# STRUCTURE AND PERFORMANCE OF AGRICULTURAL PRODUCT AND INPUT MARKETS IN THE NORTHERN DIVISION OF MACHAKOS DISTRICT, KENYA

BY

SIMEON RATEMO ONCHERE

A THESIS SUBMITTED IN PART FULFILMENT FOR THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURE IN THE UNIVERSITY OF NAIROBI

1976

This thesis is my original work and has not been presented for a degree in any other University.

.....

Simeon Ratemo Onchere
(Candidate)

This thesis has been submitted for examination with our approval as University Supervisors.

.....

Dr. Gunter Lorenzl
(University Supervisor)

.....

Prof. Adolf Weber
(University Supervisor)

ACKNOWLEDGEMENT

This work has not been done in isolation. I am a debtor - and make no apology for listing the creditors.

My chief debt of thanks is to the German Academic Exchange Service (DAAD) for providing me a scholarship to study for a Master of Science degree in Agriculture, in the University of Nairobi.

I am also indebted to the Medical Research Centre, Nairobi (MCN) for providing me with extra funds to meet some of my research expenditures. Special thanks, in this connection, go to Dr. A.S. Muller, the leader of the "Joint Project Machakos" for successfully recruiting me into this pre-dominantly medical-team during and after the survey period.

This study owes a substantial intellectual debt to the staff members and post-graduate students of the Department of Agricultural Economics, of the Faculty of Agriculture, University of Nairobi. They were the furnace in which the hypotheses and research methodology were refined. Special thanks go to Dr. G. Lorenzl - my first supervisor; Prof. A. Weber- my second supervisor; and some of my fifteen class-mates. They read and re-read the drafts, critically discussed each chapter, but still gave me the word and smile of encouragement without which this task would never have been completed.

I thank the farmers, traders, and government officers in the Northern division of Machakos district, that I interviewed, for their co-operation. Special thanks go to the Divisional Agricultural Officer and his extension team, the Divisional Co-operative Officer, Coffee Society Secretaries, the staff of Kangundo Union Store, the Manager and the staff of Kangundo dairy, the Kangundo Division Officer (=D.O.); and all the chiefs and sub-chiefs of Matungulu and Mbiuni locations.

The data collection phase of the study was made easier and much enjoyable by the co-operation and hard work of my field assistants and the JPM field supervisors. I am particularly grateful to Charles M. Kaboi for his accurate and excellent enumeration.

Finally, I am indebted to Mrs. Sally Mutiso for typing the drafts and the final version of this work; my wife - Jedidah, for her steadfastness and encouragement during and after the data collection period; my aging father - Benson Onchere, for allowing me to go back to University for a Masters degree in the face of high demand for school fees from my brothers and sisters.

For those that space has not allowed me to list, I can only say: "Your pain is registered in my heart."

LIST OF CONTENTS

page:

LIST OF TABLES

HISTOGRAMS



DIAGRAMS



PLATES

## LIST OF APPENDICES

## ABSTRACT

This thesis has been written mainly from data collected in the Northern division of Machakos district of the Eastern province of Kenya. Work done earlier had shown that in this division, malnutrition is widespread while 'killer' diseases of children 0-5 years are very common. The rate of out-migration is also high while total annual rainfall rarely exceed 1,000 mm.

Important findings of this study include:-

1. Farm output per household is so low that it does not satisfy subsistence need over the whole year
2. Non-farm sources of household income contribute for about 50 % of the total household income
3. The use of purchased inputs in food production is of negligible importance while too, loans and credit facilities are available only in very small amounts to a few farmers who also grow some poorly yielding coffee
4. There are very few extension officers of whose general education and agricultural training is inadequate
5. Foods are mainly sold by private traders at a relatively higher price than what the Maize and Produce Board would sell if it were the sole seller
6. Private traders in most market centres have insufficient trade loans, and lack enough personal means of transport, while public transport is inadequate
7. The rural infrastructure, such as rural water, rural roads, and rural electification, are poorly developed .

# CHAPTER 1

## 1. INTRODUCTION

The Medical Research Centre, Nairobi (MCN) has been conducting, since 1971, a longitudinal, multi-disciplinary population - based project in the Northern division of Machakos district, Kenya, known as the "Joint Project Machakos" (JPM). The JPM has a major aim of studying the health status of the people and the environmental factors which may be influencing it, in order to be able to formulate proposals for its improvement (21 and 22). Research is mainly concentrated on the most vulnerable population groups viz. pregnant women and pre-school children whose health status is believed to be a sensitive indicator of the health status of the community as a whole.

The JPM has, over the years, attracted some non-medical researchers into itself out of a realization that the observed disease patterns may be caused by aspects of non-medical concern. Demography and sociology for instance have been an integral part of the project since its inception. More recently soil surveys and meteorological recordings have been encouraged. Some work has also been done by geographers and socio-economists. Lately, the project management has felt a need for agricultural studies because the state of agricultural development in the area is suspected to have a link with the observed malnutrition in the area (2), and the income

status of the population (16), which in turn could affect the health status of the people (22,2 and 29).

It is therefore hoped by the Medical Research Centre that the supplementation of the original project by more agricultural studies will facilitate the design of an integrated regional development programme for that area. Such programme will then, hopefully, improve not only the health status of the people, but also their income and nutritional status.

## 1.1 THE AREA AND THE PEOPLE

Machakos district is one of the districts that make the Eastern Province of Kenya, others being Kitui, Embu and Meru. The district is administratively divided into six divisions, namely: Northern, Southern, Eastern, Western, Central and Yatta. The Kamba name for this district is 'Masaku', a district inhabited by the Akamba people, a tribe belonging to the Bantu linguistic group.

The last population census in Kenya ( 23), shows that the Northern division (where this study has been done), had in 1969, a population of 114,442 inhabitants with a density of 157 inhabitants per square kilometer. Assuming a constant annual growth rate of 3.3% since the last population census in Kenya, we find that its present population might be

MACHAKOS DISTRICT, KENYA


Key:-

..... Locational boundaries

Locational boundaries, Northern Division (Where the study has been carried)

Source:- Wall-map ; Medical Research Centre Nairobi

about 144,000. Since the total area of the division is given as 666.2 square kilometers (see AppendixVIII) then the estimated population represents a population density of about 216 inhabitants per square kilometer.

The division is composed of four locations, namely:- Matungulu, Mbiuni, Kangundo and Mwala. The Kanzalu range roughly divides it into two, with Kangundo and Matungulu locations to the west, and Mwala and Mbiuni locations to the east.

Annual rainfalls are higher to the west than to the east of Kanzalu range. In 1975, Kingoti JPM weather station recorded 1059.9 mm., while Kathama recorded 260.5 mm. (own investigations). The problem with these amounts of rainfall is that they are very unreliable and sporadic. For instance, 73%(=208 mm) of the rain that fell at Kingoti during the month of March, 1975, actually fell in one day!

The drainage pattern in the area is controlled by the Kanzalu range, from which numerous seasonal streams (=water ways) start. Such streams are filled with water during or a few hours after the rains when they are actually turned into mighty, destructive rivers and rivulets. The river Athi and its major tributary, the Kalala, do flow with fluctuating volumes all the year round. These actually form the Western, Northern and North-Eastern boundaries of the

J.P.M. study area.

The Eastern part of the area comes under the Basement System, while the Western part is covered by volcanic rocks known as tuffs (19). Soils on the tuffs are deeper, and are mainly red clays.

The Kanzalu range is composed of granitoid gneisses, which are actually metamorphic rocks that are very rich in quartz - hence their greater resistance to erosive forces (19). These have given rise to sandy weathering material.

The Eastern part is a Basement System mainly differentiated by banded gneisses (19). These are metamorphic rocks of various composition. They are less resistant to erosion than the ones making the Kanzalu range, and form soils that are red to brown with varying textures. In some Eastern parts of the area, sandy imperfectly drained soils and also black cotton soils are found (19).

## 1.2 OUTLINES OF THE OVERALL PROBLEM

From the information available[1], there is evidence that the residents of the northern division of Machakos district live under a rather harsh ecological and socio-economic environment. For instance, malnutrition of pre-school children is widespread (29, p.3) while 'killer' diseases of children 0-5 years, such as measles, whooping

1. See for instance references 2,4,5,15,21,22, & 29.

cough, acute diarrhoea, and other respiratory infections are common in the area (22).

Demographic studies have shown that there is a marked out-migration with young males especially going out to seek for salaried jobs (4 and 5). Sample household studies have shown that average household farm size is only 0.72 hectares [1], making the area the most densely populated in all of Machakos district (4, p.9). Farm incomes are low, with an average household of 5 to 6 person having had an estimated income of 1800 shillings in 1975 (15, p. 30).

On the surface, these findings imply environmental poverty. This is actually an 'Economic poverty'. Thus due to harsh climate and poor soil conditions, or some socio-economic ills, the output per capita or per household is low. So people are actually unable to generate enough incomes from the land since the productivity of land and/or labour is not in their favour.

---

1. This figure of 0.72 ha. is not representative of the entire division. It is even not representative of the JPM study area. Since the division has an area of 66620 ha., and an estimated population of 144,000; then the per capita land area is 0.46 ha. Thus an average household of 6 persons would have 2.76 ha. Thus in calculating the figure of 0.72 ha; the author must have had a biased sample - picked mainly from the high population density area. While households have farm sizes as small as 0.3 ha. in our study sample, we too found households in the eastern plains with over 5 ha of land. Definately, in Mwala location, land sizes per capita or per household are much bigger than this.

This means therefore that while the output does not satisfy subsistence needs over the whole year, there is also no surplus for the market. They have little or no disposable incomes and so cannot purchase goods or services that could keep them protected from malnutrition and diseases. All these we are going to call 'economic poverty' which shall therefore mean that the icome generated from the farms, and other sources are not enough to satisfy subsistence needs over the whole year.

The presence of malnutrition for instance is only but symptoms (28, p. 13). The problem lies in the structure for income generation, use of available income (=expenditure) besides the natural presence or absence of disease-causing organisms (28 p. 16). Therefore, the low nutritional status could be caused by many factors of non-medical concern. Ritchie (28, p. 16) associates malnutrition with:-

a) Lack of variety in the food produced;

b) Essential foods being sold out of households;

c) Insufficient cash used on food;

d) Low nutrient value of foods purchased;

e) Methods of food preparation;

f) Customs governing food use.

Ritchie's points b and c and also to some extent, points a and d are in our interest, in our attempt to show whether these people are really 'economically poor' and therefore unable to protect themselves against malnutrition and diseases.

As concerns migrations, these could be as a result of many factors that can include general lack of adequate incomes in tha area, or missing social services and amenities in the area, all of which could attract people out of the area to where they exist. Further, fear of witchcrafts or any such unacceptable social climates can result in out-migration even if people were not economically poor or sick.

# CHAPTER II

## 2. OBJECTIVES OF THE STUDY

Before stating the specific objectives of this study, and also spelling out the sort of questions that this study is set to answer, we shall briefly review the work done by other researchers that is relevant to the stated problem.

### 2.1 LITERATURE REVIEW

Malnutrition can be caused by low farm output per capita. It has been established for instance that the absence of cows on a farm is often associated with malnutrition; and that malnutrition is heavily linked with bad management, especially on small farms (2, p.3). The same source has also reported that yields of crops are much lower in Mbiuni location vis-à-vis Matungulu location and consequently note that malnutrition appears to occur more frequently in the Mbiuni side, and less frequently in Matungulu side (=coffee zone). These researchers however, express a surprise in the observation that on certain small farms - as small as 0.3 hectares or even less - having no pastures or animals, they recorded no malnutrition (2, p.11). They noted that while such farms have good management generally, it was obvious that the households owning such farms cannot live from the produce of their farms alone. They suspect a'non-agricultural source of income.'

Therefore, even a low food production per capita or per household cannot be wholly associated with malnutrition if sufficient other sources of income exist.

One of the reasons why low per capita output (therefore household output) is related to malnutrition or what we have earlier referred to as 'economic poverty' is that farm income is a function inter alia of:- the amounts of farm output and the prevailing prices. Thus a household that can only produce five bags of maize that can sell at eighty shillings, has a cash farm income of four hundred shillings only. If we expand the income argument to "household" income and define it as all that income that is generated from the farm and also from other sources, then we get that households with 'non-farm' incomes over and above the farm incomes are bound to be better off than those depending only on farm incomes, if we assume that farm incomes are all uniformly low.

Kolkena (1973) found that many heads of the households have in addition to farming, other employment to obtain at least a total net income of 1500 Kenya shillings per year; which too he considers to be the minimum for households of 5-7 persons (15). Muller (1974) argues that "if one considers 1500 shillings as a minimum annual income for a reasonable standard of living, 18% of the households in

Matungulu and 35% in Kangundo did not reach this minimum when subsistence cash and non-farm incomes are added up" (22).

In order to increase farm outputs in an area like this, purchased inputs have to play an increasing role. The need to develop an efficient input distribution system is a necessary requisite. Late, inadequate supplies, inappropriate packaging, and insufficient information accompanying the new inputs should be discouraged (11, p. 357). Associated with the question of input distribution, is the question of farm credits.

One reason for the importance attached to small farm credit as a vehicle for rural development is the believe that lack of small farmer access to credit constitute a critical constraint to the adoption of improved inputs and technologies which can lead to increased incomes and enhance rural welfare. But we know that yields can be increased substantially simply by good husbandry, without fertilizer or improved seed. Good husbandry practices involving:- early planting, correct and proven plant populations, clean weeding, are the most important yield factors (31). Heyer, working in the same district in fact found out that "credit did not appear to be nearly as important as other operational constraints."

Management, on the other hand, led to "some better farmers being able to make about four times as much as poorer farmers with the same labour and land resources"(10). The purchased inputs like Katumani seed, fertilizer, and insecticides, only help maximise the genetic potential of the crop. In themselves they do not solve production problems.

Heyer and Waweru (1976) feel that the more important development activities affecting such households include technical research programme, extension and education services, credit provision, input distribution, output marketing services, provision of infrastructure of all kinds, and land tenure reform (11, p. 338).

The improvement of marketing facilities for farm outputs and inputs contribute to the agricultural development of such an area directly through providing fuller use of a given level of production and indirectly by fostering increased production. Therefore, the role of an effective agricultural marketing system in agricultural development cannot be over-emphasised. An effective agricultural marketing system works as a co-ordinator and stimulator of economic activities. It can increase employment, expand output and stimulate incomes. All these are requisites for improvement of people's nutrition and health status.

An effective agricultural marketing system will integrate agricultural production in the entire economy while expanding technical facilities (17, p. 7-19). It will be an instrument of resource allocation while it tries to bridge supply and demand of agricultural inputs and outputs in time, space and form; by channelling market surplus from production areas, raising demand for agricultural inputs, raising quality of products by grading, and increasing trade between regions and countries. The system will then encourage capital accummulation especially in the wholesale trade which will be used in the development of physical rural infrastructures, such as roads and bridges (17, p.7-9).

## 2.2 SPECIFIC OBJECTIVES OF THE STUDY

In this section an attempt will be made to present the specific objectives of the study, showing the set of questions that the survey is expected to provide answers for. The survey concentrated on four major areas as outlined below:-

### 2.2.1 ON FARMING

To find out:-

a) The amounts of food produced per household and the proportion, if any, that is marketed;

b) If there are adequate market outlets for farm products;

c) The prices received for farm products;

d) The major purchased inputs and their availability;

e) The extent of non-farm incomes;

f) The amounts of food purchased at what costs;

g) The compulsory household expenditures drawing on farm incomes.

2.2.2 ON TRADE

To find out:

a) The quantities of farm outputs handled by traders;

b) The buying and selling prices of commodities handled; the terms of payments for products handled and goods purchased;

c) If there are special links between producers, middlemen and consumers in the farm output and input markets;

d) What nature of competition exist in the agricultural product and input markets.

2.2.3 ON AGRICULTURAL FINANCE

To find out:

a) What loan schemes exist, if any;

b) Who advances loans;

c) What problems exist in loan dissemination and repayments.

2.2.4 ON INFRASTRUCTURE

To find out:

a) The transport systems available in the area;

b) The relative importance of various market centres in terms of handling and re-distribution of farm inputs and outputs;

c) The quality and quantity of the existing agricultural extension services;

d) The nature and quantity of the available social facilities and amenities.

## CHAPTER III

## 3. METHODOLOGY

Before stating the methods of actual collection of data for this study, the sets of workable hypotheses that led to the generation of the information now obtained will be presented.

### 3.1 THE HYPOTHESES

In order to steer the survey towards the achievement of the already mentioned aims and objectives, the following assumptions were made:-

#### 3.1.1 ON FARMING

a) That farm output per household is so low that it does not satisfy subsistence needs over the whole year.

This hypothesis was formulated to establish what the household subsistence needs are; when in the year they are not met by the amounts of food produced. We therefore needed data on household harvests, times of harvests, proportion of harvest that is sold and the quantities of foods stored over the year in the households.

b) That food storage (mainly grain) does not take place at farm level due to high cash needs. The reason for this hypothesis was that since the peoples incomes are low (15) they could be selling the foods so that they have money. This would mean that they have no food stored for their own subsistence over the rest of the year. We therefore needed data on quantities of farm output sold, the times of the year that selling takes place, and the reason for the selling.

c) That there are inadequate credit facilities for farmers. This assumption was made because productivity of land and labour is usually increased by the use of purchased inputs. These are usually not possible without any loans to farmers. So we needed data on sources of loans and credit facilities, the amounts present, the terms of payments and problems of dissemination and repayments.

d) That purchased inputs are of negligible importance in the farming activities due to their high costs, and lack of availability. If this hypothesis is confirmed, then we could partially explain why farm outputs are low. So we needed data on types and quantities of purchased inputs, places bought, transport problems and the prices paid for these inputs.

e) That effective extension service to the farming community is lacking. If this hypothesis is confirmed, then we could partially explain why production is low, and possibly why malnutrition is widespread. We therefore needed data on the numbers, education and training of extension officers and farmers in the area. We too wanted to know the coverage of each officer in terms of area and households. From the farming community, we wanted to know the households visited over that year, by what extension officer, and the purpose of the visit.

f) That there are insufficient social facilities and amenities in the area. If this assumption is proved correct, then we can partly explain why people, especially young males, are moving out of the area. Therefore we needed data on the nature and quantities of social facilities and amenities present in the area, including rural infrastructure.

3.1.2 ON TRADE

a) That prices for agricultural inputs and outputs in the area differ by more than transfer costs due to lack of competition.

The reason for this assumption is that since the area is a 'food-deficient' one, unfair traders could sell agricultural commodities at higher than normal prices especially if there was lack of competition in trade. We therefore needed data on buying and selling prices, transport costs, number of sellers, market transparency, and the degree of product differentiation in the agricultural marketing.

b) That prices over time fluctuate tremendously due to high storage costs and also with farm production seasons.

We expected periods of the year when households had little or no food (mainly grain) and periods when they had some food. Therefore, traders could buy food during harvests, and sell the same at super-normal profits during periods of little or no foods in the area. This would then dig too deep into the farmers' pockets hence their economic poverty. So we needed data on how prices have fluctuated over that year in the area. These could then be matched with production seasons.

c) That there are insufficient loan facilities for traders. If this assumption proved true, then we could not expect traders to stock all the necessary inputs at the right places at the right time, all the time. This is due to lack of capital. This in turn could partially explain the low-farm-outputs, due to lack of essential inputs in the market centres. We therefore needed data on sources of loans, ease of availability, amounts advanced, and problems of dissemination and repayments.

d) That traders business is hampered by lack of private transport and insufficient public transport. The reason for this hypothesis is that, the ease, speed and economy with which agricultural inputs and outputs are moved in an area like this spell the success or failure of economic activities.

We therefore needed data on the types, nature and quantities of private and public transport in the area, and also the transport costs if possible.

## 3.2 DATA COLLECTION METHOD

The data collection of this survey was geared towards:-

- search of secondary data;
- survey of knowledgeable people;
- and a sample survey of the farming and trade communities.

The investigation of the agricultural marketing system(s) consisted of three main parts:-

A sample of 119 farmers(=housenolds) was chosen from close proximity of 5 market centres(Kangundo, Tala, Kinyui, Katheka and Kathama). These market centres are along a road that runs around the Kanzalu range joining the wetter western part (=coffee zone) and the drier eastern part (eastern plains). Since each market centre is bisected by a road, we took an imaginary line across that road to divide the sub-sample into four more-or-less equal parts. From each of these we interviewed a minimum of five farmers making at least 20 households around each market centre (=sub-sample). We therefore interviewed any household in the quarter circle where the head of a household was found at home, his wife, or an elderly member, and not children.

A standard questionnaire was used to collect the required information (see Appendix VI). A minimum of two households were interviewed daily, thus completing each sub-sample in approximately two weeks. All the five sub-samples were then completed in a little over ten weeks. During the first week of each sub-sample, the farm interviews were conducted by the investigator with an assistant working as an interpreter. In the second week of each sub-sample, the field assistant continued with farm interviews while the investigator did trade interviews in the market centre itself.

A total of 35 trader out of a general total of about 80 traders in the five market centres were interviewed during alternate weeks that the investigator was not joining the field assistant for farm interviews. These trade interviews were done by the help of a part-time interpreter. A standard questionnaire was used to collect the required information (see Appendix IV). Only traders who deal in agricultural tools, chemicals, feeds, and human foods were interviewed. All prominent traders in such business were actually interviewed.

The field data collection period started in early September, 1975 and ended during the first week of January, 1976. The main problems encountered included harsh weather (both dry and wet), transport facilities, local and national politics (Kangundo

constituency by-elections), and isolated cases of poor respondents co-operation. Most of these problems were overcome by the kind help from the field staff of the Medical Research Centre, Nairobi. The original intention to interview about 50 traders and 100 farmers altered slightly. The case of traders has already been mentioned. In the farm interviews, we had originally planned to visit two households a day. This was done with an anticipation of lack of personal transport means.

However, we purchased a heavy-duty motor-cycle and a manual bicycle all of which enabled us to start most interviews early in the days and move faster to the next households. This then enabled the sample to increase slightly.

Admittedly the traders interview was the most tricky and difficulty exercise we attempted. The unique link of a person working with the Medical Research Centre having concern with agricultural marketing aspects caused alot of suspicion. Severally, we were asked to identify ourselves properly before being furnished with any information. Most traders wondered if what we were doing was not a disguised way of price controls or income-tax assessments. The ease with which we got records, annual reports, and any data from all the Machakos District Co-operative Union, coffee societies, and

milk dairies, was encouraging. We were virtually told to 'Leave-no-stone-unturned' in all such offices.

We also resorted to check for input prices from some manufactures and marketing agencies of whose products we had seen in the division. We got a rather good response but many of them warned -"Please note that these prices are confidential and we trust that you will use them only for your research purposes." However, one such respondent also wrote.... "Please do not hesitate to contact us, as we shall be only too pleased to assist you. At the same time you are welcome to pay us a visit in case you are interested in seeing our production."

THE JPM STUDY AND CONTROL AREAS

(includes the sample market centres)


Key:

| | |
|---|---|
| ------- | Roads |
| | Market centres |
| Mks | Machakos |
| Nbi | Nairobi |

Source:- Adopted from kolkena, T.F.M; page 17.

# CHAPTER IV

## 4. GENERAL AGRICULTURE OF THE AREA, AND ITS INFLUENCE ON FARM INCOMES AND EXPENDITURES

Agriculture is fundamental to the development of the area under study. It is not the intention of the author to over-emphasize this intuitive fact. The area's main problems include low and sporadic rainfalls, poor soils, low standards of animal and crop husbandry practices, poor soil conservation measures, lack of security of land tenure, inadequate loans and credit facilities, and a poorly developed rural infrastructure. These then have a direct influence on farm incomes and expenditures since the level of the existing agriculture determines how much disposable incomes households have, and therefore their purchasing habits, assuming that there are no external sources of incomes.

In this chapter, we shall define what we mean by household incomes and expenditures, after which we shall present all the information that we have about the factors that are directly or indirectly influencing them. We shall also include additional information so as to put the reader in a clear picture as to the agricultural position of the area.

## 4.1 HOUSEHOLD INCOMES AND EXPENDITURE

### HOUSEHOLD INCOME

In 1974, it was estimated that an average household in the study area needed about 1500 shillings to lead a reasonable life (22). A figure of 1800 shillings has also been mentioned by one worker (15). Leaving aside the argument as to which estimate is more correct, we note however that there is no clear picture as to what constitute this household income.

Broadly, the household income in a rural area like the one under review, is generally a function of variables that we can represent by the following equation:-

$$(1) \qquad Y_t = f ( V_c , V_s , W )$$

where,

$V_c$ = Volume ( Quantity, Q times producer price, $P_p$ ) of farm output consumed

$V_s$ = Volume ( Quantity, Q times producer price, $P_p$ ) of farm output sold minus inputs bought

$W$ = Wages and salaries earned from non-farm employment

$Y_t$ = Total household income

The total amount of farm output (Q) can also be said to be depending on the following class of inputs:-

$$(2) \qquad Q = f ( E, I, L, M )$$

where E = Environment not normally controllable by man e.g rainfall, sunshine and humidity

I = Inputs (usually purchased) such as fertilizer, breeds, pesticides, and tools

L = Labour

M = Management

The environment (E) represents a rather difficult task to manipulate but factors such as irrigation may modify their effect at immense costs. Inputs (I) such as katumani maize seeds, grade cattle, chemicals and tools are fairly controlled by man and can be varied in intensities of use depending on skills and the economics of resource allocation that may be available.

The prices paid for output ($P_p$) are under perfect competition, determined by forces of supply and demand in a given market and differ over time, space and form.

The contribution of wage employments and salaried jobs (W) to household incomes depend on availability of such opportunities, which in turn depend on factors such as formal education, technical skills and the general progressiveness of the population.

HOUSEHOLD EXPENDITURE

Household expenditures depend primarily, on amounts of disposable incomes there is in the population. Major household expenditure items in an area like this include inter alia:-

a) Food purchases

b) School fees

c) Miscellaneous ( Clothing, soap, paraffin, etc)

We shall now turn to the mentioned variables that directly or indirectly influence household incomes and expenditures and discuss them in the context of the sample data in our possession.

## 4.2 ANIMAL ENTERPRISES

Cows, goats, sheep and chicken are common in most households. The percentage of the interviewed farmers with these animals is given in table one below:-

Table 1. PERCENTAGE OF SAMPLE FARMERS WITH VARIOUS LIVESTOCK, 1975

| ANIMALS | KANGU-NDO | TALA | KINYUI | KATHEKA | KATHAMA | AVERAGE |
|---|---|---|---|---|---|---|
| Cows | 67 | 85 | 69 | 73 | 89 | 77 |
| Goats | 40 | 65 | 69 | 78 | 89 | 68 |
| Sheep | 53 | 45 | 11 | 13 | 62 | 37 |
| Chicken | 93 | 85 | 100 | 100 | 91 | 94 |

Source: Own investigation

This table shows a clear distance effect in the sub-samples. Generally, we see that households with livestock increase as one goes from Kangundo to Kathama. This observation also show that the animal enterprise is important east of the Kanzalu than is in the west. This point is further illustrated by table two below which depicts the average household livestock possession.

TABLE 2: AVERAGE HOUSEHOLD LIVESTOCK POSSESSION OF SAMPLE FARMERS, 1975

| | Animal Numbers | | | | |
|---|---|---|---|---|---|
| Animal | Kangundo | Tala | Kinyui | Katheka | Kathama |
| Cows | 1.8 | 6.7 | 3.0 | 3.6 | 6.5 |
| Goats | 1.3 | 4.0 | 5.2 | 6.4 | 8.2 |
| Sheep | 1.6 | 4.5 | 0.4 | 0.4 | 3.5 |
| Chicken | 5.1 | 8.0 | 9.1 | 6.1 | 7.1 |

Source: Own investigation.

This table too shows a clear distance effect in the animal enterprise. For instance goat numbers per household increase gradually as one goes from Kangundo to Kathama and rise from 1.3 at Kangundo to 8.2 at Kathama. This table and the former, however, shows that sheep are of negligible importance in this area. We were informed that the Akamba people do not like eating sheep for reasons beyond the scope of this study. The estimate for the 1975 livestock possession in the entire division is given in appendix XI. From the two tables above we can then conclude that an average sample household owns 5 cows, 5 goats, 2 sheep and 7 chicken. Average livestock prices are given below:-

TABLE 3: AVERAGE FARM GATE LIVESTOCK PRICES SEPT. - DEC., 1975 (Shs)

| Animal | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Cow | 219 | 133 | 219 | 240 | 319 |
| Goat | 47 | 40 | 56 | 61 | 52 |
| Sheep | 48 | 53 | 80 | 60 | 37 |
| Chicken | 11 | 7 | 9 | 8 | 6 |

Source: Own Investigation.

The tables below show average livestock numbers that were sold in the sample households, and our estimate of revenue from livestock sales in 1975.

TABLE 4: % OF SAMPLE HOUSEHOLDS WHO SOLD AT LEAST ONE ANIMAL IN 1975

| Animal | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Cows | 27 | 30 | 35 | 9 | 43 |
| Goats | 13 | 35 | 35 | 35 | 40 |
| Sheep | 20 | 20 | 21 | 4 | 3 |
| Chicken | 53 | 60 | 46 | 61 | 49 |

Source: Own investigation.

TABLE 5: AVERAGE LIVESTOCK NUMBERS SOLD IN SAMPLE HOUSEHOLDS IN 1975

| Animal | Kangundo | Tala | Knyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Cows | 1.3 | 3.5 | 1.5 | 1.0 | 1.8 |
| Goats | 2.5 | 6.0 | 2.3 | 2.8 | 4.1 |
| Sheep | 1.7 | 3.8 | 1.0 | 1.0 | 1.0 |
| Chicken | 5.7 | 8.5 | 6.6 | 6.0 | 8.7 |

Source: Own investigation.

TABLE 6: ESTIMATED HOUSEHOLD REVENUE FROM LIVESTOCK SALES IN THE SAMPLE HOUSEHOLDS, IN 1975 (shs)

| | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Cows | 284.7 | 465.5 | 328.5 | 240 | 574.2 |
| Goats | 117.5 | 240 | 128.8 | 170.8 | 213.2 |
| Sheep | 81.6 | 201.4 | 80 | 60 | 37 |
| Chicken | 62.7 | 59.5 | 59.4 | 48 | 52.2 |

Source: Own calculation by multiplying the results of table 3 with those of table 5.

The tables above show that an average household received a cash income of 701 shillings in 1975 from selling livestock.

From the information available, we cannot exactly quantify earnings from sales of livestock products on sample household basis. For instance, we do not for sure know how much milk or eggs were produced per household, and we were not exactly told of any sales of such products although some eggs for instance were found in market centres. In chapter five, we shall however, attempt to give a picture of the livestock products market and their implications on farm incomes.

## 4.3 CROP ENTERPRISES

The following table shows the percentage of sample households that grew various crops in 1975.

TABLE 7: PERCENTAGE OF SAMPLE HOUSEHOLDS THAT CULTIVATED VARIOUS CROPS IN 1975

| Crop | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Apples | 13 | - | - | - | - |
| Arrow-roots | 67 | 5 | 4 | - | - |
| Bananas | 80 | 90 | 96 | 38 | 31 |
| Beans | 100 | 100 | 100 | 100 | 100 |
| Cabbages | 67 | 50 | 11 | - | - |
| Cassava | 73 | 85 | 58 | 42 | 31 |
| Castor | 13 | 20 | - | - | - |
| Citrus | 47 | 40 | 54 | 27 | 17 |
| Coffee | 100 | 90 | 96 | 23 | - |
| Cowpea | 86 | 85 | 100 | 100 | 100 |
| Guava | 20 | 25 | 15 | 4 | 20 |
| Loquat | 20 | - | - | - | - |
| Macada-mia | 87 | 25 | 46 | 8 | 0 |
| Maize | 100 | 100 | 100 | 100 | 100 |
| Mangoes | 60 | 80 | 69 | 65 | 66 |
| Onion | 13 | 35 | 4 | 4 | - |
| Passion fruit | 53 | 15 | 15 | 4 | - |
| Pawpaws | 47 | 75 | 50 | 46 | 54 |
| Pepper | 13 | 10 | - | - | - |
| Pigeon pea | 93 | 95 | 100 | 100 | 100 |
| Potato (Irish) | 60 | 40 | 46 | 4 | 3 |
| Potato (sweet) | 100 | 35 | 62 | 15 | 6 |
| Pumpkin | 27 | 5 | - | - | - |
| Sorghum | 80 | 85 | 54 | 31 | 49 |
| Sugar cane | 53 | 25 | 12 | - | - |
| Tomatoes | 73 | 70 | 15 | - | - |

Source: Own investigation.

This table shows that maize, beans, cowpeas and pigeon peas are cultivated by most households. Too, fruits like bananas, citrus, mangones and pawpaws are present in most households. The table also illustrates that crop diversity is greater in Kangundo, Tala and Kinyui; than Katheka and Kathama. Coffee and macadamia for instance are not present in Kathama while nearly every household in Kangundo and Tala has them.

The case of cash crops (coffee, macadamia and passion fruits) shall be given in the next section with their impact on farm incomes. In this section, we shall emphasise the food crops. We see from the table above that all farmers cultivate any combination of the mentioned crops. The harvests are however, appalling as the following series of tables show:-

TABLE 8: PERCENTAGE OF SAMPLE HOUSEHOLDS THAT HARVESTED SELECTED FOODS IN 1975

| Maize | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Piecemeal | 60 | 15 | 19 | 17 | 29 |
| 1 bag | 13 | 10 | 4 | 22 | 17 |
| 2 bags | 7 | 15 | 23 | 13 | 11 |
| 3 bags | - | 10 | 15 | 9 | 9 |
| 4 bags | - | 10 | 4 | 9 | 8 |
| 5 + bags | 20 | 40 | 35 | 30 | 26 |

(Table 8 continued)

| BEANS | Kangundo | Tala | Kinyui | Katheka | Kathema |
|---|---|---|---|---|---|
| Piecemeal | 67 | 20 | 38 | 48 | 60 |
| ¼ bag | 13 | 10 | 15 | 9 | 3 |
| ½ bag | 13 | 10 | 8 | 17 | 9 |
| ¾ bag | - | 15 | 4 | - | 6 |
| 1 bag | 7 | 15 | 19 | 9 | 6 |
| 2 + bags | - | 30 | 16 | 17 | 16 |

| PIGEON PEAS | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Piecemeal | 55 | 40 | 46 | 30 | 51 |
| ¼ bag | 21 | - | 8 | 4 | 9 |
| ½ bag | 13 | 15 | 12 | 13 | 3 |
| ¾ bag | - | 5 | 4 | 9 | 3 |
| 1 bag | 13 | 25 | 27 | 30 | 20 |
| 2 + bags | - | 5 | 3 | 14 | 14 |

| COWPEAS | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Piecemeal | 87 | 60 | 81 | 79 | 42 |
| ¼ bag | 13 | - | 12 | 13 | 23 |
| ½ bag | - | 15 | - | 4 | 14 |
| ¾ bag | - | - | - | - | 3 |
| 1 bag | - | 15 | - | 4 | 17 |
| 2 + bags | - | 10 | 7 | - | 1 |

| SORGHUM | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Piecemeal | 7 | 8 | 30 | 13 | 25 |
| ¼ bag | 53 | 46 | 20 | 38 | 50 |
| ½ bag | 20 | 8 | 30 | 25 | - |
| ¾ bag | 7 | 15 | - | - | 12 |
| 1 bag | - | 23 | 10 | 13 | 13 |
| 2 + bags | 13 | - | 10 | 11 | - |

Source: Own investigation.

The series of tables above show that in 1975, a vast majority of all households had very little harvests. Most food (other than sorghum) was eaten piecemeal while in the fields and never reached the store. While not much sorghum was produced, it is clear that most households had an harvest of between ¼ bag and ½ bag . This in effect implies that sorghum withstands the prevailing climate and soil/water relationships much more than maize, beans, pigeon pea and cowpea. It is known to be drought resistant and do out-yield maize in many of the drier parts of East Africa (1, p. 186).

Based on rainfall, expected maize yields in the area have been estimated as the following table shows. However, the descriptive terms like good, fair or poor are undefined; in their estimate. None-theless, it shows the relative seriousness of yields in two contrasting areas on either side of the Kanzalu range.

TABLE 9: EXPECTED MAIZE YIELDS BASED ON RAINFALL

| PLACE • | Poor to Nil | Fair | Good |
|---|---|---|---|
| Kabaa | 33 % | 32 % | 35 % |
| Matungulu | 8 % | 14 % | 78 % |

• Kabaa - is in Mbiuni side (=Eastern plains)

• Matungulu - is in Matungulu side (=coffee zone) (=wet western part).

Source: Mbuvi et al (1974)

We did not learn of any sales of these selected foods from our sample. This therefore represents a cash farm income of near zero in as far as food crops are concerned.

## 4.4 CASH CROPS

Coffee, passion fruits, and a few other fruits and vegetables are the main cash crops for the area. Other minor cash crops include cotton and castor.

### 4.4.1. COFFEE

Coffee is grown in the western part of the area, including most of Matungulu and Kangundo locations. From our study sample, we found that Kangundo, Tala and Kinyui respondents grew the crop Very little is grown around Katheka; and no coffee is grown at Kathama.

Table 10 shows the breakdown and importance of coffee production in the sub-samples.

Table 10 SAMPLE COFFEE GROWERS AND AVERAGE COFFEE TREES IN 1975

| | KANGUNDO | TALA | KINYUI | KATHEKA | KATHAMA |
|---|---|---|---|---|---|
| Percentage coffee growers | 100 | 90 | 96 | 23 | 0 |
| Average trees per household | 348 | 647 | 442 | 153 | 0 |

Source: Own investigation.

By the end of 1975, the division had approximately 1700 hectares of mature coffee, and half a million seedlings had been distributed. All coffee growers belong to primary coffee societies in the area. These are Matungulu, Mbilini, Muisuni, Kitwii, Kilalani, and Kakuyuni farmers' cooperative societies.

The Matungulu Farmers Co-operative Society alone has 919 hectares of mature coffee (= 54% of the divisional total) and six factories namely: Kalala, Kakulutuini, Katine, Kaukiswa, Sengani, Kyamwole, and Kawethei. Another one is being constructed at Mwatati.

The main production problems are coffee berry disease (Colletotrichum coffeanum)and leaf rust (Hemileia vastatrix). Another production problem commonly mentioned by factory or society secretaries is the one of peak-harvest period. Nearly all coffee delivered to Matungulu society in 1975 for instance, came in June/July. This resulted in high demand for casual labour accompanied by increased overtime expenditures. This period also concides with the peak harvest period at the coffee estates across the river Kalala.

Yearly production of the Matungulu society is given in the following table.

TABLE 11: COFFEE OUTPUT IN MATUNGULU SOCIETY OVER THE YEARS

| YEAR | QUANTITY | VALUE (shs) | AVERAGE PAYMENTS PER KG. IN SHS. |
|---|---|---|---|
| 1971/2 | 2,508,886 | 2,955,477 | 1.20 |
| 1972/3 | 3,869,450 | 5,007,033 | 1.28 |
| 1973/4 | 3,734,428 | 4,450,730 | 1.20 |
| 1974/5 | 4,375,053 | 6,187,704 | 1.40 |

Source: Own investigation - with access to the production records of Matungulu Society.

Table 11 shows that in a year like 1974/75, the 919 mature coffee yielded 4,375,053 kilograms of clean coffee, which is equal to 476 kilograms per hectare[1] and that an average coffee grower earned 848.70 shillings in 1974/75 season.

### 4.4.2 PASSION FRUITS

Passion fruit (Passiflora edulis) is grown in the wetter sections of Matungulu and Kangundo. Table 12 gives the breakdown in the sub-samples.

Table 12 SAMPLE PASSION FRUIT GROWERS AND AVERAGE PLANT POSSESSIONS IN SEPT/DEC. 1975

| | KANGUNDO | TALA | KINYUI | KATHEKA | KATHAMA |
|---|---|---|---|---|---|
| Percentage ggrowers | 53 | 15 | 15 | 4 | 0 |
| Average plants per household | 6 | 1 | 3 | 1 | 0 |

Source: Own investigation

Like coffee, this crop has a declining importance as one goes to Kathama via Kinyui and Katheka. In fact it is totally absent in Kathama while over a half of the households in and around Kangundo grow an average of six plants each.

1. This figure is far below the national average which is estimated at 630 kilograms per hectare (1, p. 80).

The annual report of the divisional agricultural officer showed that in 1974/75 there were 323 farmers growing a total of 20 hectares of passion fruits. The report also say that a total of 39,400 kilograms of fruit were collected from the division by passion fruit canners of Thika. These earned the division K£ 605.1 over that period; showing that an average farmer earned only 37.38 shillings for the fruits. In fact the report also mentions that the farmers were paid 29 cents for unsprayed fruits and 34 cents for sprayed fruits.

Deliveries to the processors at Thika also fluctuated from a mere 263 kilograms in May that year to 8,596 in February the same year. Table 13 below show the quantities of fruit sent to Thika in that year.

Table 13 THE DIVISIONAL PASSION FRUIT OUTPUT IN 1975

| MONTHS | QUANTITY (kgs) | MONTHS | QUANTITY (kgs) |
|---|---|---|---|
| January | 4,902 | July | 6,191 |
| February | 8,596 | August | 1,302 |
| March | 3,147 | September | 2,762 |
| April | 2,661 | October | 1,125 |
| May | 263 | November | 1,521 |
| June | 503 | December | 1,426 |

Source: Own investigations, with access to the records of the divisional deliveries to the passion fruit canners at Thika.

Over the years, the passion fruit processors at Thika continued inducing production by giving loans and credit facilities to 'good' farmers for chemical protectives (=fungicides and insecticides), wires, and posts for constructing trellis, which are all necessary for good quality fruit production.

The main production problems include the notorious passion fruit diseases, and also the low prices paid for the fruits. We learnt for instance that a farmer could get up to 70 cts per kilogram in a local market for the same fruit he could get 34 cts from the Thika processors.

4.4.3 FRUITS AND VEGETABLES

Over 70% of all households that we visited around Tala and Kangundo grew some tomatoes. Small amounts of cabbage, onions, and hot peppers(=chillies) are grown and found in open air markets, especially in the coffee zone. Judging from the volumes and quality of tomatoes handled in the Tala open air market alone, the area seems quite suitable for commercial tomato production. The main problem of vegetable production in this area is the weather (mainly rainfall), and the many crop pests and diseases. Several blights and bacterial wilts are noticed on many vegetable shambas, but these are not as serious as can be seen in wetter parts of this country.

Important fruits in this area include pawpaws, citrus, and guava. The case of passion fruit has already been presented earlier. Average household fruit tree possessions is given below.

TABLE 14:AVERAGE HOUSEHOLD FRUIT TREE POSSESSIONS, 1975

| FRUITS(Nos) | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Bananas | 26 | 30 | 19 | 5 | 5 |
| Citrus | 8 | 4 | 35 | 2 | 6 |
| Macadamias | 14 | 2 | 6 | 1 | 0 |
| Mangoes | 2 | 3 | 4 | 2 | 2 |
| Pawpaws | 2 | 7 | 6 | 2 | 2 |
| Guavas | 1 | 2 | 5 | 2 | 1 |

Source: Own investigation.

### 4.4.4 OTHER MINOR CASH CROPS

The Mwala cotton farmers co-operative society in the division was dormant during the data collection period. Officials from the Ministry of Agriculture and that of co-operative development were trying to revive its operations. The major production problems for this crop are the notorious cotton pests and diseases, accompanied by what the extension officers refer to "very low payments" for the little cotton that could even be harvested.

Castor (Ricinus communis) is yet another cash crop seen in the area. About 10% of the sample farmers grew some castor crop and could easily sell the seed to Maize and Produce Board agents at the market centres. The problem here is also that of low returns for the crop delivered. Some respondents indicated they did not harvest their crop for the market, implying that the costs of harvesting and transporting the produce could not be offset by the receipts from the board.

4.4.5 FOOD STORAGE AT FARM LEVEL OVER TIME

When we make a list of hous olds running numbers and plot a scatter of A's in a given month, we get the following table:-

TABLE 15: COMPARISON OF MONTHS OF 1975 WHEN SAMPLE FARMERS HAD NO FOOD[a] IN STORE

| Months | J | F | M | A | M | J | J | A | S | O | N | D | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total A's[b] | 57 | 56 | 43 | 33 | 27 | 34 | 34 | 42 | 64 | 68 | 97 | 103 | 676 |

a. -The term food refers mainly to maize and beans which form the staple diet of the people.

b. -A's = months reported by the respondents with no food in store summed up for all households.

Source: Own investigation, compilations and calculations.

If we regard the contents of table 15 as a rough and ready indicator of months of 1975 during which time, people had little or no food (mainly maize and beans) in store in relative or comparative terms, then we see that April and May for instance, were months that were less serious in terms of food shortage. We note too, that October, November and December were really serious months, and that nearly all households had to purchase food from elsewhere.

If we devide the total sum of A's (=676) by the households running number (=119) we get an arithmetic mean of 5.68. This figure roughly represents the number of months in 1975 that on average, all households had no food in store.

Further, if we divide the total sum of A's (676) by 12 months of 1975, we find an arithmetic mean of 56.3. If we regard 56.3 as a lower limit of A's in a given month, below which are real 'food purchasing' months, then we come out with the following conclusions:-

a) January, February, September, October, November and December of 1975 were very serious 'food purchasing' months in the area. These months turn out to be roughly the same months the Catholic Church[1] and the Red Cross Society of Kenya were giving food reliefs in the area.

---

1. See for instance appendices 1 & 2

b) The difference of these months from the total can be regarded as moderate.

This is a fairly consistent analogy, and has attempted to substitute the time series data with a recall method set of data. We shall see later that a similar set of arguments yields more or less the same results from the trade business.

Finally, in this sub-section, if we assume that all the quantities of foods reported to have been harvested were actually stored, we too can say that what one can regard as months of 'no food purchases' for this area, are actually 'moderate' periods, when households were somehow able to feed themselves from their own harvests.

## 4.5 USE OF PURCHASED INPUTS

### 4.5.1 FERTILIZERS

The table that follows shows the relative importance of chemical fertilizer use in the area immediately surrounding our five market centres, in 1975. It also gives some response from the users and non-users of fertilizers. They are all expressed as percentages of the total respondents sub-samples.

TABLE 16: FERTILIZER USE AND ON-USE RESPONSE, 1975 EACH EXPRESSED AS % OF THE FARMERS SAMPLES

| | Kangundo | Tala | Kinyui | Katheka | Kathama | Sample Ave. |
|---|---|---|---|---|---|---|
| Used ('75) | 67 | 65 | 81 | 30 | 17 | 52 |
| On Coffee | 67 | 65 | 81 | 22 | - | 47 |
| On Maize | 40 | 25 | 35 | 13 | 17 | 26 |
| Used FYM1 | 33 | 30 | 8 | 35 | 57 | 33 |

Source: Own investigation.

Clearly, we can see that chemical fertilizer use is important in the coffee zone, while in the Eastern plains farmers use FYM instead. We found heaps of farm yard manure in shambas around Kathama particularly, but we were however, very disappointed by the poor handling of this valuable asset.

---

1. F.Y.M. = Farm Yard Manure.

Most farmers just poured it on top of cultivated shambas during a dry period. We know that such handling of FYM makes it lose valuable minerals. It should have been ploughed-in when it was put on the shambas. The encouraging point we noticed about the FYM use was that most farmers used it in planting maize and beans. They all need some training on the making, preservation and use of this valuable natural 'fertilizer' which they get at a near zero real cost.

Together with the M142 beans given by the extension officers of the Ministry of Agriculture at Mbiuni, some amounts of fertilizers were also given as credit. One such 'privileged' farmers we visited at Masawa was quite pleased about the harvests compared to his neighbours who had planted the seeds without using fertilizers. As far as we know, no clear recommendations were prescribed as to the quantity and application of the fertilizer. We found a case where a farmer, out of ignorance or the like, was broadcasting phosphatic fertilizers on an already germinated M142 beans! Asked why he did that, he told us that while working in the Rift Valley, he saw 'Wazungus' doing so and that the same Wazungus got good harvests! We could not blame him for this.

It seems to us that the adoption of fertilizer use in this part of the country may not be very low, since already, all farmers are aware of the existence of chemical fertilizers. The farmers will, however need some training on correct and economical use of this input.

The table below shows the sales of fertilizer to Matungulu Farmers Co-operative Society (excluding their two estates) in 1974 and 1975.

TABLE 17: FERTILIZER INTAKE IN MATUNGULU CO-OPERATIVE SOCIETY 1974/1975
(TONS)

| Type | 1974 | 1975 |
|---|---|---|
| A.S.N. (26% N) | 14.40 | 10.50 |
| C.A.N. (26% N) | 49.30 | 10.50 |
| S.A. (21% N) | 20.00 | 0.00 |
| 25-5-5+5 | 4.50 | 0.35 |
| 20-20-0 | 0.00 | 0.15 |
| TOTAL | 88.20 | 21.50 |

Source: Compiled from delivery records of the Kangundo store, and counter-checked by receipt records of Matungulu Society.

The table above shows a sharp drop of fertilizer intake into the area in 1975 vis-a-vis 1974.

Fertilizer prices have been lowered since but during the interview period, they were selling at 90 shillings a 50 kilogram bag of ASN or CAN, 85 shillings a 50 kilogram bag of 25-5-5+5 or 20-20-0. while the SA was selling at 60 shillings a 50 kilogram bag.

### 4.5.2 AGRICULTURAL TOOLS

A jembe and a hoe are common tools in this area. The ox-plough is common in the Kathama side, where about 70% of the interviewed households have at least one ox-plough. A fork-jembe (=uma) is only important in the coffee zone where couch grass (Digitaria scalarum) and other notorious weeds (grasses and sedges) are common. Also about 20% of all respondents owned a wheel-barrow, while about 10% owned an ox-cart.

Kangundo and Tala are important market centres for these tools, but the majority of the households possessions of tools seem to have come from distant places like Nairobi, Machakos and Thika. It is probable that the household members staying outside the division purchased and brought home such tools during annual leaves, week-ends, month-ends and such other times.

### 4.5.3 COMMERCIAL SEED

Katumani maize seed is the most important commercial seed in the area. Mexican 142 bean is gaining importance east of the Kanzalu range where we found for instance that about 10% of the Kathama respondents had got the seed from the extension officers for field trials.

The following table shows the proportions of the sample farmers who used Katumani seed in 1975, and also some response from the ones who never used Katumani seed that year.

TABLE 18: PERCENTAGES OF SAMPLE FARMERS WHO USED KATUMANI MAIZE SEED IN 1975 AND SOME RESPONSE FROM THOSE WHO DID NOT USE THE SEED

| Response | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Planted Kat. | - | 10 | 12 | - | 17 |
| Planted Kat. x 2 | 26 | 25 | 15 | 30 | 24 |
| Prefer local seed | 53 | 35 | 60 | 60 | 42 |
| Lacked money | 7 | 5 | 4 | - | 10 |
| Kat. yields less | 7 | - | - | - | 3 |
| Kat. not found | 7 | 25 | 9 | 10 | 4 |

Key: Kat. = Katumani seed
Kat. x 2 = Seed from previous Kat. harvest.

Source: Own investigation.

The table above shows that very few farmers actually planted Katumani maize seed in 1975. There is also evidence that some farmers actually wanted to plant the seed but could not get it anywhere. We learnt that in the short rains for instance the seeds arrived very late in the division. This fact is also supported by the findings that over 20% of the respondents planted seed from the previous Katumani crop harvest - a practice that is not recommended.[1]

Although we learn from this table that only a small proportion of the farmers claimed that they could not afford the seed; we also notice a strong preference for local seed. Some respondents even categorically state that in the final analysis, the Katumani seed yields less than the local seed because its dwaft nature of growth makes it prone to monkey and dog attack while in the shambas.

4.5.4. STORAGE CHEMICALS

All homesteads had food storage facilities but most of these were empty during the studies. Although 43% of our respondents were aware of the existence of storage chemicals, only 37% of them said and proved by show of containers that they had actually used storage chemicals like Blue-cross (1% Melathion) and Red-Triangle (1% Lindane).

---

1. A crop that is grown from a previous harvest has already lost its genetic vigour for high yields (see reference 16, op. cit.).

The chemicals cost as little as 3 shillings (Blue cross) and protect stored grains from untold damage by bruichids and other storage insects.

The majority of the respondents said that they had so little food harvested and so did not see any need for insect protection. But 5% of these still claimed that the chemicals had a pungent smell and gave food a rather nasty taste. No wonder then, we found that up to 31% of the respondents were actually using 'ash' and the same people believed that ash was actually a better protection for stored chemicals. If this claim is true, then ash could be a perfect substitute for the commercial chemicals, and perhaps healthier. We even found the same practice with some traders in the shops. Only 10% of the respondents claimed that they do not have any money to purchase these chemicals.

### 4.5.5 FUNGICIDES AND INSECTICIDES

These are important in the coffee zone. The common ones are given in the table below showing that copper fungicides and diazinon insecticides are the most important chemicals delivered to Matungulu Society; and therefore used by coffee farmers only.

TABLE 19: CHEMICALS (MAJOR) DELIVERED TO MATUNGULU COFFEE SOCIETY IN 1974/75

FUNGICIDES (Kilograms)

| Type | 1974 | 1975 |
|---|---|---|
| Copper | 9425 | 6025 |
| Difolatan | 500 | 925 |
| Orthodifolatan | - | 274 |

INSECTICIDES (20 litre drums)

| Type | 1974 | 1975 |
|---|---|---|
| Diazinon | 80 | 93 |
| Dieldrex | 19 | 0 |
| Supadiel | 10 | 10 |
| Dieldrin | 7 | 3 |

Source: Compiled from Union Deliveries Records at Kangundo and counter-checked by Society receipt records.

These chemicals are received by the co-operative coffee societies, who own special circuit teams that go round each farm spraying the member's coffee; at specified intervals.

## 4.6 OTHER FACTOR INPUTS

### 4.6.1 HIRED LABOUR

Farm workers are paid an average of 94 shillings per month (range 70 to 105 shillings). Duties for such workers include, herdmanship, general farm work, and collection of water.

25% of all the households we interviewed had at least one farm labourer in 1975; the highest being around Tala. Casual labourers were present where bench making and terrace construction was in progress.

During the peak-coffee picking periods, the hired labour market was known to be very much affected and costs of hiring the same, shot up. The Kayatta Plantation and Matungulu Estates attracted a lot of would-be farm labourers in the area; by offering up to 3 shillings for every debe (paraffin 4 gallon tin) of coffee picked.

### 4.6.2 FARMING LOANS AND CREDIT FACILITIES

Loans and credit facilities in this area originate from the Kenya Government, pass through the Co-operative Bank of Kenya, then through the Machakos District Co-operative Union, and then they are sent to primary societies where the members get them.

Coffee is the only security for loan applicants. So, all non-coffee growers are automatically disqualified from getting loans and credit facilities. The loan approval committee also insists that:-

a) A Junior Agricultural Assistant (JAA) and/or a Technical Assistant (TA) must confirm that the applicant is a good farmer.

b) The amount given has to be equal or less than 50% of the average annual cash receipts from cherry for the previous three years.

There is a banking section of the Machakos District Co-operative Union at Kangundo township for use by loanees. In Appendix XII and XIII, we see what the loan position was in the 1974/5 year, in the division. We notice that the difference between the required and the actual loan repayments is quite high (76% of the total).

4.6.3 AGRICULTURAL EDUCATION AND TRAINING

There is a Farmers Training Center (F.T.C.) at Machakos which admits farmers for short period training nearly every year. The table that follows shows the proportion of our sample that have attended such courses, and some response for those who have not been to an F.T.C.

TABLE 20 F.T.C. ATTENDANCE AND NON-ATTENDANCE RESPONSE EXPRESSED AS A % OF THE TOTAL SUB-SAMPLES 1975

| Responses | Kangundo | Tala | Kinyui | Katheka | Katha-ma |
|---|---|---|---|---|---|
| Percentage haves | 20 | 10 | 15 | 13 | 3 |
| Not chosen | 27 | 50 | 46 | 44 | 42 |
| No time | 40 | 20 | 27 | 39 | 17 |
| Other[1] | 13 | 20 | 12 | 4 | 38 |

Source: Own investigation.

This table shows that recruitment into FTCs over the years has been very poor especially amongst the non-coffee growers. This emphasis on selection of coffee growers is perhaps caused by the fact that the Machakos District Co-operative Union has got an Education Secretary charged with the following responsibilities:-

a) Visiting members in the primary societies;
b) Arranging film shows for society members;
c) Arranging speech days;
d) Holding demonstrations and field days;
e) Sending farmers to the F.T.C.

This has then laid emphasis on the co-operative society members being chosen for training and has ignored all non-coffee growers as illustrated by the Kathama case.

---

1. These include: no response, no reason, or don't knows.

## 4.7 NON FARM INCOMES

If we define 'non-farm incomes' as that part of the total household income that has originated from sources other than from selling farm products, then we find that the most important such source for this area is that of household members working elsewhere for some paid income. The following table shows the breakdown and average amounts of money received into households of sample farmers in 1975.

Table 21 : PERCENTAGES OF SAMPLE FARMERS RECEIVING MONTHLY CASH FROM HOUSEHOLD MEMBERS WORKING ELSEWHERE FOR SOME PAID INCOME, AND THE AVERAGE AMOUNTS OF MONEY RECEIVED IN 1975.

| | KANGUNDO | TALA | KINYUI | KATHEKA | KATHAMA |
|---|---|---|---|---|---|
| Percentage households receiving | 73 | 75 | 89 | 78 | 63 |
| Amounts shs/month | 87 | 511 | 253 | 104 | 127 |
| Amounts shs/year | 1044 | 6132 | 3036 | 1248 | 1524 |

Source: Own investigation

It follows therefore that on average, 76% of the interviewed households had an average of 216.00 shillings each month (2,592 shillings a year) from sources other than direct farming.

From table 21 we notice a variation in the money received over space. Thus while an average household at Tala (that gets money) had over 500.00 shillings a month, an average household at Katheka gets slightly over 100.00 shillings. The case for Kangundo is dubious. We have a strong feeling the respondents around Kangundo were afraid to furnish us with the necessary information for fear of income tax assessment, or that they expected help from us and therefore wanted to keep the figures as small as possible.

The people working elsewhere for paid income are mostly clerical officers, members of the armed forces, drivers, housemaids, barmaids, and teachers. Some are self employed in business, wood-carving, honey collection and traditional medicine.

## 4.8 EXPENDITURE ON HOUSEHOLD ITEMS

We shall use the phrase 'household items' to refer to those items that an average household, in that part of the country, finds that it has to buy for its well-being. While such purchased items vary considerably from household to household depending on tastes, incomes, prices, substitutes, and the like, we found that meat, milk, salt, matches, paraffin, cooking fat, vegetables, sugar, maize, beans/pigeon peas, flour are commonly p chased. The table that follows give average monthly expenditures on such items during the interview period.

We also found that in about 30% of all households that we visited, at least one member took alcohol and/or smoked cigarettes or local snuff. The expenditure on this could not be estimated clearly. The table below teaches us many things about the purchasing behaviour of the sample households. It is not the interest of the study to give specific analysis on this observations, but it will suffice to note for instance that people in Tala buy more foods than those in Kathama. Too, proportionally, an average household around Tala spends much more of its disposable incomes buying proteinous foods like meat, and milk, while an average household in Kathama spends much more of its disposable incomes buying calorie (=starchy) foods like maize and flour(=maize meal).

TABLE 22: AVERAGE MONTHLY HOUSEHOLD EXPENDITURES IN THE AREA DURING SEPTEMBER/DECEMBER, 1975

(Shs)

| Item | Kangundo | Tala | Kinyui | Katheka | Kath-ama | Sam-ple Av. |
|---|---|---|---|---|---|---|
| Beans/ P.peas | 40.30 | 43.40 | 53.29 | 47.44 | 34.34 | 43 |
| Cooking fat | 24.30 | 24.70 | 12.48 | 15.80 | 12.63 | 18 |
| Flour (=maize meal) | 26.00 | 43.30 | 32.55 | 15.49 | 16.90 | 27 |
| Maize | 73.70 | 48.80 | 74.00 | 71.35 | 61.75 | 66 |
| Matches | 1.80 | 1.60 | 1.28 | 1.03 | 1.17 | 1 |
| Meat | 18.10 | 30.35 | 25.24 | 23.05 | 16.67 | 23 |
| Milk | 22.40 | 28.90 | 19.37 | 14.64 | 5.50 | 18 |
| Paraffin | 7.97 | 5.40 | 5.88 | 5.08 | 4.97 | 6 |
| Salt | 4.20 | 2.80 | 2.60 | 2.18 | 2.35 | 3 |
| Sugar | 17.10 | 29.10 | 19.48 | 17.49 | 18.94 | 21 |
| Vege-tables | 28.30 | 39.60 | 37.89 | 35.95 | 13.49 | 31 |
| TOTALS | 264.17 | 297.95 | 284.58 | 249.50 | 188.71 | . |

Source: Own investigation.

## 4.9 EXPENDITURE ON SCHOOL FEES

School fees is yet another impontant household expenditure in this area. The breakdown for our sub-sample can be given as follows:

Table 23 : AVERAGE HOUSEHOLD SCHOOL FEES EXPENDITURE IN THE AREA IN 1975

| | Kangundo | Tala | Ki ·ui | Katheka | Kathama | Sample Average |
|---|---|---|---|---|---|---|
| Children (no.) | 7 | 6 | 5 | 5 | 5 | 7 |
| School fees (shs) | 1016 | 1064 | 491 | 231 | 248 | 610 |

Source: Own investigation.

The table above shows that there is a distance effect as one goes from Kangundo to Kathama. Thus an average household in Katheka spends less than one quarter of the amount of money spent by an average household around Tala. We shall see later, in the chapter on infrastructure, that there is also a distance relationship in as far as formal education opportunities are concerned.

## 4.10 THE HOUSEHOLD BUDGET

In this section we shall attempt to draw a household budget for a hypothetical average household in our farmer's sample. First we shall consider the incomes and later we shall compare these with the expenditures.

### THE VALUE OF HARVESTED (MAJOR) FOOD CROPS

If we give a zero harvest value to all piecemeal cases in table 8, for the conveniency of calculating harvests of five major food crops in an average household, we get the result of the following table:

Table 24: MAJOR FOOD CROP HARVESTS IN AN AVERAGE HOUSEHOLD, 1975 (bags)

| CROP | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Maize | 1.27 | 3.1 | 2.66 | 2.61 | 2.28 |
| Beans | 0.17 | 0.94 | 0.62 | 0.54 | 0.48 |
| Pigeon pea | 0.25 | 0.46 | 0.41 | 0.67 | 0.54 |
| Cow pea | 0.03 | 0.43 | 0.17 | 0.09 | 0.34 |
| Sorghum | 0.55 | 0.50 | 0.50 | 0.57 | 0.35 |

Source: Own calculations.

If we assume that the Maize and Produce Board's producer price as contained in the 10th November 1975 price list, holds true for our average farmer then we can multiply the harvests given in the table above by shs. 57/85 for F.A.Q maize, shs. 218 for beans (e.g Mwezi moja beans) shs. 218 for pigeon peas, shs. 150 for cow peas, and shs. 50 for sorghum (Mtama).

We can then derive the following income matrix and present it as shown:

Table 25: ESTIMATED HOUSEHOLD INCOME FROM MAJOR FOOD CROPS FOR AN AVERAGE HOUSEHOLD, 1975 (shs.)

| CROP | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Maize | 73.44 | 179.34 | 153.02 | 149.21 | 131.90 |
| Beans | 37.06 | 204.92 | 135.16 | 117.72 | 106.64 |
| Pigeon pea | 54.50 | 100.28 | 89.38 | 146.06 | 117.72 |
| Cow pea | 4.50 | 64.50 | 25.50 | 13.50 | 51.00 |
| Sorghum | 27.50 | 25.00 | 25.00 | 28.50 | 17.50 |
| Total | 197.00 | 574.04 | 428.06 | 554.99 | 424.76 |

Source: Own calculations.

If we sum up the total and divide by 5, then we shall get a figure of shs. 435.77 which we can regard as representing an average household income from major food crops harvested.

THE VALUE OF HARVESTED CASH CROPS

In section 4.4, we found that an average divisional coffee grower received shs. 848.70 in 1975 for coffee delivered to the co-operative societies. Since only approximately 60 % of our sample farmers grew coffee, we can assume that our hypothetical average grower had 60 % of the 848.70 shillings, which is shs.509.22.

Too,an average passion fruit grower got shs. 37.58. Since approximately 20% of our sample farmers cultivated passion fruit, we can too assume that our average grower got 20 % of shs.37.58, which is shs. 7.52.

Since we cannot estimate the value of other fruit and vegetables, we shall also give them a value of zero for conveniency of calculation. Thus from the two major cash crops, our average farmers earned 509.22 shillings and additionally 7.52 shillings making a total of 516.74 shillings.

THE VALUE OF LIVESTOCK POSSESSED

The product of the results of table 2 and table 3 gives as the capital stock in livestock possessed. On the other hand, the product of table 3 and table 5 give actual cash receipts from livestock sales to an average sample household. If we take this latter case as an estimator of income from livestock possessed, we find the results of the following table:-

Table 26: RECEIPTS FROM LIVESTOCK SALES IN AN AVERAGE SAMPLE HOUSEHOLD, 1975 (shs.)

| Animal | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Cattle | 285 | 456 | 329 | 240 | 574 |
| Goats | 118 | 240 | 129 | 146 | 213 |
| Sheep | 82 | 201 | 80 | 60 | 37 |
| Chicken | 63 | 60 | 59 | 48 | 52 |
| Total | 548 | 967 | 597 | 494 | 876 |

Source: Own investigation and calculations

While livestock sales *per se* does not give the exact income figures, this is as far as we can go given the nature of results in our possession (Appendix VI question 2 and 4), which only provides as with livestock possessed and livestock sold at certain prices.

TOTAL HOUSEHOLD INCOME ESTIMATE FOR AN ARERAGE HOUSEHOLD OF THE SAMPLE FARMERS, 1975 ($Y_t$)

If we consider the fore-going income estimates as major components of household income we can then sum them up to yied the results of the following table:-

Table 27: ESTIMATED HOUSEHOLD INCOMES IN AN AVERAGE SAMPLE HOUSEHOLD, 1975 (shs.)

| Source | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Food crops | 197 | 574 | 428 | 555 | 425 |
| Cash crops[a] | 887 | 776 | 826 | 198 | - |
| Livestock | 548 | 969 | 597 | 494 | 876 |
| Sub-total | 1632 | 1350 | 1849 | 1247 | 1301 |
| Non-farm | 1044 | 6132 | 3036 | 1248 | 1524 |
| Total | 2676 | 7482 | 4885 | 2495 | 2825 |

a - This include receipts from coffee and passion fruits spreadover the subsamples depending on the proportions of growers.

Source: Own investigations and calculations

It is clear from the table above that non-farm sources of household incomes are quite substantial.

HOUSEHOLD EXPENDITURES

The result of the following table shows total household expenditures from main items only. Ideally it should be identical with the results of table 27 but the differences can partially be explained by the methods of estimation. The two tables are however comparable in relative terms. Kathama for instance, has less income and has least expenditure items, while Tala has more income and spends more.

...../66b.

Table 28.

MAIN HOUSEHOLD EXPENDITURES BY SAMPLE FARMERS,1975
(shs.)

| | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Household items | 3182 | 3474 | 3419 | 2994 | 2664 |
| School fees | 1016 | 1064 | 491 | 231 | 610 |
| TOTAL | 4198 | 4638 | 3910 | 3225 | 2875 |

Source:- Own investigations and calculations

CHAPTER V

## 5. MARKET STRUCTURE AND PERFORMANCE OF AGRICULTURAL INPUTS AND OUTPUTS IN THE SAMPLE MARKET CENTRES

In this chapter, we shall present the information we have on market structure and performance of agricultural inputs and outputs in the sample markets centres. In market structure we shall consider such factors as concentration of sellers and buyers, conditions of entry, and product differentiation.

In market performance we shall consider such factors as levels of output, exchange efficiency, product suitability including grading, participants rationality, unethical practices, conservation, progressiveness, prices, costs and profits (30).

### 5.1 AGRICULTURAL INPUTS

The most important agricultural inputs include fertilizers, agricultural tools, commercial high-yielding seeds, herbicides, fungicides, storage chemicals, seed dressings, crop insecticides, animal health and hygiene chemicals, artificial insemination, and animal feeds. These are supplied into the division by various manufacturing and marketing organisations or companies that include:- Fisons (EA) Ltd., Kleenway Chemical Ltd., Mackenzie (K) Ltd., Maida Ltd., Merchants Manufacturers Ltd., Murphy Chemicals Ltd., Muus (K) Ltd., Pfizer Laboratories Ltd., Sapa Chemicals (K) Ltd., Wellcome (K) Ltd., and Windmill (EA) Ltd.

The commercial high yielding seeds (Katumani maize, Mexican 142 beans, and sunflower), are marketed by the Kenya Seed Company through the Kenya Farmers Association and several stockists in the country including Machakos district. Artificial insemination is operated by the Veterinary Section of the Ministry of Agriculture office at Kangundo. Animal feeds are supplied mainly by Maida Ltd. and Muus(K) Ltd. The main suppliers of animal health and hygiene chemicals include Wellcome (K) Ltd., Mackenzie (K) Ltd., Fisons (EA) Ltd., Pfizer Laboratories Ltd., Sapa Chemicals Ltd., and Murphy Chemicals Ltd.

These too supply other inputs including fertilizer, spray pumps and secateurs. The Kenya National Federation of Co-operatives also receives and delivers some inputs especially the coffee inputs.

In this sub-chapter we shall present the cases of each of these inputs in turn.

### 5.1.1 THE FERTILIZERS

Fertilizers are mainly stocked at the Union store at Kangundo township. The main suppliers to this store are:- Kleenway Chemicals Ltd., Mackenzie (K) Ltd., and the Kenya National Federation of Co-operatives (=KNFC). At Tala, there are also two stockists, one for Pfizer Chemicals and the other for

Merchants Manufacturers Ltd.

The table that follows gives the quantities and types of fertilizers delivered to the Kangundo store over the last two years.

TABLE 29: FERTILIZER TYPES AND QUANTITIES STOCKED AT THE UNION STORE AT KANGUNDO IN 1974 & 1975

| | | 1974 | | 1975 | |
|---|---|---|---|---|---|
| | Kg/bag | Bags | Tons | Bags | Tons |
| Kleenway: | | | | | |
| 25-5-5+5 | 50 | 1,310 | 65.5 | 200 | 10 |
| S.A.(21%N) | 50 | 400 | 20.0 | - | - |
| A.S.N.(26%N) | 50 | 320 | 16.0 | - | - |
| C.A.N.(26%N) | 50 | 1,990 | 99.5 | - | - |
| 20-10-10 | 100 | 300 | 30.0 | - | - |
| K.N.F.C. | | | | | |
| A.S.N.(26%N) | 100 | 1,205 | 120.0 | - | - |
| C.A.N.(26%N) | 100 | 170 | 17.0 | - | - |
| 20-20-0 | 50 | - | - | 220 | 11 |
| Mackenzie: | | | | | |
| 25-5-5+5 | 50 | 440 | 22.0 | - | - |
| Single Super | 50 | 300 | 15.0 | - | - |
| Totals | | | 405.5 | | 21 |

Source: Compiled from receipt records kept by the Union branch store at Kangundo.

The most striking observation in this table is that deliveries in 1975 were only a mere 21 metric tons, vis-à-vis 405.5 metric tons in 1974

During the interview periods the fertilizers were selling at 90 shillings a 50kg-bag of C.A.N. or A.S.N., 85 shillings a 50kg-bag of 25-5-5+5 or 20-20-0, and 60 shillings a 50kg-bag of S.A. where:-

| | | |
|---|---|---|
| A.S.N. | = | Ammonium Sulphate Nitrate |
| C.A.N. | = | Calcium Ammonium Nitrate |
| S.A. | = | Sulphate of Ammonia |
| 25-5-5+5 | = | 25% Nitrogen, 5% Phosphorus, 5% Potassium, 5% Sulphur. |

The bigger packages were sold at proportionally higher prices. For instance a 100kg-bag of ASN or CAN sold at 180 shillings during that period. Most of these fertilizer stocks were delivered to the six coffee co-operative societies where members collected their share and used it mainly on coffee. The prices given above are given by the manufacturers or distributors in a special 'price list' bulletin to the sellers.

### 5.1.2 AGRICULTURAL TOOLS

The main agricultural tools marketed include:- jembes, pangas, ox-ploughs, fork jembes (=uma), sprayers, and secateurs. Pangas, jembes and fork-jembes are stocked by several traders in nearly all market centres. Ox-ploughs are mainly found in Kangundo but occasional stocks are also found in Tala. The sprayers (manual) and secateurs are mainly stocked in the Kangundo store.

The prices for these tools differ with size, make and type. The following table shows the average costs of main agricultural tools as at September/ December, 1975 in the market centres.

TABLE 30: AVERAGE SELLING PRICES OF MAIN AGRICULTURAL TOOLS. IN THE MARKET CENTRES IN SEPTEMBER/ DECEMBER PERIODS OF 1975
(Shs)

| Tool | Kangundo | Tala | Kinyui | Katheka | Kathama | Sample average |
|---|---|---|---|---|---|---|
| Ox-plough | 270 | - | - | - | - | 270 |
| Panga | 10 | 9 | 10 | - | - | 9/70 |
| Jembe (3kg) | 24/50 | - | 25 | - | 25 | 24/50 |
| Fork-jembe (2½kg) | 26/70 | - | 27 | - | - | 26/85 |

Source: Own investigation.

The traders' buying prices were difficult to establish due to the traders unwillingness to furnish us with the relevant information. Most of these tools were however, delivered to this market centres by distributors from Nairobi.

### 5.1.3 COMMERCIAL HIGH YIELDING SEEDS

Katumani maize seed, Mexican 142 beans, and sunflower are sold in most shops in Kangundo and Tala, and more so in the input shops. The interview period coincided with the short rains, during which period there were very limited stocks of such seed. The little that was found, had also arrived late, when early planters had already used their own local seed, or seed from previous harvests. One bag of Katumani seed sold at 21 shillings, and is enough to plant about half an hectare of land.

### HERBICIDES (=WEED KILLERS)

Basfapon, Dalapon, and Gramoxone weed-killers were found in the Kangundo store and also in the two stockists shop at Tala. Fisons (K) Ltd., Sapa Chemicals (K) Ltd., Mackenzie (K) Ltd., and Pfizer Laboratories Ltd., are main suppliers.

Small units (1 and 5 litres) are purchased by small scale farmers in the coffee zone, while large units (22.5 kg and 25 kg) are purchased by the coffee estates. ½ kg tins of Basfapon sold at 17.75 shillings while 1 litre jerrican of gramoxone sold at 51/60 shillings. These are used by small isolated small-scale farmers in the division.

The table that follows shows the number and types of weed-killers in Tala and Kangundo in the previous two years.

TABLE 31: HERBICIDE NUMBERS AND TYPES IN THE AREA IN IN 1974 AND 1975

| HERBICIDE | SALES UNIT | 1974 No. | 1975 No. |
|---|---|---|---|
| Basfapon | 500g. tin | 36 | 36 |
| Basfapon | 25kg bags | 20 | 36 |
| Dalapon | 25.5kg bags | 10 | 9 |
| Gramoxone | 1ℓ. jerrican | 307 | 65 |
| Gramoxone | 5ℓ. jerrican | 180 | 180 |

Source: Compiled from the receipt records of Kangundo store and Tala Pfizer stockists.

5.1.4 FUNGICIDES

These are delivered in large volumes to Kangundo store by Mackenzie (K) Ltd. mainly. Like insecticides, these have a high demand from coffee societies where they are mainly used for Coffee Berry Disease (CBD) and coffee rust.

Dithane (a zinc/manganese carbamate), copper, difolatan, and orthodifolatan are the most important fungicides. Copper is for controlling leaf rust of coffee (Hemileia vastatrix), while Difolatan and Orthodifolatan are for the control of the dreaded C.B.D (colletotrichum coffeanum). The Dithane M45 is important for the control of fungal diseases of edible fruits and vegetables. In 1975, Mackenzie (K) Ltd., delivered up to four hundred 25kg-bags of cooper, fifty 25kg-bags of difolatan, and fifty 25kg-bags of orthodifolatan. In that period, the copper was selling at 420 shillings a bag, while difolatan and orthodifolatan were selling at 943 shillings a bag. These were mainly purchased by primary coffee societies who own circuit teams that spray the members coffee.

### 5.1.5 CROP INSECTICIDES

These are mainly used for the control of the many crop pests. They form, together with fungicides, the bulk of chemicals handled by the Union store at Kangundo. The most common are Sumithion (=50% Fenitrothione), Dieldrin, Dieldrex, Tropical Mortegg, and Duter extra. Even some systemic insecticides like Disyston are also found.

Their selling prices differ with type, volume of package, and degree of concentration. For instance, a 20l. drum of Duter extra sold at 2475 shillings, while a 20l. drum of sumithion sold at 521 shillings.

Mackenzie (K) Ltd., Murphy (K) Ltd., and Shell Chemicals (EA) Ltd., are the main suppliers in order of importance. Most of these insecticides are re-distributed to the primary coffee societies where, like fungicides, the societies' special circuit teams spray the members coffee.

### 5.1.6 STORAGE CHEMICALS

Blue-corss (=1% Malathione), Red Triangle (=1% Lindane) are the main storage chemicals found in the area. They are packaged in 400g. jerricans, and sell at 3/00 shillings (Blue-cross) or 3/40 shillings (Red Triangle) at Tala and Kangundo.

Mackenzie (K) Ltd., Fisons (K) Ltd., and Pfizer Laboratories Ltd., are the main suppliers. 100g. of Blue-cross protect 90 kilograms of grain (=one maize bag). The Red Triangle (1% Lindane) is recommended for maize stored with cobs.

### 5.1.7 SEED DRESSINGS

These too are found in large quantities in the Kangundo store. For instance several 10g. packets of Lindasan are found and sell at only 1/00 shilling and is enough to protect 3 to 4 kgs. of seed from seed-borne and soil-borne diseases including several insect attack when planted.

In 1975 alone, over 1,200 such packets were delivered to the Kangundo store by Fisons (EA) Ltd. and Mackenzie (K) Ltd., mainly.

### 5.1.8 ANIMAL HEALTH AND HYGIENE CHEMICALS

Tick control chemicals (=Acaricides) are the main animal health and hygiene chemicals. Examples in the Kangundo store and the Tala Pfizer stockists' premises include Gamatox, Coopertox, Altik cattle dip, and Delnav DFF.

Wellcome (K) Ltd., and Pfizer chemicals are the main suppliers. The selling price also differ by size of packaging, type and the degree of concentration of the active ingredient. For instance, a 20 litre drum of coopertox sold at 82 shillings, a 100ml bottle of Delnav DFF sold at 21/40 shillings, while a 20 litre drum of Altik cattle dip sold at 477 shillings during the interview period.

Other animal health and hygiene products include: milking salve, healing oil, fluke and worm drench, amprol (for coccidiosis) and sevin 85.

### 5.1.9 ARTIFICIAL INSEMINATION (A.I.)

The veterinary section of the Ministry of Agriculture at Kangundo is responsible for A.I. services in the division. A specially trained inseminator, who is also an Animal Health Assistant (A.H.A.) covers all the 23 A.I. crushes in the two locations of Kangundo and Matungulu each working day.

The operation of A.I. services is discussed in greater detail in the chapter dealing with the supporting infrastructure. It will therefore suffice to mention that in 1975, 386 grade cows, and 1049 local zebus were inseminated and that the non-return percentage (N.R.%) was sixty-nine.

## 5.1.10 ANIMAL FEEDS

The main animal feeds are those used for poultry, egg, and milk production. They are found in the Kangundo store and at the two stockists shops at Tala. They are supplied mainly by Maida Ltd., and Muus (K) Ltd. although Pfizer Laboratories and Merchants Manufacturers Ltd. also supply them.

The table that follows shows the quantities of animal feeds delivered to the Union store at Kangundo during the last two years and in the appendix we shall see the amounts brought to Tala by the two minor stockists. Prices for animal feeds are also given in appendix IX.

TABLE 32: ANIMAL FEEDS DELIVERED TO THE UNION STORE AT KANGUNDO IN 1974 AND 1975

| | 1974 | | | 1975 | |
|---|---|---|---|---|---|
| | Kg/bag | Bags | Tons | Bags | Tons |
| MAIDA LTD | | | | | |
| Layers Mash | 70 | - | - | 150 | 10,500 |
| Growers Mash | 70 | - | - | 40 | 2.800 |
| Dairy Cubes | 70 | - | - | 10 | 0.700 |
| Sub-Total | | | | | 14.000 |
| MUUS (K)LTD | | | | | |
| Chick Start | 25 | 60 | 1.500 | 3 | 0.075 |
| " | 50 | 20 | 1.000 | 15 | 0.750 |
| Growers Mash | 25 | 41 | 1.025 | 20 | 0.500 |
| " | 50 | 219 | 10.950 | 213 | 10.650 |
| Layers Mash | 25 | 258 | 6.450 | 36 | 0.900 |
| " | 50 | 709 | 35.450 | 565 | 28.250 |
| Growers Finish | 50 | 10 | 0.500 | - | - |
| Broiler Finish | 50 | - | - | 12 | 0.600 |
| Sub-Total | | | 56.875 | | 41.725 |
| Dairy meal | 25 | 10 | 0.250 | 4 | 0.100 |
| " | 50 | 10 | 0.500 | 5 | 0.250 |
| Dairy Pellets | 25 | 40 | 1.000 | 4 | 0.100 |
| " | 50 | 20 | 1.000 | 10 | 0.500 |
| Calf Pellets | 25 | 10 | 0.250 | - | - |
| Sub-Total | | | 3.000 | | 0.950 |
| Bacon Start | 25 | 10 | 0.250 | 20 | 0.500 |
| Bacon Plus | 25 | 12 | 0.300 | 5 | 0.225 |
| Sow Plus | 25 | 10 | 0.250 | 1 | 0.250 |
| Sub-Total | | | 0.800 | | 0.750 |
| GRAND TOTAL | | | 60.675 | | 57.215 |

Source:- Compiled from the receipt records of the Union store at Kangundo.

## 5.2 AGRICULTURAL OUTPUTS

As we have seen in Chapter Four, the main agricultural outputs for the division include cash and food crops, livestock and animal products. The cases for most of these were also presented in Chapter four. In this section therefore, we shall only furnish the reader with additional information in order to clarify the agricultural output situation further.

### 5.2.1 THE CASE OF MILK

The report of the divisional animal health assistant (AHA) shows that in 1975 there were an estimate of 679 heads of grade cattle in the division. Most of these were in Kangundo and the rest in Matungulu locations. To help the farmers market their milk, the Machakos District Co-operative Union branch at Kangundo township operates a small dairy of whose processing and marketing function we here present.

The Kangundo dairy started in 1967, and by the end of 1975, it had a membership of 50 to 60 farmers. The dairy is managed by a competent manager trained at Naivasha. He is assisted by a machine operator and a saleslady.

The supply of milk to the dairy comes from Matungulu and Kangundo locations mainly; but some milk also comes from a nearby ranching area known as Komarock. The dairy handles and receives only morning milk and does not accept evening milk.

The Kangundo dairy co-operates closely with a privately-owned dairy at Kawethei in terms of excesses. Thus, if either dairy gets excess supplies and cannot handle it well, it transports the same to the one with lesser quantities. There is also another small dairy at Kakuyuni which is also privately owned but we did not observe any co-operation with the Kangundo dairy. Excess milk, which goes sour, is sold to some women at 'throw-away-prices' who in turn, sell the sour milk in large gourds in open-air-markets, especially at Tala.

Simple milk quality-tests are performed in the dairy. These include water-adulteration, by use of a lactometer, alcohol and acid tests to detect overdue milk, and also smell by the expert manager and his staff to detect odours that may be caused by nox ious substances and pathogenic bacteria.

Milk is transported to the dairy by either carrying it on foot, or by carrying it on bicycles for the distant members. From the ranching area of Komarock, milk is brought by 'matatus' owned privately by the ranchers themselves.

Away from the dairy, milk is either collected by costomers on foot using their own containers, every morning; or in a few cases (approx. 10%) milk is delivered to their kitchen doors by a saleslady. This latter case of customers include most civil servants in Kangundo township.

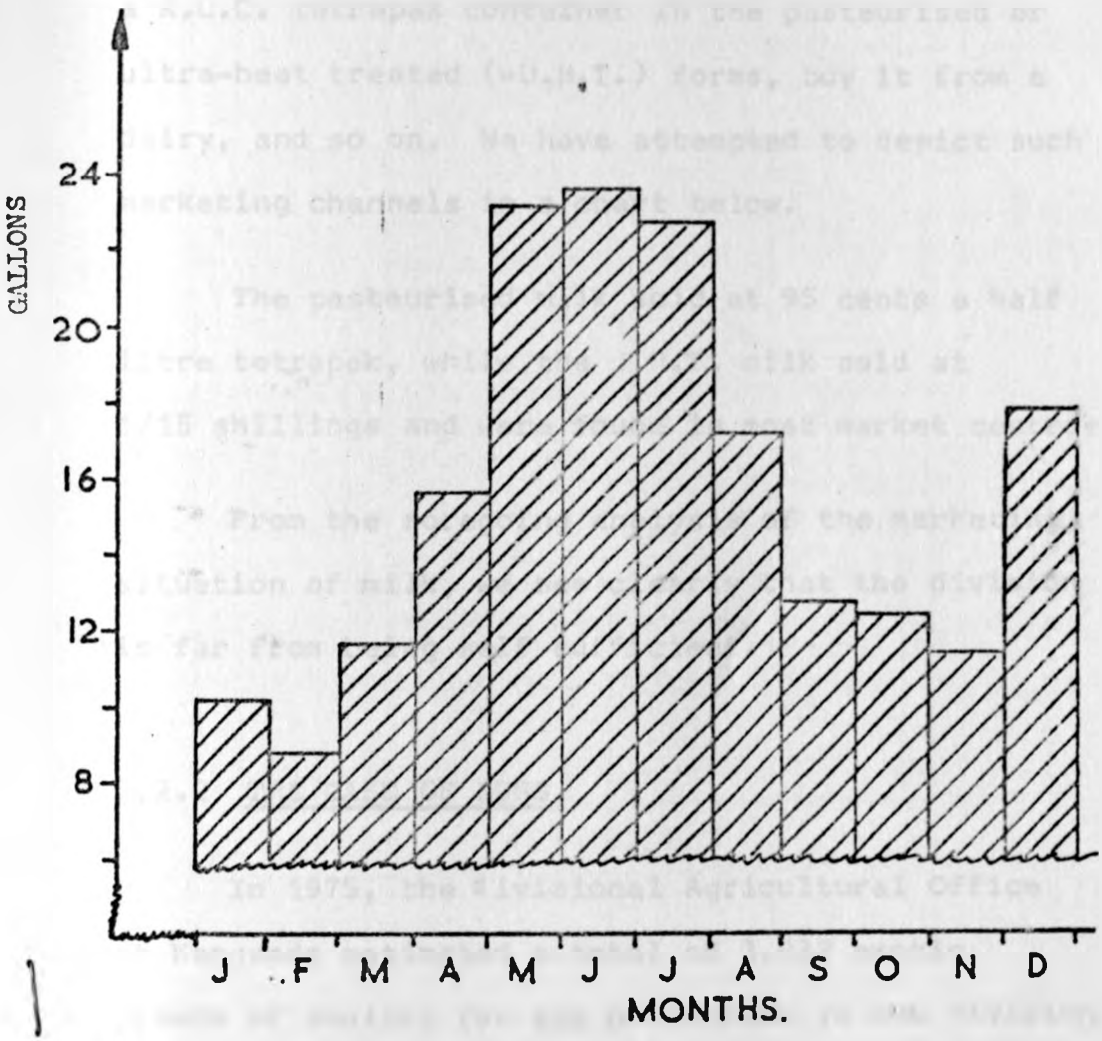
In 1975, the dairy paid members an average of 5 shillings a gallon, but fluctuated between 4.55 shillings and 5.65 shillings, throughout that year. Such payments are done after the dairy has taken off about 20% commission from the gross receipts. This commission meets all the running costs including salary payments, rent for buildings, stationery, machine and engine maintenance and repairs, and any other such costs as the members may deem necessary.

The milk received in this area over the months of 1975 is shown in graph below. This represents over 17,000 gallons (over 77,000 litres) in that year, received over the year. The graph shows that most milk is delivered to the dairy soon after the rains. It too shows that very little milk is sent to the dairy during the dry spells of weather when there is very little pasture.

HISTOGRAM 1

MONTHLY MILK INTAKE AT KANGONDO DAIRY, 1975

(100 Gallons)




Source: compiled from the receipt records of the Machakos district co-operative union dairy at Kangundo.

Final consumers in this area can get milk from several sources. They can get it from their own cows, buy it from a neighbour, buy it from the open-air-market as sour milk, buy it from a shop in a K.C.C. tetrapak container in the pasteurised or ultra-heat treated (=U.H.T.) forms, buy it from a dairy, and so on. We have attempted to depict such marketing channels in a chart below.

The pasteurised milk sold at 95 cents a half litre tetrapak, while the U.H.T. milk sold at 1/15 shillings and were found in most market centres.

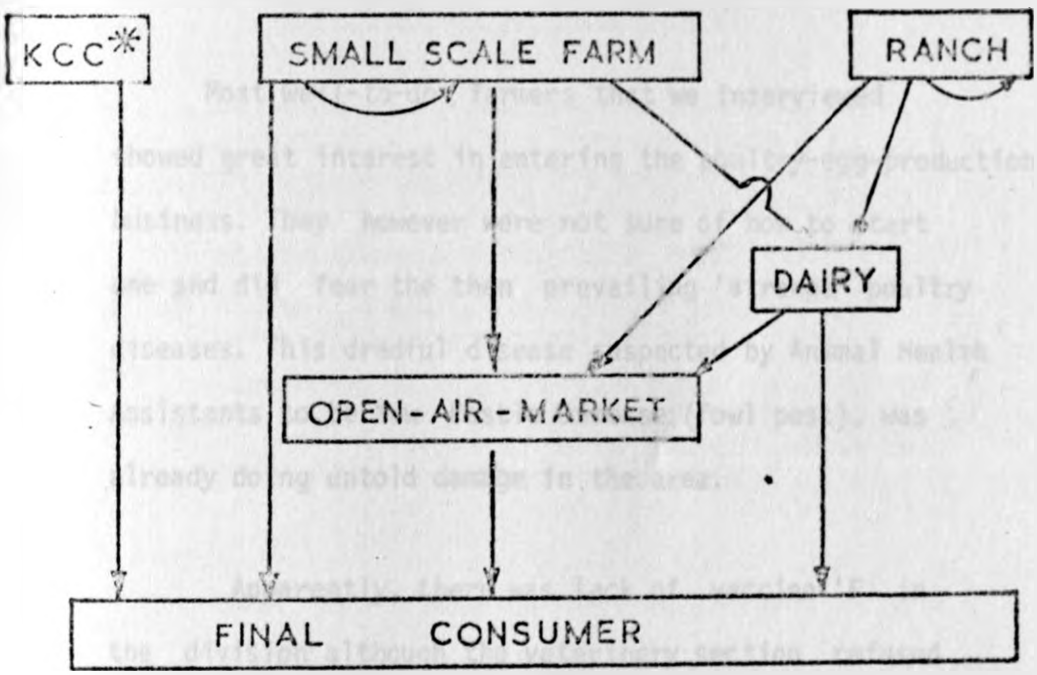
From the foregoing analysis of the marketing situation of milk, we see clearly that the division is far from being self sufficient.

### 5.2.2 THE CASE OF EGGS

In 1975, the divisional Agricultural Office at Kangundo estimated a total of 3,832 exotic breeds of poultry for egg production in the division. The same source estimated the number of local breeds of poultry to be over 27 times as much. Most of these exotic breeds of poultry are in Matungulu and Kangundo locations, situated in the immediate area surrounding Kangundo/Tala townships.

DIAGRAM 1:

MILK MARKET CHANNELS IN THE DIVISION IN 1975




Source: Own investigation

* K.C.C = Kenya Cooperative Creameries

The biggest poultry farmer in the division lives near Tala, and he is also a prominent businessman in the Tala market centre. Like most poultry farmers in this country, this farmer resents visitors and abhors business assessment by 'experts' or government officers. We therefore were unable to establish the structure and performance of his business.

Most well-to-do farmers that we interviewed showed great interest in entering the poultry-egg-production business. They however were not sure of how to start one and did fear the then prevailing 'strange' poultry diseases. This dredful disease suspected by Animal Health Assistants to be New Castle Disease (fowl pest), was already doing untold damage in the area.

Apparently, there was lack of vaccine 'F' in the division although the veterinery section refused to confirm or deny this. During the interview period, a dozen of eggs sold at 4.80 shillings although one could still get eggs selling at 30 cents in some market centres

## 5.2.3 THE CASE OF HIDES AND SKINS

The table that follows shows the breakdown of hides and skins that left the division in 1974 and 1975. This too is a rough and ready estimator of the livestock slaughtered in the divisional small abattoirs and at home, over the period.

TABLE 33: NUMBER OF HIDES AND SKINS FROM THE DIVISION IN 1974 AND 1975

| PRODUCT | 74 | 1975 |
|---|---|---|
| Hides | 8,916 | 7,655 |
| Skins (Goat) | 14,759 | 18,368 |
| Skins (Sheep) | 4,447 | 4,264 |

Source: Compiled from the records of the Animal Health Assistant in-charge of hides and skins in the division.

The Bata Shoe Company buys all these skins. One trader in Tala has special arrangements to treat some of these skins and hides with salt, under the supervision of the company. All market centres have at least one abattoir and one skin-suspension shed.

## 5.3 SOME ASPECTS OF TRADE IN THE NORTHERN DIVISION OF MACHAKOS DISTRICT: SEPT/DEC 1975

In chapter four, and also in the previous sections of this chapter, we have tried to impress upon the reader that farm outputs are low in the area, and that a considerable amount of non-farm income does flow into the area; primarily for food purchases. It follows therefore that foods (mainly maize and beans) are 'imported' into the area from areas that have market surplus, for most parts of a year. In this section we shall present some aspect concerning this food trade, and also those concerning the trade of agricultural inputs.

### 5.3.1 FOOD IMPORTS AND SALES

During September/December period of 1975, maize, maize-meal, and beans were the main foods found in shops and the open-air-markets. The following table gives the estimated amounts of foods sold in our sample markets during that period.

TABLE 34: ESTIMATED MONTHLY FOOD SALES DURING SEPTEMBER/ DECEMBER, 1975 IN THE AREA

| FOOD | SALES UNITS | KANGUNDO | TALA | KINYUI | KATHEKA | KATHAMA |
|---|---|---|---|---|---|---|
| Beans | Bags | 15 | 240 | 129 | 40 | 17 |
| Bread | Number | 520 | 500 | . | . | . |
| Cow-peas | Bags | . | . | 11 | 2 | 2 |
| flour | Cartons | 120 | 730 | . | . | 40 |
| flour | Bags | 4 | 200 | 227 | 35 | 35 |
| Maize | Bags | 120 | 900 | 727 | 120 | 102 |
| Milk | Crates | 31 | 200 | 90 | . | 70 |
| Pigeon-peas | Bags | . | . | 30 | 13 | . |

Source: Own investigation

The agents for Maize and Produce Board, who in many cases are also stockists for Kenya National Trading Corporation (K.N.T.C) are found in Kangundo, Tala, and Kinyui. Tala alone has 80% of such agents and/or stockists. Most maise found in Kinyui, Katheka and Kathama has actually been redistributed there by either traders in Tala or the traders who bring the food into the division. The Tala open-air market operates fully two-times a week, and in each market day it can handle up to 50 bags of maize and 10 bags of beans on average.

The statistics revealed that 68% of the sample traders get their produce delivered to their market centres and shop premises by a set of traders coming from an area the traders refer to simply as 'Kikuyu'.

These own several seven-ton lorries and do bring several bags of maize and beans to Tala mainly. Occasionally, they transport the produce through the division via Kinyui, Katheka and Kathama. We do not know where this place called 'Kikuyu' is, but we guess it could be at some place in Kirinyaga district, especially from a market called Kutus. Some traders in the area were of the same opinion.

The point to note here is that the Maize and Produce Board plays such a small part in selling major foods (maize or beans) in this part of the country. This point is clearly illustrated by the then prices in the division. The Board's selling price, over that period, was 80.65 shillings per 90 kg. bag of maize. But we found that the private traders sold the same quantity of maize at an average price of 87.00 shillings to the retailers regardless of the amounts received.

The retail prices for selected foods during that period are given in the table below:-

TABLE 35: AVERAGE RETAIL SELLING PRICES IN SHILLINGS FOR IMPORTANT FOODS DURING SEPT./DEC. 1975

| Food | Kangundo | Tala | Kinyui | Katheka | Kathama | Sample Average |
|---|---|---|---|---|---|---|
| Beans(Kg) | 3.00 | 2.50 | 2.80 | 2.70 | 3.00 | 2.70 |
| Beans(bag) | 280 | 216 | 221 | 280 | 243 | 248 |
| Cowpeas (Kg) | . | . | 2.60 | 2.50 | 2.50 | 2.50 |
| Cowpeas (bag) | . | . | 210 | 300 | . | 255 |
| Maize(Kg) | 1.10 | 1.00 | 1.02 | 1.03 | 1.08 | 1.05 |
| Maize (bag) | 86 | 87 | 7 | 88 | 88 | 87 |
| Meat(Kg) | 5.50 | 5.50 | 5.50 | 5.50 | 5.50 | 5.50 |
| Milk (Pkt)) | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Pigeon peas(Kg) | . | . | 2.70 | 2.80 | 2.50 | 2.70 |
| Pigeon peas (bag) | . | . | 206 | 273 | . | 240 |

Source: Own investigation

The table above shows a gradual increase in price especially in the case of maize as one goes from Kangundo to Kathama. We notice too that pigeon peas was relatively cheaper at Kathama, probably because that is where it is grown mostly. This latter observation is also reflected in the case of cow peas. Beans however, show a haphazard relation. This is probably due to the existence of so many local varieties of food beans and that the population has already got used to eating some varieties. Thus, a bag or kilogram of beans sells at a different price depending on type or cultivar.

## 5.3.2 PERSONAL VERSUS PUBLIC TRANSPORT

### 5.3.2.1 PERSONAL TRANSPORT

Very few traders had their own means of transport. The majority of these were in Tala and Kangundo as shown in the following table.

Table 36: TRADERS' PERSONAL TRANSPORT IN THE AREA IN SEPTEMBER/DECEMBER, 1975

| | Lorries | Pick-ups | Land-rovers | Cars | Total | Traders Interviewed |
|---|---|---|---|---|---|---|
| Kangundo | - | 3 | - | - | 3 | 10 |
| Tala | 1 | 6 | - | 1 | 8 | 8 |
| Kinyui | - | 1 | - | - | 1 | 9 |
| Katheka | - | - | 1 | - | 1 | 3 |
| Kathama | - | 1 | - | - | 1 | 5 |
| Total | 1 | 11 | 1 | 1 | 14 | 35 |

Source: Own investigation.

The table above also serves to illustrate the over-dependence of traders on the inadequate public transport in Kinyui, Katheka and Kathama.

### 5.3.2.2 PUBLIC TRANSPORT

Tala and Kangundo are well served with motor-vehicles (buses, matatus etc.). These link the two centres with Machakos, Mwala, Thika and Nairobi. Kinyui is served by two to three fairly regular matatus, but Katheka and Kathama have virtually zero means of public transport.

The transport costs are given in the table below (on public transport), which also includes two important external centres - Nairobi and Thika, where some foods came from. The cost of transporting a 90kg. bag of maize is given to illustrate the locational differences.

TABLE 37 :ESTABLISHED TRANSPORT COSTS FOR A BAG OF PRODUCE? SEPTEMBER/DECEMBER, 1975 IN SHS

| From-To | Nairobi | Thika | Tala | Kinyui | Kathama |
|---|---|---|---|---|---|
| Nairobi | - | - | 5 | 8 | 10 |
| Thika | - | - | 5 | 8 | 10 |
| Tala | 5 | 5 | - | 3 | 5 |
| Kinyui | 8 | 8 | 3 | - | 3 |
| Kathama | 10 | 10 | 5 | 3 | - |

Source: Own investigation

This table may lead one to think that the price per bag will also differ by the transport costs plus other terminal costs. This does not happen. The same sized bag of maize sold only for 2 shillings higher in Kathama than in Tala. What this has resulted to is that traders in the Kinyui, Katheka and Kathama markets find it cheaper to wait for produce in their market centres than come for it from Tala.

We find that some two big traders in Tala had personal transport to re-distribute the foods after receiving it. "Further, all the produce that the 'Kikuyu' traders cannot sell at Tala, is transported by these 'Kikuyu' traders to the other markets."

Agricultural tools, chemicals and feeds were brought into the area by distributors, or marketing agencies. We do not know their transport costs for sure. A slight indication concerning these is that whenever the union branch store at Kangundo wants any products urgently, it can use seven-ton lorries from the union headquarters at Machakos, and that the branch store is charged a flat rate of forty shillings, regardless of volume, from either Nairobi, Thika or Machakos.

### 5.3.3 EXPERIENCE AND TRAINING IN TRADE

Table 38 shows the starting periods for traders in the five market centres. If we assume that it is also a rough and ready indicator of the experience amongst the traders, then we see a contrasting degree of experience amongst the interviewed traders. For instance, Kangundo will have the most experienced traders while Katheka and Kathama have the least exprienced.

TABLE 38: EXPERIENCE AND TRAINING IN TRADE

| Years in Business | Kangundo | Tala | Kinyui | Katheka | Kathama | Totals |
|---|---|---|---|---|---|---|
| 31-35 | 1 | | | | | 1 |
| 26-30 | | | | | | |
| 21-25 | 1 | | 1 | | | 2 |
| 16-20 | 1 | 2 | | | | 3 |
| 11-15 | 2 | 1 | 1 | 1 | 1 | 6 |
| 6-10 | 1 | | 3 | 1 | 1 | 6 |
| 1-5 | 3 | 5 | 4 | 1 | 3 | 16 |
| Totals | 9 | 8 | 9 | 3 | 5 | 34 |

Source: Own investigation.

If we take 1960 (15 years experience) as the year beyond which starters are more experienced, then we see that only 17.65% of the traders can be said to be experienced in trade, while too, about 47% of the total traders joined trade after 1970 (i.e. 1-5 years experience).

The training of traders is a very difficult task. A report of the District Trade Officer, appearing in the Daily Nation, on 17th February, 1976, read:-

> ".... efforts made to recruit traders for the traders course were fruitless. They said they were going through hard times owing to drought, and could ill-afford to leave their business for two weeks."

We know that such courses have been conducted with difficulties over the years in Machakos town and also at Kangundo town in the recent past. This we could read from Certificates of Traders who have attended such courses. In our study sample, we found that no single trader in Katheka and Kathama had ever attended such courses. Thus, the most in-exprienced traders (as are all Katheka and Kathama) had had no chance to be trained! A sad affair.

The syllabi of such courses cover, amongst other things, some bock-keeping, profit and loss accounts, and customer/seller relationships, which are all vital for healthy business. The interesting point to note in this connection is that, actually 'Expriance is the best teacher!' We found that most prominent traders in Tala and Kangundo have never attended such courses, and are still boasting -"We have learnt-on-the-job."

### 5.3.4 LOANS FOR TRADERS

Only but prominent traders in the five market centres have some kind of loans. Many traders denied having loans, or refused to quote the amounts for fear of the dreaded 'income-tax' assessments. The following table shows the breaksown of loans to traders from our respondents, based on positive response only.

Table 39 ESTIMATED MINIMUM TRADE LOANS IN THE MARKET CENTRES, 1975

| MARKET CENTRE | % HAVES | AMOUNTS (SHS) |
|---|---|---|
| Kangundo | 56 | 35,000 |
| Tala | 50 | 70,000 |
| Kinyui | 11 | 30,000 |
| Katheka | 33 | 5,000 |
| Kathama | 40 | 25,000 |
| Total | - | 165,000 |

Source: Own investigation

While table 39 does not tell us the exact amounts of loans in the market centres, it serves to explain the relative importance of trade loans in the market centres.

An article in the DAILY NATION newspaper of 15th. January, 1976 entitled " I.C.D.C. GAVE HUGE LOANS IN MACHAKOS" revealed that in 1975, the Industrial and Commercial Development Corporation (I.C.D.C.) approved loans totalling 12,285,000 shillings for commercial and 580,000 shillings for industrial purposes to businessmen in the district. The article went on to quote the Trade Officer as saying:-

> "...Most of the traders are complaining about the the disappointingly inadequate amounts which are being approved by the corporation... The board also approved loans totalling 635,000 shillings to 127 traders during the year and 104 loan defaulters were referred to board advocates... Sums in default were 231,650.60 shillings but most defaulter continued to repay their loans and

190,685/45 was collected while 164,818/75 was recovered through advocates."

This article explains the grave situation of trade loans in the district. The Northern division being the most densely populated in the district, and also Kangundo/Tala township being the second most important commercial centre in the district (after Machakos town), it then must have featured quite well in this loan drama.

Beside the I.C.D.C. loans, we found in the market centres that some traders got loans from sources such as:- Commercial Banks, Chemical distribution organisation or companies, the County Council of Masaku, and also from friends and close relatives.

### 5.3.5 CASH VERSUS CREDIT TERMS OF PAYMENTS

The table below shows the credit versus cash sales situation in the Machakos District Co-operative Union branch at Kangundo in the last two years. It also illustrates that credit sales play a very important role in the daily business of that union store. The same union also supplies about 10% of its customers with milk (on credit) and are paid at the end of every month.

TABLE 40: SALES SUMMARY OF THE KANGUNDO BRANCH OF THE MACHAKOS DISTRICT CO-OPERATIVE UNION (SHS) 1974/75

| MONTHS | 1974 | | | 1975 | | |
|---|---|---|---|---|---|---|
| | Credit | Cash | Total | Credit | Cash | Total |
| Jan. | 192,271 | 3,270 | 195,541 | 213,050 | 15,447 | 228,497 |
| Feb | 48,576 | 4,375 | 52,951 | 148,047 | 10,887 | 158,934 |
| March | 97,904 | 7,388 | 105,292 | 81,977 | 15,675 | 97,652 |
| Apr. | 87,131 | 9.176 | 96,307 | 187,442 | 14,029 | 201,471 |
| May | 78,874 | 6,847 | 85,721 | 184,560 | 13,841 | 148,401 |
| June | 24,116 | 5,982 | 30,098 | 80,800 | 7,696 | 98,496 |
| July | 171,897 | 17,016 | 188,913 | 178,937 | 7,026 | 185,963 |
| Aug. | 32.685 | 5,410 | 38,095 | 58,990 | 9,384 | 668,374 |
| Sept. | 41,926 | 9,932 | 51,858 | 69,899 | 10,373 | 80,272 |
| Oct. | 126,157 | 13,569 | 139,726 | 180,963 | 9,943 | 190,906 |
| Nov. | 403,673 | 14,376 | 418,049 | 149,085 | 6,710 | 155,795 |
| Dec. | 301,147 | 14,339 | 315,486 | 105,735 | 7,163 | 112,898 |
| Totals | 1,606,357 | 111,680 | 1,718,037 | 1,599,485 | 128,174 | 1,727,659 |
| Perce-ntages | 93.5 | 6.5 | 100 | 92.6 | 7.4 | 100 |

Source: Compiled from the records of the Union branch at Kangundo store.

This case is reversed with private traders. We only found a very few cases where traders allowed some close friends and relatives with good credit reputation to take items on credit and pay at month ends. Some of these were actually people working outside the area who made arrangements to have their families supplied with items, not exceeding some ceiling amount of money.

Theoretically, a large part of all 'good' business relies heavily on credit terms of payments along the entire market channel. Credit terms, can stimulate demand, while also ensuring a minimal customers if practised with all marketing ethics. It is something that could be encouraged in a place like this where most disposable incomes are generated elsewhere.

## 5.3.6 VOLUME HANDLED OVER TIME

If we make a list of the traders running numbers and plots a scatter or 'P's against the months of 1975, when the respondents had large volumes of foods sold, and then sum up the 'P's in a given month we get the following:-

TABLE 41: RELATIVE IMPORTANCE OF THE AREAS 'FOOD-PURCHASING' MONTHS FROM THE FOOD SELLERS PREMISES, 1975

| Months (1975) | J | F | M | A | M | J | J | A | S | O | N | D | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total 'P's | 13 | 12 | 10 | 8 | 9 | 17 | 19 | 23 | 24 | 25 | 25 | 25 | 210 |

Source: Own investigations and calculations

This table is similar to the one given in chapter four, but has drawn its data from the trade business.

If we divide the total number of 'P's (=210) by 12, we find an arithmetic me 17.5. If we regard all months with the total 'P's over 17.5 as being times that maximum volumes were handled, we find that in at least seven months, a lot of foods were carried into the area and sold through the premises. We also see from the table above that March, April and May were months with minimum food sales from the shops. This roughly coincides with the earlier observations based on the farmers interview.

By and large, based on the traders response, we can estimate the volumes handled during peak periods in the five market centres to be 2,000 bags of maize, 450 bags of beans, 40 bags of pigeon pea and 50 bags of cowpea, each month. But this figure dropped to near zero when farmers had harvests.

### 5.3.7 STORAGE PROBLEMS

The main storage problems for traders in this area include insect and rodent attack. 32% of the respondents accepted having had some slight problems with weevils and other insect pests. 42% of the respondents said they had some problems with rodents, especially rats.

The methods being employed to keep down these problems include cat-keeping and fumigation. While most traders keep cats to take care of the rodents, some traders, who handle large volumes of produce, told us that they occasionally ask the fumigation team of the Maize and Produce Board to come and close the stores and fumigate them. This latter method is not common since the rate of produce flow in the premises is quite high. Traders can sell up to 120 bags of produce in a single day!

### 5.3.8 COMPETITION IN TRADE

Competition is usually a very difficult thing to assess in any marketing systems. In this section, and the one that follows we want to bring out some indicators of competition or monopoly that we observed in the agricultural product and factor markets in the area.

The 'perfect market' model requires, inter alia, that there be many sellers and buyers. We cannot be sure of how many buyers or non-buyers there are. We can assume that they are many. But, we have an indication of how many sellers there are in the trade business. This is depicted in the table below.

TABLE 42: TRADERS IN VARIOUS BUSINESSES, 1975

| MARKET CENTRE | HUMAN FOOD | ANIMAL FEED | TOOLS | CHEMICALS | TOTAL |
|---|---|---|---|---|---|
| Kangundo | 6 | 1 | 5 | 2 | 14 |
| Tala | 6 | 2 | 2 | 2 | 12 |
| Kinyui | 9 | - | 1 | - | 10 |
| Katheka | 3 | - | - | - | 3 |
| Kathama | 5 | - | - | - | 7 |
| TOTAL | 29 | 3 | 10 | 4 | 46 |
| % OF TOTAL | 63 | 7 | 21 | 9 | 100% |

Source: Own investigation.

The total number of traders given here is larger than the number of traders interviewed because some traders have combination of businesses. Although we may be inclined to think that the trade with many sellers is more competitive, and that the one with less sellers is more monopolistic, we must however be careful to note that these are retailers; and that they could have many or few suppliers in the market chain. For instance, although we have very few retail outlets for agricultural chemicals, we have seen that these are supplied by several manufacturing and marketing agencies or companies.

The model also requires, that products be homogenous. We noticed especially in chemical markets that product differentiation is the order of the day. This can be regarded as indicator of monopolistic competition.

The model also requires that a perfect market system should have free entry and exit. This is far from being so in this area. High skills, and capital injection requirements accompanied by the 'necessary' trade licences prevent free entry and exit.

Even the perfect knowledge of marketing systems by all participants can be doubted. This we see for instance where large drums of chemicals, or huge fertilizer packages are brought into the division and

cannot be bought by a single farmer. This shows that the distributors (=middlemen) do not know their 'market.'

We do not intend to leave the reader with an impression that the marketing systems in the areas are all that bad. We did not expect a 'perfect market' in the area. We have only used the model as a yardstick to try and assess the situation as it is.

Asked whether or not the traders felt affected by the number of traders in the same market centre dealing in the same product, we got the following response:-

TABLE 43: TRADERS RESPONSE TO THE COMPETITION QUESTION

The numbers are expressed as a percentage of the total respondent in the sub-samples.

| Response | Kangundo | Tala | Kinyui | Katheka | Kathama |
|---|---|---|---|---|---|
| Do not mind | 71.4 | 62.5 | 55.5 | 33.3 | 80 |
| Should be smaller | 28.6 | 37.5 | 45.5 | - | - |
| Should be larger | - | - | - | 66.6 | 20 |

Source: Own investigation.

The most interesting observation to be made from the table above is that while no trader in Kathama and Katheka feels that the numbers of competitors should be smaller, no trader in Kangundo, Tala or Kinyui wants the numbers to be larger. The likely explanation for such response could be the level to which the market centres have grown. Thus since Tala and Kangundo for instance are relatively large vis-à-vis Katheka and Kathama the traders want to exploit its size and name by being few. Likewise, the traders in the small market want the size and name for their small towns to grow, hence do not care if there were many traders.

### 5.3.9 SPECIAL TRADE LINKS

In this section, we shall discuss the observed trade links between middlemen (=traders) and consumers, and also between traders and producers, in an effort to theoretically bring out the observed distortions in the 'perfect market' model.

Earlier in this chapter, we have seen that organisations or companies dealing in agricultural chemicals, tools, fertilizers and feeds have special distribution systems. We have again seen a case where a single marketing agency has set up its stockist in Tala market, and directed it to sell no 'ones' products.

Even the giant Union store at Kangundo has only to handle products from some 'sources' only! The selling prices are also dictated by that 'source'. What do all these mean to a student of Agricultural Marketing? What is the theoretical consequence of such monopolistic restrictive practices on trade? What distortions are inflicted on the 'perfect market' model and what consequences does this have on the market structure and performance of the area?

The answers to these questions are many, diverse and more often than not- contradictory. First the growth of such observed practices like product differentiation, information agreements, or open price agreements leads to reduction in productivity, and distortions in resource allocation. For instance, we have seen that farmers are just given fertilizers. No one cares to advice on fertiiizer types and use. This can lead to land destruction, hence reduction in productivity.

The art of fixing the structure of the distributive channel (as one agency has done), and therefore size and qualifications of middlemen tends to distort resource allocation both in distribution (a marketing function), and in manufacture.

A stipulation that a retailer must only carry a firm's brand of animal feeds or so, reduces competition, increases product differentiation, and worse, reduces price competition. The sufferer is the weaker market participant - the poor, sick and hungry farmer. Such practice creats monopolistic tendencies ; even if, on the surface, the status quo is maintained. The practice inhibits growth, and prevent progress towards acceptable social welfare, and hinders healthy economic competition.

## CHAPTER VI

## 6. THE INFRASTRUCTURE

In this chapter we shall present the case of the surporting rural infrastructure. This special investigation has been done on the understanding that a poor developed rural infrastructure is, and can be a serious obstacle to the intended rural development programme. We have addressed ourselves to general communication, rural electricity, rural water supply, health services, home economics, and social centers and external contacts.

### 6.1 COMMUNICATION

#### 6.1.1 ROADS, BRIDGES AND MEANS OF TRANSPORT

The speed, ease, and economy with which agricultural inputs and outputs are moved in an area like this, spell the success or failure of farming operations. This is because transport development is usually closely related to agricultural development.

Kangundo and Tala are fairly well served with transport means. All-weather roads link these two markets with Nairobi, Thika, Machakos, and Mwala. Buses and 'matatus' are available at all times to and from these townships.

Transport problems increase with distance as one enters the JPM study area. Admittedly, there numerous roads and feeder-roads in the area, but all are rough and impassable during wet weather. No road or feeder-road has anything that can be described as a 'bridge' ! When it rains, the mighty temporary rivulets and waterways formed, cut deep gullies across the roads and virtually disconnect communication. Some parts of the roads, especially in the eastern plains, become very sticky and/or slippery.

While Kinyui market centre is served by two to three fairly regular 'matatus' these are poor serviced and ill-maintained. Thus, motor breakdowns are not uncommon between Tala and Kinyui. Beyond Kinyui, transport means even become a bigger problem. Lorries carrying sand to and from the area, are nearly the only motorised transport means expected by travellers. In fact the bicyle becomes an important vehicle of transport with over 50 % of all households visited around Kathama having at least one bicycle. The ox-cart also becomes a common site especially for fetching water and other goods from distant places.

### 6.1.2 TELEPHONES AND POST OFFICES

There is a post office at Tala and another at Kangundo with privately owned and rented boxes. The post offices also operate telephone services and have placed several public call boxes at strategic places in premises owned by prominent businessmen. No such services exist in any of the market centres in the JPM area. Perhaps it would be a good idea to have at least a post box at Kinyui, Kateka, and Kathema for people to receive and post letters. Traders in these markets could be encouraged to stock postage stamps

## 6.2 ELECTRICITY

The East African Power and Lighting company operate such facilities at Tala and Kangundo only. One school in the JPM study area (Matungulu Girls school) generates her own electricity. If such services were extended to Kinyui, Katheka and Kathama, schools in the area would benefit a great deal.

## 6.3 WATER

Tap-water is only found at Tala and Kangundo townships. The Matungulu girls' school also provides herself with untreated tap-water. A few households have endeavoured to drill some wells but these are dry for most parts of the year. Such wells also do easily collapse due to the nature of the underlying parent rock. Any programme intended to improve the quality of rural life, in this part of the country, as well as provide an important economic stimulus for higher agricultural production should include a comprehensive plan for the provision of clean water supplies to all households.

Truely, the area is dissected by numerous seasonal streams and waterways. But, for most part of the year these streams can simply be described as dry valleys. They turn into mighty rivers and rivulets during and for a few hours after a torrential down-pour of rain, during which period they cause untold damage to soil structures, leading to serious erosional gulleys at places.

The Athi and its tributary the Kalala do flow all the year round along the western, northern, and north-eastern boundaries of the JPM study area. Thus only people staying along them can get the water the year round. Otherwise, the bulk of the population has to spend alot of time and energy carrying small drums of water on their backs from these water sources. A few lucky ones have ox-carts for this purpose.

## 6.4 HEALTH SERVICES

The government hospital at Kangundo, and the mission health centre at misyani provide valuable health services for the entire division. Like most government or public hospitals in this country, these are usually overcrowded by both in- and out-patients. There are also numerous but occasional private doctors clinics at Kangundo , Tala, Kinyui, And Kathama. Since doctors in their private practice are 'discriminating monopolists' in an economic sence, then, one can imagine that their fee is not the smallest in these private clinics.

The JPM study area is richly endowed with medical servises. All pregnant women and pre-school children have special clinics in Katwaanyaa, Kinyui, Miseleni, and Kathama run by three JPM doctors of the Medical Research Centre, Nairobi. Since 1973 these clinics have been running every week. . The area than can be assumed to have a very good doctor/patient ratio, knowing that some districts in this country have hardly a doctor. It is however, beyond the scope of this study to evaluate the role and effectiveness of the Medical Research Centre services in that part of the country. It will suffice to mention that the study population is happy with them, and that even a mere provision of free transport for all emergency cases to hospital is known and appreciated by all; over and above the free clinics for all pregnant women and children 0-5 years of age.

If we attempt to compare such survices to all of the Machakos district, we come to appreciate even further the part played by MCN in the study area. The entire district has only three government hospitals namely,Makindu , Kangundo, and Machakos hospitals. Assuming a constant annual growth rate of 3.3 % since the 1969 population census (=707 thousand), the present population

can be estimated at 893 thousand inhabitants. From such a figure, we can then constract the following table:-

Table 44 MAIN GOVERNMENT HOSPITAL MEDICAL PERSONNEL IN THE DISTRICT, JUNE 1976

| CATEGORY | NUMBER | PERSONS FOR EACH (1000's) |
|---|---|---|
| Doctors/Dentists | 18 | 50 |
| Nurses (Registered) | 36 | 25 |
| Midwives (Registered) | 99 | 4.5* |
| Clinical officers | 39 | 23 |

* - It is assumed that midwives attend only females (= half of the population)

Source: Own investigation

The distribution of these hospital workers was however very uneven. For instance, while Machakos Hospital had up to 17 doctors/dentists, Kangundo Hospital had only one medical doctor and five enrolled nurses. At that time too, Makindu Hospital had no doctor,no enrolled nurse, but operated through a clinical officer.

## 6.5 SCHOOLS

An article appearing in the DAILY NATION newspaper of 17th. February, 1976 entitled 'SCHOOL IN SHORT OF STUDENTS' read:-

> "A secondary school in Machakos district is facing a strange problem - It is short of students....."

Sources close to the education office revealed that the people had nothing to eat and could not be expected to pay school fees.

This secondary school happens to be outside the JPM study area (Katangi secondary school). However, this state of affairs is also seen in the primary schools of the JPM study area. We found for instance that, by February 1976, only 8 (eight) standard seven pupils had been registered in Ulaani primary school (in the eastern plains), while at the same time 89 (eighty nine) standard seven pupils had been registered at Kinyui primary school (in the coffee zone). This is a strong indicator of what agriculturally less productive areas have for school children (=human capital), in terms of formal education.

We can clearly see from the two tables that follow that primary school registration, and the percentage of registered students in terms of the populations is much better in the coffee zone than in the drier eastern plains

Table 45: STUDENT/POPULATION RATIOS IN THE SUBLOCATIONS OF THE JPM STUDY AREA, 1976

| SUBLOCATION | POPULATION | PUPILS | PUPILS/POPULATION % |
|---|---|---|---|
| Kingoti | 5998 | 2562 | 43 |
| Kambusu | 4544 | 1716 | 38 |
| Katheka | 1803 | 690 | 38 |
| Ulaani | 3308 | 1280 | 39 |
| Katitu | 2691 | 656 | 24 |

Source: Own investigations and calculations

Table 46 : PRIMARY SCHOOL REGISTRATION, FEBRUARY 1976

The list includes only schools in JPM study area.

| LOCATION/SUBLOCATION | CLASSES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | TOTALS |
| MATUNGULU LOCATION | | | | | | | | |
| Kingoti sublocation | | | | | | | | |
| 1. Kinyui | 157 | 197 | 210 | 112 | 101 | 101 | 89 | 965 |
| 2. Matungulu | 60 | 104 | 96 | 63 | 70 | 56 | 55 | 504 |
| 3. Kngoti | 88 | 80 | 70 | 50 | 68 | 48 | 50 | 454 |
| 4. Kakulutuini* | | | | | | | | |
| Kambusu Sublocation | | | | | | | | |
| 5. Katwanyaa | 100 | 100 | 150 | 100 | 100 | 100 | 50 | 700 |
| 6. Kanzalu | 50 | 100 | 66 | 45 | 40 | 42 | 36 | 379 |
| 7. Uamani | 37 | 38 | 35 | 31 | 39 | 28 | 34 | 242 |
| 8. Itheuni | 84 | 75 | 80 | 45 | 46 | 34 | 32 | 396 |
| Katheka Sublocation | | | | | | | | |
| 9. Katheka | 58 | 62 | 81 | 55 | 28 | 36 | 25 | 345 |
| 10. Miselini* | | | | | | | | |
| MBIUNI LOCATION | | | | | | | | |
| Ulaani Sublocation | | | | | | | | |
| 11. Mutula | 60 | 62 | 196 | 60 | 60 | 45 | 38 | 541 |
| 12. Itikoni | 50 | 51 | 100 | 100 | 50 | 50 | 50 | 451 |
| 13. Ulaani | 50 | 50 | 50 | 50 | 50 | 30 | 8 | 288 |
| Katitu Sublocation | | | | | | | | |
| 14. Muthwani | 82 | 50 | 87 | 49 | 42 | 40 | 26 | 376 |
| 15. Katitu | 46 | 42 | 42 | 41 | 40 | 39 | 30 | 280 |
| Totals | 922 | 1029 | 1263 | 801 | 734 | 649 | 523 | 5921 |
| Averages | 71 | 79 | 97 | 61 | 57 | 50 | 40 | . |

* - Records not found.

Source: Own investigation.

## 6.6. AGRICULTURAL CO-OPERATIVES

By the end of 1975, there were six farmers co-operative societies in the division. These are all concerned with coffee. They are:- Matungulu, Mbilini, Muisuni, Kitwii, Kilalani, and Kakuyuni. The cotton farmers' cooperative society at Mwala is dormant; thus all active societies are in Matungulu and Kangundo locations.

The division has also got two ranches, namely: Drumvale farmers co-operative society and Kimiti farmers cooperative society. The Drumvale ranch is mainly concerned with beef. milk and poultry production. It grows no crops, and does not settle its members. The Kimiti ranch, on the other hand, specialises only on beef production and settles all its members. This Kimiti ranch, was actually inherited as a gift from its farmer settler by the members.

Under the jurisdiction of the divisional cooperative officer at Kangundo, is also the Mukaa Mkuu Farmers co-operative society; which is supposed to grow cotton as a major enterprise. The members of this society farm however, grow some coffee,, and some horticultural crops like tomatoes and passion fruits. It settles all its members.

In the J.P.M. study area, the Matungulu farmers co-operative society (the largest of all societies in the division) runs coffee factories at Kalala, Kaukiswa and Kakulutuini. It is also constructing another factory at Mwatati. Outside the J.P.M. study area, the same society also runs factories at Sengani, Kyamwole, Kamethei and Katine. This giant society also owns two large estates, namely:-

Matungulu Coffee Estate (with over 200 hectares of coffee)[1] and the Kayatta Plantation (with over 145 hectares of coffee).

All these societies are members of the Machakos District Co-operative Union. The Union operates a Banking Section for members at Kangundo township. The same Union also runs a milk dairy, and an input store at the same township.

The table below shows the membership situation in the coffee societies of the Northern Division of the District in the recent two years.

TABLE 47: MEMBERSHIP TO COFFEE SOCIETIES OF THE NORTHERN DIVISION OF MACHAKOS DISTRICT[2]

| SOCIETY | 1973 | 1975 |
|---|---|---|
| Matungulu | 5,233 | 7,291 |
| Mbilini | 1,573 | 2,031 |
| Muisuni | 1,005 | 1,209 |
| Kakuyuni | 990 | 1,619 |
| Kitwii | 917 | 1,547 |
| Kilalani | 923 | 1,126 |
| TOTALS | 10,641 | 14,823 |

Source: Own investigation: By informal personal interviews and access to society records.

1. One hectare of coffee is equivalent to 1330 plants (1).

2. This numbers exclude the large coffee estates.

## 6.7. AGRICULTURAL EXTENSION FORCE

The word 'force' is used here to explain 'strength' and can be substituted by 'service'. Table [48] shows the distribution of extension officers in the division, in 1975, and their work load measured in agricultural sections per officer, or average land area in kilometres covered per officer.

TABLE 48: AGRICULTURAL EXTENSION STAFF AND THEIR COVERAGE

| LOCATION | TAs* | JAAs* | SECTIONS PER JAA | AVERAGE $Km^2$ PER JAA |
|---|---|---|---|---|
| Matungulu | 12 | 6 | 1.33 | 29.67 |
| Mbiuni | 12 | 34 | 2 | 49.97 |
| Kangundo | 3 | 9 | 1 | 14.33 |
| Mwala | 29 | 23 | 3 | 91.05 |
| TOTALS | 7 | 20 | | |

Source: Own investigation: By access to divisional agricultural officer records.

TA* = Technical Assistant

JAA* = Junior Agricultural Officer

Together with these twenty seven members of the divisional agricultural staff, there sits a divisional agricultural officer and two divisional technical assistants. The divisional agricultural officer is trained in Egerton College, Njoro, for three years of diploma work in Agriculture, after Form IV. The divisional technical assistants are trained at Embu Institute of Agriculture for two years after Form IV. One of these divisional TAs is specially trained in home-economics. The supporting staff include a driver, a part-time typist, and an office messanger. They have one all-terrain vehicle to share with the veterinerians.

The JAAs are the most important "Agriculturalists" in the chain. They are the contact-men. They work and live at the Sublocations (=Agricultural Section). They all belong to the same linguistic group as the farmers. The problem with the JAAs is that they all have little or no formal education. The best is a primary seven, while the majority can only read and write. They attend occasional specialised courses at the farmers training centres (=FTCs) as may be arranged by the Provicial Director of Agriculture (=P.D.A.).

From the divisional office, we go to the District Agricultural Officer at Machakos, who is a University graduate trained for three years at the University of Nairobi, Faculty of Agriculture.

By and large, there is an urgent need to improve the quantity and quality of the entire extension service at farming levels. We found for instance that, for every 10 farmers we visited around Kathama, only ONE had been visited by a JAA and that he advised on bench making or so. We cannot blame the JAAs per se, but we should also consider their other problems other than training and formal education. His sole means of transport is a bicycle. This is an unpleasant and torturous means of transport when we consider that a JAA is supposed to cover up to 91 square kilometres, in a place with intense solar radiations and high ambient temperatures as experienced and recorded by the J.P.M. weather stations.

## 6.8 VETERINARY SERVICES

The veterinary section of the Ministry of Agriculture has six Animal Health Assistants(A.H.As.) in the division all trained at A.H.I.T.I., at Kabete for two years after Form IV. They have distributed their responsibilities as follows:-

- AHA in-charge of the division;
- AHA in-charge of Kangundo location;
- AHA in-charge o Matungulu location;
- AHA in-charge of Mbiuni location;
- AHA in-charge of Artificial Insemination;
- AHA in-charge of Hides and Skins.

We should note with interest that Mwala, the largest of all locations[1] has no Animal Health Assistant at all! Too, there are only three Animal Health Assistants for the locations, and have to deal with the estimated 43,679 heads of cattle and several other livestock in the area.

The service also runs 32 cattle dips distributed as follows:

---

1 Area of Mwala is 182.09 square kilometers. See also appendix.

TABLE 49 CATTLE DIPS IN THE DIVISION IN 1975

| LOCATION | NUMBER | $Km^2$/Dip |
|---|---|---|
| Matungulu | 8 | 21.4 |
| Kangundo | 11 | 11.7 |
| Mbiuni | 7 | 22.3 |
| Mwala | 6 | 30.3 |
| TOTALS | 32 | - |

Source: Own investigation, with access to the veterinary section records.

It follows therefore that on average each cattle dip in the location serves an average of 20.8 square kilometers, and is used by an average of 1,365 heads of cattle, not mentioning other livestock. This figure definitely calls for more dips in the area. The motorised spray-race at Tala has never worked for several months (26).

We should mention here that the dip-construction progress is encouraging over the years. Thus in 1971/72 the division had only 3 dips, and this has risen steadly to 12 dips in 1972/73, then to 21 in 1973/74 and finally to 24 in 1974/75. There is also another plan to build 15 more in order to increase the total cattle dips in the division to 47 by the end of 1975/76 (26).

One of the divisional AHAs is in-charge of Artificial Insemination (=AI). There are twenty three AI crushes (3 in Matungulu and 20 in Kangundo locations) altogether. The job of the inseminator starts each working day at 9.00 a.m. and ends at 12.20 p.m. covering a distance of 58 kilometers on a motor-cycle, following a fixed route.

His work over the last few years has increased as follows:-

TABLE 50: NUMBER OF CATTLE INSEMINATED IN THE DIVISION 1973 - 1975

| COWS | 1973 | 1974 | 1975 |
|---|---|---|---|
| Local Zebus | 177 | 550 | 1,049 |
| Grade Cattle | 131 | 257 | 386 |
| TOTALS | 308 | 807 | 1,435 |

Source: Own investigation with access to the divisional animal husbandry files.

For every 100 cows inseminated in 1975, 31 of them on average, had to be re-inseminated. This represents a non-return percentage of 69 (=N.R.% of 69). This low N.R% can be partially explained by the very nature of working hours. The working hours are fixed by man, but the heat-cycles of the animals are not.

Ideally, all animals that are on heat in the evenings should be inseminated in the morning of the following day, and those on heat in the mornings should be inseminated later that evening as a rule-of-thumb. We should therefore attribute some of this low N.R.% to the fixed working hours and public holidays including Sundays.

The veterinarians also castrated 2,475 bulls in 1975 as compared to 1,314 in 1974. The philosophy behind the castration is the reduction of numbers of local zebu-sired calves, and increase of the calves born by use of artificial insemination so as to improve the productivity of the divisional herd gradually.

## 6.9 HOME ECONOMIC UNIT IN THE NORTHERN DIVISION IN 1975

The division has only one technical assistant (T.A) in-charge of home economics. She is specially trained in Embu Institute of Agriculture for two years after form four. She is assisted by only one Junior Agricultural Assistant (J.A.A) who is stationed at Matungulu.

These two ladies have managed to form clubs in three locations as shown in table 51 below.

Table 51 HOME ECONOMICS CLUBS IN THE DIVISION IN 1975

| LOCATION | NUMBER | MEMBERSHIP |
|---|---|---|
| Matungulu | 1 | 56 |
| Mbiuni | 2 | 42 |
| Mwala | 0 | 0 |
| Kangundo | 3 | 220 |
| TOTALS | 6 | 318 |

Source: Own investigation by personal interviews and access to home - economics files for the division

All the members of these home economics clubs are women. They are taught courses in child-care, nutrition, cookery, sewing, house management, home improvement, health and sanitation and general agriculture. The unit also arranges home-visits.

The main problems of this unit, as expressed by the ladies, is lack of staff and also lack of transport.

## 6.10 SOCIAL CENTRES AND EXTERNAL CONTACTS

The division has got some places that people can meet for social or religious purposes. Too, 50% of all households that we visited had at least one transistor radio. Newspapers like Baraza, Daily Nation, Standard and Taifa Leo, and magazines like Joe and Weekly Review, are sold in Tala and Kangundo. There are occasional open-air mobile cinemas, mainly run by advertising companies and organization from Nairobi - shown at Tala, Kangundo and Kinyui.

For religious purposes, the area has many churches owned by many denominations. The JPM study area alone (87 square kilometers) had in 1975 30 churches built and administered by seven denomination. The distribution is given in the table below:-

TABLE/ 52: CHURCHES AND DENOMINATIONS IN THE JPM STUDY AREA, DECEMBER, 1975

| SUB-LOCATION | VILAGE | CHURCHES | DENOMINATIONS* |
|---|---|---|---|
| Kingoti | Ithingu | 1 | ABC |
| " | Kingoti | 1 | EAGF |
| " | Matheini | 4 | AIC,SA,RCC, GNCA |
| " | Makulutuini | 2 | AIC |
| " | Kithaathai | 2 | ABC, AIC |
| " | Nduu | 2 | ABC, SA |
| Katheka | Katheka | 1 | ABC |
| Kambusu | Katwanyaa | 1 | AIC |
| " | Vamani | 2 | SA,RCC |
| " | Itheuni | 2 | AIC, GFF (JW) |
| " | Mwatati | 2 | RCC, AIC |
| " | Kanzalu | 2 | ABC, SA |
| Ulaani | Ngomano | 1 | AIC |
| " | Katitu | 1 | ABC |
| " | Kambusu | 1 | ABC |
| " | Utiithini | 1 | GNCA |
| " | Mutula | 1 | AIC |
| Katitu | Mango | 1 | AIC |
| " | Muthwani | 1 | SA |
| " | Masawa | 1 | AIC |
| " | Kiimani | 1 | SA |
| | | 30 | |

SOURCE: Own investigation.

*ABC = African Brotherhood Church
AIC = African Inland Church
EAGF = Evangelistic Apostles of Good Faith
GNCA = GOOD NEWS CHURCH OF AFRICA
GFF(JW)= Gospel Furthering Fellowship (Jehovahs Witness)
RCC = Roman Catholic Church
SA = Salvation Army.

For other social and 'mental rest' each market centre has at least one 'pombe club' and one bar. The majority of these are in Tala and Kangundo.

We shall now attempt to give a short description of plates I - VIII in page 128 - 131.

Plate I — An ox-cart is a common means of transport. It is also used to collect water from River Athi and its tributary the Kalala.

Plate II — This is a cemented and well-protected spring near Matungulu Chief's camp. It is a unique water source of its kind, providing the nearby villages with an ever-flowing 'tap water'.

Plate III — Raised stands are common in all open-air markets. This is how Kinyui market looks on non-market days.

Plate IV — Coffee is grown in the wetter parts of Matungulu and Kangundo locations. The growers belong to farmers co-operative societies and own facilities for pulping, drying and storing coffee.

Plate V — This is not a very pleasant site. It is building near Kathama which serves both as a school and a church.

Plate VI — Several lorries carrying sand from the area are a common site on the road beyond Kinyui towards Kathama. When it rains they all get stuck in mud and virtually disconnect transport.

Plate VII — Articifial Insemination is provided by the Veterinary Division of the Ministry of Agriculture in the wetter parts of Kangundo and Matungulu location. This is a holding-structure for restraining cows during the process of insemination. Such structures are placed on the side of the roads for the convenience of the inseminator.

Plate VIII — The construction of cattle dips has risen steadly in the past few years. This is a modern, newly built cattle dip near Tala.

PLATE I. TAKING WATER HOME

PLATE II. THE REST WATER SOURCE

PLATE III. A TYPICAL OPEN AIR MARKET

PLATE IV. A TYPICAL COFFEE FACTORY

PLATE V A SCHOOL OR A CHURCH ? - BOTH

PLATE VI 'A SAND LORRY' - A COMMON MEANS OF TRANSPORT

PLATE VII. A TYPICAL ARTIFICIAL INSEMINATION CRASH

PLATE VIII. A MORDERN CATTLE DIP

# CHAPTER VII

## 7. DISCUSSIONS ON HYPOTHESES AND PROVISION OF ANSWERS FOR QUESTIONS RAISED

In this chapter we shall systematically attempt to discuss the hypotheses that we gave in chapter three, and also provide answers for questions raised before the study. We shall draw upon evidence presented in chapters four, five, six and appendices.

### 7.1 ON FARMING

#### 7.1.1 The hypothesis on farm output per household being so low that they cannot satisfy subsistence need over the whole year

In trying to answer the question on how much food is produced per household, and how much of this is marketed, there was no reliable way of estimating the harvest. This is because we found that most food is eaten piecemeal while in the shambas, and never reaches the stores. In chapter four we have evidence that the expected harvests are actually low, and that for most parts of 1975, households had no food in store. In five we have seen that traders in the market centres have handled large volumes of food (mainly maize and beans) coming into the area from a place called 'Kikuyu'. Only cash crops and livestock products left the division in that year. In the case of coffee (the single most important cash crop) we found that the yields are far below the national

average. Milk, the most important marketed livestock product, does not satisfy the divisional needs because large amounts of K.C.C. tetra-pak milk comes into the division daily. We therefore are inclined to accept this hypothesis and add that the low household output problem is more in the Katheka and Kathama sub-samples than the Kangundo, Tala and Kinyui sub-samples.

### 7.1.2 The hypothesis on lack of food storage at farm level due to high cash needs

Food that is produced by a household, can either be eaten, stored for future use, or sold. In this case, we have found that most food (mainly maize and beans) is eaten piece meal while in the shambas. The little that is finally harvested is stored, but lasts a very short time because it is small. For most part of the year, food is actually purchased from market centres. We therefore have no reason to associate the lack of food storage, for most part of the year, with high cash needs since no food is actually sold out of the households. Cash crops, livestock, and livestock products, plus a few fruits and vegetables are exceptions to this generalisation however. In this case we are referring to products such as maize, beans, pigeon peas, and cowpeas.

We could therefore attribute the lack of food storage in the households to factors such as lack of sufficient harvests. The hypothesis is therefore rejected.

### 7.1.3. The hypothesis on loans and credit facilities for farmers being inadequate

In an attempt to answer questions on what loan schemes exist in the division, who advances them, and what problems exist in loan dissemination and repayment, we found that some loans exist in the coffee zone. These loans are channelled from the Kenya government through the Co-operative production credit scheme, to the co-operative coffee societies where the members get them. The obtained farmers' sample indicated that 22% of the respondents had an average of 207 shillings each as credit or loan facility. We have also found that in a sub-sample like the Kathama one, no single farmer has a credit or loan facility. This is because coffee is the only security for loan acquisition, and it is not grown in Kathama. Thus, as far as the area east of the Kanzalu is concerned, we do not talk of inadequacy but total absence of loans and credit facilities. It follows therefore that we accept the hypothesis strongly for the Kathama side. Too, an average of 207.00 shilling per annum per household is not sufficient to cause a substantial production.

adjustment for increased food production. This is because prices for inputs as given in chapter four and elsewhere are too high. We therefore feel inclined from the available evidence, to accept this hypothesis, and add that the problem is slightly less serious in the Kangundo, Tala and Kinyui sub-samples (=coffee zone).

### 7.1.4 The hypothesis on purchased inputs being of negligible importance in the farming activities due to their high costs, and lack of availability

Major purchased inputs include simple hand tools like a panga, and a jembe. In the coffee zone are inputs such as fertilizer, and protective chemicals. These coffee inputs cannot be considered as purchased inputs since they are compulsory inputs distributed to coffee growers and indirectly paid for, by deductions from earnings. In the case of food production, purchased inputs such as insecticides, and fertilizers play a very insiginificant role. Versatile tools such as tractors are absent from our sample thus early land preparation and early planting are not very possible. An ox-plough is perhaps the most versatile of the tools, But, this is only common in the eastern plain where land is generally flat, and farm sizes are bigger. The prices for these tools are also high as we have seen in chapter four.

A common ox-plough was selling at about 300 shillings for instance.

While these inputs are not completely absent from the area, most of them are only found at Kangundo or Tala. Thus farmers who need them have to travel on foot or by 'matatus' to these market centres spending a lot of time or money.

We therefore hesitate to totally accept or reject this hypothesis. .l that we can say at the moment is that the inputs are generally absent in the Kathama, Katheka and Kinyui sub-samples, and that they cost much since they are all not very common in the households.

### 7.1.5 The hypothesis on lack of effective extension service in the area.

The divisional extension officers cover a large number of households and also a large land area. The junior agricultural Assistants (J.A.As), who are actually the 'contact men' have little or no formal education although they can all read and write. Livestock diseases are prevalent in the area. There are only three Animal Health Assistants who actually deal with the farmers as such. From our farmers sample only a small percentage of the respondents had been visited by an agricultural extension officer.

All these kind of evidences lead us to believe that the extension service in the area, leaves much to be desired in quality and quantity. Thus, we are inclined to accept the hypothesis.

### 7.1.6. The hypothesis on their being insufficient social facilities and amenities in the area

In an attempt to find out what social facilities and amenities are available in the area, we found that pombe clubs, bars, churches, and mobile cinemas form the backbone of such facilities and amenities. All market centres have at least one pombe club and do entertain the older folks particularly in the late afternoons and early evenings. Churches also are patronised by the old folks including some school children. The open-air mobile cinemas are mainly attended by school pupils and are, more often than not, composed of advertisements about the 'best' smoke, beer or cosmetic in 'town'. All these facilities show that they are unsuitable to the migrating youths who are always having 'somewhere they have yet to go'. The J.P.M. study area is lacking facilities such as rural electricity, rural water, telephones, post-offices, and regular transport means.

All these observations lead us to concluded that there is insufficient social facilities and amenities in the area. We therefore accept the hypothesis.

## 7.2 ON TRADE

### 7.2.1 The hypothesis on prices for agricultural inputs and outputs differing by more than transfer costs due to lack or competition

The prices for agricultural inputs are determined elsewhere, and dictated to retailers in the area to sell them with only 5% commission. In the last section of chapter five we have tried to impress upon the reader that it is difficult to exactly say that such input markets are perfect or imperfect. We too could not exactly determine the transfer costs for these inputs since most of them are brought into the area by marketing agencies or organisations who were external to our sample.

The farm outputs never entered any organised market channel except for the cash crops, livestock and livestock products. In this hypothesis, therefore, the more relevant item is the large amounts of foods coming from 'Kikuyu'. If the traders from 'Kikuyu' sold the products in the area at a price that is not justified by the transfer cost, we could then accept the hypothesis outright. The snag is that we do not know the exact transfer costs for these traders; nor do we know their buying price. Thus, while we know their selling price, we cannot say whether or not this differ by more than transfer costs. All we know is that, for instance, a bag of maize sold at a price

that is higher than what the Maize and Produce Board could sell it, if it were the sole seller. Only if we assume that the boards price covers the transfer costs, can we conclude that any price above the 80/65 shillings represents a more than transfer cost amount. We therefore lack sufficient and vital information so as to reject or accept this hypothesis.

### 7.2.2 The hypothesis on prices fluctuating tremendously over time due to high storage costs, and also with farm production seasons

It is only for about four months of the year on average, that households managed to support their subsistence needs from their own harvests. The bigger part of that year, they purchased foods from the shops if and when they could afford. This latter period is when government and the Catholic church distributed foods (mainly maize and beans) in the area. During the period of small harvests, the traders from 'Kikuyu' brought little or no foods, because people could not buy. Thus, we cannot talk of prices falling at this time because the products were absent. During the peak purchasing period the price for these products remained nigh. We were not informed of any fall of price over such period

Storage costs are also negligible or difficult to quantify; because the products came into the division only when it was most needed, and did not stay long in the retailers' premises. While we could assume that prices should fluctuate with production season, that is, when farmers have foods the prices are low, and when there is no food in the farms, the prices are high, we have no evidence to support such supply/ demand forces as determinants of price. A time series type of data, rather than a recall method set of data perhaps would be more rewarding to test this hypothesis. As far as we are concerned, there was no price fluctuation, and therefore we reject this hypothesis, but warn that a different method of data collection is likely to yield a different result.

### 7.2.3 The hypothesis on their being insufficient loan facilities for traders

The Kenya government, through the I.C.D.C., gives loans to traders in this part of the country. A good proportion of the traders in Tala and Kangundo accepted being in possession of some loans, but many refused to say the amounts or the conditions, of repayments. Their complaints and problems are well put by the district trade officers statements in chapter five.

The major input stores, all operate at huge loans mainly from the manufacturing and marketing agencies. Thus, for the real big traders in Tala and Kangundo, we have no reason to believe that they have insufficient loan facilities. The problem of loans for traders is only pronounced in the Kinyui, Katheka and Kathama sub-samples. Traders in these markets have hardly any loans. This is also reflected in the quantity of items stocked in their buildings. It follows therefore that we are inclined to accept this hypothesis in as far as the Kathama, Katheka and Kinyui sub-samples are concerned, but hesitate to accept or reject the hypothesis in as far as Tala and Kangundo sub-samples are concerned. The reason for hesitation in the latter case is that we cannot justify the sufficiency or insufficiency of the available loans from the information that we have.

### 7.2.4 The hypothesis on traders business being hampered by lack of private transport and insufficient public transport

Tala and Kangundo are fairly well served by public transport. In these two sub-samples, too most prominent traders have their own private transport. Thus the two centres actually operate as a major re-distribution centres for the Kinyui, Katheka and Kathama markets. Public transport is also not very serious to and from Kinyui, since it is served

by two fairly regular 'matatus'. The Katheka and Kathama sub-samples are however seriously affected by public transport and the traders have hardly a private means of transport. In general, therefore, we can say that there is an increase lack of private transport and insufficiency of public transport as one goes from Kangundo to Kathama via Tala, Kinyui and Katheka. Thus for the distant markets we accept this hypothesis but as we come towards Tala and Kangundo, we should hesitate to reject or accept the hypothesis. The reason for the hesitation particularly in the Tala and Kangundo sub-samples is that we have no way of telling how much private transport is sufficient or insutficient. But, for the J.P.M. study area, we have reason to believe that the hypothesis should be accepted.

## CHAPTER VIII

### 8. CONCLUSION

This work was designed primarily to furnish the management of the 'Joint Project Machakos' with additional agricultural and socio-economic information that may be influencing the observed malnutrition, outmigration and poor health status of the people of the northern division of Machakos district, Kenya. The broad-based assumption was that if the agricultural output of the area were sufficiently high, the people would be well-fed, have adequate farm-incomes with which to purchase goods or services that could keep them protected from poor health, and need not necessarily migrate out of the area.

This chapter will relate all the available information to derive possible measures for adoption with regard to the proposed regional development programme. The suggestion being offered if adopted will contribute to increasing agricultural output in the area, improve the income of farmers, and possibly improve the nutritional and health status of the inhabitants .

One of the most important observations in this study is that farm output per household (and therefore per capita) is so low that it does not satisfy subsistence needs over the whole year.

This has resulted into large volumes of food (mainly maize and beans) being brought into the area from other districts with market surplus.

Cash crops (mainly coffee), and livestock form nearly the only source of farm cash receipts. Much of the receipts from such source is actually spent on school fees, a notorious household expenditure in the area. Moreover, the distribution of cash crop cultivation is dictated by weather, soils and altitude. Thus there is no real cash crop east of the Kanzalu range. Yields of any such cash crops are also far below the national average.

The non-farm sources of income therefore, play a major role in household incomes and expenditure. Receipts from such sources are substantial, and it has been noted that migrants, especially those going to urban areas, do not completely cut links with the area. It is also said that in Kenya, the urban-rural income transfers represent about a fifth of the urban wage bill.

An average household spends much more than it can generate from its own farm. Major expenditure include the purchase of household items such as foods, and also school fees. The difference between what can be afforded and what cannot be afforded is then met either by off-farm sources of income, or by government and church relieves.

In some cases malnutrition and undernourishment are rampant among pre-school children. This becomes an indicator of household economic povery. Such state of affairs is often accompanied by poor health especially observed in children 0-5 years and pregnant women.

The remaining part of this chapter shall be devoted to short discussions of the areas that call for planned intervention in order to overcome the over-all problem. The areas are by no means exhaustive, but they represent the key-areas from our own point of view; that can be manipulated to solve the overall problem.

AGRICULTURAL EXTENSION, TRAINING AND EDUCATION

Although agricultural education and training for the farmers and the extension staff is not in itself a sufficient condition for agricultural development, it is certainly a necessary condition (20, p. 345). A very small proportion of the sample farmers had neither attended a farmers training centre nor been visited by a 'change agent'-the extension officers. Too, most of these change agents had little or no formal education, and yet covered a large expanse of area in terms of responsibility.

More education and training is needed for these two sets of groups - the farmer, and the contact extension worker, so as to provide the population with the tools and attitudes necessary to improve farm management techniques, and hence output per capita. The coverage of each extension worker is quite high, knowing that his only means of transport is a manual bicycle in the case of a junior agricultural assistant (J.A.A.).

All such observations call for a deliberate effort to increase the quantity and quality of the extension staff. Special courses, field days, demonstrations, and barazas should also be encouraged for all farmers (not coffee growers only), so as to keep the population aware of the rapidly changing agricultural conditions.

VETERINARY SERVICES

The division had only six members of staff (Animal Health Assistants)(=A.H.A.s) in the veterinary section in 1975. Only three of these were in direct contact with the farmers. Mwala, the largest of the locations had no single A.H.A. All the six have little veterinary training, since the best are of certificate level trained at A.H.I.T.I. in Kabete, Nairobi. There was an apparent lack of vaccine 'F' since the dreaded New-castle disease (=foul pest) was already doing untold damage in the area. Quarantines were common due to FMD (=Food and Mouth Disease), while a very small population of the divisional herd was vaccinated against this disease. Artificial insemination crushes, and cattle dips are also concentrated in two locations leaving large expanse of the area virtually devoid of veterinary services.

Observations like these call for an increased number of veterinary services which can be achieved by increasing the number of qualified staff in the area.

SECURITY OF LAND TENURE

The incentive to develop a piece of land, and therefore to maximise its output lies in the pride of land ownership (9, p. 132-156). Security of land tenure also indirectly influences soil fertility and

therefore productivity of land because of the increased incentive to conserve.

A necessary security for loan or credit acquisition for this area is coffee. But the coffee grows on land! Land is however, not considered as adequate security because the people who till it, and rear animals on it have no legal title-deeds.

We then find it necessary, nay, imperative to suggest that an immediate land registration, and provision of title-deeds will accelarate change towards commercial farming not only by making land a security for loan acquisition, but also by increasing the incentive to produce more from the land (20, p. 244-265).

## LOANS AND CREDIT FACILITIES FOR FARMERS

The process of increasing farm outputs involves, amongst other things, the adoption of purchased inputs, Such inputs have to be sold at a price the farmers can afford, and be found at a place the farmers can easily reach, spending minimum time and money.

The adoption of such inputs usually need some financial assistance from off-farm sources and should increase production so as to cover the costs of the inputs and the interest charged on such borrowed capital (3).

In our case, this is given in form of loans and credit facilities to a few farmers who also grow coffee. Thus, the vast majority of the farmers do not get such loans, and even for the coffee farmers, the amounts are very small.

Admittedly, there are problems of repayments (see Appendices XII and XIII), but such problems could be caused by other operational constraints, such as management (10). The provision of loans and credit facilities without discrimination, coupled by effective advisory services on the optimal use of such facilities should be deliberately encouraged in this area if farm outputs have to be substantially increased.

SUPPLY OF FARM INPUTS

Kangundo and Tala are the only market centres in our sample that stocked main agricultural inputs. These two centres are the most important such centres in the whole division. It follows therefore that farmers in remote areas away from Tala and Kangundo do not easily get such inputs. The case for inputs such as Katumani seed becomes even much more crucial since the seeds are needed in the farms at the right time, all at ago. Such conditions were not fulfilled at least in the short rains of 1975. Such inputs should be available at convenient places at the right

time (11, p. 604); packaged in suitable containers. Such observations then leads us to suggest that stocks of such inputs should be encouraged in other markets too. This can for instance be encouraged by providing loans for some trader in these other markets specifically for starting or increasing their current stocks.

RURAL INFRASTRUCTURE

An improved rural infrastructure can enhance the health and productivity of the people, while too prividing marketing facilities and outlets for farm outputs and inputs. The roads and bridges in this area are rough and impassable during wet weather. Apart from the two market centres of Tala and Kangundo, there is hardly any tap-water, electricity, or telephones in the rest of the division. Veterinary services are concentrated in only too locations; where coffee co-operative societies, and home economics clubs are also active.

Such observations call for deliberate programmes intended to improve the entire infrastructure of the area. Such programmes could take rural water, rural electricity, rural roads and bridges, and veterinary services as a priority; since these affect the quality and quantity of farm outputs directly.

CO-OPERATIVE MARKETING

Most farms have at least one fruit tree. Too, vegetables, especially tomatoes, are seen in large quantities in market centres. There is no organised market channel for these horticultural crops. They sell at relatively low prices, thus private traders are traversing the area during harvests of such crops buying them and transporting them to large urban centres like Nairobi and Mombasa.

For the farmers to increase the returns from such farm output, they could get together and make a marketing co-operative. Such a marketing co-operative could provide the farmers with the following advantages:- (34, p. 153).

a) Provide them with opportunities for earning a higher income by possibly raising the prices obtainable from such farm output, since their bargaining power will also be increased.

b) It will replace the present country buyers (=middlemen) and therefore pass the profits to the growers that they would otherwise miss.

c) It would serve as a useful means of extending credit to horticultural farmers while it provides a useful channel for propagating ideas for improvement of methods of cultivation and marketing.

## THE DISTRICT OF MACHAKOS IN NATIONAL PERSPECTIVE[1]

In this chapter, we have made some recommendation or given suggestions on possible intervention measures that could be undertaken so as to make life in that part of Machakos district much better than is now. In this section, we want to furnish the reader with some vital information on Machakos district as a whole in reference to other districts of Kenya. We shall briefly introduce some vital information about the district as a whole, then, later we shall use some common factors to compare the district with others.

The district has six divisions, 28 locations, and 206 sub-locations over an area of slightly over 14 thousand square kilometers.

The district is covered fairly well with a net-work of roads but most of these are in extremely poor conditions and are impassable during wet weather. The total road length is 2100 kilometers, and has a road density of 0.148 per square kilometer. 64 % of all these roads are class D (secondary) and class E (minor). Only 250 km are tarmaced while 220 are gravelled.

Tap water and electricity are found only in major centres such as Machakos town and Kangundo township. There are 822 primary schools, 22 government aided secondary schools and 52 harambee and private schools. The district has 653 hospital beds, 5 health centres, 38 dispensaries and three hospitals.

28 % of the total land area is forest, national park, or game

---

1. This information has been gathered by face-to-face discussions with most civil servants in Machakos district and verified by reading reports of the District Development Committee, government ministries' annual reports and the Kenya Statistical Abstract, 1975.

reserve. The bulk of the population live on small scale farms while about 22 % of the total farm land is used for large scale farming (mainly ranching).

When we compare farming land potentials, human population densities, and pupil/population percentages of Machakos district with other district in this country we get the results of tables 53 and 54. These tables show that Machakos district lies in a rather unique position. It is neither low potential nor high potential in agricultural se-e. If primary school registration is assumed to be an indicator of the districts investment in human capital, the district compares fairly well with most relatively high potential areas of Kenya. In fact in that respect, the district can be described as excellent.

The districts problem then lies in the fact that a relatively high human population is supported mainly on a medium potential area. In this respect the district is comparable to none. We can clearly see from the two tables that districts with most land area of low to medium potential are actually supporting very small population. Thus in the case of Machakos district, the proportion of its total population that is prone to food shortages is considerably high vis-à-vis all other parts of Kenya.

Notice that while a district like Embu has a good proportion of its land, medium potential, it has no low potential area and its high potential area is proportionately larger than that of Machakos hence its relative large population density. Thus, during bad years (in terms of total rainfall) there are proportionately more humans with food shortages in Machakos viv-à-vis Embu. The case of Kitui district is much serious since there is much less potential area, but the population density of Kitui is four times less

Table 53: THE POPULATION OF MACHAKOS DISTRICT IN TERMS OF LAND POTENTIAL, POPULATION DENSITY, AND THE PUPIL POPULATION PERCENTAGE AMONGST 21 DISTRICTS IN KENYA THAT BELONG TO THE LOW TO MEDIUM POTENTIAL AREAS IN AGRICULTURAL SENSE

| DISTRICT | PROVINCE | LAND POTENTIAL % | | | POPULATION '000 | AREA '000 $km^2$ | DENSITY PER $km^2$ | PRIMARY PUPILS '000 | PUPILS PER POPULATION (%) |
|---|---|---|---|---|---|---|---|---|---|
| | | LOW | MEDIUM | HIGH | | | | | |
| Wajir | NEP | 100 | - | - | 86 | 57 | 2 | 2 | 2 |
| Garissa | NEP | 100 | - | - | 64 | 44 | 1 | 3 | 4 |
| Mandera | NEP | 100 | - | - | 95 | 26 | 4 | 3 | 3 |
| Turkana | RVP | 100 | - | - | 165 | 61 | 3 | 4 | 3 |
| Isiolo | EP | 100 | - | - | 30 | 26 | 1 | 4 | 13 |
| Marsabit | EP | 100 | - | - | 52 | 73 | 1 | 4 | 8 |
| Kajiado | RVP | 99 | - | 1 | 86 | 21 | 4 | 13 | 15 |
| Tana River | CoP | 96 | 2 | 2 | 51 | 39 | 1 | 7 | 14 |
| Taita | CoP | 92 | 1 | 7 | 111 | 17 | 7 | 29 | 26 |
| Laikipia | RVP | 86 | - | 14 | 66 | 10 | 7 | 18 | 27 |
| West Pokot | RVP | 78 | - | 22 | 82 | 5 | 16 | 10 | 12 |
| Baringo | RVP | 75 | 8 | 17 | 162 | 11 | 15 | 32 | 20 |
| Kilifi | CoP | 71 | 21 | 8 | 308 | 12 | 25 | 45 | 15 |
| Kwale | CoP | 64 | 20 | 16 | 206 | 8 | 25 | 32 | 16 |
| Lamu | CoP | 50 | 49 | 1 | 22 | 7 | 3 | 4 | 18 |
| Elgeyo Marakwet | RVP | 47 | - | 53 | 159 | 3 | 59 | 29 | 18 |
| Kitui | EP | 47 | 50 | 3 | 343 | 29 | 12 | 78 | 23 |
| Narok | RVP | 44 | - | 56 | 125 | 19 | 7 | 13 | 10 |
| Nakuru | RVP | 41 | 7 | 52 | 291 | 7 | 41 | 70 | 24 |
| Machakos | EP | 34 | 57 | 9 | 707 | 14 | 50 | 235 | 33 |
| Embu | EP | - | 74 | 26 | 179 | 3 | 66 | 52 | 29 |

Provinces:- NEP = North-Eastern, EP = Eastern, RVP = Rift Valley, CoP = Coast

Source: Compiled and calculated from:

a) Kenya Statistical Abstract, 1975 pp. 2, 13, 103.

b) Republic of Kenya, Ministry of Education, Annual Report, 1975.

Table 54:

LAND POTENTIALS, POPULATION DENSITIES, AND PUPIL POPULATION PERCENTAGES OF 14 MOST HIGH POTENTIAL DISTRICTS IN KENYA

| DISTRICT | PROVINCE | LAND POTENTIAL % | | | POPULATION '000 | DENSITY PER $km^2$ | PRIMARY PUPILS '000 | PUPILS PER POPULATION (%) |
|---|---|---|---|---|---|---|---|---|
| | | LOW | MEDIUM | HIGH | | | | |
| Kisii | NP | - | - | 100 | 675 | 307 | 213 | 32 |
| Kakamega | WP | - | - | 100 | 733 | 222 | 236 | 30 |
| Kericho | RVP | - | - | 100 | 499 | 98 | 108 | 22 |
| Murange | CP | - | - | 100 | 445 | 180 | 147 | 33 |
| Nandi | RVP | - | - | 100 | 209 | 76 | 55 | 26 |
| Trans-nzoia | RVP | - | - | 100 | 124 | 50 | 34 | 27 |
| Uasin Gishu | RVP | - | - | 100 | 191 | 50 | 40 | 21 |
| Bungoma | WP | - | - | 100 | 345 | 112 | 111 | 32 |
| Busia | WP | - | - | 100 | 200 | 125 | 53 | 27 |
| South Nyanza | NP | 1 | - | 99 | 663 | 116 | 157 | 24 |
| Nyandarua | WP | 2 | - | 98 | 177 | 50 | 56 | 32 |
| Kiambu | CP | 4 | - | 96 | 476 | 194 | 147 | 31 |
| Nyeri | CP | 7 | - | 93 | 361 | 110 | 123 | 34 |
| Kirinyaga | CP | - | 9 | 91 | 217 | 151 | 64 | 29 |

Provinces: NP = Nyanza, RVP = Rift Valley, CP = Central, WP = Western

Source: Ibid (as previous table)

## REFERENCES


1. ACLAND, J.D.: East African Crops, FAO/Longmans, 1971.

2. BARADI, T.A. and van RIJN, P.J. The Relationship between Agriculture and Malnutrition; Royal Tropical Institute, Amsterdam, 1975.

3. BAUM E.L. et al (eds) Capital and credit needs in a changing agriculture, Ames, Iowa, 1961.

4. BLOK, P.G. Interim report on the demographic studies of the JPM, Medical Research Centre, Nairobi, 1975.

5. BLOK, P.G. Report on civil registration scheme in Kenya. Royal Tropical Institute, Amsterdam 1975.

6. BRESSLER, R.G. and KING, R.A. Markets, prices and inter-regional trade. John Willey and sons, inc., New York 1970.

7. CHEGE, F.E. and ASCROFT, J. Marketing farm supplies in rural areas: A study of farm inputs availability in Tetu Division. Institute for Development Studies. Discussion Paper No. 48, 1967.

8. DAVID, M. Marketing of food crops and purchases of industrial commodities by Nyanza small-holders, 1970-71.

   Institute for Development Studies, University of Nairobi Working Paper No. 265, 1976.

9. de WILDE, J. et al Experiences with agricultural development in Tropical Africa. Vol. I & II. Johns Hopkins Press, Baltimore, Maryland, 1967.

10. HEYER, J. — Economics of small scale farming in lowland Machakos. Institute for Development Studies, University of Nairobi, Occasional Paper No. 1,1967.

11. HEYER, J. MAITHA,J.K. and SENGA, W.M. (eds.) — Agricultural development in Kenya: An economic assessment. OUP, Nairobi, 1976.

12. HESSELMARK, O. and LORENZL, G. — Structure and problems of the maize marketing systems in Kenya. Zeitschrift für Auslandische Landwirtschft, Berlin, Vol. 15 (1976), pp. 161 - 179.

13. HUNTER, G. — The choice of methods for implementation of agricultural development policies. Institute for Development Studies, University of Nairobi, Discussion Paper No. 212, 1974.

14. KOHLS, R. L. — Marketing of agricultural products. Macmillan, New York, 2nd Edition, 1961.

15. KOLKENA, T.F.M. — Socio-economic survey in two rural areas of Machakos district, Kenya. Royal Tropical Institute, Amsterdam, 1975.

16. LEAKEY, C.L.A. (ed.) — Crop improvement in East Africa. Commonwealth Agricultural Bureaux, England, 1970

16. LORENZL, G. — Marketing and agricultural development. "Economics", Vol. 8, 1974, pp. 7 - 19

18. MBITHI, P.M and BARNES, C. — A conceptual analysis of approaches to rural development. Institute for Development Studies, University of Nairobi, Discussion Paper No. 137, 1972.

19. MBUVI, J.P. et al — A preliminary evaluation of the soils of North-western Machakos. National Agricultural Laboratories, Kenya, 1974.

20. MELLOR, J.W. — The Economics of Agricultural Development. Cornell University Press, New York, 1968.

21. MULLER, A.S. et al — Joint research project in the Machakos district in Kenya: Basic Document. Medical Research Centre, Nairobi, Kenya, 1972.

22. MULLER A.S. — Annual reports: Joint Project Machakos, Medical Research Centre, Nairobi, Kenya, 1974 and 1975.

23. REPUBLIC OF KENYA — Kenya Population Census, 1969. Vol. I, Central Bureau of Statistics, Nairobi, 1971.

24. IDEM — Provincial annual reports; Eastern Province. Ministry of Agriculture, Kenya; 1974 and 1975.

25. IDEM — District annual reports. Machakos, district; Ministry of Agriculture, Kenya, 1971 and 1975.

26. IDEM — Divisional annual reports. Northern division of Machakos district. Ministry of Agriculture, Kenya, 1974 and 1975.

27. IDEM — Development Plan 1974-78 Government Printers, 1974

28. RITCHIE, K.G. — The identification and analysis of nutritional problems in rural areas. Institute for Development Studies, University of Nairobi; Working Paper No. 265, 1976.

29. SHULPEN, T.J.W. — Annual reports, 1975. Department of Nutrition. Medical Research Centre, Nairobi, Kenya, 1975.

30. SOSNICK, S.H. Operational criteria for evaluating Market performances; in Market Structure Research, Ames, Iowa, 1964 (p. 80-125).

31. van PISCHKE, J.D. A critical survey to approaches to the role of credit in smallholder development. Institute for Development Studies, University of Nairobi, Working Paper No. 145, 1974.

32. WHETHAM, E.H. Agricultural marketing in Africa. Oxford, 1972.

33. WHITELAW, W.E. and JOHNSON, G.E. Urban-rural income transfer in Kenya: An estimated remittances functions. Institute for Development Studies, University of Nairobi, Discussion Paper No. 137, 1972.

34. WIDSTRAND, C.G. (ed ) Co-operatives and rural development in East Africa. Scandinavian Institute of African Studies, Uppsala, 1970.

35. WISNER, P. and MBITHI, P.M. Drought in Eastern Kenya. Comparative observation of nutritional status and farmer activity at 17 sites. Institute for Development Studies, University of Nairobi. Discussion Paper No. 167, 1972.

36. WILSON, F.A. Some economic aspects of the structure and organisation of small scale marketing systems of fruits and vegetables in Kenya. Institute for Development Studies, University of Nairobi Discussion Paper No. 176, 1973.

APPENDIX I

FOOD AID FOR FAMINE VICTIMS

The government is committed to ensure that famine-stricken families are supplied with food stuffs. This was revealed by the Machakos D.C. Mr. Benson Kaaria. He said that government has provided 20,000 bags of maize and 1,000 bags of beans to the people in the area.

Mr. Kaaria said, government contribution alone could not alleviate the situation and the Wanainchi must consider planting crops like millet, cassava, sorghum, kunde, and Katumani maize which are not affected by drought.

Chiefs in the area have been directed to issue orders under the Chiefs' Authority Act requiring all persons to plant these crops, said Mr. Kaaria. He said the government will assist to find seeds for the people and anyone who is late in planting would be committing an offence.

..... He also revealed that government has assisted with 1,460 bags of Katumani seed."

Source: DAILY NATION. 12/2/76.

APPENDIX II

CATHOLICS GIVE SHS. 5M. TO FEED HUNGRY WANA NCHI

The Catholic Church in Kenya has spent about five million shillings in the past two years in a bid to help famine in drought-stricken areas.

The money has been used to supply food to these areas, in co-operation with the government authorities and in identifying and promoting permanent solution to the problem of drought. ....."While supplying food we are aware of the danger of creating situations of dependency on outside food supplies and the drought-food distribution is merely a short-term emergency measures." the statement added.

"In our programme, we make every effort to promote activities which will lead to self sufficiency on the part of the community faced by the catastrophe" the Secretariat said. Some of the permanent solution include irrigation schemes where famine stricken families are resettled."

....Apart from Agricultural initiatives, the church also inspires creation of small-scale income producing situations which enable people to generate small incomes independent of the vagaries of the wealther. Although food distribution was part of combating famine, "our aim is to promote self-reliance and self-sufficiency in these areas." They are giving small grants to more than 40 projects, and hope to make permanent contributions."

Source: DAILY NATION, 12/2/76.

APPENDIX III

DISEASES OF LIVESTOCK IN THE NORTHERN DIVISION OF MACHAKOS DISTRICT

SOURCE: Summarised from the Animal Husbandry reports for 1974/75 of the division •at Kangundo, and casual interviews and talks.

Foot-and-Mouth disease (F.M.D.) is a major disease of livestock in the area. This disease, like most viral diseases, has a near 100% morbidity. Its mortality is however, very low, but it depresses growth and milk yields. Usually the animal sav salvates alot develops large visicles and ulcers in the mouth and tongue; and worse develops ulcers in the interdigital spaces resulting in lameness. The disease is fatal to calves, kids and lamps! The causal organism, a virus, perpetuates int itself in many strains, hence difficult to control. The disease is therefore a notifiable one. The vaccinations programmes in the division, over the years, haveddelivered:- 306 doses in 1971, 550 doses in 1972, 210 doses in 1973, 1331 doses in 1974 and 3305 doses in 1974. These vaccinations are small compared to the total livestock population.

Anthrax, a bacterial disease caused by Bacillus anthracis was not reported in 1975 but due to possible dangers of outbreak, 1900 vaccines were adminstered in 1975 compared to 1005 vaccines in 1974.

Black-quarter also called 'black-leg' a bacterial disease caused by clostridium chauvoei was also not reported, but 820 doses were adminstered in 1975.

East Cost Fever (E.C.F.) caused by a protozoan Theileria, parva, and transmitted by a brown-ear tick Rhipicephalus appendiculatus is becoming less important in the area, as the following figures show:- 1971 - 109 doses, 1972 - 43 cases 1973 - 63 cases, 1974 - 30 cases, 1975 - 13 cases reported. Such improvement is partly attributed to the proportionate increase in cattle dips in the division, and partly to animal immunity (natural) The disease has a near 100% mortality, and has a very short incubation period.

Anaplasmosis, also called 'Gall-sickness', caused by a protozoan anaplama maginale, transmitted by bont-legged species of ticks Hyalomma spp. had 12 cases confirmed in 1975 compared to 16 in 1974.

Rinderpest, commonly known as 'cattle plague' also a viral disease, was not reported in 1975 But calves below the age of 6 months were vaccinated to attain life-immunity, by 2,470 doses in 1975, compared to 20,906 in 1974, 6,470 in 1973, 7,000 in 1972 and 8,026 in 1971.

Calf diseases, especially worms and flukes, were reported and treated, but no case of sheep or goat diseases were reported.

Newcastle disease, also called 'fowl pest' was a rather serious poultry disease in the entire division. The pace with which vaccine 'F' doses were being given was appalling. Figures tell by themselves. 1973 - 1264 doses, 1974-388 doses 1975 - 750 doses. These doses are 'nothing' considering that the division had over 105,000 birds over 1975 year. The bias of vaccinating only exotic breeds of poultry leaving the local breeds of poultry to die in numbers is an ill-advised practice.

Fowl typhoid, had 600 reported vaccinations while several birds were treated for acoccidiosis.

Other common livestock diseases included liver-flukes, especially in the wetter parts of Matungulu and Kangundo locations, mastitis for dairy cows, and a number of minor ones.

APPENDIX IV

Onchere, UNIVERSITY OF NAIROBI

AGRICULTURAL MARKETING SURVEY, TRADE QUESTIONNAIRE
JOINT PROJECT MACHAKOS

Trader..... Date.....

Market Centre..... Plot Number.....

Person Interviewed..... Sub-sample.....

Postal Address.....

1. What do you deal in mainly:-

   1.1 Foods....., ....., .....

   1.2 Tools....., ....., .....

   1.3 Chemicals....., ....., .....

2. When did you begin doing this business in this market centre?

3. Had you done such business elsewhere:.....

   3.1 Where?.....

   3.2 When? .....

   3.3 Why did you move here?.....

4. Where do you get your products from? (give place and distance).....

   .....

5. Who is (are) your common customer(s)?.....

   .....

6. How far are they located from here?.....

   .....

7. Do you own your own transport?.....
   Which?.....

8. Do you hire transport at all?.....

   8.1 How often?.....

   8.2 For what?.....

   8.3 How much do you pay?.....

9. Do your customers pay you cash when purchasing anything?.....

10. Do you pay cash for all items that you have in the premise?.....

    10.1 If not, explain.....

    .....

11. How do you protect your stored products from:-

    11.1 Insect damage.....

    11.2 Rain and sun.....

    11.3 Rats and mice.....

    11.4 Deterioration over time.....

    11.5 Other spoilage.....

12. Do you consider your capacity storage as:-

    12.1 Enough?.....

    12.2 Not enough?.....

    (investigator to observe too).

13. Do you consider your storage as:-

    13.1 Poor.....

    13.2 Good.....

    13.3 In-between.....

    (investigator to observe).

14. Which time since X-mas have you had the largest quantity of products in your premise?

Name months .....

14.1 How do you explain this?.....

15. When have you had little or no product here?

.....

15.1 Why was this so?.....

16. Do you have any loans?.....

16.1 From who?.....

16.2 How much?.....

16.3 How are you repaying it?.....

16.4 If you do not have any, what is your reason?.....

17. Have you attended any business (trade) course?

.....

17.1 Where?.....

17.2 When?.....

17.3 How long was it?.....

17.4 What was it about?.....

17.5 If not, why haven't you?.....

FOR FOOD SEELERS

18. For the interest of knowing the most important food crops in this area, can I estimate with you how much of each product you have?

Maize..... Beans.....

P/Pea..... Potato.....

Cow Pea..... Sorghum.....

Fruits..... Vegetables.....

.....

.....

.....

Other..... Other.....

..... .....

19. How much of the products you deal in did you have:-

| Product | Last week | Ave. week | Ave. month | Av. year |
|---|---|---|---|---|
| Maize | ..... | ..... | ..... | ..... |
| Beans | ..... | ..... | ..... | ..... |
| P/Peas | ..... | ..... | ..... | ..... |
| Cow pea | ..... | ..... | ..... | ..... |
| Sorghum | ..... | ..... | ..... | ..... |
| Vegetable..... | | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... |
| Fruits | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... |
| Other | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... |

20. What do you sell these products/unit?

| | |
|---|---|
| Maize..... | Beans..... |
| P/Pea..... | Potato..... |
| Cow pea..... | Sorghum ..... |
| Millet ..... | Vegetables ..... |
| Fruits ..... | ..... |
| ..... | ..... |

20.1 For how long has the price(s) been so?

.....

20.2 What was the price then?.....

21. What about the buying price/unit?.....

| | |
|---|---|
| Maize..... | Beans ..... |
| P/Peas ..... | Potato ..... |
| Cotton ..... | Sorghum ..... |
| Cow pea..... | Vegetables..... |
| Fruits..... | Other..... |
| | (specify) |
| Other..... (specify) | ..... |
| ..... | ..... |

22. Which months have prices been highest since X-mas?

.....

22.1 When have they been lowest?.....

22.2 How much?.....

| | Lowest | Highest |
|---|---|---|
| Maize | ..... | ..... |
| Beans | ..... | ..... |

| | Lowest | Highest |
|---|---|---|
| P/Peas | ..... | ..... |
| Cow pea | ..... | ..... |
| Millet | ..... | ..... |
| Sorghum | ..... | ..... |
| Other | ..... | ..... |

23. How many other traders in this market deal in these same products?.....

23.1 Would you like these numbers to be:

23.1.1 Smaller?.....

23.1.2 Larger? .....

23.2 Why?.....

.....

FOR FARM INPUT SELLERS

24. For the interest of knowing the most important agricultural inputs in this area, can I know how much of each you have, the selling price per unit, and the buying price?

| Fertilizers | Quant. | Selling price unit | B/price unit |
|---|---|---|---|
| ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... |
| Storage chemicals | | | |
| ..... | ..... | ..... | ..... |

24. Storage chemicals

..... ..... ..... .....

..... ..... ..... .....

Tick Control chemicals

..... ..... ..... .....

..... ..... ..... .....

Other animal para. control

..... ..... ..... .....

..... ..... ..... .....

..... ..... ..... .....

Crop protection chemicals

..... ..... ..... .....

..... ..... ..... .....

..... ..... ..... .....

| Animal Feeds | Quantity | Selling price unit | B/Price unit |
|---|---|---|---|
| For cattle | | | |
| ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... |
| ..... | ..... | | ..... |
| For poultry | | | |
| ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... |
| Other inputs (specify) | | | |
| ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... |

APPENDIX V

LOAN BREAKDOWN TO MATUNGULU SOCIETY FACTORIES, 1975

| FACTORY | LOAN | | TOTAL |
|---|---|---|---|
| | Co-op Bank | C.P.C.S | |
| Kalala | 102,538 | 85,800 | 188338 |
| Kakulutuini | 45,850 | 38,000 | 83850 |
| Kaukiswa | 47776 | 33,440 | 81216 |
| Kawethei | 44,514 | 33,440 | 77954 |
| Kyamwole | 84,032 | 71,440 | 155472 |
| Katine | 35,021 | 24,320 | 59341 |
| Sengani | 52,269 | 44,080 | 96349 |
| TOTALS | 412,000 | 333,000 | 745,300 |

Source: Own investigation

* The loan source is actually the same, but, we have stuck to the classifications in the coffee societies.

N/B

If all the 7291 members of the Matungulu society had applied for loans, each would get an average of 104 ☆ only.

APPENDIX VI

Onchere, UNIVERSITY OF NAIROBI

AGRICULTURAL MARKETING SURVEY: FARMERS QUESTIONNAIRE
JOINT PROJECT MACHAKOS

Farmer's name..... Date.....

Location..... H/H No.....

Sub-location..... Sub-sample/No.....

Village..... Person interviewed....

Postal address..... .....

---

1. Which crops do you grow in this shamba?

How much area does each occupy?

| Area/Number | Area/Number |
|---|---|
| Coffee..... | Cowpea..... |
| Cotton..... | Potato(Irish)..... |
| Maize..... | Potato (Sweet)..... |
| Beans..... | Castor..... |
| Pigeon pea..... | Cassava..... |
| Bananas..... | Sorghum..... |
| Millet..... | Sisal..... |
| Fruits..... | Vegetables..... |
| ..... | ..... |
| Other(specify) | Other(specify) |
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |

2. Which animals do you have What are their numbers

2.1 Cattle

2.1.1 Bulls..... 2.2 Goats.....

2.1.2 Heifers..... 2.3 Sheep.....

2.1.3 Calves..... 2.4 Chicken.....

2.1.4 Cows..... 2.5 Other poultry..

2.1.5 Total..... 2.6 Other(specify).

4. Can you please also answer some questions about animals that you have sold?

| | Cattle | Goats | Sheep | Chicken |
|---|---|---|---|---|
| 4.1 Since X-mas | | | | |
| 4.2 This month | | | | |
| 4.3 Place sold | | | | |
| 4.4 Distance to market | | | | |
| 4.5 Time spent | | | | |
| 4.6 Place sold | | | | |
| 4.6.1 Open-air-mkt | | | | |
| 4.6.2 Neighbour/ relative | | | | |
| 4.6.3 Butcher | | | | |
| 4.6.4 Other | | | | |
| 4.7 Number given for free to relative or neighbour/ friend. | | | | |
| 4.8 Amount got (Shs). | | | | |

3. Can you please answer the following questions about the food crops that you have on the shamba, or you have just harvested?

| Question \ Crop | Coffee | Cotton | Maize | Beans | P/Pea | Bananas | Millet | Cowpea | Cassava | Potato (Irish) | Potato (sweet) | Sorghum | Sisal | Fruits | Vegetables | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3. 1 Amount harvested | | | | | | | | | | | | | | | | |
| 3. 2 Amount marketed | | | | | | | | | | | | | | | | |
| 3. 3 Place marketed | | | | | | | | | | | | | | | | |
| 3. 4 Distance to market | | | | | | | | | | | | | | | | |
| 3. 5 Time taken to market | | | | | | | | | | | | | | | | |
| 3. 6 Means of transport to market | | | | | | | | | | | | | | | | |
| 3. 7 Cost of transport | | | | | | | | | | | | | | | | |
| 3. 8 Amount of money received | | | | | | | | | | | | | | | | |
| 3. 9 Place sold | | | | | | | | | | | | | | | | |
| 3.9.1 Open air market | | | | | | | | | | | | | | | | |
| 3.9.2 Shop owners | | | | | | | | | | | | | | | | |
| 3.9.3 Society | | | | | | | | | | | | | | | | |
| 3.9.4 Neighbour/relative | | | | | | | | | | | | | | | | |
| 3.10 Amount given free to friends/relatives | | | | | | | | | | | | | | | | |


- 174 -

5. Which of the following items do you have at home? Can you answer some questions about them?

| | Fencing material | Building material | Ox-plough | Pangas | Jembes | Fork-jembe | Bicycle | Radio | Other |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Amount at home | | | | | | | | | |
| 5.2 Place bought | | | | | | | | | |
| 5.3 Age | | | | | | | | | |
| 5.4 Means of transport | | | | | | | | | |
| 5.5 Cost of transport | | | | | | | | | |
| 5.6 Cost of each | | | | | | | | | |
| 5.7 Amount got for free | | | | | | | | | |

6. Do you have a food store?.....

6.1 If yes, what products are in there now?.....
.....

6.2 If not, what product(s) was there last?
.....

6.3 When did it get finished?.....

6.4 How much was it to start with?.....

6.5 Which months of this year have you had some produce in the store?.....

6.6 Which months then have you had no product in the store?.....

7. Do you use any chemicals when storing food produce?

.....

7.1 Which chemical?.....

7.2 How much?.....

7.3 Where do you get them from?.....

7.4 Cost/unit?.....

8. If you do not use storage chemicals:-

8.1 Are you aware that there are such chemicals?

.....

8.2 What is your honest explanation for not using such chemicals?.....

9. Did you apply any chemical to any of your crops to control crop diseases and insect pests that attack crops while they are in the field?.....

9.1 Which chemicals?.....

9.2 Where got from?.....

9.3 How much?.....

9.4 Cost/unit?.....

10. If you do not use these protections:-

10.1 Are you aware of their existence?.....

10.2 What is your honest reason for not using it?

.....

11. Did you use purchased seed during your last planting season?.....

11.1 Which seed..... 11.2 How much?.....

11.3 Cost/unit?..... 11.4 Do you always use such seed? Explain.....

12. If you do not use commercial seed at all:-

12.1 Are you aware of their existence?.....

12.2 What is your honest reason for not using them?.....

13. Do you use fertilizer onto any of your crop?

.....

13.1 How much during:

13.1.1 this season?.....

13.1.2 last season?.....

13.2 What is the cost/unit?.....

13.3 Which crops do you apply fertilizer?

| Type | Amount(Kg) |
|---|---|
| Coffee..... | ..... |
| Cotton..... | ..... |
| Maize..... | ..... |
| Other..... | ..... |
| ..... | ..... |

14. If you do not:-

14.1 Are you aware of their existence? .....

14.2 What is your honest reason for not using them?.....

15. Do you buy any feeds for your animals?.....

15.1 Which feeds?

| | Quantity(Kg) |
|---|---|
| 15.1.1 Cattle ..... | ..... |
| 15.1.2 Poultry..... | ..... |
| 15.1.3 Other ..... | ..... |

15.2 How much does each cost you?.....

15.3 Where did you get it from? (name place and distance)?.....

15.4 How did you bring it home?.....

15.5 How much did the transport cost you?.....

16. If you do not buy feeds for animals:-

16.1 Are you aware of their existence?

.....

16.2 What then is your honest reason for not buying them?.....

17. How much of the following items do you purchase in a week? How much do they cost?

| | Qty(Kg) | Cost/unit | Qty(Kg) | Cost/unit |
|---|---|---|---|---|
| Meat | ..... | ..... | Matches | ..... |
| Milk | ..... | ..... | Cigarettes | ..... |
| Eggs | ..... | ..... | Beer | ..... |
| Salt | ..... | ..... | Paraffin | ..... |
| Cooking fat | ..... | ..... | Other | ..... |
| Vegetables | ..... | ..... | Fruits | ..... |
| | ..... | | | ..... |

18. How much have you sold this month?

| | Quantity | Returns(shs) |
|---|---|---|
| Milk | ..... | ..... |
| Eggs | ..... | ..... |
| Beer | ..... | ..... |
| Other | ..... | ..... |

19. How much then of the following do you purchase per month? How much does this cost you?

.....

| | Qty. | Cost(shs) | | Qty | Cost(shs) |
|---|---|---|---|---|---|
| Maize | ..... | ..... | Sugar | ..... | ..... |
| Beans | ..... | ..... | Milk | ..... | ..... |
| Others | ..... | ..... | Other | .... | ..... |

19.1 Where do you get them from?.....

| Product | Place | Distance(Km) |
|---|---|---|
| Maize | ..... | ..... |
| Beans | ..... | ..... |
| Sugar | ..... | ..... |
| Milk | ..... | ..... |
| Other | ..... | ..... |

19.2 How do you carry them home?

| | Product | Cost(shs) |
|---|---|---|
| 19.2.1 | On foot..... | ..... |
| 19.2.2 | Ox-cart..... | ..... |
| 19.2.3 | Matatu ..... | ..... |
| 19.2.4 | Bicycle ..... | ..... |
| 19.2.5 | Other(specify)..... | ..... |

20. How many times has any government officer visited your farm since Xmas?

| | | Number | Reason of visit |
|---|---|---|---|
| 20.1 | Veterinarian | ..... | ..... |
| 20.2 | Ag. Assistant(AA) | ..... | ..... |
| 20.3 | Junior Agric. Asst. | ..... | ..... |
| 20.4 | Other(specify) | ..... | ..... |

21. Have you ever attended an Agricultural course?

21.1 Where?.....

21.2 When?.....

21.3 What was it about?.....

21.4 What did you particularly learn from this Course?

21.5 If you have never attended any, what is the reason for this?.....

22. Do you have any loan?.....

22.1 Where did you get it from?.....

22.2 How are you repaying it?.....

22.3 Do you have any problems repaying them? .....

22.4 What problems did you get when you were looking for this loan?..... .....

22.5 How much is the loan?.....

22.6 If you do not have any credit facility:-

22.6.1 Are you aware of any place you can get it? Which?.....

22.6.2 If yes, have you tried getting the loan?.....

22.6.3 If yes, what failed you?..... .....

23. Have you had any paid workers this year?.....

23.1 How many? casual..... permanent.....

23.2 What is(was) their main job?..... .....

23.3 How much did you pay them?..... .....

24. How many children of over 18 years do you have?

24.1 Are any of these away from home?.....

24.2 How many?.....

24.3 How many children of below 18 years of age do you have?.....

25. How much money have you spent on school fees this year?.....

25.1 Primary School(s).....

25.2 Secondary School(s).....

26. Do you, or any member of your family work anywhere for some paid income?.....

26.1 Who is (are) there?.....

26.2 What job?.....

26.3. What is the monthly income you get from them?

.....

APPENDIX VII

THE JPM STUDY POPULATION, 1975

| SUB-LOCATION | VILLAGE | NO OF HHs |
|---|---|---|
| 1. Kingoti | 1. Ithingu | 126 |
| | 2. Muthwani | 170 |
| | 3. Kingoti | 177 |
| | 4. Matheini | 166 |
| | 5. Kakulutuini | 132 |
| | 6. Kithaathai | 148 |
| | 7. Nduu | 310 |
| | 8. Kinyui mkt. | 122 |
| | TOTAL HHs | 1351 |
| 2. Katheka | 1. Katheka mkt | 38 |
| | 2. Misakwani | 157 |
| | 3. Miscleni | 57 |
| | 4. Kavumbu | 84 |
| | TOTAL HHs | 336 |
| 3. Kambusu | 1. Katwanyaa | 200 |
| | 2. Uamani | 156 |
| | 3. Itheuni | 193 |
| | 4. Mwatati | 161 |
| | 5. Kanzalu | 162 |
| | TOTAL HHs | 872 |
| 4. Ulaani | 1. Ngomano | 81 |
| | 2. Katitu | 154 |
| | 3. Kambuso | 67 |
| | 4. Kaani | 141 |
| | 5. Utithini | 172 |
| | 6. Mutula | 108 |
| | TOTAL HHs | 784 |
| 5. Katitu | 1. Manzuva | 81 |
| | 2. Mango | 103 |
| | 3. Kalama | 108 |
| | 4. Muthwani | 180 |
| | 5. Masawa | 117 |
| | 6. Kiimani | 117 |
| | TOTAL HHs | 706 |
| | TOTAL STUDY HHs | 4049. |

Source: Records of the Medical Research Centre Nairobi.

## APPENDIX VIII

## AGRICULTURAL SECTION AREA, POPULATION AND POPULATION DENSITY OF THE NORTHERN DIVISION OF MACHAKOS DISTRICT

| LOCATION | SECTION | PERSONS (1969) | AREA (ha) | PERSONS ($per\ km^2$) |
|---|---|---|---|---|
| Kangundo | | 39,998 | 12,899 | 271 |
| | Kangundo | 4,223 | 1,460 | 374 |
| | Matetani | 3,722 | 2,225 | 294 |
| | Isinga | 3,635 | 1,821 | 234 |
| | Kitwii | 4,230 | 2,607 | 302 |
| | Kyevakuli | 3,956 | 1,416 | 214 |
| | Mbusyani | 3,605 | 1,821 | 231 |
| | Muisuni | 5,192 | 1,821 | 319 |
| | Mbilini | 6,396 | 1,295 | 487 |
| | Kikambani | 5,039 | 1,298 | 164 |
| Mbiuni | | 16,387 | 14,990 | 107 |
| | Mbiuni | 2,173 | 1,021 | 123 |
| | Katitu | 2,691 | 1,416 | 151 |
| | Ulaani | 3,308 | 2,630 | 112 |
| | Kabaa | 3,939 | 3,965 | 95 |
| | Makiliba | 1,838 | 2,023 | 117 |
| | Mumbuni | 2,438 | 3,036 | 79 |
| Matungulu | | 40,524 | 17,804 | 230 |
| | Kyaume | 5,161 | 1,821 | 506 |
| | Sengani | 6,914 | 2,630 | 315 |
| | Kambusu | 4,544 | 2,226 | 536 |
| | Kingoti | 5,998 | 1,416 | 355 |
| | Katheka | 1,803 | 1,012 | 118 |
| | Katine | 3,900 | 2,427 | 208 |
| | Kawathei | 6,533 | 2,427 | 289 |
| | Nguluni | 5,667 | 2,845 | 92 |
| Mwala | | 17,537 | 18,209 | 99 |
| | Kibau | 3,010 | 2,428 | 133 |
| | Kyawango | 1,771 | 3,237 | 49 |
| | Maveli | 2,125 | 3,237 | 75 |
| | Mathuithini | 2,530 | 2,428 | 126 |
| | Mango | 4,740 | 3,237 | 140 |
| | Myanyani | 3,357 | 3,642 | 94 |

Source: Compiled from the 1969 population census and records from the divional agricultural office at Kangundo; Machakos district.

APPENDIX IX

SELLING PRICE OF SOME ANIMAL FEEDS IN THE DIVISION, IN SEPTEMBER/DECEMBER 1975

| FEED | Wt. OF BAG | PRICE | |
|---|---|---|---|
| | KGS | SHS | CTS |
| POULTRY: | | | |
| Broiler finisher | 50 | 74 | 80 |
| Chick start | 25 | 35 | 50 |
| Chick start | 50 | 69 | 35 |
| Layers mash | 25 | 27 | 75 |
| Layers mash | 50 | 53 | 35 |
| Layers mash | 70 | 95 | 25 |
| Growers mash | 25 | 27 | 75 |
| Growers mash | 50 | 53 | 35 |
| Growers mash | 70 | 64 | 35 |
| CATTLE: | | | |
| Calf pellets | 25 | 28 | 00 |
| Calf pellets | 50 | 54 | 00 |
| Dairy cubes | 70 | 50 | 25 |
| Dairy meal | 25 | 22 | 00 |
| Dairy meal | 50 | 42 | 00 |
| Dairy pellets | 25 | 22 | 00 |
| Dairy pellets | 50 | 42 | 00 |
| PIGS: | | | |
| Bacon plus | 25 | 27 | 75 |
| Bacon plus | 50 | 53 | 35 |
| Pig start | 25 | 33 | 50 |
| Pig start | 50 | 65 | 00 |
| Sow plus | 25 | 28 | 50 |
| Sow plus | 50 | 55 | 00 |

Source: Own investigation.

APPENDIX X

PRODUCTS DELIVERED INTO THE DIVISION BY VARIOUS MARKETING ORGANIZATIONS/COMPANIES OVER THE LAST TWO YEARS. (The prices are for Sept./Dec.1975)

The lists are by no means exhaustive

1 MACKENZIE (K) Ltd.

| P R O D U C T | SALES UNIT | 1974 | 1975 | SELLING PRICE (SH) |
|---|---|---|---|---|
| Agrodust (BHC) | 400 g jars | 264 | - | • |
| Amprol (coccidiosis) | 30 g pkts | 140 | - | • |
| Agrocide | 400 g jars | 40 | - | • |
| Basfapon | ½ l jars | 24 | - | 17/75 |
| Benlate | 1 kg pkt | - | 250 | 130 |
| Clordox | 200 cc bottles | 36 | 96 | 6/25 |
| Copper | 25 kg bags | 100 | 400 | 420 |
| Coopertox | 200 l drums | 3 | - | 3043 |
| " | 20 l drums | 15 | 65 | 313 |
| " | 5 l tins | 60 | 40 | 82 |
| " | 1 l tins | 300 | 228 | 25/50 |
| " | 250 ml tins | 120 | 312 | • |
| Dithane M45 | ½ kg bags | 36 | - | 18/50 |
| " | 50 g pkts | 144 | - | 3/60 |
| D.D.T. 5% | 2 kg pkts | - | 120 | 5/00 |
| " 5% | 400 g jars | 120 | - | 2/70 |
| " 25% | 500 ml tins | 204 | 18 | 8/20 |
| Dieldrex 18% | 20 l drums | - | 23 | • |
| Dieldrin | 20 l drums | - | 10 | 521 |
| Difolatan | 25 kg bags | - | 50 | • |
| Dalapon | 25 kg bags | - | 9 | 590 |
| Duter extra | 25 kg drums | - | 3 | 2,475 |
| Delnav D.F.F. | 100 ml bottles | 20 | - | 21/40 |
| Epison salt | 500 g bags | - | 24 | 3/35 |
| Fluke & Worm drench | 25 g pkts | 222 | 660 | • |
| Gramoxone | 1 l jerricans | 307 | 60 | 61/60 |
| Gramoxone | 5 l jerricans | 180 | 180 | • |

(Mackenzie cont'd)

| | | | | |
|---|---|---|---|---|
| Diazinon | 25 ml bottles | 144 | - | 5 |
| Foliar feed | 400 g bottles | - | 72 | 10 |
| Fendrothine | 20 l drums | - | 16 | 728 |
| Fernasand | 10 g pkts | 1200 | - | 1 |
| Gamatox | 400 g jars | 64 | - | 4/70 |
| Greenmans powder | 2 kg pkts | - | 90 | 7/25 |
| Lindasan | 10 g pkts | - | 598 | 1 |
| Healing oil | 85 ml tins | 48 | - | 1/85 |
| Lindane 1% | 400 g jars | 120 | - | 3/40 |
| Milking salve | 500 g tins | 144 | 108 | • |
| Malamite | 400 g jars | 200 | - | • |
| Macklick mm. bricks | 2 kg | [illegible] | 240 | 4/75 |
| " | 10 kg | 10 | 20 | 27/00 |
| " | 2½ kg | - | 100 | • |
| Malathione 1% | 400 g jars | 264 | - | 3 |
| " 50% | 200 cc bottles | 36 | - | 6/25 |
| Murtano | 10 g pkts | 1200 | - | 1 |
| Nilverm | boluses | 80 | - | 4 |
| Nilzan | boluses | 40 | 100 | 5 |
| Orthodifotan | 25 kg bags | - | 50 | 943 |
| Poultry louse powder | 400 g jars | 20 | 40 | 5/40 |
| Py-grease | 250 ml tins | 24 | 24 | 5/20 |
| " | 1 l tins | 6 | 24 | • |
| Pruning saws | 14 inch | 120 | 170 | 6/50 |
| " | 12 inch | 84 | 240 | 6/00 |
| Pumps (= sprayers) | | 9 | - | 132 |
| Red triangle | 400 g jars | 25 | - | 3/40 |
| Secateurs | • | 574 | 396 | • |
| Sevin 85S | 45 g pkts | 960 | 1424 | 2/45 |
| Supadiel | 500 ml bottles | 240 | 120 | 16 |
| Supatox | 20 l drums | - | 8 | • |
| Sumithion | 20 l drums | 100 | 30 | 521 |
| Toxandrin | 400 g jars | 96 | - | 3/30 |

2 MURPHY CHEMICALS Ltd.

| P R O D U C T | SALES UNIT | 1974 | 1975 | SELLING PRICE (SH) |
|---|---|---|---|---|
| Dieldrin | 500 g tins | - | 24 | 16 |
| Dieldrin | 20 l drums | 30 | - | 521 |
| Diazinon | 20 l drums | 30 | 60 | 1354/50 |
| Duter extra | 25 l drums | 40 | 40 | 2865 |
| D.D.T. 5% | 400 g jars | 227 | 160 | 2/80 |
| Flea, bug & louse powder | 200 g jars | 48 | - | 0/90 |
| Foliar feed | 25 kg bags | - | 30 | 290 |
| Fentrothion | 20 l drums | - | 10 | - |
| Greenmans powder | 2 kg pkts | 20 | - | 7/25 |
| Greenmans powder | 5 kg pkts | 28 | 8 | 14/80 |
| Malamite | 400 g jars | 80 | - | - |
| Murosol-aerosol | 150 g jars | 60 | 48 | 7/25 |
| Murtano | 10 g pkts | 600 | 3000 | 1 |
| Tropical Murtegg | 20 l drums | 80 | 41 | 160 |

3 SHELL CHEMICALS (EA) Ltd.

| P R O D U C T | SALES UNIT | 1974 | 1975 | SELLING PRICE (SH |
|---|---|---|---|---|
| Aldrex | 1 l tins | | | |
| Copper | 50 kg bags | | | |
| Dieldrex | 20 l drums | | | |
| Shelltox | ½ l tins | | | |
| Sprayers | no | | | |
| Supatox | 20 l drums | | | |
| " | 5 l tins | | | |
| " | 1 l tins | | | |
| " | 250 ml tins | | | |

4 FISONS (EA) Ltd.

| P R O D U C T | SALES UNIT | 1974 | 1975 | SELLING PRICE (SH) |
|---|---|---|---|---|
| Agrodust (BHC) | 400 g jars | 600 | 250 | 3 |
| Basfapon | 500 g tins | 12 | 36 | 17/75 |
| Basfapon | 25 kg bags | 20 | 36 | • |
| Clordox | 200 ml bottles | 60 | 36 | 6/25 |
| Diazinon | 20 l drums | 120 | 80 | • |
| D.D.T. 25% | 500 ml tins | 180 | 106 | 8/20 |
| Lindasan | 10 g pkts | 250 | 1200 | 1 |
| D.D.T. 5% | 400 g jars | 180 | 106 | 2/80 |
| Malathion 50% | 400 g jars | 120 | 10 | • |
| Malathion 1% | 200 g bottles | 12 | 5 | 13 |
| Murtano | 100 g pkts | 600 | - | 1 |
| Rogor-E | 200 g jars | - | 48 | |
| Sevin 85S | 45 g pkts | 640 | 1408 | 2/45 |
| Supadiel | 200 ml bottles | - | 12 | 9 |
| " | 500 ml tins | 360 | 266 | 16 |
| Toxadrin | 400 g jars | - | 48 | 3 |
| Diazinon | 200 ml jars | - | 12 | • |

5 KLEENWAY CHEMICAL Ltd.

| P R O D U C T | SALES UNIT | 1974 | 1975 | SELLING PRICE (SH) |
|---|---|---|---|---|
| FERTILIZERS: | | | | |
| 25-5-5+5 | 50 kg bags | - | 5 Tons | |
| 25-5-5+5 | 25 kg bags | - | 2.5 Tons | |
| DISYSTON (systemic) | 20 kg drums | - | 513 drums | |
| SPRAYERS | No | - | 50 units | |

6 MERCHANTS MANUFACTURERS LTD., 1975

The list include only those products found in the premise on the day of interview. We had no access to any records.

| PRODUCTS | SALES UNIT | NUMBER | SELLING PRICE (SHS) |
|---|---|---|---|
| FERTILIZERS: | | | |
| D.S.P. (44%) | 10 kg bags | 2 | • |
| D.S.P. (44%) | 25 kg bags | 20 | 75 |
| 20-20-0 | 10 kg bags | 20 | 23 |
| CATTLE FEEDS: | | | |
| Dairy cubes | 20 kg bags | 9 | 21 |
| Dairy cubes | 70 kg bags | 16 | 55 |
| Dairy meal | 20 kg bags | 8 | 20 |
| Wheat bran | 45 kg bags | 4 | 26 |
| POULTRY FEEDS: | | | |
| Chick mash | 20 kg bags | 10 | 27 |
| Growers mash | 20 kg bags | 1 | 19 |
| Growers mash | 70 kg bags | 18 | 63 |
| Layers C. meal | 20 kg bags | 18 | 22 |
| MINERAL SALTS: | | | |
| K.N.Z. | 10 kg bricks | 38 | 22/50 |
| CHEMICALS: | | | |
| Fenithothion | 20 1 drums | 8 | 728 |

NOTE:

This is the only supplier of small unit fertilizer packages in the division.

7 PFIZER LABORATORIES LTD.

The list include only those products found in the premise on the day of interview. We had no access to any records. The list is by no means exhaustive.

| P R O D U C T S | SALES UNIT | NUMBER | SELLING PRICE (SHS) |
|---|---|---|---|
| FERTILIZER: | | | |
| A.S.N. (26% N) | 50 kg bags | 61 | 105/50 |
| STORAGE CHEMICALS: | | | |
| Red triangle | 400 g jars | 24 | 3 |
| TICK CONTROL CHEMICALS: | | | |
| Tick grease | . tins | 24 | 165 |
| Dip wash | . tins | 16 | 411 |
| Pry-grease | . tins | 13 | 5/50 |
| Pry-grease | . tins | 4 | 12/50 |
| HERBICIDES: | | | |
| Gramoxone | 1 l jerricans | 5 | 51/60 |
| MINERAL SUPPLIMENTS: | | | |
| Stock licks | . bricks | 20 | 13/90 |
| Maclick | . " | 10 | 25/15 |
| Red lick | . " | 13 | 17/90 |
| Dairy lick | . " | 6 | 25 |
| K.N.Z. | . " | 58 | 22/75 |
| POULTRY FEED: | | | |
| Chick & Duck mash | . bags | 5 | 31/70 |
| Layers C. meal | . bags | 11 | 23/35 |
| SEEDS: | | | |
| M 142 beans | . beans | 8 | 45 |
| Katumani maize | . bags | 100 | 21 |

N/B. There were other products in the back store but the trader did not allow us to see or count them. He argued the business was for a company of three - and he was alone!

APPENDIX XI

ESTIMATED LIVESTOCK NUMBERS IN THE DIVISION IN 1975

| ANIMAL | | NUMBER |
|---|---|---|
| Cattle: | Grade cows | 679 |
| | Local zebus | 56,897 |
| Goats: | | 33,583 |
| Sheep: | | 9,007 |
| Pigs: | | 44 |
| Poultry: | Exotic layers | 3,832 |
| | Locals | 102,555 |
| | Turkeys | 17 |
| | Ducks | 138 |
| | Geese | 11 |
| Bees (Hives) | | 1,892 |
| Rabbits | | 987 |

Source: Compiled from the Animal Husbandry Annual Report for the Northern division of Machakos District.

The numbers of poultry and bee-hives were falling rapidly during the interview period. Poultry, because of a 'strange' disease and bee-hives because of migrations to the newly settled areas of Yatta and Kyanzavi.

APPENDIX XII: LOAN DEVELOPMENTS (SEPTEMBER, '74 TO SEPTEMBER, '75)

| SOCIETY | LOANEES (START) | BALANCE (START) Shs | WITHDRAWALS Shs | REPAYMENTS Shs | BALANCE (END) Shs | LOANEES (END) |
|---|---|---|---|---|---|---|
| Matungulu | 2,990 | 1,156,639/80 | 425,772/00 | 4,347,640/80 | 1,207,911/45 | 1,114 |
| Mbilini | 1,292 | 551,118/80 | 125,780/00 | 309,123/60 | 405,219/60 | 1,033 |
| Muisuni | 682 | 324,051/05 | 57,800/00 | 1,331/60 | 284,001/00 | 516 |
| Kilalani | 615 | 316,818/90 | 60,059/00 | 122,196/95 | 291,906/80 | 322 |
| Kakuyuni | 546 | 142,332/75 | 32,502/00 | 71,601/55 | 117,717/50 | 229 |
| Kitwii | 486 | 188,895/65 | 40,150/00 | 82,911/70 | 159,733/35 | 218 |
| TOTAL | 6,611 | 2,679,858/95 | 742,063/00 | 4,934,856/20 | 2,466,489/70 | 4,432 |

Source: Compiled from loan and credit records of the Ministry of Co-operative Development office, at Kangundo township.


- 192 -

APPENDIX XIII: LOAN AND DEBT DEDUCTIONS (SEPT. '74 TO SEPT. '75) (shs)

| SOCIETY | MEMBERS DEBTS | | REPAYMENTS | | |
|---|---|---|---|---|---|
| | BEFORE REPAY-MENT | AFTER (OVERDUE) | REQUIRED | ACTUAL | DIFFERENCE |
| Matungulu | 17,853/10 | 8,085/35 | 20.000/00 | 7,931/10 | 12,068/90 |
| Mbilini | 245,281/20 | 195,925/80 | 5,000/00 | -0 | 5,000/00 |
| Muisuni | 15,007/25 | 8,052/50 | 5,000/00 | - | 5,000/00 |
| Kilalani | 304,417.75 | 280,100/70 | 28,599/00 | 0 | 28,599/00 |
| Kakuyuni | - | - | 60,500/00 | 19,137/00 | 41,363/00 |
| Kitwii | 113,553/65 | 79,683/40 | 13,000/00 | 4,199/55 | 8,800/45 |
| TOTAL | 696,612/95 | 571/847/75 | 132,099/00 | 31,267/65 | 100,831/35 |

Source: Compiled from loan and credit records of the Ministry of Co-operative Development, office at Kangundo.

- 193 -

APPENDIX XIV

TECHNICAL STAFF: MINISTRY OF AGRICULTURE, MACHAKOS DISTRICT, 1975

| | T.As | J.A.As |
|---|---|---|
| Crop division | 50 | 131 |
| Cotton staff | 1 | 3 |
| Credit division | 7 | 3 |
| Coffee staff | 1 | 6 |
| Range division | 3 | 3 |
| Training division | 3 | 19 |
| Home economics | 2 | 7 |
| | 67 | 172 |

Where, T.A = Technical assistant
J.A.A = Juniour agricultural assistant

| Other staff: | number |
|---|---|
| Animal health assistants (=A.H.As) | 19 |
| Junior A.H.As | 18 |
| Clerical officers (C.Os) | 3 |
| Higher C.Os | 1 |
| Junior C.Os | 1 |
| Drivers | 2 |
| Artisans | 2 |
| Typists | 1 |

Source: Republic of Kenya, Ministry of Agriculture annual report 1975, page 5; Machakos district.

- 195 -

## APPENDIX XV

### MONTHLY RAINFALLS IN THE J.P.M. STUDY AREA, 1975

(mm)

| MONTH | KING'OTI | | KATWANYAA | | ITHEUNI | | KATHEKA | | KATHAMA | |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 0 | (0) | 0 | 0(0) | 0 | (0) | 0 | (0) | 0 | (0) |
| February | 7.5 | (1) | 12 | (2) | 6 | (2) | 3 | (1) | 10.5 | (2) |
| March | 285.3 | (10) | 170 | (10) | 157 | (5) | 149 | (4) | 90. | (6) |
| April | 180.3 | (9) | 183 | (9) | 207 | (9) | 230 | (10) | 230. | (11) |
| May | 28.5 | (3) | 30 | (6) | 46 | (4) | 40 | (3) | 37 | (2) |
| June | 0 | (0) | 0 | (0) | 0 | (0) | 0 | (0) | 0 | (0) |
| July | 55 | (3) | 55 | (2) | 34 | (4) | 65 | (3) | 47 | (3) |
| August | 0 | (0) | 0 | (0) | 0 | (0) | 0 | (0) | 0 | (0) |
| Septe. | 52.5 | (2) | 55 | (6) | 107 | (6) | 75 | (5) | 100 | (5) |
| October | 130 | (7) | 94 | (6) | 82 | (5) | 94 | (5) | 73 | (4) |
| November | 223.6 | (11) | 149 | (11) | 228 | (12) | 220 | (8) | 189 | (12) |
| December | 97.2 | (9) | 90 | (8) | 102 | (8) | 134 | (8) | 84 | (6) |
| TOTAL | 1059.9 | (55) | 838 | (60) | 969 | (55) | 1010 | (47) | 860.5 | (51) |

Source: J.P.M. weather station records.

() Wet days.