployed and landless people, as has been the case on most of the existing settlement schemes.

From the preceding remarks it would appear that when African settlement is extended small-scale farmers will be selected on the basis of

their capital resources. It would seem reasonable to select large-scale farmers on the same basis, for the data available suggest that the most successful large-scale farmers are those with substantial capital resources of their own. Clearly, this will have an effect on income distribution. First, for any particular type of settlement it will tend to make those who are already better off more so, while not contributing directly to the employment of people in the lower income groups, especially the landless and unemployed. But if this method of selecting settlers means that a more productive type of farming is practiced a larger amount of employment may be provided in the long run. Second, the choice between large and small-scale farms will affect income distribution. The data available suggest that income distribution would be relatively unaffected if either small-scale farms or large-scale farms operated by groups of partners were chosen. But because the large-scale farms operated by partnership groups are usually poorly managed, large-scale farms of this type probably will not be chosen. If large-scale farms operated by individual owners are chosen rather than small-scale farms this will tend to have an undesirable effect on income distribution; at least, it will not help to remove some of the existing inequalities.

Within the overall categories of large and small-scale farms, a better choice may be possible if particular types of large or small-scale farms are selected. For example, the smaller of the large-scale farms, especially those less than about 500 acres, performed as well as the average small-scale farm with respect to the criteria adopted in this thesis. Thus the national interest may be served equally well whether small-scale or the smaller of the large-scale farms are chosen

for extension of African settlement. There would be some points in favor of the large-scale farms. For instance, these farms are more suitable for the production of high quality seeds and breeding stock. On the other hand, the small-scale farms may be preferred because they involve more people in land ownership.

Both the large and small-scale farmers could obtain substantially higher incomes if they were to produce higher yields as a result of adopting improved farming practices. The rate at which these better methods are adopted should be affected by the amount and quality of the extension services provided to the farmers. On a given area of land there are, of course, far fewer farms if the land is used for large rather than small-scale farms. Hence it should be easier to provide better extension services to the large-scale farms. Perhaps, for this reason, the large-scale farmers will be able to increase yields faster than the small-scale farmers.

The data presented in this thesis suggest that the large and small-scale farms obtained quite similar yields; but the average value of output per acre was higher on the small-scale farms, primarily because the land in small-scale farms was cultivated more intensively. If in the future the large-scale farms obtain yields higher than those on the small-scale farms, the extra output obtained would help to compensate for the difference in intensity of land use. But the average output per acre obtained by the small-scale farms in the survey was about 50 percent higher than that on the large-scale farms. It would seem unlikely that the large-scale farmers can obtain yields in the future so much higher than those found on the small-scale farms that this would compensate for the

effect on farm output of the more intensive land use on the small-scale farms. But the smaller of the large-scale farms in the survey obtained an output per acre quite similar to that on the small-scale farms. Thus, if the large-scale farmers do obtain in the future yields higher than those on the small-scale farms, the average output per acre on the smaller of the large-scale farms may be distinctly higher than that produced by the small-scale farms.

So far the discussion has been limited to the performance and potential for further development of existing African farms. But if African settlement is extended the land which is transferred will not all be similar to that used by Africans at present. This may affect the relative merits of the alternative forms of African settlement. For example, much of the mixed farming land which is still in European ownership is located in the Uasin Gishu and Nakuru Districts. Although both wheat and maize are grown in these areas they are the major wheat producing areas in Kenya. If this land were used for small-scale farms most farmers probably would not grow wheat. Even though the individual farmers may be able to obtain reasonable incomes from a system of farming based on maize and milk production, Kenya may experience a wheat shortage if this land is used for small-scale farms.

Most of the ranches and plantations are still in European ownership. It does not seem feasible to subdivide them into small farms. On a coffee estate, for example, if the land were subdivided, some settlers would obtain farms containing nothing but coffee while others would receive land on which no coffee was planted and perhaps on which there was no land suitable for coffee production. In the long run it may be possible to

redistribute coffee production more evenly between the small-scale farms. But in the short run coffee production would certainly be reduced and coffee is the major export crop of Kenya.

The ranches are suitable only for the extensive production of livestock. This type of farming tends to produce a cash income only at irregular intervals when livestock mature. Also, specialized production, even in livestock, if it is in the lower rainfall areas where precipitation is less reliable and livestock diseases more prevalent, is subject to higher risks. Thus this land is not well suited to small-scale production; small-scale farmers tend to have few capital reserves and they need to obtain a regular and reliable income.

The ranches and plantations could not easily be transferred to Africans even for continued use as large-scale units. They require substantial capital which few Africans possess. Neither do many Africans have any experience in operating businesses as large as these. Perhaps it will be possible for Africans to take over the ranches and plantations under some form of group ownership, through producer co-operative societies, for example. But present indications are that very few of the large-scale farms operated by groups of Africans are managed efficiently. For this reason, if the ranches or plantations are transferred to Africans, it should be done slowly so that experience can be gained with this type of organization. Some of the ranches and many of the plantations are owned by limited liability companies. It would be quite easy for Africans to gradually assume control of these through buying shares on the stock market. This, in fact, is taking place on a small scale.

Within the overall category of small-scale farms, some choice is

possible between farms of different sizes. The data available suggest that the smaller of the small-scale farms tended to be more successful with respect to most of the criteria used. But, of course, the smaller the farm the smaller the income received by the individual farmer. Thus, in choosing between the smallest farms, such as those on a high-density settlement scheme like Mautuma, and the larger farms, such as those on most low-density settlement schemes, a conflict may arise between the need to settle as large a number of people as possible and the need to provide each settler with the opportunity for earning a reasonable level of income.

The major conclusions of this thesis may be summarized as follows: Providing that the small-scale farmers can be financed in a manner less onerous than that used in the past, the costs and benefits of extending African settlement in the mixed farming areas of the former "White Highlands" would be quite similar whether Africans were settled on small-scale farms or on the smaller of the large-scale farms. The large-scale farms, however, may be preferred in areas where wheat is a major crop. There would seem to be strong justification for not permitting Africans to own and operate the larger of the large-scale farms as complete entities, especially if these farms are to be operated by groups of partners.

During the period of the current development plan, Kenya is extending African settlement by creating new small-scale farms similar to those on the previously established low-density settlement schemes. In addition, the Government is allowing Africans to buy large-scale farms intact. This does not appear to be a rational policy based on the evidence

currently available regarding the performance of the large-scale farms. Apart from this proviso, one could find little fault with Kenya's present policy for extending African settlement to new areas.

# APPENDIX I

## STATISTICAL APPENDIX

TABLE I. KENYA, LAND CATEGORIES BY DISTRICT, 1960-1962*

| Type of Land [b] | African Areas: Central Province | Nyanza Province | Kamba District | Masai District | Rift Valley Province | Coast Province | Northern Frontier | European Areas | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | | | (Square miles) | | | | | |
| Ai | 1,784 | 4,192 | 435 | 1,535 | 1,277 | 445 | - | 872 | 10,540 |
| Aii | - | - | - | 1,023 | 345 | - | - | 267 | 1,635 |
| Aiii | 234 | 399 | - | 485 | 291 | 474 | - | 1,779 | 3,662 |
| Aiv | 104 | 1,297 | - | 987 | 224 | 643 | - | 1,456 | 4,711 |
| Total High Potential Land | 2,122 | 5,888 | 435 | 4,030 | 2,137 | 1,562 | - | 4,374 | 20,548 |
| Bi | 1,058 | 809 | 1,108 | 520 | 1,343 | 425 | 15 | 1,063 | 6,341 |
| Bii | 156 | 755 | 1,177 | - | 455 | 601 | - | 275 | 3,419 |
| Biii | 194 | 636 | 1,190 | - | 1,195 | 679 | - | 3,579 | 7,473 |
| Total Medium Potential Land | 1,408 | 2,200 | 3,475 | 520 | 2,993 | 1,705 | 15 | 4,917 | 17,233 |
| Low Potential | 2,782 | - | 4,179 | 3,618 | 1,491 | 2,640 | 130 | 2,910 | 17,750 |
| Poor Ranching | - | - | 3,861 | 6,548 | 754 | 14,994 | 121,727 | - | 147,884 |
| TOTAL | 6,312 | 8,088 | 11,950 | 14,716 | 7,375 | 20,901 | 121,872 | 12,201 | 203,415 |
| No. Holdings [a] | 278,700 | 401,500 | 128,800 | 40,966 | 51,800 | 89,700 | 133,176 | 3,609 | 1,128,251 |
| | | | | (Average acres of various grades of land per holding) | | | | | |
| High Potential | 4.9 | 9.4 | 2.2 | 63.0 | 26.4 | 11.1 | - | 775.6 | 11.7 |
| Medium Potential | 3.2 | 3.5 | 17.3 | 8.1 | 37.0 | 12.2 | 0.1 | 871.9 | 9.8 |
| Low Potential | 6.4 | - | 20.8 | 56.5 | 18.4 | 18.8 | 0.6 | 516.0 | 10.1 |
| Poor Ranching | - | - | 19.2 | 102.3 | 9.3 | 107.0 | 585.1 | - | 83.9 |
| Total | 14.5 | 12.9 | 59.4 | 229.9 | 91.1 | 149.1 | 585.6 | 2,163.6 | 11.4 |

(See footnotes following page)

TABLE I. KENYA, LAND CATEGORIES BY DISTRICT, 1960-1962*

Footnotes

* Data from Kenya, Ministry of Finance and Economic Planning, Economics and Statistics Division, Kenya African Agricultural Sample Census 1960/61, and ibid., Kenya Population Census, 1962. Also from Kenya, Ministry of Agriculture, A National Cash Crops Policy for Kenya (1963), by L. H. Brown. This table is only intended as an approximation. The areas of the different grades of land are said to be accurate in the source. However, the total areas in the table conflict slightly with statistics from other sources.

a/ The figures shown for the number of agricultural holdings are the numbers from the Sample Census for the following districts: Central, Coast, Nyanza, Ukambani and the African areas of the Rift Valley Province. There are no agricultural statistics available for either Masai district or the Northern Frontier District. In fact, there are virtually no agricultural holdings as such in these areas for they are used almost entirely for nomadic livestock ranching. For these latter areas the figure shown under number of holdings is the number of adult males in these districts at the time of the 1962 population census. As there is virtually no non-agricultural employment in these areas this figure is an indication of the number of people who would have agricultural holdings in these areas if settled farming were practiced. It is thus a fairly realistic figure to use for comparison purposes.

b/ The land categories shown in the table are as follows:

A. High Potential Land. Rainfall above 35" per annum.
- Ai. With good deep soils and moderate temperatures.
- Aii. With good deep soils but too cold for two crops a year.
- Aiii. With deep soil but either a fertility or drainage problem.
- Aiv. Shallow soil not suited to arable agriculture.

B. Medium Potential Land. Rainfall 35-25" per annum.
- Bi. With good deep soil.
- Bii. With fertility or drainage problem.
- Biii. With shallow soil unsuited to arable agriculture.

C. Low Potential Land. Rainfall 20-25" per annum.

D. Poor Ranching Land. Rainfall less than 20" per annum.

In the table categories C and D were both included together under category C in the European areas for it was not possible from the statistics to distinguish between them.

TABLE II. KENYA: GROSS FARM REVENUE FROM LARGE FARM AREAS, 1956-1965 *

(Millions of £ E.A.)

| Product | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 a/ |
|---|---|---|---|---|---|---|---|---|---|---|
| Temporary Crops | | | | | | | | | | |
| Wheat | 3.5 | 3.6 | 2.9 | 2.7 | 3.5 | 2.7 | 2.1 | 3.3 | 3.7 | 3.8 |
| Maize | 2.2 | 2.4 | 2.4 | 1.6 | 1.7 | 1.8 | 2.2 | 1.6 | 1.2 | 1.2 |
| Other | 1.9 | 1.9 | 2.0 | 1.8 | 1.8 | 1.5 | 1.1 | 1.4 | 1.3 | 1.3 |
| Total | 7.5 | 7.9 | 7.3 | 6.1 | 7.0 | 6.1 | 7.0 | 6.3 | 6.1 | 6.3 |
| Permanent Crops | | | | | | | | | | |
| Coffee | 9.7 | 8.9 | 8.3 | 7.7 | 7.2 | 7.6 | 6.2 | 7.1 | 9.6 | 7.7 |
| Sisal | 2.4 | 2.1 | 2.4 | 3.6 | 4.7 | 4.1 | 4.4 | 7.5 | 6.5 | 4.3 |
| Tea | 2.9 | 3.0 | 4.0 | 4.4 | 5.3 | 4.8 | 6.6 | 6.6 | 7.6 | 6.9 |
| Sugar | 0.4 | 0.5 | 0.7 | 0.7 | 0.8 | 1.0 | 1.1 | 1.2 | 1.1 | 1.0 |
| Pyrethrum | 0.8 | 1.0 | 1.1 | 1.2 | 2.1 | 1.9 | 1.5 | 1.2 | 0.5 | 0.7 |
| Wattle & other | 0.8 | 0.7 | 0.9 | 1.0 | 1.0 | 0.9 | 1.0 | 0.8 | 0.8 | 0.9 |
| Total | 17.0 | 16.4 | 17.4 | 18.6 | 21.0 | 20.3 | 19.3 | 24.4 | 26.0 | 21.5 |
| Livestock | | | | | | | | | | |
| Cattle for slaughter | 1.9 | 1.9 | 2.2 | 2.4 | 2.7 | 2.8 | 3.6 | 3.2 | 2.5 | 2.4 |
| Sheep for slaughter | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 |
| Pigs for slaughter | 0.5 | 0.5 | 0.7 | 0.7 | 0.7 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 |
| Poultry & eggs | 0.2 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 |
| Wool | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.3 | 0.4 | 0.4 | 0.4 | 0.3 |
| Breeding stock & other | 0.4 | 0.6 | 0.6 | 0.8 | 0.8 | 0.6 | 0.8 | 0.8 | 0.9 | 1.4 |
| Total | 3.4 | 3.8 | 4.2 | 4.8 | 5.1 | 4.9 | 6.1 | 5.5 | 4.8 | 5.1 |
| Dairy Products | 4.5 | 4.3 | 4.0 | 4.5 | 4.7 | 4.4 | 4.5 | 4.4 | 4.3 | 4.1 |
| TOTAL REVENUE | 32.4 | 32.3 | 33.0 | 34.0 | 37.9 | 35.7 | 37.0 | 40.6 | 41.2 | 36.9 |

(See footnotes following page)

TABLE II. Footnotes

* Based on Kenya, Ministry of Finance & Economic Planning, Economics and Statistics Division, annual series of Statistical Abstracts. Depending on which Statistical Abstract is used slightly different estimates for the same figure can be obtained. For this reason some of the figures in this table are a little different from the comparable figures in text Table 5.

a/ Provisional figures.

TABLE III. KENYA: GROSS FARM REVENUE FROM SMALL FARM AREAS, 1957-1965 *

(Millions of £ E.A.)

| Product | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 a/ |
|---|---|---|---|---|---|---|---|---|---|
| **Temporary Crops** | | | | | | | | | |
| Maize | 1.2 | 1.1 | 1.0 | 1.0 | 1.1 | 1.1 | 1.2 | 0.7 | 0.8 |
| Cotton | 0.4 | 0.3 | 0.5 | 0.5 | 0.5 | 0.3 | 0.5 | 0.6 | 0.7 |
| Rice | 0.2 | 0.3 | 0.2 | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 |
| Pulses | 0.2 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| Potatoes | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 |
| Vegetables & other | 0.7 | 0.8 | 0.5 | 0.6 | 0.6 | 0.6 | 0.9 | 0.6 | 0.3 |
| Total | 2.8 | 3.0 | 2.6 | 2.9 | 3.1 | 2.7 | 3.3 | 2.7 | 2.6 |
| **Permanent Crops** | | | | | | | | | |
| Coffee | 0.9 | 1.3 | 1.8 | 2.2 | 2.8 | 3.3 | 3.0 | 5.4 | 5.4 |
| Sisal | - | - | 0.1 | 0.3 | 0.4 | 0.1 | 0.5 | 0.7 | 0.2 |
| Pyrethrum | 0.1 | 0.1 | 0.2 | 0.5 | 0.7 | 0.5 | 0.4 | 0.5 | 0.7 |
| Coconuts | 0.1 | 0.2 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.4 |
| Wattle | 0.3 | 0.3 | 0.2 | 0.2 | 0.1 | 0.2 | 0.3 | 0.2 | 0.2 |
| Cashew nuts | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 0.1 | 0.1 | 0.2 | 0.4 |
| Pineapples | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 |
| Tea | - | - | - | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 |
| Other | - | - | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.2 | 0.3 |
| Total | 1.6 | 2.1 | 3.4 | 4.3 | 5.0 | 5.0 | 5.3 | 7.9 | 8.1 |
| **Livestock & Dairy Products** | | | | | | | | | |
| Cattle | 1.8 | 1.9 | 1.8 | 1.9 | 1.8 | 2.1 | 2.2 | 2.3 | 2.4 |
| Sheep, pigs, goats & poultry | 0.5 | 0.5 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 |
| Dairy products | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.5 | 0.7 | 0.8 |
| TOTAL REVENUE | 6.9 | 7.6 | 8.4 | 9.6 | 10.4 | 10.5 | 11.6 | 14.0 | 14.5 |

* Based on Kenya, Ministry of Finance and Economic Planning, Economics and Statistics Division, Economic Survey, 1960, through ibid., 1966. These figures include only produce sold outside of the producing district and are thus underestimated. No statistics are available for 1956 or earlier years.

a/ Provisional figures.

# APPENDIX II

## LARGE-SCALE FARMS:

## ENTERPRISE COSTS AND RETURNS AND INPUT/OUTPUT COEFFICIENTS USED IN FARM BUDGETS

Note: The Citation Numbers shown in this appendix refer to the citations listed at the end of Chapter 5.

TABLE I. LARGE-SCALE FARM NUMBER ONE: DAIRY CATTLE *

| | Actual 1965/66 | Assuming Higher Yield |
|---|---|---|
| Expenses: | (Shillings per Livestock Unit) | |
| Labor | 39 | 39 |
| Purchased Feed | 20 | 40 |
| Transport of Milk | 20 | 25 |
| Dip | 17 | 17 |
| Artificial Insemination | 15 | 15 |
| Veterinary | 10 | 10 |
| Other | 3 | 3 |
| | 124 | 149 |
| Output | 375 | 468 |
| Net Revenue | 251 | 319 |
| Input/Output Coefficients: | (Gallons per Cow, Acres per Stock Unit and Man-Days per Stock Unit) | |
| Yield of Saleable Milk | 228 | 300 |
| Stocking Rate | 4 | 4 |
| Annual Labor Requirements | 22 | 22 |
| Labor Requirements in Peak Month (throughout year) | 2 | 2 |

* The output figures include the effects of inventory changes. Almost 70 percent of the milk was sold as whole milk at an average price of 2/26 shillings per gallon. Most of the remainder was separated and sold as butterfat at an average price, including bonuses, of 3/33 shillings per pound of butterfat. On the average all farmers in the survey sold only 45 percent of their milk as wholemilk. Thus, even though this farmer received a milk yield very similar to the average, his dairy output per cow was somewhat higher than the average. For the hypothetical enterprise with a higher yield it has been assumed that half of the extra milk could be sold as wholemilk.

The labor data are based on information available from various published farm management surveys (3, p. 57; 4, p. 61 and 8, p. 60).

(continued)

For the high yielding enterprise it was expected that most of the improved yield would result from a general improvement in cattle management, especially breeding management. This would not necessarily involve the farmer in additional expense. However, some items of expense such as purchased feeding stuffs have been increased to levels similar to those found on the better farms where high yields were obtained. However, most of the increased yield is not expected to stem from a higher level of feeding.

Throughout this thesis the term livestock unit is used frequently in order to express numbers of livestock of different ages or different types in a common unit. In order to estimate the number of livestock units the following ratios were used:

| | Fraction of One Livestock Unit |
|---|---|
| Adult Grade Cattle | 1 |
| Grade Cattle between one and two years old | 2/3 |
| Grade Cattle under one year old | 1/3 |
| Adult Native Cattle | 2/3 |
| Young Native Cattle | 1/3 |
| Native Sheep and Goats | 1/6 |

TABLE II. LARGE-SCALE FARM NUMBER ONE: MAIZE *

| | Actual 1965/66 | Assuming Higher Yield |
|---|---|---|
| **Expenses:** | (Shillings per Acre) | |
| Fuel & Machinery Repairs | 57 | 57 |
| Fertilizer | 25 | 40 |
| Labor | 25 | 33 |
| Seed | 8 | 8 |
| Transport | 5 | 8 |
| | 120 | 146 |
| **Output** | 248 | 444 |
| **Net Revenue** | 128 | 298 |
| **Input/Output Coefficients:** | (Bags or Man-Days per Acre) | |
| Yield | 6.7 | 12.0 |
| Annual Labor Requirement | 14.5 | 17.5 |
| Labor Requirement in Peak Month (May-June) | 3.5 | 4.5 |

* The output figures are based on a price of 37/00 shillings per 200 pound bag without bag.

The labor data are based on various published farm management surveys and on judgment (3, p. 57; 4, p. 61 and 8, pp. 36, 60, 80 and 102).

The higher yield from the hypothetical enterprise with a yield of 12 bags per acre was assumed to have been obtained from a general improvement in maize husbandry. Probably, more attention to the standard of cultivations, the time of planting and the supervision of labor would be the most important. This improved level of management could be obtained without any additional expense. However, the levels of expenditure on fertilizer, labor and transport have been increased to bring them up to the levels which were more generally found on the farms where higher maize yields were obtained. Unfortunately, there is only scanty and often conflicting evidence in Kenya of the potential returns which can be obtained from the use of extra fertilizer, c.f. (6) for example.

TABLE III. LARGE-SCALE FARM NUMBER ONE: PYRETHRUM *

| | Actual 1965/66 |
|---|---|
| | (Shillings per Acre) |
| Expenses: | |
| Labor | 163 |
| Fuel & Spares | 11 |
| Transport | 6 |
| Seed | 5 |
| | 185 |
| Output | 678 |
| Net Revenue | 493 |

| Input/Output Coefficients: | (Pounds of Dried Flowers per Acre or Man-Days per Acre) |
|---|---|
| Yield | 372 |
| Annual Labor Requirement | 91 |
| Labor Requirement in Peak Month (May-June) | 9 |

* The average price received by this farmer was 1/82 shillings per pound of dried flowers. This is based on a price of 157/00 shillings per pound of pyrethrins. The average pyrethrins content of the dried flowers was approximately 1.2 percent.

The labor data are derived from various published farm management surveys (3, p. 57; 8, p. 36 and 9, p. 70).

The expenses for seed and fuel and spares are estimated under the assumption that the pyrethrum crop lasts for four years.

TABLE IV. LARGE-SCALE FARM NUMBER TWO: DAIRY CATTLE *

| | Actual 1965/66 | Assuming Higher Yield |
|---|---|---|
| Expenses: | (Shillings per Livestock Unit) | |
| Labor | 35 | 35 |
| Purchased Feed | 9 | 20 |
| Transport of Milk | 13 | 18 |
| Dip | 10 | 12 |
| Veterinary | 10 | 10 |
| | 77 | 95 |
| Output | 334 | 410 |
| Net Revenue | 257 | 315 |
| Input/Output Coefficients: | (Gallons per Cow, Acres per Stock Unit and Man-Days per Stock Unit) | |
| Yield of Saleable Milk | 210 | 300 |
| Stocking Rate | 3.2 | 3.2 |
| Annual Labor Requirement | 22 | 22 |
| Labor Requirement in Peak Month (throughout year) | 2 | 2 |

* The output figures include the effects of livestock inventory changes. Over 70 percent of the milk was sold as wholemilk at an average price of 2/12 shillings per gallon. The balance was separated and sold at an average price of 3/00 shillings per pound of butterfat. For the higher yielding enterprise it has been assumed that three-quarters of the additional milk would be sold as butterfat.

The sources of the labor data and the assumptions about the higher yielding enterprise are given in Table I.

TABLE V. LARGE SCALE FARM NUMBER TWO: MAIZE *

| | Actual 1965/66 | Assuming Higher Yield |
|---|---|---|
| Expenses: | (Shillings per Acre) | |
| Fuel & Machinery Repairs | 57 | 57 |
| Fertilizer | 32 | 40 |
| Labor | 18 | 25 |
| Transport | 13 | 17 |
| Seed | 10 | 10 |
| Insecticide | 3 | 3 |
| | 133 | 152 |
| Output | 326 | 444 |
| Net Revenue | 193 | 292 |
| Input/Output Coefficients: | (Bags or Man-Days per Acre) | |
| Yield | 8.8 | 12.0 |
| Annual Labor Requirement | 14.5 | 17.5 |
| Labor Requirement in Peak Month (May-June) | 3.5 | 4.5 |

* The footnote to Table II also refers to this table.

TABLE VI. LARGE-SCALE FARM NUMBER THREE: DAIRY CATTLE *

| | Assuming Poor Yield | Assuming Average Yield |
|---|---|---|
| Expenses: | (Shillings per Livestock Unit) | |
| Labor | 36 | 36 |
| Purchased Feed | 21 | 21 |
| Dip | 12 | 12 |
| Transport of Milk | 8 | 12 |
| Veterinary | 10 | 10 |
| | 87 | 91 |
| Output | 206 | 281 |
| Net Revenue | 119 | 190 |
| | (Gallons per Cow) | |
| Milk Yield | 130 | 200 |

* The figures in this table are based primarily on the average dairy enterprise costs and returns for farms with the above milk yields (1, p. 16).

It is assumed that half of the milk is separated and sold as butterfat at an average price of 3/00 shillings per pound of butterfat, the balance being sold as wholemilk at an average price of 2/20 shillings per gallon.

The only item of expense which differs between the above two enterprises is the cost of transporting milk. This appeared to be the usual situation on the farms in the survey where the yield levels were similar to those shown above. The difference in yield does not seem to arise from a difference in the amount of purchased inputs used, rather the higher yield is obtained from improvements in dairy management such as better breeding practices and better grazing management and these forms of improvement do not involve any extra expense.

# APPENDIX III

## SMALL-SCALE FARMS:

## ENTERPRISE COSTS AND RETURNS AND INPUT/OUTPUT COEFFICIENTS USED IN FARM BUDGETS

Note: The Citation Numbers shown in this appendix refer to the citations listed at the end of Chapter 6.

TABLE I. SMALL-SCALE FARM NUMBER ONE: DAIRY CATTLE *

| | Actual 1965/66 | Assuming Higher Yield |
|---|---|---|
| Expenses: | (Shillings per Livestock Unit) | |
| Purchased Feed | 4 | 28 |
| Dip | 16 | 16 |
| Artificial Insemination | - | 12 |
| Veterinary | 5 | 10 |
| | 25 | 65 |
| Output | 259 | 376 |
| Net Revenue | 234 | 311 |
| Input/Output Coefficients: | (Gallons per Cow, Acres per Stock Unit or Man-Days per Stock Unit) | |
| Yield of Saleable Milk | 226 | 300 |
| Stocking Rate | 2.6 | 2.6 |
| Annual Labor Requirement | 22 | 22 |
| Labor Requirement in Peak Month (throughout year) | 2 | 2 |

* The output figures include the effects of inventory changes. The milk is all sold as wholemilk at an average price of 1/38 shillings per gallon.

The labor data are based on various published surveys (1, pp. 60 and 80; 13, p. 61; 16, p. 57).

The higher yield from the hypothetical enterprise was assumed to have been obtained from a general improvement in husbandry. It does not represent solely a return to a higher level of feeding. Improvement in breeding practices would probably be the most important factor.

TABLE II. SMALL-SCALE FARM NUMBER ONE: MAIZE *

| | Actual 1965/66 | Assuming Higher Yield |
|---|---|---|
| Expenses: | (Shillings per Acre) | |
| Hire of Machinery | 101 | 101 |
| Transport | 16 | 24 |
| Fertilizer | - | 40 |
| Seed | 4 | 8 |
| | 121 | 173 |
| Output | 296 | 444 |
| Net Revenue | 175 | 271 |
| Input/Output Coefficients: | (Bags or Man-Days per Acre) | |
| Yield | 8.0 | 12.0 |
| Annual Labor Requirement | 14.5 | 17.5 |
| Labor Requirement in Peak Month (May-June) | 3.5 | 4.5 |

* The figures shown under "Actual 1965/66" are 1963/64 figures updated to 1965/66.

The higher yield from the higher yielding enterprise does not represent solely the extra return to fertilizer. Better attention to planting at the right time and obtaining the correct plant population would probably be more important.

Hand cultivation has not been considered as a realistic alternative to tractor cultivations on any of the small-scale farms, at least not for the major crop enterprises. Farmers appear to be unwilling to make the effort if a tractor is available; the standard of cultivation is usually poor if done by hand and most farmers would be unable to plant more than two acres of crops if they relied solely on hand cultivation; two acres of maize would be an insufficient area of maize to allow the farmers to obtain sufficient income to be able to repay their loans.

TABLE III. SMALL-SCALE FARM NUMBER ONE: TEA *

| | Estimates Only |
|---|---|
| | (Shillings per Acre) |
| Expenses | 54 |
| Output | 945 |
| Net Revenue | 891 |

| Input/Output Coefficients: | (Pounds of Made Tea or Man-Days per Acre) |
|---|---|
| Yield | 700 |
| Annual Labor Requirement | 211 |
| Labor Requirement in Peak Month (May-July) | 22 |

* The only items of expense included here are for pruning knives, baskets, etc. The figure is based on published data from the Nyeri area (14, p. 40). No charge has been made for interest on capital used in developing tea to maturity. Generally most of this work is done with unpaid family labor.

The output is based on an estimated yield of 700 pounds of made tea per acre. This is equivalent to 3,150 pounds of leaf if conversion is made at the usual rate of one pound of made tea being equivalent to four and one-half pounds of leaf. It has been assumed that farmers would receive an average price of 30 cents per pound of leaf. In the past farmers have received a fixed price of 23 cents per pound of leaf plus a variable bonus of between five and 10 cents per pound.

The labor data are based on two published surveys from the Nyeri area (14, p. 57; 17, p. 65).

TABLE TV. SMALL-SCALE FARM NUMBER THREE: DAIRY CATTLE *

| | Assuming An Average Yield | Assuming A Higher Yield |
|---|---|---|
| Expenses: | (Shillings per Livestock Unit) | |
| Purchased Feed | 10 | 20 |
| Dip | 15 | 15 |
| Artificial Insemination | - | 12 |
| Veterinary | 6 | 10 |
| | 31 | 57 |
| Output | 260 | 354 |
| Net Revenue | 229 | 297 |
| Input/Output Coefficients: | (Gallons per Cow or Acres per Stock Unit) | |
| Yield | 200 | 300 |
| Stocking Rate | 2.2 | 2.2 |

* About 25 percent of the milk is sold as wholemilk at an average price of 1/40 shillings per gallon. Most of the remainder is sold as butterfat, the farmer receiving an average price of 80 cents per pound of cream. This farmer, who is a Maragoli, seems content to consume skim milk unlike the other farmers who have been discussed, all of whom were Nandi people, who appear to have a strong preference for wholemilk. This is understandable for the Nandi are traditionally cattle keepers while the Maragoli are not. The skim milk which this farmer consumed has been valued at an arbitrary price of 50 cents per gallon. There is no established price for skim milk.

Apart from the above remarks about milk prices, the footnote to Table I applies to this table also.

# END

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# AN APPRAISAL of AFRICAN SETTLE-MENT SCHEMES

CLOUGH, Richard Hayes