DIFFERENCES IN RESOURCE UTILIZATION IN RURAL
KENYA: A CASE STUDY OF A HETEROGENEOUS
SETTLEMENT SCHEME, WITH PARTICULAR REFERENCE
TO DAIRY FARMING INNOVATION IN THE NZOIA
SCHEME, KAKAMEGA, KENYA.

BY

KISAKA WAFULA

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DECLARATION

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

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KISAKA WAFULA

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

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DR. W. OMOKA
University Supervisor

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ABSTRACT

This study examines the individual socio-economic and other governmental extension factors which make for differences in the levels of sustaining innovation in the Nzoia Scheme. This was a case study of a rural planned settlement scheme. In analysing the nature of resource utilization by the farmers here, we laid much emphasis on the dairy farming enterprise innovation. This was because it was considered to be a more relatively steady income generating activity for an average farmer, compared to arable farming activities. In this case we found that maize production in arable farming was the only other most important activity all the farmers in the scheme engaged in full-time each year.

The available data shows that the socio-economic factors, more so income disparities, were quite critical in explaining the success or failure in dairy farming development, and agriculture in general, in the scheme. The dairy farming innovation had been introduced to all the farmers on joining the scheme. However, problems have arisen in failure for most farmers to sustain and improve the general quality of grade dairy farming development on their farms.

On the other hand, we found also that such pertinent governmental services as the performance (and availability) of the extension services (veterinary and artificial insemination (A.I.), the availability or not of piped water supplies, inadequacy of dipping facilities, roads and other communication services had some influence on the production levels differentiation. In this case,

differential accessibility to, use, and availability of these
resources was also critical in the general farming, but more so
in the case of the dairy enterprise.

In the same light, it was realized that a greater majority of the
farmers studied in the scheme were less commercially oriented in
their farming production. Despite having relatively large farms
(average 30 acres); such farmers were found to produce on peasant lines",
largely for their subsistence and the remainder for sale. In this
connection it was realised that some farmers never majored in a
particular agricultural enterprise strictly on the basis of costs
and benefits derived from such. Rather, there was evidence such
farmers farmed only routinely - come the planting season, and in
some instances, because other farmers also engaged in the same
enterprise. This was quite evident in the case of maize farming in
the area of arable farming.

Production orientations on such lines shows that very little
profits can be obtained, more so as we found that well over 80% of the
farmers studied did not keep farm records. In short, therefore, our
conclusions were that most farmers production capacities were
inadequate to generate a sufficient income to meet the household
and other extra obligations faced by the individual farmers in
question. This may explain why we also found that there was an
inherent problem in the repayment of the initial farm development
loan advanced to the farmers when they joined the scheme. In this
case, it was found that well over 67% of the farmers studied had
still outstanding loan instalments to clear, after 20 years of settlement.

The study also set out to examine to what extent the farmers'
performance in the scheme met what had been the very objectives
of setting up such planned rural settlements. These revolved
around the provision of land to the supposedly landless Kenyan
citizens; the need to increase agricultural production, and thus
provision of a viable income source to the settlers; and to stem
the afore-thought rural-urban migrations for employment. The
findings reveal that though most farmers were producing
atleast beyond their subsistence levels, in general production
capacities were below average in maize and dairy farming enterprises.
Some farmers performance showed alot of underutilization of land
resources as they tilled only small patches.

In dairying, there were very few farmers who undertook this
enterprise on a commercial basis, and hence the very declining nature
of this enterprise in the scheme.

Such production levels for most farmers will also mean low
levels of income in return. The consequence then will be that such
farmers are unable to provide substantial employment opportunities
on their farms, implicity self-defeating in alleviating rural
unemployment. Additionally, such low levels of income to the
farmers only means that they can not offer attracting salary packages
to the prospective job-seekers in such areas.

In a nutshell, therefore, our observation from this study reveal
that the major aim achieved in the creation of the Nzoia scheme could
best be described as providing land to the landless. The other aims
mind during the plan for such schemes appears to be far away from bei

achieved. There is therefore greater need for the farmers to drastically improve and increase their production capacities if the other aims have to be achieved, somehow. This will however, need greater sacrifices in an attempt by the government to provide sufficient extension services, (more so in dairy farming development and improvement on communications and marketing facilities in the region generally.

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INTRODUCTION

1.1: The Research Problem:

This study attempts to explore the various factors which might help explain some assumed differences in resource utilization among the farmers in the Nzoia Scheme. The point of contention is whether among the many agricultural activities alternatives, one can choose the most beneficial as the major activity on the farm. In a way, this will definitely centre around a farmer's good judgement of entrepreneural work, and thus maybe be able to take a risk in so doing to make out the best alternative in the various farming activities and opportunities so available at his discretion. Such activities may range from arable/cash crop farming, Dairy farming, horticulture, poultry farming, and piggery, among others.

In so analysing, we are thus faced with the problem of whether farmers are consciously aware that the major activity on the farm is also necessarily the best paying, in terms of returns, since it is assumed that their production capacities are necessarily beyond the subsistence levels. In this light therefore the question is what criteria does a farmer use in choosing whichever activity is considered as the major one on the farm? If otherwise, how far are the farmers ignorant about what should be the major activity on the farm, and what is the magnitude of its spread in the scheme?

For the purposes of this study, we will mainly focus our attention on dairy farming development in the scheme. For one, this is an activity that can most likely generate income all year round, other factors being constant, atleast compared to most arable enterprises on the farm. Hence for a farmer more concerned with the generation of a more steady income, dairy farming would most likely be a consideration as the major activity. Secondly, the Nzoia Scheme also geographically falls within the former "White Highlands" and therefore quite potential an area agriculturally. Thirdly, albeit later, the Nzoia Scheme had been one of the offshoots of the 1953 Swynnerton plan which had laid special attention to "high potential" lands to produce a prosperous African agricultural population with the then targetted earnings from individual holdings set at no less than £100 (Odingo 1967:142). It had also been the aim of such settlements to help 'assuage unemployment which had resulted from the departure of some European farmers at the approach of independence and the period immediately after," in Kenya.

Odingo (1967: 147 - 148) had also noted the overall costly nature of setting up land settlements in the former white highlands. This was due to having to buy out large scale European farms by the Kenya government, and thereafter pass the loan repayment responsibilities to the farmers. For the Low Density Schemes of plots of thirty seven acres on average, and in which the Nzoia scheme falls, the average cost of settling a family on the scheme was no less than £814. Therefore, as the author concluded, this method of rural development by settling

farmers in the Kenya Highlands was extremely costly. The question
we are confronted with is whether the individual farmers really
understand the cost that was involved, and whether they can make
sure their production capacities are aimed at investment in an
activity most paying in terms of receipts? Did the individual
farmers really understand the government's objectives of setting
up such schemes? In this case, among others, there had been need
to provide land to the landless Kenyans, an undertaking that should
have increased the total agricultural production, provide sources
of income for the individual farmers and employment opportunities
for other jobless Kenyans as farm workers. To what extent have
therefore such objectives been achieved? In the same light, we
have to remember that it was the individual farmers on whom the
ultimate burden of repaying the loan had to fall, largely from the
receipts from the agricultural produce. That aside, this income
from farm produce should also be able to sufficiently nourish the
financial needs to the farmers in question. How far can this be upheld?

1.2: The Objectives:

These will centre around the examination of the various
socio-economic factors which make for differences among individual
farmers in the nature and success in dairy farming in the Nzoia
Scheme. We therefore seek to isolate these and show how significant
they are to each individual farm land. Thus, what individual factors,
as compared to other external or collective ones, account for the

nature of the differences in dairy farming development? This is
with the assumption that the farmers in the Nzoia Scheme were given
more or less similar opportunities to make a start at farming
generally. More specifically, therefore, the following are the
outlined objectives:

(a) To show why there are perceived differences in the nature
of dairy farming development at the individual farm levels;

(b) To examine whether the farmers in the scheme major in
a particular agricultural activity specifically on the
basis of the very corresponding income receipts from it,
as contrasted from other activities;

(c) To analyse how far the farmers production capacities can
be able to generate sufficient income to meet both
subsistence and other extra obligations faced by the
individual farmers;

(d) To examine whether the overall performance of the farmers
in the scheme meet what had been the stipulated aims of
setting-up such settlement schemes.

CHAPTER TWO

THEORY, LITERATURE REVIEW AND HYPOTHESES:

2.1: THEORY:

Kenya falls within the category of developing countries which have numerous problems hindering their endevours to development, both in the economic, social and political spheres. Like other nations in the developing world therefore, the scope for development lies in the rural resource utilization in the development of agriculture, a sector dominantly concomitant with the present developing countries. Further more the virtual absence of any known mineral resources in such nations glooms any faster attempts at development. It was thus partly due to the realisation of this latter consideration that, for our case, Kenya after independence chose to develop the agricultural sector, among other factors, in a bid to fight poverty, illiteracy and therefore ignorance. These were the ideas manifested in the Kenya Development Plan, 1966 - 1970 (Ndegwa and Norbye, 1967: 87-90). The then frame of reference was in line with the modernizing ideas, for instance the need to modernize traditional agriculture by providing readily available consumer goods, for people to send their children to school and get immediate hospital care.

The need, therefore, to exploit agricultural and related resources lay in the government's efforts to create motivating media or

would have been swayed to farming as a favourable enterprising
business; the effect of which should have halted possible population
movement to urban areas for job opportunities where the
factorisation system had just started to emerge. Such incentive
included land consolidation and registration, provision of credit
facilities; to establish a network of extension services, more so farm
training centres; better communication facilities and market centres
(Ndegwa and Norbye 1967: 92). The policy of resettlement or
creation of settlement schemes appeared to have been a definite
off-shoot of this very realisation; in which case the government
itself had become an agent of change - just among others that had
been applied during the historical period of post-independence
Kenya.

Such lines of development have never, however, been without
fault, a view exemplified amongst many rural developmentalists
(Lele, 1975: 19; Hunter, 1969: 3-43; Oloya, 1968: 1). Indeed
the problem of rural poverty has always persisted even to date, so
that it is no longer a localized issue, as seen in the statement
quoted from the then president of the World Bank, R.S. MacNamara
(Lele, 1975: forward), "How to raise productivity among the rural
poor in developing countries is one of the two or three most urgent
questions confronting the international community today." Such
concern would appear to derive from implicit disillusionment that
may result from high rates of failures in change agencies to make
any impact on development programmes in developing countries. Indeed

why, despite trials of a great variety of approaches by the donor
and national agencies, and despite a great deal of experience
having been generated from these efforts, should the problem of
rural poverty have remained (or even increased?) acute? (Lele, 1975:V

It is interesting to realise that the explanations propounded
by many western Europe scholars (Hyden, 1983 Hunter, 1969: 3 - 43
(Korten, 1972: 3 - 13) have always been mapped to the nature of
traditionalism and cultural rigidity supposedly conspicuous in
developing countries, as contrasted to the then situation in Europe.
As a consequence, there has therefore, mistakenly and hurriedly
arisen the tendency to prescribe remedial measures in the Economic
developmentalist model of western Europe, as the most viable process
(indeed linear, Rostow, W.W., 1960) by which the transformation
of the developing countries, shall occur. However, the present
historical happenings have proved such lines of thought not only
fallacious, but also inapplicable to developing countries. In
any case even "Rostow's Stage model" does not have a smooth flow
(Higgins 1959: 178).

It has been shown historically thus, that we can not replicate
the social, political and economic conditions under which Europe unde
went in its transformational epoch. Even to justify this further
is Hunter (1969: 3) in his analysis of agricultural development
being inseparable from non-economic elements in life of a society -

its history, beliefs, ambitions and ideals. The author further
states that though technology exists for borrowing, it is
unsuited to their needs (developing countries) - usually designed
for large-scale production, requiring capital and skills of
which they are short of, economical in labour of which population
problem in Africa means abundant surplus labour and ill-adapted
to their land tenure and social pattern. A study carried out in
Pakistan on peasants (who in Rostow's terms were pre-Newtonian in
Science) however indicated that in most cases failure of change
agencies programmes is due to their incompatibility and inconvenience
(Refugio : 1972). Here was thus introduced a new type of wheat
variety suited to local conditions and which never demanded extra
ordinary sacrifices on the part of the farmers as to appear quite
alien. What we note here is that it was thus within the realm
of the farmers convenience and without any doubt ended as one of
the best and successful agencies programmes which had revolutionized
wheat yields drastically, but within the prevailing cultural system.

2.1.1: The Modernization Model:

The concept of modernization is a relative one, and basically
western Europe oriented. There has hardly been a uniform and/or
standard definition universally adopted. This view is reflected
in the work of Weiner (ed) (1966:4) who holds that since there has
never been a precise and concrete definition of modernization,
some scholars have suggested that therefore the starting point of
any definition of modernization is not in the character of the society,

but in the character of individuals. The author went at length

to review the views of various scholars, for instance,

Black (a historican is quoted as seeing modern societies

as characterized by the growth of new knowledge and that

presumes the existence of men with an increasing capacity to

understand the secrets of nature and to apply this new knowledge

to human affairs ; Mclelland (a psychologist) is seen to underlie

self-reliance and an achievement oriented as the essential qualities

of a modern man; while on the other hand, Anderson and

Shils (Educationists) stressed the development of skills and a

spirit of creativity. As Weiner, (ed) (1966:4) had seen thus,

the general consensus among the above scholars revolves around

conception of new ways of thinking which make it possible for men

to create modern industry, modern society, and modern government.

    Mclelland, (1962) is also quoted as holding that the existence

of certain modern attitudes are a precondition to development,

for example that effective entrepreneurship presumes the existence

of a way of thinking that leads men to behave in a particular

energetic way. This is the psychologist "need achievement," and

that on the contrary, family particularism is an obstacle to modern

entrepreneural behaviour, as are fatalism, laziness, a preference

for leisure over work, consumption over thrift. Upto this extent,

we are compelt to content with the question, are the differences

among the dairy farmers in the Nzoia Scheme basically a function

of the above analytical framework? If this can be held true, what

parallels does this difference take in this case? Is this

difference at the individual level or a reflection of the nature
of society from which the individual originated?

It is indeed true, to some extent, that societies, through
historical time, differ in their conception of their social,
political and economic lives. At face value one is led to
dichotomise any two societies as modernizing and the other still
traditional. This is the contention which Weiner, (ed), (1966:6)
had in his analysis of how a society starts to modernize. He sees
Max Weber's ideas that certain traditional societies had within them
seeds of modernity - that the development of commerce, the emergence
of the political autonomous urban centres in the late medieval world,
and above all the Protestant Reformation, laid foundation for
modernization in the West. In this case the value system of
calvinism contained the "need achievement" that made modern
entrepreneurs possible. In part, however, Alexander Gerschenkron
(Weiner (ed) 1966:6) differs with this view, and holds that
calvinism (might have) facilitated development, but that many value
systems seem to exist in modernizing societies. To this, Weiner,
(ed) 1966) adds that Catholicism has apparently not impeded the
extra ordinary high rate of economic growth of many Latin American
countries through the 1950's; nor does any analysis of religious
beliefs throw any light on why Indians and Chinese have been so
much more productive outside their home societies than within.
Additionally, Stanislaw, (Weiner, (ed) 1966:10) sees less of values
impeding profitable economic activity, since people often described

as indolent in one environment may prove to be effective entrepreneurs in another. Richard Lambert (sociologist) has the same views (Weiner, (ed) 1966:10).

Upto this level therefore, there are distinct differences among social scientists as to how values and attitudes can be changed. One school believes, atleast, that attitudinal and value changes are prerequisites to creating a modern society, economy and the political system; while other social scientists have taken an alternative model that appropriate attitude, and more vitally, the appropriate behaviour will be forthcoming, once the opportunities and incentives are provided (Weiner, (ed) 1966:9). He holds further that in this latter category are many economists and political scientists, for example those who point to the existence of institutional impediments to productive activities in many developing or modern systems, such as land tenure system that deny peasants the gain from increasing productivity, taxes that slow the flow of goods from one portion of the country to another, and elaborate bureaucratic regulations that retard the rate of investment. Might these structural impediments be applying differentially to farmers in the Nzoia scheme to have a leaning on nature of resource use?

Hunter (1969: 30-31) theorizes three basic stages of modernization in the process of agricultural change and development. The initial stage is the traditional society - with traditional religion, social relations and agricultural methods being so

traditional and unchanging over a long period of time. The second stage comprises those societies which are already drawn into the modern economy too far, who may grow cash crops and use fertilizers, but are yet strongly held in the traditional land tenure, values and instincts of the past still hold. The third stage is the modern, with commercializing farmers who increasingly have accepted a modern outlook and are finding ways of avoiding traditional restraints which no longer have a binding force upon them. To some extent, we can favourably infer that most of the farmers in the Nzoia Scheme lie between the second and the third stages; but also with a likelihood of some still in the traditional society. This could be so because, in part, this model lacks a 'smooth flow' also, so that in most areas, if not all, there is bound to be alot of unevenness amongst different societies on the one hand, and individuals on the other. Can therefore, such individual differences in modernization levels in the Nzoia scheme explain why there could be perceived differences in the nature of resource utilization in relation to dairy farming capacities? And to what extent can such an explanation be upheld, amidst other intervening factors? For instance, Hunter, (1969:82) considers that the question of values has to be considered in the process of agricultural development, and that social and cultural ties in the stage of modernization of attitudes, religious convictions, education, health, position of women in society etc. will all determine or condition the types of approach to economic advance which can be used.

Nyangira, (1975), on his part, in analyzing the variations
in public policy outcomes in Kenya, concluded that this had a
relation to the levels of regional modernization differences. He
defined modernization as the process of creating modernity,
adaptation which is characterized by growth, differentiation,
integration, specialization and complexities in the structures of
the social system. That modernity could be measured on such indices
as the rate of exposure to urbanization, per capita income levels,
educational and political awareness. He had observed,
that high rates of modernity are positively correlated with high
levels of modernization. He sees "relative modernization" - the
variation in the levels of, and rates of modernization among
regional units, individuals and institutions - as setting the
very differences correspondingly in resource use. Nyangira's
conclusion was that there was a comparative advantage in resources
and their allocation, on the same basis. His framework of study
took case by case, from which he held that regions most modernized
(using indicators as seen above) have more access to allocation
of educational resources (those areas in most cases which historically
or geographically had to have earlier and more intensified
contact with the western world); will also have more agricultural
allocation as are highly receptive to change and thus commercialization
as compared to the more conservative peasant areas of the same
nations; that population pressure had historically been related
to the motivation to innovation and thus modernization, and that
therefore with the creation of settlement schemes, the transfer of
population and resettlement favoured most those areas originally

more modernized. For our case, this latter factor is quite
important, for the question we are to contend with is as to
whether the structural differences inherent in heterogeneous
settlement schemes is basically a function of such derivations
from different regions and with their modernization levels? If
such an analysis could be upheld, then no doubt the Nzoia scheme
then must have derived its population from both modernizing (or
modernized) and the more traditional ethnic groups; but how far
can we explain the present economic polarisation basically as
being due to the differences in modernization rates when the
farmers joined the scheme?

On the one hand, we could easily be tempted to conclude by
upholding the above, basically from the fact that, in the long run,
such differences have had to appear in the form of agricultural
commercialization variations, use of extension services, ability
to take credit, entrepreneurship capacities, in our case as it
relates to dairy farming here.

The foregoing discussion makes us attempt the specification
of the constraints of development to each particular environment,
an attempt to move from generalizations as many European scholars
have done in relation to developing countries, as we saw earlier.
We shall thus work on the presumption that there are obvious regional
differences both in ecology, climate, social, political and
environmental factors generally. This indeed then should preclude

reduction of development analysis on regional or areal levels.

In our case, we attempt to go further than this to the individual

level in trying to analyse factors which account for the differences

in the nature and pattern of the resource utilization in relation

to dairy farming in the Nzoia Scheme. Such a level has had little

emphasis in the area of agricultural development by agricultural

and even economic developmentalists. For instance, Hunter, (1969:

25) only mentioned the need to reduce the units of analysis from

whole nations to smaller levels, but quite an attempt to break

through with the usual wholesome stereotyped notions.

2:1:2: Growth Models and Rural Development:

Essang, (Nov. 1978:36) sees the prevailing lines of development

in most developing countries as tending towards emphasis on rural

development, development of agriculture and related activities,

the modernization of rural infrastructure, and the establishment

of small-scale rural industries. Such has aimed at increasing rural

incomes and employment, increase supply of farm output to match

the rising demand by the fast growing population and urban industries;

stem the tide of rural-urban migrations, and most vital, raise

rural welfare by providing equal income earning activities or

opportunities for rural inhabitants and improving the quality of

rural environment. Essang however contends that the type of rural

development strategies adopted by policy makers in countries concerned

will to some extent be influenced by the existing models of economic

growth to which policy makers and their advisors might have been
exposed. For our purposes, two of the models considered are
directly applicable, and are considered below.

(a) The High Pay-Off Input Model:

This model has been attributed to Schultz, T.W. (1964), one
that assigns a strategic role to new high yielding varieties and
educated labour. The aim was to explain why the traditional
agriculture is characterized by low incomes and low productivity
despite its competitive structure. The farmers in this sector
are seen as rational and positively responsive to price incentive;
are efficient resource allocators under the constraints imposed by
static technology and existing factor endowments. But despite
all these (as seen by Essang) they remain poor as have exhausted
all the profitable opportunity to invest in the factors at their
disposal. That the operation of diminishing returns in a situation
of static technology ensures that hard-work and thrift do not bring
high rates of return. That hence, and since farmers have already
allocated their resources efficiently, no useful purpose would be
served by farm management and extension programmes directed at a more
efficient resource allocation in the traditional agriculture.

Hence to be worthwhile, such programmes should include a
package of high-yielding and profitable new inputs on which farmers
can invest (grade dairy animals in our case). This was indeed a
realisation observed in a study on dairy grade cattle establishment

in Kakamega, over the local Zebu cattle (Chitere, 1976:39).
Essang also observed that given the positive price responses
exhibited by farmers, that Schultz, T.W. (1964) had also argued
that agricultural modernization strategy must emphasize a price
policy which lower input prices, and raises those of outputs in
an effort to obtain a favourable input - output price ratio. That
agricultural modernization can not further more proceed far unless
there is investment in research to produce and diseminate inputs
embodying new technology and in the education of rural people on
whom rests the task of allocating the resources of development.
That Schultz contention was that such investments are associated
with very high rates of return compared to investments in the
alternative projects. In this case, Essang notes that Schultz
used this model to justify why there are differences in agricultural
incomes and productivity among countries, thus a reflection of
differences in the scope and quality of investments in research,
technology and education among the countries concerned.

This model is seen by Essang to have alot of relevance for
rural development in less developed countries. First it provides
a framework for a positive price policy in the context of
agricultural development; secondly, provides a justification for
government investment in agricultural research and training of
agricultural scientists. That it shows that investment in research
and education have higher social returns than comparable investments
in alternative projects and thus lending strong support to current

efforts to step up and intensify investment in agricultural education, extension and research; thirdly, it provides part of the explanation for the observed failure of farm management and extension programmes to increase productivity in agriculture. That until recently, extension and farm management experts busied themselves with resource allocation problems and ignored the critical question of price incentives, new technology and the opportunity cost of following extension services advice; and fourthly, the model provides strong support for current effort to boost export and food crop production through subsidization of the purchase of pesticides, fungicides, fertilizer and higher yielding varieties.

(b) The Diffussion models of Rural Development:

Essang holds that these models make an attempt to explain the existence of substantial productivity differences among farmers in the same economic and geographical regions. Accordingly therefore, such differences arise due to differences in the farmer's adoption of new varieties of seeds, mechanical and chemical inputs. In our case we are to content with how far the farmers in the Nzoia scheme could retain or sustain the new ideas they were introduced to (dairy farming and its management). That the path of agricultural and rural development lies in narrowing the existing productivity differences through the diffusion of technological innovations; and hence the authors of these models are said to concentrate

on the analysis of the various techniques for diffusing innovation
to farmers. In this case the focus is mainly on the techniques
of communication (by the extension service to the farmers). In an
attempt to find the most appropriate method for such diffusion of
innovation, policy makers and extension administrators resort to a
number of devices, such as experimental stations and demonstration
farms which aim to help in the spread of new techniques through
demonstration effects. This was also an observation made by Chitere
(1976:63) quoting Rogers and Shoemaker, (1971) on the essentials
for the diffusion of innovation.

Essang also holds that there has usually been tendency in some
countries for emphasis to be placed on 'progressive' farmers and
local leaders whose production techniques and farm organization are
held up as examples to be followed by the farmers in the immediate
locality. How far this technique can be successful is however
questionable, especially for our case in the Nzoia scheme as relates
to dairy farming development.

2.2: Literature on Dairy Farming:

Many of the works around dairy farming in Africa (and Kenya
in our particular concern) have in most cases been only
generalisations of the basic ideals to be followed by the farmers.
Professor Musangi (1971) deals mainly with problems of dairy farming
management procedures, with least emphasis on the human and
individual factors in this. In the same trap are Allson and Phipps,

mentioning the need to establish the quantitative returns from
dairy farming and to determine whether there are any expenditures
made in the same. In our case, this will definitely also form
the basis of our analysis at the individual farm level in the
study of the Nzoia dairy farming.

Crotty (1980), apart from analyzing the various management
procedures, dwells mainly on the need to increase profit margins
through commercialization and sale of dairy products to the market.
Indeed, even dairy farming commercialization in Kenya would be
uneconomical on small holdings combining such with arable farming.
F.A.O. (April, 1973) was more concerned with the overall low
livestock production, under - and improper utilization of resources
of pasture, low herd productivity generally and inadequate
infrustructure, and which have to be improved if dairy development
has to be feasible. This is indeed true when consideration has to
be made particularly in the area of development of access roads
to effect easier accessibility to collecting centres and marketing
points for dairy products. It is worth noting that concern had
also been extended to the idea of overhauling the traditional sector
and the creation of the modern sector. For the Nzoia scheme,
problems of the traditional sector are likely to be exemplified in
the individual farmer's introduction of inferior Zebu cattle in the
schemes whose management requirements hamper on productive dairy
farming, leading to overall declining yields on the farm. F.A.O.
(1973) also had made an effort to consider the creation of more

feeder roads in the interior areas, as experience has shown that
large supply of milk are left at home due to lack of bigger
carriage facilities (in most times this is done on bicycles to
collecting centres more than five kilometres away).

Nylholm, (1975) concurs with F.A.O. (April, 1973) in his
notation of the need to change the attitude of the rural people
in order to increase agricultural production. He thus considers the
socio-economic factors in the economic development, such as the
role of cattle in social life and its uses (the Indian case) and
the extensive nature of grazing practices. The nature of the economic
behaviour of farmers is also considered, such as non-breeding,
non-replacement of stock or non-investment in inputs for increased
milk production (a concern exemplified in India's second 5-year plan,
1956 - 1966). Nylholm also discusses the nature of model transfers
from western Europe and how reliable they can be in dairy
development in the Bangalore milk area (India) where farms are too
small to handle the technology propagated by development agencies.
Hence from this, there is need to adopt such technology as is only
suited to local conditions and in the economic convenience of each
farmer. This generally fits into our concern in that there was an
attempt to focus the methodology on individual households and the
socio-economic factors at the individual level.

Russel (1962) though basing his work mainly on the British
dairy industry, and highlighting problems of peak production and

need for elaborate management procedures, discusses the question
of cost-effectiveness in decision over dairying or crop farming
and which is relevant to this study. We will thus seek to analyse
the pattern of cost-benefit factor in allocation of resources by
farmers between dairying and other competing alternatives of farm
use.   There is need to attempt to find out in this study whether
farmers actually focus on profit per cow in the economics of milk
production, in this case to know whether the extension service gives
such information to them. This is a factor many scholars in Africa have
given little emphasis. For instance, Malcolm   (Musangi, R., 1966)
only notes that resource allocation in dairying and other enterprises
has to be in such a way that the return to land, labour and capital
and managerial skills is economical, without much elaboration. Even
F.A.O. of United Nations (April, 1966) on the Regional Conference
on Dairy problems in Africa, held in Nairobi, Kenya, only recommended,
among others, the need for the highest possible return to the
producers for milk supplied for liquid consumption either directly
or preferably through processing plants. Such a conference ironically
never touched on the social and cultural inconveniences in milk
production in Kenya (in such schemes as the Nzoia). The only noted
problem here was the decline in dairy herds in the period preceeding
acquisition of independence (upto 1964) during the change of hands
of the dairy industry, originally dominated by Europeans in White
Highlands. .

     With the same line of view was Wells (1968) in his consideration

of the problems emanating from the transfer of land from Europeans
to Africans. However, for him there is a more coherent analysis
of the problems of dairy development in post-independence Kenya:
Poor husbandry and management of animals which in most cases was
below average; low yield per cow due to the decline in genetic
potential of dairy cows, progressively: that most milk producers
in Kenya attain levels of production far below capacity of their
cows due to underfeeding of their livestock, laxity in applying
disease control measures, all which have to be solved at the
individual level first (thus unhealthy cows of one farmer will
most likely pose disease hazards to the rest of the other farmers'
animals as they are potential disease transmitters, through using
such common facilities as dipping). On the question of low supply
and long distances, Wells (1968) and Musangi, (1971) have
concurrent views. For instance that individuals have had to supply
as little as one pint of milk and walk long distances on poor and
impassable roads to collecting centres. Hence Wells (1968) appears
to reflect that it was these problems which prompted the Kenya
government in its development plan (1968-73) to stress the need to
increase production per cow through improved husbandry; was to set
up the animal extension department programme in feeding, pasture
management and improvement. There was need in this plan to realize
as has already been noted, the crucial factor of differences on
regional and individual levels where lasting results had to be
attained. This ties with individual decisions at farm level in the
nature of resource utilization, a factor which Kenya's Fourth

Development Plan (1979-1983) appeared to be well aware of - in
its bid to generate economic growth and alleviate poverty, the
solution lay in full utilization of the then underutilized
resources in the rural areas, amidst the perceived potentials,
for example cases where plots in some schemes had been left idle
for long periods. The Plan atleast went further to consider the
problems of complexities of rural areas in this context (economic,
social and environmental factors) in agricultural development. This
sought to emphasize on regional basis in assessing the nature of
local needs. In a way, this was in line with the District Focus
for Rural Development Programme. But in areas such as settlement
schemes, what the government saw as regional differences, at
national level, are likely to be manifested at the individual level,
in the nature of the resource allocation and utilization at the
individual level, in heterogeneous settlement schemes. Hence to
some extent, this should have been a consideration, too.

A study carried out in India (George and Chokshi, Jan, 1977)
serves as the best example on dairy development decisions at farm
levels. They hold that ".... success of dairy development programmes
depends as much on efficiency in the procurement of milk, processing
and marketing activities, as on the influence of such programmes
on farmers decisions related to investment patterns in dairy and
milk production and disposal practices." In this case, a dairy
farmer is seen as having to grapple with three major decisions: How
much to invest in dairying; what kind of milk production practice

has to be adopted and how to utilize the milk produced at home.
Trully therefore, as seen by the authors also, these decisions will
determine the quantity of milk produced, the nature of land
utilization pattern among competing farm alternatives, investment
patterns in dairy foodstuffs, such as purchase of high grade cattle
and stock replacement, family consumption of milk, dependance on
milk, and interaction with the local community in terms of
organizing collective activities (Co-operating). This study,
though largely based on India, has a lot of relevance to Kenya,
and more so the concern of this study as relates to patterns of
dairy farming in the Nzoia Scheme.

As seen for the case of India (George and Chokshi, 1977),
despite a number of studies having attempted to determine factors
influencing the pattern of milk production and marketing decisions
by a farmer, the existing studies do not provide a comprehensive
analysis of the factors, influencing the farmers decisions on
investment in dairy milk production practices and milk marketing.
Indeed, the F.A.O. (April, 1966) conference on dairy farming
problems in Africa never touched comprehensively on these, and at
best only mentioned them for other countries other than Kenya.

There are a number of vital observations we can make from
the emerging discussions by George and Chokshi (1977) in India:
First that investment patterns in dairy farming will depend on the
profitability, risk, avaibility of capital, labour requirements, and

such social factors as family tradition and religion. To some
extent, these views are common to Higgins (1959) who held that
for an individual to have incentive to work harder or better, or to
take additional risk with ones capital, one must be clear of the
use to which the additional income is to be spent. Can we therefore
infer that at the individual level those who understand more these
factors are more likely to produce more milk through taking more
risks in dairy investment? And to what extent can the farmers
have been made aware of such risks involved when they joined the
Scheme initially? According to the same author, global high
fertility rates, more so in developing countries, has indirectly
played a disincentive to the growth of private savings and investment
to produce a flow of income. At the individual family level
therefore the amount of private saving and investment (in dairy
farming?) will correlate to the density of the dependants to an
individual farmer, such as the amount of milk to be disposed to
the market and pattern of landuse,other competing dependencies
such as investment in education.and housing.

Secondly, decisions at farm level will be dependent on farmers
attitudes towards changes in the environment, such as availability
of credit, utilization of rates of extension service in form of
veterinary and artificial insemination services availability. It
had been found, for instance, that farmers with low education levels
had tendency to keep large herds of cattle of low quality, had made
less investment in cattle sheds and other fixed structures. That

also there was a higher correlation in higher levels of education with
the tendency to invest in more expensive cattle (high grade) and
related structures, (George and Chokshi, 1977:17). For our case
we shall also attempt to show whether these same findings can be
replicated in our study.

In summary, there is need to shift the emphasis from earlier
dairy development plans which were heavily oriented towards building
up infrastructural facilities for milk plants. This was the view
prevalent in Kenya during the F.A.O. (April, 1966) conference in
Nairobi - proper hygienic conditions, processing of milk, efficient
transport and storage facilities. However, there is need for an
integrated approach incorporating production and enhancement at
farm level, procurement, processing and marketing of milk for a
sustained growth of dairy industry (George and Chokshi, 1977). The
Indian case typically shows that a well established dairy industry
serves the interests of a large number of small and marginal farmers
in rural areas. That hence the success or failure of dairy farming
development programmes depended on the ability of the programme to
influence the farmers decisions and utilization of milk. There
should be enough incentives in this case which can influence the
farmers decisions on the levels of milk production at the individual
farm level, and the scheme as a whole.

From the foregoing discussion, it is also evident that the
penetration of governmental and other development agencies services

will be reflected at the individual level performance. For farmers to use, for example extension services, they have to be aware of their existence, a task which extension staff at village level has to grapple with. The best example to support this view was carried out in Pakistan on the supposedly very traditional peasants where a new variety of wheat was introduced with maximum success (Refugio, 1972). The best celebrated medium here was the extension field officer at the village level, who channelled the vital information both theoretically through discussion with the farmers individually, and with practical demonstration plots on a few selected peasant plots. It is our contention that there is need to establish, in our case, the nature of the extension service staff relationship to farmers. Is the extension service adequate at the individual level, and how far can the present levels of production be attributed to it? Here we should note, (as seen by Mbithi, 1974) that the common bias of extension services has mainly centred and focused on large scale farmers; and this has in most cases failed as a means of diffusing innovation to other farmers in the locality (Essang, 1978).

For the Pakistan case, we realise that the ease with which, and the short period during which the dwarf wheat was adopted was due to the degree and extent of the penetration of the advisory agricultural development service; though there were compromising factors such as better yields registered, the relatively simple technology used and thus understandable, needing no major overhauls in

the social structure. This achievement greatly contradicts many western Europe agricultural developmentalists' and economists' outdated notions that traditionalism is the basic barrier to innovation and thus agricultural commercialization and/or modernization (Hyden, 1983; Hunter, 1969; Korten, 1972). In this case therefore we are confronted with the task of analysing the nature of the information flow between the extension service officials and the receiving individual farmer, to determine the pattern and failure of agricultural development programmes. In our case, once more, one can not do without analysing the situation by isolating the individual cases.

We want to justify the need to direct our agricultural development attention more at the individual level decisions, as there are individual constraints to development and hence differential knowledge and accessibility to available resources to be used in this case. In the same context, there is need to focus our attention as to whether dairy farmers apply cost-benefit analysis in their farming procedures. Not many studies have been able to isolate this factor for consideration more seriously. We believe this is the only way individual farmers, if made aware, can be more conscious of their production capacities in their resource allocations to various farm competing alternatives. To some extent, it may be true to suggest that many farmers may engage in very unproductive agricultural alternatives without being conscious of this. Such a venture would thus tickle their imaginations into reconsideration

to engage in more productive enterprises, given the meagre
resources at their disposal. From this, it can also be possible
to account for the nature of cause and effect relationship in
dairy and crop farming enterprises - such as responses to price
changes in relation to the amount of milk which can be produced,
or decisions to abandon or increase an enterprise altogether.

However, the argument for cost-benefit analysis is expressed
with the awareness that there are problems of poor management due
to improper record keeping, or none at all. To start with, however,
there is need to try and focus on more concrete financial investments
such as long term bases which most farmers can be able to remember
mentally as can be the case with investment in purchases of dairy
animals and related structures. More detailed expenditures on
daily basis will require more elaborate research designs and which
have to be over longer time periods, if one has to keep track of
all the dairy expenditures and production records. It is
therefore hoped that this preliminary study will motivate comprehensive
studies in the same direction later on.

2.3.1 HYPOTHESES:

1.   That higher amounts of income which accrue to a farmer leads to
     more investment in milk production.

2.   The intensity of the penetration of the extension service (at
     the individual level) and how the related managerial advice
     in dairy farming is received has a relation to the amount of

3. The production of milk far above the subsistence requirements
correlates to dairy farming enterprise as the major activity
at the individual farm level.

4. The larger the number of dependants to each household, the
greater the drain on financial resources, and thus the less
there is to invest in milk production.

2.3.2: Variable Specification:

These are specified according to the order of the hypotheses
as presented above:

1. (a) Variables: The variables in the first hypothesis are the
amount of income as the independent variable; while
invested amount, in milk production, is the dependent one.

(b) Indicators: The various indicators sought in the collection
of data include all sources of incomes to a farmer, such
as employment opportunities and out-of employment activities
such as business shops, butcheries, matatu operation etc.

The amount of milk produced is measured on daily production
in Kilogrammes or gallons; Investment in pasture fields development,
dairy farming structures such as dipping facilities on the farm,
stock replacement etc. The focus was mainly on the period extending
upto five years backwards, on the farm's dairy development.

2. (a) <u>Variables</u>: The intensity of the contact of the extension
   service (at the individual level) and the method of
   dairy farming managerial advice will be the independent
   variables; while the amount of milk produced is the dependent
   one.

   (b) <u>Indicators</u>: The intensity of the contact of the extension
   service will be be measured by the frequency of visits from
   the veterinary officers, dairy farming advisors, artificial
   insemination officials etc per week, month etc upto the
   last five years, in as much as the farmers will be able
   to remember. We shall also seek to establish whether the
   farmers have the basic knowledge of the requirements in
   dairy farming management, such as stocking rate, breeding
   requirements etc, to be cross-checked with the quality
   of their animals etc. We also seek to know whether the
   methods used to channel the managerial advise is practical/
   demonstrational, or simply verbal and theoretical.

   The amount of milk produced will be measured in the number
   of gallons or kilogrammes daily, in the last five years period.

3. (a) <u>Variables</u>: Dairy farming as the major activity on the
   farm is taken as the independent variable; while milk
   production far beyond subsistence levels or requirements
   is the dependent one.

(b) Indicators: Dairy farming as the major activity on the
     farm will be measured in relation to the amount of land
     allocated to it, investment patterns, where if more than
     any other land utilizing activity on the farm, and incomes
     received from such an activity.

Milk production is measured in Kilogrammes or gallons on
daily basis. We also look at the quality of animals on the farm;
pastures planted and the number of attendants, as can be compared
to other farm activities.

4. (a) Variables: The number of dependants and financial drain
        will be the independent variables; while investment in
        milk production will be the dependent one.

   (b) Indicators: The number of dependants will be measured
        in population size in the family, number of children in
        school and fees amount paid per year over the same five
        year period.

Investment in milk production will be measured in the
availability or not of developed dairy farming structures, pastures
development and other provision of livestock feeds; the replacement
of old stock and the present dairy animals breed quality.

2:4: Operational Definitions:

Resource Utilization:

resources as, "The collective means possessed by any country for its own support or defence." In our case, this will apply to collective means at the disposal of the farmers in the scheme, such as land, water, extension services, credit facilities, capital formation and use, labour hiring etc.

FARM RECORDS:

This relates to the recording of various expenditures on inputs into the farm's production processes; and the receipts that accrue in return. Such will include costs of production, such as cattle feeds, veterinary service costs, milk yields (per cow), cattle replacement, extension officials visits etc.

Income to a household:

This is the income a farmer earns from both the farm enterprises (cash crops, milk sales etc) and the non-farm businesses such as job opportunity, shops, butcheries, house property, land rent, wages etc.

Entrepreneurship:

As used here, this relates to the organization and co-ordination of physical resources of land, and labour, capital etc by an individual farmer (head of household) at the farm level. It thus involves the function of seeing investment and production opportunities, organization of an enterprise to take a new production

process, raising capital, hiring labour, arranging for supply of the raw material (inputs) and combining these factors of production into a going concern; introducing new sources of natural resources and selecting top managers for the day-to-day operations (Higgins, 1959).

Risk:

Walsh and Williams (1969) see this as relating to a situation whereby although the outcome with respect to some phenomenon which affect the calculations is not known or accepted with certainty, the estimators (farmers) atleast have some idea, in probabilistic terms of what the range of possible values will be. This brings in the concomitant term of 'uncertainty' - where the estimators are not even able to be fairly precise as in the case of the 'risk' situation. Since the normal run of projects (enterprises) involve atleast some risk, private investors (individual farmers) will not invest (in a farm enterprise) unless the prospective returns on such an investment is somewhat higher than it would be in a riskless situation.

Cost-benefit analysis:

This will relate to the computation of the ratio of the total cost of incurring a project (a farm enterprise), to the total benefits or receipts from the same. In this case, a farmer will only be justified to economically invest in a particular enterprise

(farm activity) if the total benefits exceed the total assessed costs (Walsh and Williams 1969).

Cost-benefit analysis can also be seen in terms of the total relevant costs incurred in using scarce resources (needed to contribute to the desired objectives e.g. having to increase the volume of milk produced on the farm) and the total sum of benefits from producing similarly scarce goods and services, (such as cash-cropping using the same farm resources).

The difference realized between the total relevant costs incurred, and the total sum of benefits should be net profit, which economically one has to strive to maximise from any enterprise where its continued implementation can be justified (Blitzer, Feb. 1977).

THE RESEARCH METHODOLOGY

3.1: Introduction:

The Nzoia scheme is taken as a case study in an attempt to
analyse the differences in resource utilization in rural Kenya,
focusing particularly on the dairy farming industry. The head
of the household was interviewed on the various aspects of dairy
farming on the farm. Such included stock replacement decisions
farm enterprises combination criteria, decisions on the quantity
of milk to produce, the combinations of the factors of production,
and capital formation and investment patterns on the farm. In this
case, the first task was to establish whoever held an upper hand
at decisions as seen above in most times during the calendar year.
In cases where there were joint decisions undertaken, one of the
decision makers could be interviewed, where there was consent. This
specifically involved joint decisions between husband and wife on the
farm, although generally wives were less willing to grant an
interview without the husband's consent. It thus turned out that
although the majority of our respondents made indications of making
joint decisions and consultations, we ended up interviewing mostly
the male respondents, for the reason already indicated above.

3.2 SAMPLING METHODS:

The Nzoia scheme is a region comprising two hundred plots, of
an average of thirty acres. However, the total number of farmers

in the scheme was found to be only one hundred and seventy nine.
This is so because six farmers were found to have had more than
one plot, either several combined together or some plots situated
separately. The scheme was settled by a number of ethnic groups
whose population was found as below:

Luhyias	-	145	farmers
Kikuyu	-	24	"
Luo	-	7	"
Kamba	-	1	"
Kisii	-	1	
Teso	-	1	"
	Total	179	

We had initially sought to interview half the population of the
farmers in the scheme. This was on the basis of the number of
plots as the assumption had been that each farmer owned just a
single plot. Since this was never the case, we decided to interview
farmers in one hundred plots, which thus was more than half the real
farmers who own plots in the scheme (179).

We employed the method of stratified sampling to obtain our
sample population in the scheme. The method allows the researcher
to ensure that certain groups in the population are reflected
proportionally in the sample (Herzon, and Hooper, 1976:15). As
already seen, the population of farmers in the Nzoia scheme constitutes
of various ethnic groups, on whom the research is based. Hence for
each of the strata formed by ethnicity to have a proportional

reflection of the sample, they have to be sampled differently on their own basis.

Since each household farm had a plot number, these were used to select a sample through the mechanism of raffling, with the replacement of the already selected members. This ensured that each member (plot number) selected had an equal original probability of selection into the sample. We recorded plot numbers on small slips of papers, for each ethnic group separately. These slips of papers were then folded up and raffled thoroughly in a basin every time a new selection was made. Thus the folded paper slips were randomly picked from the basin, for which the plot number was recorded only once. Whenever the same number was picked for the second time, it was not recorded in the sample. In this case the sum of the samples obtained from each ethnic group formed our grand sample of the total population in the scheme that we sought to interview. We thus interviewed half of the population of each ethnic group. However, since some ethnic groups had only one farmer, he had to be interviewed as a whole, population. Additionally, those farmers who were found to had combined more than one plot were represented in the sample only once. In this case, once any plot number of the combined or owned farms appeared in the sample, the rest of the plots owned by the same farmer automatically lost their chances of selection into the sample. This was aimed at providing greater chances to interview other farmers who had just single plots in the scheme.

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3.3 The Limitations of the Study:

It was realized that our questionnaire was long and took well
over three quarters of an hour on average. This was in addition
to other times spent with the farmers for direct observation of
other dairy farming components, such as the quality and conditions
of the dairy animals a farmer kept, the availability of any
established artificial pastures, milking sheds, watering places and
dipping facilities, among others. This was even further compounded by
the fact that some farmers tended to over explain what to us were
obvious questions. For instance, when asked to comment about their
rating of the local co-operative management, there was evidenced
a lot of subjective rationalisation, probably due to some personal
differences with either the former or current office bearers, some
of the complainants who had made fruitless attempts to be elected
officials to the co-operative at one time or another. To some
extent therefore, such people had already formed negative opinions
or reactions as far as their personal observations were concerned,
a factor probably reminiscent in the mass-exodus or boycott of the
co-operative society as a channel for selling milk and other
agricultural produce.

The responses from farmers were also diverse. While the majority
of the average farmers interviewed about their opinions on various
aspects of the research provided both problems and expected solutions,
among others, it was realised that some farmers relatively doing

problems. It was not surprising to note that some thought it was
simply the question of the government knowing their plight and
thus expected to also provide such solutions. It was thus felt
necessary to probe further the respondents on specifically what
they thought and/or expected the government should do. We
believed that by so doing such farmers would in future be more
enlightened about their problems and provide or make an attempt at
their solving. For example the belief was that such farmers would
in future be able to seek the help of the extension service and
other development agencies, such as in the more effective utilization
of loans in farming enterprises. They would no longer be assumed
in that category which waits for the extension service (government)
to realize their problems and come to their farms.

The study period for our research had also coincided with the
scheme's harvesting time, meaning most of the respondents could never
easily be reached for interview. Initially an attempt was made to
help in the harvesting work for sometime, during which period general
discussions on farming were made. This was never quite successful
in most times as some farmers were still reluctant to 'waste' an
hour for the interview, due to the long questionnaire. Therefore we
sought refuge in undertaking the research as from the afternoons
for those farmers found busy in the mornings. This had meant
having to travel from one end of the scheme to another to establish
whether the farmer scheduled for interview was free or not. In the
process, valuable time was definitely lost, in some instances compelling

before we could procure an interview with him.

In an attempt to minimise the amount of time lost generally,
most of the morning periods and those times a farmer was busy,
were used in the observation of other dairy farming components,
such as established pastures, milking sheds and watering points.
This undertaking no doubt reduced the average time spent with each
farmer on such discussion, without necessarily always having to move
to every part of the farm again.

A few household heads were working class, engaged in teaching or
other private and public service professions. Such were never
easily available over most week days, and hence could only be
available over the weekends. Here was another problem as it was
during such days that they also most likely worked on their farms.
In some instances, we resorted to "instant confrontations" at
whatever times or places (market centres/schools) for interviews,
such as over lunch times or free periods in schools, or during their
social times. But this was only done usually after the other
observation requirements had been done, to make a more effective and
smooth discussion.

There were a few cases of those respondents working far from the
scheme. We made an attempt to write them to arrange an interview at
their own convenience. This method was not quite successful, as
most never replied. We were compelled to make frequent visits to

their plots on most weekends or through information that they were
available.

It had also turned out that most of our respondents were male
spouses. We had initially proposed to interview the heads of
households who made the major decisions as related to the various
aspects on dairy farming on the farm. In some cases, we had realised
quite some contradictions in the farm's decision making process.
In most cases there were indications of joint decision making, but
some female spouses were less willing to be interviewed lest they
find problems with their male counterparts. A possible inference
here appeared that such 'discussions' and decisions were only after
the male spouse had made up his mind about what to undertake. Any
discussions made could simply occur in the form of informing the
female spouse on what was yet to take place. Otherwise our research
period could have taken a more relatively shorter period had we to
interview more of the female respondents as they appeared more easily
available on the farms in most cases. May be this would have provided
more balanced responses from a greater proportion of women to men in
their understanding of problems inherent in farming and their likely
solutions. There were for instance some cases of male spouses who
responded positively to the availability of such services as A.I.,
but when probed further were found not to be quite knowledgeable about
the punctuality and reliability of such services. It had been found
that such farmers relied on their workmen in most times, as were
usually away during the weekdays working. There was one or so cases

who even consulted their workmen during the interview to ascertain
on certain aspects of services.

The most explosive and sensitive part of our research centred
around incomes. Apart from the more steady produce from maize and
milk production, it was never easy getting the rightful income
figures accrueing to the farmers who had businesses or other sources
of incomes such as tractors, grinding mills, shops, bars and
restaurants, among others. We had thus to resort to making rough
estimations, depending on the kind of businesses, of the incomes
one gets. This had been complicated from the fact that interviews
about income receipts leave a lot of suspicion on the part of the
respondents as to the real motives of the study research. In cases
where we highly doubted what a respondent gave as his income levels,
we resorted to use of indirect methods to obtain these figures.
This involved the use of subordinate staff, through 'inducement' of
course, who were managers, cashiers to such businesses. There is no
way we can however guarantee that even these were the true income
levels. However, there were a few instances where we realised some
divergence in income when we employed this method, such as in the
matatu operation. However, it has to be underscored that the concern
really was not to obtain the actual income amounts received, rather
we were concerned about the proposition that a substantial income
resource was a vital component in the development of dairy farming on
a farmer's plot. For instance, while some farmers had complained of
frequent disease emergence for their cattle, and in most times

without immediate forthcoming cash to purchase the drugs (such as
for the dreaded East Coast Fever costing well over Ksh. 500/= per
small bottle), reliably it was believed a farmer with a chain of
businesses was in a better position to offset such an emergency.
This was likely to ensure not only a more healthy grade dairy herd
but also one with a sound income source.

We were unable also to compute such incomes related to seasonal
activities, such as for those involved in selling of agricultural
produce as middlemen, and livestock dealers, among other, who only
come in the business limelight during harvesting or when schools
open and the affected parents have to obtain cash for fees. Despite
our realisation that such middlemen in agricultural produce could
be doing quite a lucrative business, it was never easy to compute
income levels involved due to its seasonality. On the same note,
some respondents were unwilling to record this as a business
undertaking since it is not a full-time undertaking for which they cou
tie a particular income average within some concrete specific time
period. In the final analysis, we had no option but rather to
overlook this in analysing the income quantities to a farmer.

3.4 Data Collection Methods:

We basically employed the interview method using the questionnai

to obtain the relevant information needed from the respondents.
The questionnaire comprised of both the 'closed' and 'open-ended'
questions. The use of participant observation was also supplementary
especially in cross-checking on the quality of livestock, quality
of management such as pasture, and related dairy structures developmen
such as fencing, milking parlours or sheds; and the farmer's own
experiences in dairy farming in terms of his own management capacities
and consciousness for dairy farming development.

During the course of the study, there were certain variables
which needed special attention in the methodology required to
obtain the required information. This was mainly in areas of
incomes accrueing to the respondents, and the quality of their
management in the field of dairy farming. For the latter consideratio
we formed our own indicators which we used to suit the scope of
this study. We first discuss the former, thus the methodology
around the way we arrived at incomes to a respondent.

The initial study aim was to get information from almost all
likely sources of income. This was to be from all farm enterprises
which the respondents engaged into and from which some or all the
produce was sold for cash. The focus was also to be on off-farm
income earning activities, such as running business shops, butcheries
public service vehicles, property rents, wages and salaries to the
respondent. As relates to farm enterprises, it was found that the
only stable activities were the production of maize and milk. In

this case they were the only activities engaged in year in, year out, whether singly or doubly. Other farm activities such as production of sunflower, beans, potatoes, groundnuts, were those either not frequently engaged in or simply used for subsistence purposes. It was difficult to compute their incomes in this case, and hence their contributions to the total income was side-stepped. We thus computed farm activities incomes from maize and milk production only. Coffee production was another farm enterprise engaged in by some farmers. However, this is a recent introduction in the scheme, in the last about five years, and whose marketing is not well established yet, in terms of the completion of the processing factory in the scheme region. In any case, the farmers with some coffee plantations had rarely made any harvests for sale to provide them with a significant income.- It was also not considered.

The focus of our analysis was in a five year period, in this case from early 1980's to the close of 1986. We never recorded the yield for 1987 because our research was done from July the same year and for which we could not obtain the yield for maize as had not been harvested and marketed. Milk yield production for the same year was also ignored for the purposes of arriving at a more favourable average of the annual agricultural enterprises income. For the period in question, thus five years focus, we recorded the lowest and highest yield ever reached by a farmer in maize and milk production on the farm. The corresponding incomes were computed on the same basis, respectively. This thus gave us the highest

ever annual income and the lowest income ever attained by the
farmer.

The statistics for the computation of the income depended
largely on the respondent's own memmory as much as possible
about the highest yield ever marketed. This was in terms of the
number of maize bags sold and the number of milk kilogrammes or
gallons delivered to the collection centre for processing. In
cases where there were doubts, we asked in terms of which year the
respondent had either a crop failure or the best yield or whether
there had been any problems associated with drought, in the years
in question. For milk production, an attempt was made to cross-
check the total yield delivered for sale by inquiring about the
volume of delivery vessels used or whether they ever borrowed from
other neighbouring farmers. We also used milk record cards or
payment slips for some farmers who kept them, particularly for
the latter as was case with those who delivered straight to the
Kenya Creameries Co-operative (K.C.C.). This had also aided us to
get the amount of cash paid per kilogramme of milk delivered. For
those who delivered to the local co-operative society, the amount
of cash paid was obtained there.

The total amount of cash earned from the total lowest and
highest sales for maize produce was arrived at by multiplying by
an average price of Ksh. 170.00. This was partly arrived at
because within the same five year period we focused our attention,

farmers generally alleged that the price per bag of maize had
fluctuated between Kshs. 158.00 and Ksh. 180.00. This was also
verified from the local co-operative society which sometimes acts
as a marketing channel for some farmers' maize and other smaller
agricultural produce. On the other hand, it was noted that a
number of farmers also had sold their maize to middlemen, whose
purchase prices in many cases depended on mutual agreements with
the individual farmers. This variation from year to year had thus
compelt us to use an average figure for the purposes of our
computations.

Unlike the case for maize whose income is computed at the end
of the year, for milk production, we had first to compute monthly
income. This was arrived at by first multiplying the total daily
yield in kilogrammes by an average of thirty days in a month. This
total was then multiplied by the price per kilogramme of milk,
depending on whether a farmer delivered his milk directly to K.C.C.
on his own, or through the local co-operative society. The
corresponding payments for a kilogramme of milk supplied was found
to be Ksh. 3.10 and Ksh. 2.10 respectively. The annual income was
calculated by multiplying the total monthly income by twelve months
in the year.

The proceeds from the two major agricultural activities were finally
added together, in terms of the lowest ever registered maize income
to the lowest milk income in the five year period. The same was
done for the highest ever yields for the same activities. These

two computations gave us the lowest and highest grand incomes to have accrued to a farmer from the two major agricultural enterprises in the period time.

It is our confession here however that our statistics might only have been approximations and not necessarily actual quantity yields, and therefore total incomes also. This was due to dependence on the farmers mental capacities to remember and who were bound not to precisely remember or quote the desired figures. On the same note, it is our conviction to justify our figures as our initial proposition was not really aimed at getting the actual figures on the yields from the agricultural enterprises. Ours was an attempt at simply making an approximation of the levels of income to a farmer which was hypothesized to have a leaning towards capital investment in, our concern, dairy farming development at the farm level.

The other sources of incomes which accrued to the farmers were calculated from the occupational monthly incomes and other businesses such as shops, butcheries, matatu operation, tractors, grinding-mills, bars and restaurants owned by some farmers. This was necessarily separated from other agricultural enterprises incomes, more so monthly income from milk, because we wanted to note whether other additional sources of income to a farmer formed an integral component of financial investment in dairy farming or not. An attempt to establish actual and precise financial outlays from milk and maize production were never forthcoming as generally farmers never made record of

these financial avenues. However, going by the general numerous
complaints from farmers about numerous cattle diseases and the
equally expensive cattle drugs, one could only assume that a
farmer with a more steady and sound income source would be in a
more safer position to offset such emergencies with greater success.

The kind of off-farm business which the farmers in the Nzoia
scheme were found to engage into included operations of shops,
butcheries, matatus, tractors, grinding-mills, bars and restaurants.
Some of the farmers were found to own a combination of these
businesses. For the case of matatu operation, to estimate the
likely income accrueing to a farmer daily, he was first asked to
state the vehicle capacity. Then on the whole whether in most
times he operates at full, half or far below capacity on most days.
We also sought to know how far the destination was that the operator
plied, such as between two major towns etc, which could tell us the
likely amount of fare he charged to passengers. It was believed
that in this light we could attempt an estimation of the likely
daily income to the operator. This was never easy, for the single
matatu operator was less willing to quote the actual income daily
ranges, only giving vague answers as sometimes doing good business.
Despite this, we estimated the daily average capacity of the
matatu at half, allowing for recurrent expenditures by the owner
and to take care of the carrying capacity ranges during good and
bad business days. How we got around this complication will be
discussed later in the problems encountered during the study, and

the alternative methodology employed to acquire the required
information.

In relation to the shops/Canteen businesses, the operators
were simply asked the average ranges of income they received per
day, from which an average was then computed for this study. Our
personal acquaintance with most of them was an added advantage
in the process of the study as the shopkeepers had our confidence.
However, the only limitation here was that the figures obtained were
gross, not reflecting the real operations of the businesses.

The income earnings from bars were also obtained by asking the
respondents to quote the average ranges of daily incomes on both
bad and good days for their businesses. We made a further attempt
to cross-check these initial figures through the employed
subordinates who worked as cashiers or managers for the businesses
in question. In additional we also tried to find out how many
crates of beer or soda get ever sold.

However, in relation to those who owned butcheries, they were
asked about the number of animals that were ever slaughtered in a
week, and of what kind, thus whether cows, sheep or goats or pigs
etc. We then asked the butchermen about what range of costs of the
animals they bought for slaughtering. This was critical because
we realised the butchermen registered their disatisfaction at the
levels of meat consumption in the area, and hence unlikely to over-
invest. The average net profits which the respondents gave ranged
between Ksh. 500 to Kshs. 800/= per slaughtered cow. The butchermen

did not seem so keen on goat/sheep businesses due to market problems, and hence we excluded this altogether from income computation. For our purposes then, we calculated income profits at an average of Ksh. 600.00. This was multiplied by the average weekly animals slaughtered, by an average of thirty days to get a likely monthly income from the same. This was however, as already noted, only an attempt at estimating the likely income from such income sources, and which aid in dairy farming development on ones farm.

Those who owned tractors were asked to state the nature of contractual activities they engaged in. Such included farm ploughing, transportation, planting, maize shelling etc. For our case, there was one case of tractor ownership and who only engaged in farm ploughing for other farmers mainly. There were other farmers who owned tractors but which were only used for undertaking activities on the farmer's own plots. Those who ploughed for other farmers were asked to estimate the number of average farms they are ever hired to plough in any ploughing seasons in the last five years. An attempt was then made to establish the average sizes of the farms to determine the likely income levels in this case. Income would then be computed by multiplying the average number of farms the tractor owner ever ploughed, by the number of average farm acreage that were involved. This total was then multiplied by the average cost of ploughing an acre over the last five years. It should be noted, however, that such a source of income proved quite seasonal and hence its incidence on the overall total income might never depict a true picture throughout the year, dividing by twelve to get a monthly income.

The owner of a grinding mill was also, in the same light, asked to estimate the number of bags of maize ground in each day. This was then multiplied by the number of debes contained in a bag of maize, and then by the price charged per debe for grinding. The daily income was thencomputed for thirty days in a month. However, we only recorded half the total earnings, allowing for everyday expenditures on fuel, labour and repairs.

In general, it had to be noted that in all these cases, save for occupational monthly incomes, we were unable to come up with actual incomes to the businessmen in question. The best we did was to estimate the figures from the available information we had at our disposal, and which should be reliable for the purposes of our. study.

The methodology around participant observation centred mainly on the individual respondents dairy farming management capacities and thus the quality of his herd. This related to the way an individual farmer was aware of the proper or basic methods involved in raising grade dairy animals. This was in terms of for example the ability to supplement natural grass with other cattle feeds, such as bran, salt lick, maclick, hay etc; how urgent he responded to animal health conditions by regularly purchasing cattle drugs for tick-borne diseases, for deworming; whether he had a good milking parlour or shed; planted pastures and following rotational techniques in the paddock system; close monitoring of animal health conditions and controlled breeding methods, thus atleast mating of a grade bull

to a grade cow; and lastly, whether a farmer had animals that
looked naturally healthy - not emaciated and/or borny. These
indicators were constructed for our own purposes and understanding
of this study, and need not necessarily be ideal. We categorised
them into five major groups as follows:

(i) Cattle feeding - whether a farmer frequently bought supplementary
feeds to animals, such as bran, salt-lick, maclick, hay and other
concentrates to suppliment natural pastures. We also looked at
whether there were any planted artificial pastures such as nappier
grass etc, and whether the grazing land was enough.

(ii) Availability of and/or good milking shed (or parlour), and
with strict hygienic conditions followed.

(iii) Rotational techniques of grazing- whether these were
strictly adhered to, with pasture lands divided into paddocks with
fences.

(iv) Strictly controlled breeding procedures - here we looked at
whether a farmer controls the kind of grade breeds on the farm, by
for example breeding or mating grade to grade animals and not
underbreeding (mating a Zebu bull to a grade cow or underbred bulls
to grade cows). Here was also considered the animal population
(stocking rate) in relation to the available pasturelands.

(v) Fast response to animal health conditions, such as the
ability to mobilise financial resources to purchase drugs in good
time for treatment emergencies to sick animals; frequent animal
deworming - a requirement of once every three months. We also
considered whether a farmer monitors individual animal production
fluctuations or in cases where some animals are allowed to die
of old-age because they are ones 'pets'.

There were also five categories of management capacities
responses designed for the farmers as follows:-

   (i) To a very great extent

  (ii) To a great extent

 (iii) To some extent

  (iv) To a small extent

  (v) To a very small extent

In this light a farmer who responded to the positive to all
the five management routines outlined earlier was categorized as
managing his dairy farming to a very great extent. A response to
only four meant management to a great extent; a response to three
meant to some extent; a response to only one or two meant to a small
extent; while a response to none or where a farmer was found to be
largely ignorant, such as lack of technical know-how in dairying,
was rated as managing his dairy farming to a very small extent.

Initially, this analysis of the extent of dairy farming
management was intended to be the farmers own personal consideration.
It was however realised that this could not work just at face value
like that, as some farmers were considering themselves good dairy
farming managers while they were not. Hence the need to apply the
indicators used, and also personal observations of some of the
available conditions, such as animal breed quality. It had been on
this premise that we also designed indicators used to denote the
farmers animals breed condition, for which we had six categories as
follows:-

(1) Very highly degenerated - This applied to the case where
a farmer's animals were bonny, unhealthy and for which he could
never precisely name which animal breeds he had. Such also never
made or showed any trace of breed to the researcher. In this case,
we considered or had in mind the type of animal breeds which the
farmers in the scheme were given when joining the scheme, such as
friesian, Guernsey, Jersey, Aryshire and redpoll.

(2) Highly degenerated - This was case whereby the animals
had been randomly bred, such as crossing friesian with jersey and
also between grade and Zebu animals. Thus while it was possible
to trace some breeds of older animals, it was not automatic for the
more younger ones a farmer had on the farm. Such animals were also
considered not quite healthy, too.

(3) Fairly degenerated - This applied to a farmers animals with a healthy condition appearance, but whose breeds are mixed due to interbreeding (grade to different grade breed) and cross-breeding. To some extent, they showed characteristics of certain breeds recognisable.

(4) Degenerated - Here were animals which still maintained their original breed, but which showed trace of inadequate management on the side of the farmer due to inadequate feeding and general lack of adequate care.

(5) Breed maintained - was case where breeding, feeding and general management of animals was visibly of high standards. The animals appeared to maintain their original breed.

(6) Upgraded - This applied to cross-breeding of a grade bull to a Zebu dam only. Where the opposite had occured (Zebu bull to grade dam) this was underbreeding leading to cattle grade degeneration. Cattle degeneration in these case applied to the change in the original breed of the animal due to for example inadequate management, wrong breeding procedures etc.

CHAPTER FOUR

DESCRIPTIVE AND INFERENTIAL DATA ANALYSIS

In this chapter an attempt is made to describe and make inferences from the findings of the study. There will therefore be two sections to it. The first deals with the general descriptions of data findings. The other part of the chapter will centre around purposive attempts at making statistical inferences about the data at hand. In this latter case, we will strive to establish whether there are certain characteristic relationships existent between the various dependent and independent variables as used in each of the hypotheses in the study.

4.1: The Descriptive Data Analysis:

The total population of the farmers in the Nzoia scheme was found to be 179, though the whole scheme comprises a total of 200 plots. In this case, some farmers had actually owned or combined more than one plot. A total of 100 farmers were sampled for interview in the study. It was however largely the male population (90 farmers) that was interviewed, as compared to only 10 female respondents. The criteria for the choice of respondents depended on who was the head of the household, and in relation to the decision making pattern on the farm. In this case, seven of the ten female respondents interviewed were household heads by virtue of being widows. The other three were largely responsible for a great deal of day-to day farm decisions either because their husbands were engaged elsewhere

with off-farm businesses, or just never cared much about the farm.

4.1.1: The levels of income to farmers and possible investment in dairy farming development

The study reveals that most farmers studied in the scheme do not appear to engage in other off-farm income earning activities, apart from a few in the formal employment. This is shown in the table below. There were nine farmers (respondents) who apart from owning the farm were also primary school teachers. Nine others were self-employed in such businesses as shops or canteens, butcheries, bars and restaurants, and matatu operation. Fourteen farmers did farming and engaged in other various means of earning more income, such as wage labour in trades such as masonry or other contractual dealings. However, a substantial number of respondents (68) engaged only in farming to earn their livelihood.

Table 1: Occupations of respondents:

Type of Occupation	No. of farmers
Farmer/teacher	9
Farmer/self-employed	9
Farmer/Farmer/housewife	68
Farmer/other occupations	14
Total	100

It is not easy to make a positive conclusion that the majority
who do farming alone are content with, and get, such incomes as to
satisfy all their financial needs. There could be two sides to
this consideration. As Pollard (1981: 567) observed also, the
off-farm income could be a major provider of investment funds in
farming; but on the other hand, high non-farm income may merely
indicate the neglect of the farm. Likewise, some non-farm occupations
could comparatively be less productive, in terms of the proceeds.
For instance, of the 30 farmers who received some monthly income in
one way or another, nineteen (or 63.3%) received incomes ranging
from as low as Kshs. 500 - 2,000/=.

On the other hand, it was found that 25 of the 30 farmers (83.3%)
actually received incomes that were below the average of all the
farmers who made some monthly income (Ksh. 7,456/= average). This
shows that they were receiving quite low incomes in such occupations
providing them a monthly income. It is possible that such farmers
may tend not to recognise that dairy farming requires their full
time energies; rather they may be filled with notions that farm
income is 'unreliable', and thus the need for a 'survivalist income',
despite the low rates of renumerations in such opportunities as
primary school teaching. Pollard (1981:580) found this tendency
also. The situation as depicted in the case of the Nzoia scheme
tends to discount our supposition that additional income is a crucial
source of income investment in dairy farming development at the
individual farm level.

As was the case with the high variations in the levels of occupational monthly incomes, the same is explicit with farm incomes. These were categorised as yearly incomes, as most agricultural activities engaged into by farmers in the scheme yielded income by the end of the year. Farmers were asked about the lowest and highest yearly incomes they had ever received in the period of the last five years before the study.

In the lowest yearly income category, a farmer who reported the lowest income had received Kshs. 3,400/= while the farmer who received the highest (of this lowest yearly income) reported K.shs. 99,780/=. Here, the average income was found to be Ksh. 32,643/=. For the farmers studied, there is definitely high income disparities, given the range of Kshs. 96,380/=.

On the other hand, this same trend is visualised in the category of the highest yearly income reported by the farmers. The lowest income here (and what is supposed to be his highest ever income earned in a year in the last five years) was Kshs. 11,900/=. The highest income reported here was Kshs. 294,060/=. This gave a range of Kshs. 282,160/=. As was seen above, the minimum income received in this case is also far below the average income (Kshs. 51,027/=). These findings are quite in accord with earlier observations by Clough (1968:106) and Clayton (1983:48). The latter had concluded that such variations in income on the farm were due to the differences in farm family characteristics such as size, ability and energies expended

in the farm, among others. This variability in the Nzoia scheme
may be explained in a number of ways, but largely in the number of
acreages (farm size?) a farmer has set aside, for our case, for
what he considers a major activity on the farm. This realisation
should also therefore shed light on the degrees of innovativeness
amongst the farmers.

There were only six farmers in the scheme who had made attempts
to obtain dairy farming development loans. These ranged from
Kshs. 20,000/= to Kshs. 50,000/=. Three of the six loanees actually
received the loans in cash form, while one received the loan in
form of dairy cows and grass seed for pasture development. The other
two received it in form of dairy cows. In a way, it is interesting
to note the quite low rates of loan use in dairy farming development.
One possibility is that the farmers are self-sufficient and can
finance their dairy farming development from their overall farm or
off-farm incomes, and hence they are less inclined to seek for such
loans. On the other hand since some farmers had reported the fear
they have about the reliability of dairy farming, it may simply be
a question of risk aversion.

From just these few six cases, two farmers were unsuccessful with
the loan as the animals actually died before any gains. They
reported never to have followed it up to take another loan because,
as one reported, the loan was quite a disappointment. The other one
has yet to complete payment of the previous loan. The other four

farmers benefited from the loan to a large extent, in addition to having an increase in milk supply. Two of the successful loanees were able to built themselves a permanent house. Of the remaining two who made gains in the loan, one was able to pay all the farm loan and was in a much better financial position, apart from building himself a house. The remaining farmer also paid farm loan and is in a much better financial position than before the loan.

Apart from one farmer who used some off-farm income to re-pay the dairy farming loan, the other five squared it through milk production sales and other agricultural production activities. This shows that given the opportunity, most farmers in this scheme are in a favourable position to make a lot of development through the credit facilities, and be able to finance loan repayments from farm activities.

On the other hand, the situation may not be that real. A look at the repayment capacities of farmers of the initial farm loan - (one which went into the purchase of the former white highlands, and other initial capital investment such as fencing material, dairy farming equipment etc) - is not encouraging. Slightly over twenty years, on average, since farmers joined the scheme, only thirty farmers had completed repayment of such loan. The other seventy farmers studied approximated the amount of loan remaining ranging from Kshs. 4,000/= to 40,000/=. On the average, each farmer has about Kshs. 12,000/= to complete the payment.

In an earlier study on settlement schemes in the former
white highlands, Clough (1968:56) found the same problems with
repayment of the loans on time. For the small scale farming
schemes, this was then attributed to very low incomes that it
would not have been easy for the farmers to repay their loan
instalments to the department of settlement. That such incomes were
only sufficient to provide them with reasonable levels of living;
and that the farmers studied never made a cash income which even
approximated or approached the target levels set by the settlement
planners.

As we had seen earlier, the levels of income in the Nzoia
scheme for some farmers are relatively too low, and highly variable.
This might be one reason why about three quarters of the farmers in
the scheme have never been able to offset their farm loans. The
income levels might just be on such scales that they are only sufficient
to augument the subsistence financial obligations with almost none
left to substantially go into the loan repayment. Such farmers may
not just be putting more energies in their farming, and thus not
good entrepreneurs. This in a way also means there is continually
low finances available for possible investment in general farming, and
dairy development, in our case. This is even coupled with the
high number of dependants (14) reported by respondents, on the average.
The farmers interviewed reported all sorts of help to such dependents,
from financial aid, providing them with a piece of land for them to
farm independently, to provision of all subsistence needs.

Gwyer (1972:5) writes that Clayton (1970:440) saw that the programmes crop intensification and land registration in small scale agriculture had succeeded in increasing its employment capacities as they lead to an increase in commercialized agriculture. The observation was that employment increased because farmers become more better-off and thus withdraw into entrepreneural role and employ others to help them on the farm. That crops such as tea, coffee, and pyrethrum generally have higher labour requirements per acre than food crops like maize and beans. That the purchase and application of material inputs by farmers not only raises the crop-output, but also increases labour demand; and that use of material inputs such as fertilizers and insecticides, through raising crop yields increases labour demand not only at harvest times, but raises marginal productivity of labour in such operations as weeding.

Odingo (1966:148) had however earlier expressed his pessmism at how some rural programmes in agriculture could help alleviate the unemployment problems through land settlement in the Kenya Highlands. The problem had been that the majority of the High-Density Schemes were designed to use family labour. As a consequence, this had little provision for employed labour. The Nzoia scheme differs from the above schemes, in that it falls in the Low-Density Settlement schemes. It is relatively about double the acrage of High-Density schemes. The picture presented on employment in this scheme seems rather gloomy. The study reveals that there were a total of fourty-one farmers who had not employed any labour in the

last five years, in the dairying enterprise, before the study.
There were other fifty farmers who only reported an average of one
employee. Six farmers had had two employees and only one had an
average of four employees. The tables 2 and 3 below show more
clearly the employment situation.

Table 2: Volume of labour used in dairy farming in the Nzoia scheme:

Volume of Labour	No. of Farmers	Percentage
0	41	41
1	50	50
2	6	6
3	2	2
4	1	1
Total	100	100

Table 3: Volume of labour used in other farm activities:

Volume of Labour	No. of Farmers	Percentage
0	73	73
1	20	20
2	4	4
3	2	2
4	1	1
Total	100	100

Table 3 above shows even a more disappointing picture in relation to total labour used by individual farmers. The majority of the farmers thus reported having had no employed labour in the scheme in the same period. Only a small minority (20%) had an average of one. The other 7% had between 2-4 workers. These figures took into consideration those workers paid on a monthly basis as considered permanent.

Although Gwyer (1972:5) depicted a rather encouraging occurence in terms of increased rural agricultural employment possibilities, he hastened to add that the trend may be curtailed by cash shortages at the time of application, since many demands of the farm households especially school fees have exhausted all receipts from the previous seasons crop. That cash shortages may also preclude the hiring of labour to meet the seasonal peaks. We have no doubt that the low rates of permanent labour employment in the Nzoia scheme is affected by the same conditions, especially the large number of dependents reported per household. In the same light, there was not much concrete evidence that farmers used casual labour whenever farming activities demanded. The only possible conclusion would then be that most farmers resort to their 'dependents' labour reserve, for what they could have hired for cash, and especially given the overall low incomes for a large proportion of the farmers.

That there is an intrinsic problem of low income levels to most farmers in the scheme can be reflected in the levels of labour

cost those farmers who employed labour actually offered. The maximum total average cost of labour ever paid in the five year period was Kshs. 2,500/= by a single farmer, per month. The minimum ever paid was Kshs. 80/= to a herds boy. A total majority of farmers (28) reported paying an average labour cost of Kshs. 245/=.

In short therefore, our conclusion from the foregoing discussions reveal that the lesser investments in labour in agricultural activities, and dairy farming in particular, maybe due to the low levels of incomes earned by the majority of the farmers in the scheme. The findings on dairy farming development investment in the scheme show that there is a significant association between having additional income sources, and the tendency to make investments in dairy farming development. The contingency coefficient is 0.61299, with 35 degrees of freedom. These findings contradict those of Pollard (1981:580). However, in our case, the contradiction may result from the fact that there were very few farmers who ever had any other sources of off-farm incomes in the scheme.

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* Note: Most of the contingency tables in this study have most cells with less than five cases. This occurence invalidates the discussion of the chi-square.

Table 4: <u>The relationship between occupation and types of dairy farming investments:</u>

OCCUPATION TYPES	PREFERRED DAIRY INVESTMENTS							
	NONE	CATTLE PASTURE	PASTURE SPRAY	CATTLE	PASTURE	DIP SPRAY	CATTLE PASTURE SPRAY	TOTAL
FARMER/TEACHER	5	2	0	1	0	0	1	9
FARMER/HOUSEWIFE	8	0	0	0	1	0	0	9
FARMER/SELF EMPLOYED	0	3	1	0	0	0	0	4
FARMER	23	15	2	10	6	1	2	59
FARMER/OTHER	6	5	0	3	2	0	3	19
TOTAL	42	25	3	14	9	1	6	100

In addition, the findings also indicate that the type of occupation reported by the farmers is also associated with investments in dairy farming development. This is shown by a contigency coefficient of 0.49627, with 28 degrees of freedom (see table 4 above).

On the whole there were 58 farmers who made some investments in dairy farming development in one field or another. Some farmers had reportedly made substantial gains as a result of such ventures. Twenty seven farmers reported having generally increased their milk quantity levels, and thus an added higher income from dairy farming. Nineteen farmers reported, in addition to gains above, having been able to acquire other development loans in arable farming from the guarantee of repayment through milk sales. Seven farmers were able to built themselves permanent houses, acquired other farm development loans, and had produced larger milk quantities, and thus higher incomes also. Two other farmers were able to acquire other farm development loans; one farmer made gains in all the reported gains above; while another built himself a permanent house and acquired other farm development loans.

In general therefore, almost all of the farmers who made some dairy farming investments on their own gained from the same. This might be the explanation for most of the interviewed farmers willing to make even more investments in milk production were the prices of milk to be increased. Twenty-one farmers saw that investing more

would result in higher returns and a more steady monthly income from milk production. Twelve farmers foresaw a steady monthly income; while eleven others aimed at generating more income from milk production. Another eleven wanted to generate a more steady income monthly; Nine farmers hoped to generate more income and therefore higher returns; while seven farmers aimed simply at higher returns in milk production (see table 5 below).

Table 5: Contemplative reasons for willingness to invest more in Milk production:

Reasons	No. of farmers
Higher returns and more steady monthly income	21
Steady monthly income	12
Generate more income from milk	11
Generate a more steady monthly income	11
Generate more income from.milk and thus higher returns	9
Generally higher returns from milk production	7
Total	71

However, with lower or reduced milk prices, there were thirty-four farmers who could not foresee themselves sacrificing more investments in milk production. This was due to the lack of

additional funds to channel in the dairying enterprise (14 farmers).
Four farmers had no qualified workers to enable them stake more
in dairy investments (as the farmers themselves were not always
available full-time on the farms); while one farmer had no
qualified worker nor additional funds. Three farmers were scared
of the reported frequent cattle deaths; two farmers could only
make more investments in a paying enterprise. While another two
reported having inadequate land. Five farmers lacked additional
development funds and were also scared of cattle deaths; while three
farmers reported that to them animals were 'God-given', and hence
could not reduce them whether milk prices tumbled. (see table 6
below).

Table 6: Inhibitive circumstances against more investment in milk
          production with lower milk prices:

Reasons	No. of farmers
Lack of additional development funds	14
Non-availability (lack) of qualified workers	4
Lack of funds and no qualified workers	1
Scare of frequent cattle deaths	3
Can only invest in a paying enterprise	2
Inadequate land	2
Lack of funds and scare of cattle deaths	5
Animals 'God-given'	3
Total	34

4.1.2: The nature of extension services and their influence on the farmers' performance in the scheme:

The tables 7 and 8 below show the ages and educational standards of the farmers interviewed in the scheme.

Table 7: Farmers' age distribution:

Age Category	No. of Respondents	Percentage
Upto 50	18	18
50 - 59	54	54
Above 59	28	28
Total	100	100

The respondents ages ranged from 31-86 years, with a mean of 54 and a mode of 50 years. As the table above shows, most farmers are actually in their late ages. This is to be expected because most should have joined the scheme (between 1966-69) when they were in their late twenties or early thirties in age. The more younger respondents are more likely to be the children of original farmers who were registered for the farms when the scheme was being opened for settlement.

Most of the respondents and their spouses as shown in table 8 had at least attained the basic primary education, though there are

variations by sex. The number of male respondents was 93 because seven female respondents were widowed and hence their dead husbands educational levels were not recorded. This table shows that of the 93 male spouses, only 5 had never had any schooling, as compared to 24 female spouses. However, more women had had upto standard four level of education, compared to 27 males; and 28 and 19 respectively for education levels upto standard eight. It is however shown that males attained higher educational levels (42) of form two and above, compared to 16 females. This might be explained from the fact that in the olden days, most women never achieved higher levels of schooling, if ever they went to school, and more so as the ages of the farmers are mostly beyond 50 in the Nzoia scheme (see table 4).

Table 8:   Levels of (respondents) educational Standards by Sex:

Educational Standards	Males	Females	Total
None	5	24	29
Upto Std 4	27	32	59
Upto Std 8	19	28	47
Form two and above	42	16	58
Total	93	100	193

George and Chokshi (1977:7) had concluded that age and levels of education of farmers had an influence on the farmers performance and

the nature of the animals kept. Since most decision makers on the
farms in this study were found to be male, then our tentative
observation should be that use of extension information should
likely be higher, and performance too. The assumption is that
educational levels, and therefore modernity, have a bearing on the
likely innovativeness degrees of individual farmers, in liaison with
the extension advise.

Over half of the interviewed farmers (54) in the Nzoia scheme
reported never to have had any prior dairy farming knowledge when they
joined the scheme. The remaining 46 had various explanations to
their previous encounters with some form of milk production
experiences. Thirty-nine reported having had such in their previous
home areas, having mainly centred around the local Zebu breeds.
Even though, such production was never done on commercial lines,
rather mainly for the subsistence in the household. Thus a total
of 93 farmers interviewed reported never to have been marketing their
milk exclusively for the purposes of cash incomes. Other farmers
with milk production knowledge reported having had prior training in
either schools or colleges (4 farmers), through attending the
National Agricultural shows, listening to radio agricultural
programmes and reading related newspapers (1); and two others
had either had prior training, visiting agricultural shows or listening
to radio agricultural programmes and reading agricultural newspapers.

However, it had been the Kenya government's objective that all farmers undergo some kind of inductive courses at farmers training colleges (F.T.C.s) (such as Lugari F.T.C. in the region) in dairy farming before or immediately they joined the scheme. In the course of the interviews with the farmers, we found that some had never attended such courses. For instance some reported having only sent a workman or any other relation, and some of whom were never any more staying on the farms at the time of the interview. As Pollard (1981:579) also found, all the farmers in the Waller Field (scheme) in Trinidad were expected to have attended some dairy course prior to entry into the scheme. But about 15% of them reported never to have attended even the induction courses. This was attributed to likely take over of farming operation by wives of the original plot recipients upon death or separation from their husbands or upon his leaving the farm for alternative work elsewhere.

George and Chokshi (1977:88) concluded that for farmers to use the help of development agencies (and/or other extension services), they should be aware of some of the relevant facilities. The task of making farmers more knowledgeable about such services largely rests with the extension services personnel and the related media of communication (Refugio, 1972:   ). Chitere (1976:44) also observed the greater need for extension education for both the farmers and junior extension officers. That most problems faced by farmers revolve around lack of know-how, particularly in the more complicated dairy farming development and related routine operations. These

observations tend towards our supposition that the degree of
extension service input can have a leaning towards an increase in
farm productivity by individual farmers. But Chitere (1980:47)
saw that the extension efforts of educating farmers, and provision
of support services, get influenced by two factors - the process of
communication of the information to the farmers, and, secondly, the
strategies employed in contacting and involving rural farm families
in agricultural programmes.

The findings from the Nzoia scheme show that all farmers interviewed
were actually knowledgeable about the existence of the extension
services. Such included agricultural officers, veterinary and
community development officers. The majority reported, however,
knowledge of only the first two officers (88 farmers).

The farmers were asked to state the number of times they had
been visited by any of the extension personnel in particular time
periods. There were only six farmers who reported having been
visited once in the last week prior to the interviews with them. In
the last one month prior to interview, sixteen farmers had been
visited once; while in the last three months, fifteen farmers had
been visited once, and two farmers had been visited twice. In the
last six months, fourteen farmers had been visited just once; two
farmers had been visited twice and one farmer reported a record six
times of visitations. In the last five years, twenty-four farmers
had been visited once; five farmers had been visited twice; two

farmers had been visited thrice, and one farmer had been visited eight times.

Although we depended largely on the farmers' own memory whether they had been visited by the extension personnel at any one time, the findings here reveal very low extension service work in the scheme. These findings are in accord with an earlier observation by Roling et al (1973) who noted that the individual farm visits method is widely used by agricultural field workers in this country (Kenya). The author however concluded that the number of farm visits made by junior extension workers is very low (Chitere, 1980:49). It has also been noted that other methods used by the extension services to educate farmers included recruiting the latter for courses, demonstrations, briefing on new development in farming at barazas and co-operative society meetings. That those owning radios may listen to broadcasts, or may also read agricultural newspapers or obtain information about improved farming from neighbours and other knowledgeable persons in farming communities (Chitere, 1980:49).

However, the findings about these other methods of educating farmers were no better placed in the scheme. There were only fourty-two farmers who reported attendance of barazas at one time or another, many of which were largely administrative oriented. This is why even most of those farmers who reported no attendance indicated that such programmes in farming are no longer seriously organized in the scheme. There were even fewer farmers who ever read agricultural

and related informational newspapers (20 farmers). The realisation
was that the farmers were ignorant about the existence of such
newspapers, more so when probed to mention their particular
names and their scope (see table 9 below). The highest readership
was reported for the farmers' voice agricultural newspaper, for
which eleven farmers reported reading.

Table 9: Agricultural newspaper readership by farmers:

Type of newspaper	No. of farmers	%
Farmers' voice	11	11
Kenya Farmer, Coffee Bulletin, Farmers' voice	3	3
Farmers' voice; Kenya Farmer	2	2
Kenya Farmer	2	2
Coffee Bulletin; Farmers Voice	1	1
Kenya Farmer; Coffee Bulletin	1	1
Farmers' not reading	80	80
Total	100	100

On the radio media broadcasts, there were 47 farmers who
reported listening to the agricultural radio programmes. Those who
reported not listening either never owned radios then or such
programmes were broadcast when they were always away. Even for some
of those who indicated listening to the programmes, it was realised
this was sometimes only coincidental. This was reflected in the
farmers limited knowledge of particular times such were broadcast

or particular aspects of farming they dealt with.

A total of 72 farmers had attended some National Agricultural shows held annually in various towns of Kenya at different times of the year. However, only 61 farmers indicated they had some gainful knowledge in dairy farming development. It should be made clear, however, that the large number of reported farmers having attended agricultural shows was due to the fact that the farmers were asked as to whether they had ever visited any agricultural show ever since joining the scheme. Table 10 below shows the usage of such media of agricultural information by farmers in the scheme. It should also be noted that there was alot of overlap in the usage of these media by farmers, hence totals more than 100.

Table 10: Types of media of agricultural information used by farmers.

Media type	No. of farmers	%
Agricultural shows	72	38.5
Newspapers	20	10.6
Radio programmes	53	28.3
Barazas attendance	42	22.4
Total	187	99.8

The individual farm extension visits were highly skewed towards th general arable agricultural farming. The only major strides towards

dairy farming actually involved the treatment of sick cattle by the veterinary officers, reported by 22 farmers. Twenty other farmers reported such visits as only having been routine work, which in most cases involved mere observations of the crops on the farm by the extension field officers. Twenty three other farmers reported visitations for routine work and other types of jobs done by the extension service, such as when a farmer wanted to establish a coffee plantation and needed the advice and directing by the field officers. There were 6 other farmers who reported being visited for the purposes of treatment of sick cows and other types of extension advice; 5 other farmers were visited for treatment of sick animals, routine work and other extension advice; one farmer reported being visited to make a farm plot demonstration (on techniques of maize planting), treatment of sick animals and other types of extension work; while one farmer had reported being visited for routine work and dairy farming advice. In this last case, the farmer reported being adviced to burn down the marshes on the farm to reduce the incidence of ticks on the farm.

In general, there was very little dairy farming development extension advice. There were only six farmers who reported having been visited specifically for some dairy farming work. Two farmers were adviced on dairy farming grazing methods; two others on the general dairy farming management, such as need to spray animals on the farm and bush clearing to reduce tse-tse flies; one farmer was given advice on how to feed milk to calves; while another farmer was

adviced to spray his animals one more time on the farm as there
were too many ticks on it.

In emphasizing the need for increased dairy farming advice
from the extension service, Chitere (1976:45) observed that the
enterprise entails a whole series of practices, such as correct
milking (times) and milk handling practices, pasture establishment
and utilization etc, each needing particular knowledge and skills.
It may perhaps be possible that the inadequacy of such an extension
service may be the undoing for better dairy farming development at
the individual farm level for some farmers. This inadequacy is
further exemplified in the nature of extension discussions the
farmers reported having ever held with the extension field officers.
In the five year period as the focus of our study, the majority of
the farmers (31) held discussion on coffee establishment on their
farms. This is a recent establishment in the scheme and appears
to have attracted the attention of the extension service more than
dairy farming in the scheme established much earlier. The assumption
could be that dairy farming must have been adopted and integrated
by the farmers by now, but it may be interesting to find completely
a different situation for a large majority of the farmers in the
scheme.

There were other 11 farmers who had been visited but who never
made any discussions with the extension field officers. Four others
reported just being directed on what to do, depending on the problem;

five others discussed on coffee spraying and prunning timings; 2
farmers discussed about maize planting techniques, while two others
discussed about the viability of dairy and poultry farming establishment
on their farms. One farmer had just discussed with the extension
field officers about the establishment of the most viable project to
undertake on the farm; 43 other farmers had not engaged in any
discussions with the extension service officials. These findings
generally show that the channels of extension service information are
inadequate, and on the whole 'one way street.' Roling and Ascroft
(1971) saw communication as emanating from a source, through a
medium, then feedback and effect. Some findings in the Nzoia scheme
reveal that in some instance, the extension field workers did not
follow-up whatever discussions made with the farmers. One farmer
reported putting off altogether a poultry project because he was not
able to receive more information from the extension field officer.

The Kakamega District Development Plan, (1984-88:35) had
recommended proper training and sufficient deployment in numbers of
the extension service if agricultural production had to be increased
drastically. The findings about the performance of the extension
service in the scheme shows a lot of inadequacy, as reported by the
farmers. Fourty-eight farmers reported that such performance was
very unsatisfactory. There were 45 other farmers who generally
considered them doing their work unsatisfactorily. There were only
3 farmers who were indifferent about the way the extension service does
its work; and 3 others who reported that they performed in a

satisfactory manner. However, further observation revealed that
the extension field officers were generally inadequate in numbers,
innefficient in their work and not easily accessible when farmers
have urgent problems (22 farmers). There were 18 farmers who saw
them as inefficient and not easily available. Eleven farmers saw
them as inadequate in their numbers and inefficient; while seven
others reported them as inefficient, inaccessible and biased in
their services against poor farmers. Six farmers saw them as
inefficient; five farmers reported inadequate numbers, inefficient
and baised service. The rest of the farmers reported the various
combinations of inadequate numbers, work inefficiency, inaccessibility
and biased service to them. All in all, the farmers in the scheme
appear to show a lot of disatisfaction about one of the most vital
components of rural development.

Implicit in such sentiments is that some farmers appear to view
their present low performance in the scheme in terms of inadequate
advice from the extension service. This in a way tends towards our
proposition that the intensity of extension service and the nature
of advice is crucial, more · so to the average farmers, in their
innovative capacities.

This study showed that most artificial insemination (A.I.)
service centres along the roads were actually situated quite far-off.
There were only 22 farmers who reported residing within half a
kilometre of such centres. (see table 11 below). A total of 52 farmers

stayed between one and two kilometres of such centres. Twenty

others were three kilometres away and over. The longest

distance reported was 3.5 kilometres and the shortest 0.04 kilometres.

However, the mean was as high as 1.592 kilometres. This shows that

72 farmers interviewed had to travel one kilometre and over to

get A.I. service. It is probable, therefore, that most of the

farmers interviewed were disollusioned about the whole operation of

the A.I. service. In this case a total of 55 farmers considered the

present A.I. service in the scheme as just very inadequate. Thirty-

three others viewed it as generally inadequate, while 4 others saw

that it was fairly adequate, and three farmers reported that it was

adequate.

Table 11: Distance covered by farmers to A.I. centres:

Distance in kilometres	No. of farmers
Upto 0.5 Km	22
Upto 2.0 Km	52
More than 3.0 Km	20
Total	94

Generally there was no farmer who reported getting A.I. service

on the farm individually. The table 12 below shows the ratings of

the A.I. service adequacy in the scheme by farmers.

Table 12:   The farmers rating of A.I. service in the scheme:

Degree of A.I. service rating	No. of farmers
Very Inadequate	55(%)
Inadequate	33(%)
Fairly adequate	4(%)
Adequate	3(%)
Missing/other	5(%)
Total	100

A total of 57 farmers reported that they used neighbours bulls
as an alternative to missed A.I. services. There were only 24
farmers interviewed who reported using or having 'bulls' on their
farms. Four farmers reported that in most times their cows mate
during dipping days; one reported that they mate at watering places
at rivers. Two farmers reported both during dipping and watering
times with therefore bulls from neighbours. There were twelve other
farmers who never responded, because five never had cattle presently
while seven used A.I. services always. See table 13 below.

It will be realised that what was clear from the study is that
most of these bulls used in place of missed or unavailability of
A.I. service are not necessarily pure breeds. This is as a result
of some farmers having introduced the zebu type of breed in the

Table 13: The farmers alternatives to A.I. service in the Nzoia
            Scheme:

Alternative used	No. of farmers
Neighbour's bulls	57(%)
Bull on the farm	24(%)
During dipping sessions	4(%)
During dipping and watering sessions	2(%)
At watering places	1(%)
Others	12(%)
Total	100(%)

scheme, with some of these bulls having been cross-bred from zebu

cows. As Goldson (1977:64) noted, this might also be compounded

by the problem of poor or non-dispossability of low quality bulls

due to the farmers ignorance. With time, the whole process of

uncontrolled breeding and underbreeding leads to gradual breed

degeneration, coupled with low levels of animal husbandry and inad

technical know-how in grade dairy farming by some farmers.

In a way, the foregoing observation may shed light in explain

why we considered that most farmers grade cattle had actually

degenerated in their breed conditions. There were only twenty

farmers whose cattle could be considered well managed, and with

satisfactory breed condition maintenance. The rest of the farmers

who had some dairy cattle reported having such with varying
conditions ranging from highly degenerated to just degenerated.
There were seven farmers without dairy cattle.

The contigency coefficient analysis shows that there is not
much significant association between extension discussions reporte
and A.I. service use or not by the farmers (0.36614). This is at
8 degrees of freedom. (see the contingency table 14 below).

Table 14: The association between the nature of the extension se
discussions and the use or not of A.I. services in the
scheme:

Nature of discussions	No. of farmers not using A.I.	No. of farmers using A.I.	To
Farm terracing	1	0	
Most viable project	1	0	
Coffee plantation establishment	23	7	3
Pruning; spraying coffee	3	2	
Maize planting techniques	1	1	
Dairying and poultry establishment	1	1	
Were directed on just what to do	2	2	
Has never arisen need yet	3	3	
Only came to treat cattle	1	4	

However, there is greatly a significant association between dairy farming advice and animal condition, (0.70711), with 6 degrees of freedom. This may go in to explain the vitalness of extension service in the adoption capacity of farmers to innovatio On the other hand, this high association may be explained from the fact that those farmers who received the dairy farming advice were only six (see table 15 below).

Table 15: <u>Association between the nature of dairy animals conditi and the extension advice:</u>

Nature of advice	Total number of farmers reporting Natur of animal condition			
	Fairly Degener- ated	Degenerated	Breed main- tain- ed	Tota
Grazing methods	1	0	1	2
Dairy management	0	1	1	2
Calf Feeding	1	0	0	1
Animal spraying	0	1	0	1
Total	2	2	2	6

The findings of this study about dairy farming management capacities showed that most farmers were not doing good farming.

There were only two farmers who were found to manage their dairy farming to a very great extent. However 29 farmers managed their stock to a great extent. Hence, only about a third of the farmers studied could be termed as doing better. There were 26 farmers who were rated to manage their cattle to a small extent; while sixteen were rated as managing to a very small extent.

In this case, it was observed that three quarters of farmers were not excellent dairy farming managers on their farms. As were seen, they may therefore be termed as not innovative enough, an explanation that may be implicit in the found low levels of extension service in the scheme. The low milk levels reported in the scheme, as compared to the initial levels, may also be explained by the same circumstances (see tables 16 and 17 below). Table 17 shows that there were only 34 farmers who reported producing somewhat more milk presently. There were three farmers who never had registered any changes in their milk levels; while 63 farmers reported producing lower milk levels presently.

Table 16: <u>Levels of dairy farming management ratings of farmers:</u>

Management levels/capacity	Number of farmers
To a very great extent	2
To a great extent	29
To some extent	26
To a small extent	23
To a very small extent	16
Missing	4

Table 17:   A comparison of milk levels for individual farmers
            since joining the scheme:

Present milk levels	Number of farmers
Now much higher	28
Now slightly higher	6
No change	3
Now slightly lower	8
Now much lower	47
No milk now	8
Total	100

Most farmers who produced less milk levels presently explained
that they considered their present dairy farming management as
having deteriorated, compared to the initial times when they joined
the scheme (see table 18 below). Another ten farmers, apart from
the management problems, reported problems with the extension
services. In this latter case, the problems were seen in terms of
inadequate veterinary and A.I. services, inadequate cattle drugs and
unreliable A.I. services. The mangement problems related to lack
of adequate technical know-how, inadequate capacities to supplement
cattle feeds, having fewer animals presently, degenerated animal
breeds, improper breeding methods and frequent cattle drying-up
and long periods before cattle calved down.

Table 18: **Explanations for lower levels of milk in the scheme**
           presently:

Reason(s) Given	Number of farmers
Poor management	37
Poor management and extension service problems	10
Poor management and problems of Ancilliary services	6
Poor management and lack of adequate capital	7
Poor management, problems of extension services and Ancilliary services	4
Ancilliary services problems	1
Total	65

Seven farmers reported poor management and inadequate development

capital at their disposal. The latter related to having inadequate

liquid capital, expensive cattle drugs and paying substantial

amounts of fees. There were six farmers who reported management

and ancilliary services problems. The latter was in terms of

unavailability or inadequate piped water on the farm, inadequate

dipping facilities or poorly maintained and hence ineffective.

Four farmers reported problems of extension services, management

and ancilliary services, while one farmer had just ancilliary service

problems.

However, a look at   general problems reported by all
farmers shows that these same problems are not only peculiar to
farmers who were found to produce lower milk quantities.   It may
then be that what affects the general and individual farmers milk
production capacities is the magnitude and size of the various
problems.   Nevertheless, the differences will be compounded by
personal characteristics such as individual energies invested
in the enterprise, entrepreneurship and a good foresight for the
future planning on the farm.   Table 19 below shows the various
problems encountered by farmers since they joined the scheme.

It can be seen that management problems preponderate.   Eighteen
(18) farmers combine these with those of extension services and
ancilliary services.   In addition to what we already saw about the
breakdown of extension services problems, here will also include
inadequate cattle drugs or their unavailability, poor veterinary
attendance and uncontrolled cattle mating due to too many 'freelance'
bulls owned by some farmers.   Ancilliary also includes poor feeder
roads; far-off milk collection centres, poor water supply system
and its management, cattle diseases due to many prevalent ticks
(probably due to poor or inadequate dipping facilities).   Management
problems also incorporate cattle deaths, cattle degeneration,
inadequate pastures, ticks in marshes, land dispute, and diseases
on the farm.   Capital problems will also include expensive cattle
drugs and feeds.

Table 19: <u>Major problems encountered by the farmers since joining</u>
<u>the scheme:</u>

Kind of problems	No. of farmers
Management; Extension service and Ancilliaries	18
Management and Ancilliaries	17
Ancilliaries	13
Management and capital	10
Management; capital and ancilliary	7
Management, capital, extension and ancilliaries	7
Capital; Extension; Ancilliary	7
Capital and Ancilliary	8
Management	5
Management, Capital Extension	3
Ancilliaries	2
Development capital	1
Management and extension	1
Capital and extension	1
Total	100

The contigency coefficient for the cross-tabulation of
management capacity with the kind of animals farmers were presently
keeping is highly associated, at 0.68742. This is at 52 degrees of
freedom. These findings tally with those of Ruthenberg (1966:73)
who found considerable decline in animal husbandry, despite
government support, as most settlers were not acquainted fully
with the requirements of commercial dairy farming. He saw that

there had been inadequate feeding of dairy animals during the
dry seasons, and that generally, calving intervals averaged twenty
months, and calf feeding became quite a problem. The conclusion
here is that these problems still persist for the Nzoia scheme. In
another study, Pollard (1981:581) had similarly seen that, with time
there had been gradual depletion of stock numbers and increased
degeneration of pasture conditions, in the line of animal husbandry
problems.

The findings in the scheme also showed that there was very little
record keeping by farmers. There were only eleven farmers who
reported ever having made farm records at one time or another in the
last five years. See table 20 below. Note that the type of records
kept overlap for each of the eleven farmers reported. All these
farmers did not make any records on the visits by the extension
service, and on any discussions and recommendations if there were
any engaged into. Generally, these records tend towards the inputs
costs and outputs made in the named agricultural enterprises. All
the farmers who kept these records believed that such were beneficial
in their farming. In this case, seven farmers reported that they
wanted to know the benefits and/or losses in their agricultural
farming. The other four reported that they wanted to account for
the various inputs and outputs in their farm enterprises. This
similar low rates of record keeping by farmers had also been
observed in a similar study by Pollard (1981:565).

Table 20: The types of records kept by farmers in the scheme:

Type of records kept	No. of farmers
Dairy farming cattle feeds and treatment costs	6
Cattle feeds only	3
Milk production trends per cow	8
Milk production trends and calving frequencies per cow	1
Inputs and outputs in arable	9
Coffee spraying expenses; and costs of inputs and outputs in maize	1
Inputs in maize and horticulture	1
Balancing in inputs and outputs	10
Salaries for workers	1
Total	40

There were a total of 36 farmers in the sample who reported not to have paddocked their grazing fields, allowing their animals to 'roam' everywhere in the pasture fields on the farm.

Even the sixty-four farmers who reported having paddocked their grazing lands were in some instances found not to be strictly observing rotational grazing procedures. For instance, some paddocks had broken fences between them, and there generally never appeared a concrete rotational grazing procedure followed therefore.

This was partly observed from the conditions of pasture fields which had almost no signs of fallowness. This problem was even further compounded by the very realisation that most of the pastures were naturally growing and with almost no management of such. The possibilities of the misuse of pastures under such conditions were bound to occur, making them become of poor quality. This may explain why we found that fifty-two farmers reported that they believed their pasture resources were generally inadequate for their cattle.

In an attempt to offset this pasture inadequacy, some farmers reported that they had planted nappier grass with which they supplemented the shortage. These twenty-four farmers also bought other supplements such as maclik, bran etc. But eleven farmers reported grazing favours from neighbours who appeared to have plenty of pastures. There were five farmers who reported grazing along the sides of the road only; while five others reported sometimes grazing along the sides of the road or had small resources of planted nappier grass. Two other farmers reported that they grazed their cattle along the sides of the road, at the market place or sometimes on the neighbours farms. There were three farmers who reported that they grazed their cattle along the road, on their neighbours farms or had planted some nappier grass and sometimes bought some feed supplements. Two farmers just reported asking favours from their neighbours.

This realisation about the inadequacy of pastures for dairy cattle simply means some farmers are unable to cope with the

requirements of the dairy farming innovation in the scheme.
Further more, such kind of grazing procedures, especially along
the road sides and on neighbours farms or market places, may prove
quite a problem in attempts to control cattle diseases in the
scheme.

4.1.3: The quantity of milk produced versus consideration of dairy farming as major activity at farm level:

The realisation in the Nzoia scheme was that farmers mainly
engaged in two farm activities, dairy farming and maize production.
The other activities the farmers reported engaging in, but not on
full-time basis, were planting sunflower, beans, irish potatoes, and
simsim. However, as was noted elsewhere, there was problem of
computing their income in the last five years, since most farmers
never considered them as major crops, and in which they engaged
only occasionally. In this case, the only major activities were
the two initial ones above, and which thus formed our basis of
comparison for the farmers in choosing which as the major activity
on the farm.

It had initially been observed how income levels were quite
disparate in the scheme. In addition, such in the scheme would
also be accounted for by what a farmer considers as the major activity
on the farm, and the number of acrages (farm size?) he has set
aside for the same. The majority of the farmers (54%) in the scheme

reported engaging in milk production as their major activity on
the farm. Another 45% reported having arable farming (maize
production) as their most important activity on the farm. The
others, one had no idea of what was considered the most vital
activity he engaged in, while the other remaining was a case of
an 'abandoned' farm on which no production activity ever took place.

It is our belief that this differentiation in electing
what to specialise in as a major activity or enterprise can never
be termed coincidental, on the part of the farmers. It is
interesting to note the nature of accompanying criteria employed by
the farmers in the scheme. At a glance, the conclusion we can
make is that these reasons used centre mainly around the personal
attributes of the individual farmers in the scheme. The 50
farmers among those who considered dairy farming as their major
activity (53 in total) reasoned that the activity provided a steady
monthly income likely to offset most of the current expenditures
and other financial emergencies both on and off the farm. The other
three farmers majoring in dairy farming considered the activity more
labour saving, compared to the general arable farming enterprise.
However, also implicit in this reason is that they also derive a
more steady monthly income from milk production.

There were eleven farmers who engaged in arable farming
because they considered it relatively less risky in comparison to the
precarious dairy grade animals "where you are never sure when cattle

diseases strike, and might easily wipe out the whole herd." Such
farmers would thus most likely be risk averse. There were other
eleven farmers who engaged in maize production as a major activity
because they fetched quite a lumpsum yearly income from the same.
Such had also considered that despite milk production providing a monthly
income, sometimes this income was too low to adequately augment all
the financial requirements on the farm. A particular example cited
was that usually at the beginning of every year, for some, the
financial constraint was so heavy that they could only manage with a
lumpsum income. To them, this was provided for from the sales of
maize from the previous year's harvest. The reckoning is that there
is usually higher fees amounts to be paid when schools open for
first terms compared to other terms in the academic years. School
fees payments made by the farmers averaged Ksh. 11,000 per year over
the last five years each year. The minimum however was Ksh. 700
as compared to a maximum of Ksh.32,000 for one farmer who reported
having a child schooling in India.

On the other hand, there were ten farmers who engaged in maize
production as a major enterprise on the farm because it was the
only income earning source on the farm. Such also might have kept
some milk animals providing subsistence milk to the household. Nine
farmers considered arable farming as less complicated and hence the
input in terms of their management also relatively less demanding.
This was in addition to one farmer who actually considered arable
farming as needing very little actual technical knowhow. One

farmer never engaged in commercial dairy farming because the
family operated the same on a different farm elsewhere; while two
farmers had maize farming as the only activity on the farm then.
There were two missing responses, thus one farmer was unable to
make out what he majored in between dairying and arable farming, while
the other had no productive activity on the farm presently having
been engaged in the formal sector for employment.

The production of milk in the Nzoia scheme was found generally
to be extensive in nature. In this case, the farmers kept extensive
pasture fields on which the milk animals grazed, in some cases on 'free-
lance basis' as the farmers had not divided such lands into paddocks
(36 farmers). However, the majority (64) reported having paddocked
their grazing lands. Some farmers reported having planted nappier
grass, but even this was mainly fed to the cattle during milking
times. It is therefore, possible that the acrage amount spared for
the major activity on the farm corresponded, particularly to dairy
farming as the major activity.

The mean acrage reported by the farmers under their major
activities was fifteen acres. But the minimum was three, as
contrasted to a maximum of 75 acres, in the case of a farmer who
owned more than one plot in the scheme.

These findings, inter alia, are concurrent with those of George
and Chokshi, (1977:2) in their consideration of dairy farming (and

in our case, decisions in what to engage in as a major activity)
as a viable activity. For their case, farmers had to grapple with
certain crucial decisions at the individual farm level. They had
to decide on how much to invest in dairy farming (e.g. in terms of
pasture land); what kind of milk production practice to be adopted
(such as extensive or zero-grazing); and how to utilize the milk
so produced at home. Accordingly, such decisions by a farmer should
determine the quantity of milk produced; land utilization (patterns),
purchase of inputs, family consumption of milk, dependence on
middlemen and interaction with local community in terms of organizing
collective activities.

On the other hand, Carlstein (1974:1) observed that in the
reorganization of large scale social systems, as regions (the Nzoia
schemes?) or nations, involves huge human projects of tremendous
range and complexity. That, however, such could (easily) be limited
by the capacity of performance within its institutions, and limited
capacity to transform them. Such limitations, and (likely)
potentials, could perhaps be better understood in the context of
how the population in a region (individual farmers) is able to use
its time and space (land resources) resources for different types
of individual and collective projects. In this case, the author
appears to hold that individual farmers capacities and perceptions
are crucial at the individual farm level performance. This is
supported by Mbilinyi (1976:68) that in peasant farming, differences
in production emanate from their perceptions about such areas of
decision making as what to produce; method of production; quantity

to produce of each enterprise (milk and maize); when to produce
and when to buy and sell.

The data on dairy farming production levels in the scheme shows
that most farmers general production is low. Sentiments expressed
by some farmers appear to tilt towards the thoughts that there is
generally inadequate advice from the extension service. Production
levels in milk were considered in the dry and wet seasons. During
the former, a majority of sixty-seven farmers reported producing only
upto ten kilogrammes of milk for sale. There were fourteen others who
produced upto fifteen kilogrammes, while only twelve respondents
produced beyond sixteen kilogrammes and above of milk for sale.
See table 21 below:

Table 21:   Amount of milk in kilogrammes supplied for sale in the
            Nzoia scheme during the dry seasons

Number of kilogrammes supplied for sale	No. of farmers	%
Upto ten (10) kg	67	72
Upto fifteen (15) kg	14	15
More than 16 kg	12	12.9
Total	93	99.9

There were seven farmers who did not presently have any dairy
cow on the farm and were therefore not supplying any milk for sale.

Table 22 below shows the levels of milk supplied for sale
during the wet seasons in the scheme. There were fourty-six farmers
who produced upto 10 kilogrammes; twenty others produced upto
15 kilogrammes; while the remaining twenty-seven produced beyond
sixteen kilogrammes. These findings show that most farmers produced
and supplied more milk for sale in the wet seasons than in the dry
seasons. This occurence may be explained simply from the fact that
there is relatively more plenty pastures (natural) available to the
animals, and in turn which produce a lot of milk. At face value,
it indicates somehow most farmers depend on 'nature' in much of
their dairy farming. This may go along way in justifying that there
is little manipulation undertaken, generally, for increased milk
production for most farmers in the dry seasons.

Table 22: Amounts of milk supplied for sale during the wet seasons
in the scheme by farmers:

Number of kilos supplied for sale	Number of farmers	%
Upto 10 kilos	46	49.4
Upto 15 kgs	20	21.5
More than 16 Kgs	27	29
Total	93	99.9

Further evidence shows that nineteen farmers reported that their animals usually dry-up because of the dry seasons, implicitly times when there is pasture shortages. There were eleven others who reported that low levels of milk production resulted from the frequent cattle deaths, and which was also coupled with most of those surviving drying-up. Nine farmers reported cattle deaths as the only major problem here; while six others reported that low milk levels sometimes resulted from their animals being in-calf almost simultaneously, and consequently having dried up altogether.

Three farmers reported cattle deaths and sometimes being compelt to sell milk animals to off-set urgent financial requirements, such as school fees. Three others were even more explicit in their reasons that such were usually times when they had inadequate water and pasture shortages. Two farmers had problems of cattle deaths because they believed they exercised inadequate management and animal husbandry. One farmer reported frequent cattle diseases, such as foot and mouth rot which 'disabled' his milk cows frequently, and problems of cattle drying-up; while another saw that there were problems of cattle deaths and inadequate pastures. See table 23 below, which shows more explicitly the reasons provided by the farmers for producing very low levels of milk sometimes. The table shows there were other three farmers who reported problems of artificial insemination services. In this case, the unreliability of the A.I. service led to their cows missing the service repeatedly, and hence taking long periods before calving down.

Table 23: **Reasons reported for the low-levels of milk produced
in the scheme:**

Reported reasons	No. of farmers
Cattle drying up and dry-seasons	19
Cattle deaths and drying-up	11
Cattle deaths	9
Cattle drying-up and being in-calf	6
Cattle deaths and selling for fees	3
Inadequate water and pastures	3
A.I. service problems	3
Cattle deaths and inadequate husbandry	2
Cattle deaths and inadequate pastures	1
Frequent cattle diseases and dry seasons	1
Total	58

The table above shows that most farmers in the scheme, at
least, have increased dairy farming animal husbandry and management
problems. Ofcourse this could be compounded by other problems
such as inadequate capital resources to some farmers. This will
definitely make such farmers less able at sustaining successfully
the dairy farming innovation in the scheme. Additionally, most of
these farmers may elect dairy farming as their major enterprise
on the farm, but whose monthly income is relatively too low to
make any greater impact in farming generally.

The F.A.O. of United Nations, (1973:43) observed, in relation
to Sudanese Livestock development, that problems in low overall
livestock output was in relation to under-utilization and improper
utilization of the pasture resources, low herd productivity,
inadequate infrastructure and other service. These observations
appear to feature greatly in the Nzoia scheme's case. Nylholm
(1975:34) found that the economic behaviour of some farmers was
largely responsible for low-milk yields, such as non-breeding,
non-replacement of old stock, and non-purchasing of dairy farming inputs
(such as supplementary feeds). These sentiments were also observed
by Russel (1962:172), Wells (1968:8 - 64), F.A.O. of U. N.
(1967:10-19), Stotz (1979: 7-8) and Pollard (1981:581).

A cross-section of the farmers studied reveals that a total
of fourty-three farmers either actually owned some zebu cows
or had cross-breeds from local zebu cows. This was sometimes
in addition to having some grade dairy animals, but of poor
health conditions. There were other fifty farmers who reported
they owned grade dairy cows, which were of various health
and breed conditions. This was in addition to other smaller
livestock, such as sheep, goats and donkeys. There were two farmers
who then owned only sheep on their farms. This is in contrast to
the situation when the farmers were given an average of five grade
dairy cows on joining the scheme. But these had been of various
genetic breeds, such as the friesians, guernseys, Jerseys, Aryshires
and Redpolls etc. The findings thus indicate that there have been
differential capacities at the integration of the grade dairy

farming innovation amongst the farmers in the Nzoia scheme
generally. The resultant consequence has been that some farmers
have tended to fall back to the less 'fragile' zebu cattle with
less management requirements.

These findings in the Nzoia scheme are in accord with Kenya's
1974-78 Development Plan (p. 17) which saw that by 1974, 90% of all
adult female stock in the nation were zebu cattle, which have low
yields. In the light of the 1980-82 rough estimates of livestock
in the Kakamega District, our findings in this case show that
the pattern has not drastically changed since mid 70's. See table
24 below. This compares the absolute changes in numbers of
livestock of zebu and grade cattle in the district during the
years 1980-82. The statistic are adopted for the case of the Lugari
Division only, in which our area of study falls.

Table 24: The zebu and grade cattle population for Lugari Division,
Kakamega (Source: Kakamega District Development Plan
1984-88 pp. 29).

Type of cattle breed	Period		%change
	1980	1982	
Zebu cattle	5,343	91,573	1,614
Grade cattle	18,525	22,515	21

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These findings then show that there have been fundamental changes in the populations of Zebu cattle, compared to grade cattle. This change in zebu cattle can basically be attributed to their importations from the rural areas of the district and other surrounding regions. The explanation regarding this trend was seen in the light that high increases in number of grade cattle could not be achieved due to the high rate of deaths from tick-borne diseases, estimated to claim upto 30% of the progenies of A.I. and approved bulls (The Kakamega District Development Plan, 1984-88:29).

Implicitly, therefore, most farmers prefer the zebu cattle breed, and with various interesting reasons for keeping such. Of the fourty-one farmers with zebu or zebu-crossed breeds, 14 reported such being hardy and less risky. Six farmers kept such by virtue of them having resulted from uncontrolled mating with other farmers' zebu/cross-breed bulls; four farmers considered them more easily manageable. Six other farmers had such paid to them as dowry; four others kept zebu oxen for ploughing. There were three farmers who kept zebu cattle which provided them the only milk for subsistence and oxen for ploughing; while one farmer reported keeping zebu, vis-a-vis grade dairy cattle, whose calves he sold for school fees and oxen for ploughing his land. Another farmer reported that such had been given to their children by the grandparents and hence could not be disposed off lest they aroused the anger of the latter; and yet another farmer had actually allowed a workman to rear zebu cattle alongside his own grade cattle.

Two others, one kept zebu cattle because they were more resistant to diseases and used or consumed relatively less pasture quantities (and hence lesser investments), while the other used them for ploughing and had also received them for dowry.

The contingency coefficient analysis, in our case however, reveals that there is not a significant association between sex and the respondents disposition at keeping the zebu cattle or zebu cross-breeds, (0.31423 at 10 degrees of freedom). However, there is quite a significant association between ethnicity and the type of animals the farmers were presently keeping on their farms. Thus a contigency coefficient of 0.67409, with 84 degrees of freedom. In this case there is a suggested association that all the ethnic groups in the scheme have a preference for keeping grade dairy cattle and sheep on their farms (see table 25 below). There is also a marked association (0.56144) between ethnicity and the reasons for keeping zebu or zebu cross-breeds. In this case, all these groups consider such animals generally less risky to keep and are hardy. This is at 40 degrees of freedom. This is also reflected in the association between the farmers levels of management and animal husbandry, with the reasons for preference of zebu cattle or cross-breeds. Thus, the contigency coefficient of 0.66582, with 30 degrees of freedom.

Table 25: The association between ethnicity and type of animals farmers kept on their farms:

ETHNIC GROUP	NO ANIMALS	GRADE ZEBU C.BREED	CROSS-BREED AND SHEEP	GRADE AND CROSS BREED	GRADE AND SHEEP	ZEBU CROSS BREED AND SHEEP	ZEBU AND CROSS BREED	GRADE SHEEP AND CROSS BREED	GRADE SHEEP DONKEY	GRADE DONKEY	GRADE GOATS DONKEY	GRADE ZEBU SHEEP	SHEEP	CROSS BREED	GRAD
LUHYIA	4	8	5	9	21	3	3	5	2	0	1	4	2	1	9
KIKUYU	0	0	1	0	4	0	0	0	6	1	2	0	0	0	0
LUO	1	0	0	0	2	1	0	1	0	0	0	0	0	0	0
KALENJIN	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
KISII	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
KAMBA	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
TESO	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
TOTAL	5	8	6	10	29	4	3	7	8	1	3	0	0	0	0

The contigency coefficient for farm decision making with the
reasons for preference of zebu or cross-breeds shows quite a
significant association at 0.65578, with 30 degrees of freedom.
We found from the study that most decisions are made jointly by
husband and wife (59 farmers). Twenty-seven other farmers reported
that farm decisions were at the discretion of the husband; while
seven others (widows) reported decisions made by wives. Five farmers
reported decisions by husband and elder son jointly; while two
reported decisions by elder sons.

On the other hand, we found that the extension field workers
do not necessarily discuss with the decision makers themselves. Intact
most farmers reported that such field officers talked to anybody
responsible they found on the farm at the time of their visits (40
farmers). What then appears is that the 'anybody' has to make a
report to the decision maker later. This meant giving second hand
information which is bound to have a lot of technical loopholes.
There were nineteen others who reported that field extension officers
talked only to husband or wife whenever they came; while sixteen
reported talks to wife only. Four farmers reported talks to husband
only; two to elder wife only, while two others reported extension
officers talking to farm manager, and the other farm worker. There
were seventeen farmers who reported that it had been a long time since
the extension field officers ever visited their farms, and hence no

responses. (see table 26 below). .

Table 26: <u>The persons the extension field officers were reported</u>
<u>to talk to on individual farms in the scheme:</u>

Nature of persons	No. of farmers
Any member of the household	40
Husband and/or wife	19
Wife only	16
Missing response	17
Husband only	4
Elder/First wife	2
Farm manager	1
Workman	1
Total	100

One conclusion from these findings is that in cases where the
extension personnel talked to anybody, there is bound to be
communication breakdown and discontinuity by the decision maker in
taking up or applying extension service advice recommendations.
The conclusion implies that there may be erroneous reports to the
decision maker particularly where it relates to matters of
technicalities, such as the use and prescriptions of drugs and
chemicals as adviced. On the whole there are possibilities
if discarding some of the recommendations by the decision maker,

such as in cases where a household member initially discussed
with the extension officer, but later can not express the same
more coherently. Such a situation may have an effect on the
innovativeness degree, and the possible consideration of a major
activity on the farm, more so where such involves a lot of technicalities.
This may explain some of the reasons why some farmers have fallen
out with grade dairy farming, let alone as a major activity on
their farms.

However in relation to investment possibilities in dairy
farming as a major activity, there is not a significant association
with sex, 0.32180 with 7 degrees of freedom. But there is a
marked association between ethnicity and investment in dairy
farming development (0.53351). In this case all the ethnic groups
have a preference also for making investments in pasture development
and cattle replacement. In this latter case, 22.1% of the Luhyas;
42.9 of the Kikuyus and the only single Kamba had made investments
in this line.

There is also a marked association between the levels of
management capacity and the desire to invest more in milk production
(0.49331), with 20 degrees of freedom. In any case, higher levels of
management and animal husbandry should more directly be related to
the levels of innovativeness among the individual farmers. See the
contigency table below (table 27). There is also a similar kind of
association between those who make decisions on the farm and the

very desire for increased investment in milk production, 0.48532
at 20 degrees of freedom.

Eight farmers reported never to had replaced their old stock,
such as through purchasing others of better quality breeds for
increased milk production. It is however interesting to note some
of the methods reported by some farmers that were used to replace
some of their old stock.' Fourty-two farmers reported such
replacements occuring through natural herd replacements and
purchasing others in some instances. Thirty-five farmers reported
that their cattle replaced themselves naturally through procreation;
while four farmers usually purchased other stock. Four others
reported natural replacement and up-grading of zebu through cross-
breeding with grade cattle; while three others reported natural
replacement and receiving others through dowry payments to them. Two
farmers reported natural replacement, dowry payments and transfering
zebu cattle from their original home areas; while one farmer replaced
his old stock by cross-breeding zebu with grade cattle; yet another
reported having replaced his cattle through dowry payments only.

These findings show that slightly more than half of the farmers
in the scheme studied appeared not to be seriously in control of the
quality of their dairy cattle. This is in addition to the reported
problems of increasing low-quality bull population and uncontrolled
mating, therefore, when cattle meet during dipping days. This might
be an implicit impediment to average and below level dairy farmers in
the scheme taking to this activity as a major one on the farm.

Table 27: The association between the levels of management capacities in dairy farming and the desire to invest more in the same:

LEVEL OF MANAGEMENT CAPACITY	TO GENERATE MORE INCOME	GENERATE MORE STEADY MONTHLY INCOME	INCREASE OVERALL RETURNS FROM MILK	INCREASE THE MON-THLY INCOME OBTAINED	MORE INCOME AND AND HIGHER RETURNS	STEADY INCOME AND HIGHER RETURNS	TOTAL
TO AV. GREAT EXTENT	0	1	1	0	0	0	2 (2.8%)
TO A GREAT EXTENT	1	6	2	6	5	9	29 (40.8%)
TO SOME EXTENT	3	4	1	3	3	6	20 (28.2%)
TO A SMALL EXTENT	5	1	3	2	1	5	17 (23.9%)
TO A VERY SMALL EXTENT	2	0	0	0	0	1	3 (4.2%)
TOTAL	11 (15.5%)	12 (16.9%)	7 (9.9%)	11 (15.5%)	9 (12.7%)	21 (29.6%)	71 (100%)

4.1.4   The likely effects of family size on the quality of dairy
        farming development at the individual farm level.

The data on households populations reveal a relatively large
family size among the respondents in the scheme. The average number
of children was found to be eleven, casting a typical reflection of
the nature of family sizes in rural Africa, and most other developing
countries. This has been observed by Hunter (1969:8), Higgins
(1959:46), Kocher (1968:22) and Clough (1968:36) in relation to
rural development problems. It is interesting to note that despite
most households having monogamous marriages (66 households), as
compared to 34 which had polygamous, the large family is prevalent.
Caldwell (1968:74) made an observation that there was a relationship
between the number of children borne to a woman and her educational
level. In this case, women with lower standards of education were
found in most cases to bear more children during their reproductive
years. This situation appears to tally with our findings in the
scheme, as we had seen earlier, about the general low levels of
education among household women.

Further analysis on the situation in the scheme reveals that
despite the ages of the household, as was already seen, seventy one
households out of the one hundred studied had atleast a child yet
to go to primary school, with the highest number being six children.
There were only ten farmers whose children had all gone through
primary school. But of the other ninety remaining households, they
reported having between 1-11 children in primary school, while 24

households reported having five and above children there.

There were eighty-six households who reported that they had between 1-5 children in secondary school. Fourteen households reported having no children in secondary school. On the other hand, it is interesting to note that the study revealed that eighty-five households reported having no children in any kind of technical training. There were also eighty-seven households which reported having no children in any kind of colleges of post-school education.

However, there were fifty-eight households which reported having atleast a child in one kind of employment or another. There were fourty-two households which reported having no child in any kind of employment opportunities. This is a state of affair which is not encouraging in terms of the future development of the scheme, when the respondents (parents) come of active age in the no long future. In fact such circumstance tend towards our proposition that larger family sizes become a problem to dairy farming in particular, and farming in general in the scheme. On the other hand, the situation maybe that most of the respondents' children are actually school leavers awaiting some form of job opportunities or another. This is supported from the fact that seventy-three respondents reported that they had no child completely unemployable.

The problem of unemployable children (those whose educational qualifications can not warrant them a viable job) to parents is

double-edged. This is because in the first place, it is assumed
parents use substantial financial resources for their education
while at school. The hope from their parents is that they will be
self-sufficient on completion of education, and even be more placed
to help other family members and the ageing parents. Secondly,
failure to attain competitive' qualifications from school leaves
the parents with an inifinite responsibility for their children's
subsistence.

There could be other consequences such as the ultimate
compulsion on the part of the parents to subdivide the farm to such
children. Under different circumstances, such children could have
been able to purchase their own pieces of land elsewhere. The
result is, as was realised with some households, there is a tendency
for the over-all reduction in the productive capacity of the farm.
This is worsened where also the general overall levels of education among
the members of the household involved is also low relatively, and
therefore low capital endowments. In this case, unless the head of
the household engages in other off-farm income generating activities
or farm production is above average, investment in childrens'
education and who do not "re-emberse or replenish the kitty" leaves
the parent in a more financially desperate position, with time.

There is no significant association between the respondents'
marital status and types of dairy farming investments in the scheme,
(0.30685). In this case, as reported, there were 93 respondents who

were married, while seven females were widows (see table 28 below).
There was no response from one farmer.

Table 28: The relationship between marital status and types of
dairy farming investments made by farmers.

Preferred dairy investments	Marital Status		
	Married	Widowed	Total
No investments	35	7	42
Cattle and Pasture	25	0	25
Pasture & Dip Spraying	3	0	3
Dairy cattle replacement	14	0	14
Pasture development	9	0	9
Dip spraying	1	0	1
Cattle; Pasture & Dip Spraying	5	0	5
Total	92	7	99

4.1.5: Milk marketing and other ancilliary services in the scheme:

Most farmers in the scheme considered that the price offered by
the Kenya Creameries Co-operative (K.C.C.) for their milk was
relatively inadequate to cover their production expenses sufficiently
(53 farmers). There were some farmers who made their own private
arrangements for delivery of milk to K.C.C. (Kitale branch) and

were paid Kshs. 3.10 per kilogramme of milk approximately. These
farmers had broken from the local Co-operative Society which used
to market the farmers' milk supplies jointly. Those who still
delivered their milk through the local Co-operative Society
reported a net payment of Kshs. 2.10 per kilogramme of milk.

Twenty-nine farmers thought the price was sufficient or
adequate to cover production costs; while eighteen others never
seemed to know whether it was adequate or not, let alone the actual
price paid per kilogramme of milk they supplied.

There were thirty-seven farmers who reported that they delivered
their milk for sale through the local Co-operative Society. 17 of
them said they delivered through the co-operative because they were
members; 6 others believed that was the only outlet they knew of;
4 farmers saw the need to keep the co-operative running by being
full-time members; 4 others believed their milk levels were too low
to warrant direct delivery to K.C.C. (Kenya Co-operative Creameries);
three farmers reported that they could not presently afford the expen
involved in delivery through K.C.C.; two farmers reported being
members to the Co-operative and which they considered as the only
marketing channel for their milk; while one farmer sold his milk
through the co-operative simply because other farmers also delivered
milk through there.

These findings show that over half of the interviewed farmers
never send their milk through the local co-operative society any more

These farmers (51) reported to have made their own private
delivery arrangements with K.C.C., and hence had very little dealings
with the Co-operative society in terms of marketing their milk.
The local Co-operative Society had been the only milk marketing
channel for all the members in the scheme, until late 1970's when
some members began streaming out to institute their own private milk
marketing with K.C.C.

The farmers who sent their milk directly to K.C.C. had various
reasons for doing so. 14 farmers reported that they opted to send
their milk directly to K.C.C. because they considered the local
co-operative management as bent on exploiting milk producers, by,
among others, undercutting on the milk price they offered. Thirteen
farmers reported that K.C.C. paid more bonuses for their milk, more so
during the dry seasons, which the local co-operative never did. In
this case, as one farmer reported,'K.C.C. pays the local co-operative
the overall milk bonuses, but which are not passed on to farmers in
relation to the amount of milk delivered. Instead, the local
co-operative management turns such money into co-operative expenditure,
or even sometimes it ends into individual pocket." .

Eight farmers reported that K.C.C. paid more money per quantity
of milk (Kshs. 3.10 as compared to Kshs. 2.10 by local Co-operative
per kilogramme of milk delivered).Four farmers wanted to reduce
probable losses to returns on their milk sales. In this case, the
farmers reported that initially when they sold their milk communally
through the co-operative, there was frequent 'returning' of milk

because such was contaminated as several farmers mixed their milk in one single milk container. Hence when such milk was rejected by K.C.C., the farmers as a whole stood to loose, even when their milk was always clean, and hence unnecessary losses.

Four other farmers saw that K.C.C. paid reliably at every month end and one was always assured of an income provided the milk was delivered. In the words of one farmer, "sometimes the local co-operative could deposit less money in the bank, from sales delivered by farmers, and thus those farmers who went late to the bank had always to be 'bounced back' due to inadequate or no money in the bank." This tended to interfere with his plans, more so where there were emergencies.

Three farmers reported, that it was easier to make financial transactions with K.C.C.; especially where one was making repayments to some kind of loan. In this case, they saw that such money would always be paid provided the specific cash payment quantity was indicated. These farmers had taken a swipe at the local co-operative management "who purportedly deducted their milk money but never made payments to the institutions from which the farmers had borrowed money only to discover later that their loans were still outstanding, and never able to recover the money already deducted." For instance one farmer had reported "that he delivered one hundred and fifty bags of maize through the local co-operative meant to offset an Agricultural Finance Corporation (A.F.C.) loan borrowed a season earlier. However, a few months later, to his chagrin,

he found that the loan was never paid, and he had not yet recovered his money back, amidst A.F.C.'s threats to attach his property."

There were two farmers who opted from the co-operative delivery system to avoid unnecessary deductions by the management on their incomes. In this case, they had all reported "that sometimes the management arbitrarily deducted their milk money purporting to offset the repairs incurred in the repair of the co-operative lorry or other emergency expenses. That sometimes they could only be paid half their income for such months or nothing altogether, and that they could only get such money over a long time period as they were only paid in small amounts." One farmer, a female respondent, was not able to say categorically why she delivered her milk to K.C.C. directly, as had been the husband who made the arrangements on his own.

Generally therefore, most farmers in the scheme (about half) appear to have alot of disillusionment about the management of the local co-operative society and the way it is run. This clearly explains why many are opting out to make their own private marketing of milk, an occurence which should never augur well for the co-operative movement and development in Kenya. As one clerk at the co-operative confided," the present number of farmers who delivered milk through the co-operative were only about 37, and the co-operative has had to go its way to contract with other individuals in the areas outside the scheme whose milk it transports to K.C.C. He saw that otherwise the co-operative would not be able to meet transportation

expenses and the lorry would have broken down long ago."

Hyden (1970:   ) had among others, observed that the
co-operative societies were an important component of rural development
programmes, but that such are also faced with problems such as
ethnic rivalry and financial mismanagement, resulting to the
crippling of many co-operative societies in Kenya, hence not quite
possible for them to contribute meaningfully to the nation's
agricultural programmes implementations. The Kakamega District
Development Plan, (1984-88:20) made observations which tend towards
our findings. It had been observed that despite the numbers of
primary co-operative societies having gone up, and their membership,
between 1978-1982, the co-operative movement seems to have performed
poorly as the level of active societies appears to have fallen from
63% in 1978 to 40% in 1982. There was a corresponding drop in
membership from 58-56%, and that a staggering 44% of all co-operators,
in the district could be termed as either semi-active, dormant or
were under liquidation. The plan heaped blame on poor financial
management by co-operators, coupled with non-availability of
adequately trained manpower to satisfactorily handle the extension
services for the promotion of the co-operative movement. Apparent
in this analysis is therefore the generally poor co-operative
movement in the district as a whole, of which the Nzoia farmers
co-operative society is also part.

The farmers interviewed in the scheme observed that on the whole, the Nzoia Farmers Co-operative Society's management was rated as inefficient (58 farmers). Thirty-two other farmers rated the management as either fairly efficient or just efficient in their work; while 10 farmers reported that they were less concerned about how the co-operative was run.

The Kakamega District Development Plan, (1984-88:21) observed that there were three out of eleven water projects in the district under the Ministry of Water Development, that were highly over-utilized. Although these were not named, the findings from the Nzoia scheme study highly tend towards this observation. The Nzoia scheme is served by the Nzoia water system that was made operational as from 1972. This water system appears to have been expanded to serve other areas in the other scheme and privately owned farms in the region. It was however clear from the study that with time, there has been increased water shortages to individual farms, to the extent that presently, some farmers reported having had no water for the last five years and over. Presently there were only 38 farmers who reported that they get water on their farms either occasionally or full-time. The rest of the farmers (62) reported problems of extreme shortages and inadequate supplies, that they could only take recourse to Nzoia River, for those who had farms nearby, and some small streams and springs with untreated water. Even those who reported having water in most times, sometimes this was never available in sufficient quantities for human and livestock consumption. Such farmers were then also compelt to water their animals some kilometres away.

There were a total of 33 farmers who reported watering their
animals upto half a kilometre away. Another 36 watered them a
kilometre away; while 11 others watered their livestock between
one and half kilometre and three kilometres away. There were
seven farmers who had dug boreholes on their farms from which
water requirements were met both domestically and for their livestock
consumption. There were only 12 farmers who reported having no
major problems with water supplies, while one farmer never stayed
on the farm presently.

There is then a general finding that the Nzoia scheme has a
water problem at present, and which is a vital resource component
in successful dairy farming development in any region in Kenya.
Chitere (1976:23) had observed that farmers in the non-scheme
areas of Kakamega District had been required to meet the conditions
of having fenced, and if possible paddocked the farm and made sure
that water was available on the farm, before they could be allowed
to rear grade dairy cattle. There had thus been seen the need to
restrict the movements of the animals in a bid to limit possible
death risks due to the prevalence of ticks, and hence tick-borne
diseases. This is contrary to our findings in the Nzoia scheme, where,
apart from dipping, animals have also to move, (for some farmers)
long distances in search of drinking water. It is also surprising
that some farmers in the scheme reported not to have paddocked
their grazing land, or in other instances had allowed fences to break,
allowing free movement of their cattle.

As relates to dip services, all the farmers in the scheme interviewed reported atleast dipping their cattle, once in a week. There were only four operational plunch dips serving the public here. However, our findings indicate that these dips are inadequate, especially in terms of being located far-off places from most farmers. There were eight farmers who reported that they no longer use the four public dips, but rather spray their cattle on the farm individually. Fourty farmers reported dipping their cattle upto a distance of a kilometre away from their farms. Another thirty-seven travelled upto two kilometres away. Eight farmers reported making journeys upto three kilometres away. This clearly indicates that there is a big problem with dipping services in the scheme. This, especially looked at in terms of total distance, travelled to and fro such dipping centres, means a lot of valuable time is lost by the cattle, instead of grazing and hence generally reduced milk yield for that day. This would also apply to travels to A.I. centres and to watering places, and especially for the latter where animals would already be thirsty again by the time they arrive back on the farm.

Our findings tally with those of the Kakamega District Development Plan (1984-88:29) which had observed that there was generally an insufficient number of dips in the district for adequate disease control, and that also there was lack of funds to maintain and operate all dips in the region. Indirectly, this meant occasionally there would be no funds to purchase acaricides to replace the old ones in the dips, and hence reducing the

effectiveness of tick, and therefore, disease control. Since
grade dairy animals are quite vulnerable to diseases, more so
tick borne, the poor quality dips would be the unmaking of most
farmers' success at grade dairy farming development. This might
explain why, as had been seen earlier, there has tended to be an
increase in resort either to keeping zebu or zebu-crossed cows
which were reported to be more hardy and/or resistant to most
tick-borne diseases. Stotz (1977:8) found that tick-borne diseases
were responsible for the death of 40 - 50% newly purchased grade
dairy cows participating in the 'Dairy Enterprise Recording Scheme,'
despite fact that most farmers owned cattle sprays and actually used
them. On the other hand, Hopcraft (1976:49) had also found that
35% of all heifers participating in the A.I. scheme died before their
first calving, and that 80% of these died of tick-borne diseases.

Odingo (1967:141) had observed that generally, the aim of
settlement schemes is usually regarded by governments as a more
toward solving rural population pressure, as well as providing
employment to landless and the unemployed. However, we should
here add that the farmers to join the scheme should also be
knowledgeable enough about the aims of the scheme. Generally the
farmers in the Nzoia scheme believed that they were settled in the
Nzoia scheme as they were landless; to increase agricultural
production thereafter; and provide sources of income to them.
There were however 12 farmers who reported that they never knew
nor understood any aims of their settlement on the scheme.

On the basis of these aims, the farmers were asked to rate their comparative individual performance, and generally in the scheme as a whole. Individually, 25 farmers reported to be doing quite well; 19 farmers were not quite satisfied with their performances; 18 farmers reported that atleast they produced beyond their subsistence needs; 13 farmers reported that they were financially constraint to do better; 7 farmers thought they atleast owned land now; 5 farmers reported inadequate capital while one farmer said he had land now and produced beyond his subsistence needs. The other 12 farmers who never understood the aims of settlement were not asked to rate themselves.

On the general rating, 23 farmers believed other farmers were constraint with inadequate capital; 29 farmers saw that most farmers produced atleast beyond the subsistence needs; 20 farmers reported that most of other farmers were doing quite well; 7 farmers believed that other farmers had now land; 6 believed those who do not do good farming lack proper planning; while 3 other farmers held that they had no idea of the performance of other farmers (see tables 29 and 30 below).

Table 29: Individual farmers ratings of their performance in relation to the aims of settlement by the government:

Rating	Number of farmers
Doing quite well	25
Not quite satisfied with their performance	19
Producing beyond their subsistence needs	18
Having financial constraints	13
Have land now	7
Have inadequate income from farming	5
Producing beyond subsistence and has land	1
Total	88

Table 30: The farmers ratings of the general performance of other farmers in the scheme.

General Rating	Number of farmers
Most produce beyond their subsistence needs.	29
Some farmers lack adequate development finance.	23
Most farmers do quite well	20
Farmers have land now	7
Some lack proper planning	6
Have no idea	3
Total	88

On the whole, the farmers interviewed believed that those
farmers whose production capacities dispersed from the governments
aims of creating the settlement scheme could be helped in the
following ways. 22 farmers believed there was need to provide
more extension advice to the farmers on the general farming, but
more so in dairy farming development. 32 farmers wanted a more
flexible source of development capital, for instance more grace
periods or waiving of loans in cases of crop-failures etc. 12
farmers wanted more loans and increased extension service; 3
farmers wanted an increase particularly in dairy advisors; while one
wanted the government and/or the National Cereals and Produce Board
to be paying farmers more promptly on delivery. There were 17
farmers who thought they were good farmers and with no much
problems. However, 13 others could not provide any solutions for
their under performance remedy.

The farmers interviewed were also asked to give the various
problems they presently faced in their dairy farming, and those
they thought affected the rest of the farmers and the scheme in
general. It was our realisation that most of the individual and
general scheme problems were not quite different.

These reported problems revolved around the areas of management;
development capital; extension services and other encilliary services.
The management problems were seen in terms of frequent cattle deaths,
inadequate dairy farming knowledge, lack of qualified dairy farming
workers; other farmers unhealthy animals, inadequate pastures on

a land dispute. The development capital problems were in terms
of lack of or inadequate funds, expensive cattle drugs and
inadequate land. The extension services problems were inadequate,
corrupt and discriminatory veterinary services (where one farmer
reported that the veterinary personnel first serve those farmers
they know have ready cash to pay for the drugs, leaving the
poor farmers' animals to die by the time they think of now serving
them), unreliable and/or inadequate A.I. services, uncontrolled
cattle mating in the scheme (sometimes from low quality bulls), no
dairy farming advisors, inadequate cattle drugs sometimes. The
problems with the ancilliary services were irregular, inadequate, poor
or no water supplies; inadequate, inneffective, poor dipping facilities;
frequent cattle diseases, poor tick control measures, poor/inadequate
feeder roads in the scheme, far-off collection centres for milk,
unqualified dip attendants and bad mixing of dip acaricides.

Most farmers in the scheme reported more inclination towards
doing better dairy farming in future, although there was no indication
how some of the hitches would be overcome, more so financial and
animal husbandry problems. In their future plans, 23 farmers aimed
at rearing more milk cows and plant more pastures; 18 other farmers
wanted to establish more pastures on their farms. There were ten
farmers who wanted to increase their livestock numbers only; 10 farmers
wanted to reduce arable farming and devote more land to dairying;
three farmers had plans for a dairy loan to rear more cows; two
farmers had plans for more cows and were building their own
plunch dips; 2 others wanted more cows   and   water   pump   on

borehole on the farm, rear more cows and plant more pastures; one farmer
reported need for a water pump and more pastures, while another
had plans to purchase a pure grade dairy bull and establish more
pastures, and yet another was to reduce arable farming and acquire
a development loan.

The other 27 farmers had either no immediate future plans or
were unwilling to make any changes, unless the government provided
services such as A.I., veterinary services and water supplies were
drastically improved. But on the whole, most farmers interviewed
were willing to make changes, some quite drastic, and it would be
upto the extension services to take advantages of such forward
sightedness of most farmers to improve the quality of farming in the
scheme, and hence the farmers standards of living.

4:2: INFERENTIAL DATA ANALYSIS

This section of chapter four analyses the statistical relationships
between the dependent and the independent variables that were used
in the hypotheses around the study. There were four major hypotheses.
The inferences will be made in terms of the linear correlation and
regression coefficients.

HYPOTHESIS 1:   Higher amounts of income to a farmer leads to more
                investment in milk production.

Table 31:   The relationship between income amounts to a farmer and
            possible investments in milk production during the dry
            seasons.

Variables	R. Square	Simple R	B	Beta
Yearly income	0.80231	0.89572	0.00038	1.02980
Monthly income	0.82453	0.38325	-0.00006	-0.014765
Additional income	0.82697	0.51258	-0.00003	-0.07580

The income amounts were the independent variables, while the
dependent variable was the amount of milk, measured in kilogrammes.
The yearly income was computed from the total sales from maize and
milk production.   This included the highest yearly totals and the
lowest totals to individual farmers.   The correlation coefficient
indicated that these two are highly correlated and virtually the
same hence the use of just 'yearly income' amounts is adopted here.
The table above shows that this income from agricultural enterprises
is highly correlated with the amounts of milk a farmer produces in
the dry seasons.   The monthly income and additional income sources
explain very little of the variation in milk production in the same
seasons.

In all, the three independent variables explain 82% of variation.
This is quite a high percentage and may be attributed to the fact
that dairy farming as an enterprise requires a lot of capital input,
such as in supplementary feeding and other emergencies as treatment.
The residual variation not explained by the three independent
variables may be due to other independent variables not included
in the study, or due to the measurement and/or sampling errors.
Partially therefore, this part of our analysis is in accord with
our hypothesis that higher levels of income to a farmer leads to
more investments in larger quantities of milk produced on the farm.
The best predictor here is yearly income (0.00038), followed by
monthly income (-0.00006).

Table 32: **The relationship between income amounts to a farmer and
possible investment in milk production in the wet seasons:**

Variables	R - Square	Simple R	B	Beta
Yearly income	0.67307	0.82041	0.00048	1.14468
Additional income	0.77437	0.31122	-0.00016	-0.32799
Monthly income	0.79243	0.23970	-0.00009	-0.18608

The three independent variables, as in table 31 still remain.
The dependent variable here is the amount of milk produced in the
wet seasons. It can be observed that the same nature of the

relationship between the variables is reflected almost in the
same manner, only that here, the coefficients are lower. The only
difference is that additional income sources (off-farm) explain more
of the residual variance after the yearly income, compared to
that explained by monthly income. In this case, it is the best
second predictor of the change in the dependent variable, after the
yearly income (i.e. -0.00016 and 0.00048 respectively).

The slightly lower coefficients in table 32 may be explained
by the fact that in the wet seasons, there is generally more
abundantly available pasture. This may mean less effort is needed
from the farmers in terms of the possible investments in food
supplements to offset pasture shortages. These findings also support
our hypothesis.

In general, our findings (table 31 and 32) are in line with those
of Pollard (1980:580) who found that there was not a strong relationship
between gross output and the off-farm sources of income. He
concluded that in most cases, off-farm businesses are essentially
for survival. But in our case, as contrasted with Pollard's findings,
farmers with supplementary off-farm occupations produced maize and
milk farm outputs better than those farmers who had none. We are,
however, in agreement that most farmers with salaried monthly incomes
were generally worse off than full-time farmers with or without
off-farm incomes. Pollard (1980) in the same light indicated that
some employments necessitated long periods of absence from the farm

(such as teaching or other public service occupations which are
mainly full-time, and sometimes outside one's own district). The
author concluded that there was evident tendency of most farmers
either never to recognize that farming required their full-time
energies; or else had belief that such attention will not yield
satisfactory income levels. We observed a few cases of farmers who
had 'abandoned' their farms, having left them only to inexperienced
and untrained workers in animal husbandry management.

In short, it is our contention that despite the foregoing
discussion, the levels of income accruing to a dairy farmer is
crucial in sustaining and upgrading his animal husbandry practices.
Russel (1960: 21-22) observed that British farmers were faced with
inadequate capital which was required in construction of cow-sheds,
buildings, water supplies, electric light, labour for dairying which
involved seven days, problems of disease control, and cow feed stuffs
production (such as hay and silage production). In the same light,
George and Chokshi (1977:28) also found that most investments made
by farmers in dairy farming consisted of the purchases of cattle,
construction of cattle sheds and buying of equipment needed for
cattle keeping, and animal feeds.

The crucial need of higher income levels to a farmer is also
exemplified in the observations by Chitere (1976:39-40) about farmers
being faced with increasing costs of dairy grade animals and
agricultural inputs, such as feeds and fencing materials. This meant
an initial higher capital outlay and maintenance costs of keeping a

grade dairy animal were inevitable. For the farmers in the Nzoia
scheme, most of the initial capital was provided for by loan,
including grade dairy cattle (average five animals) and equipment
and fencing material. Crucial at their disposal would thus be the
capacity of maintaining high quality dairying on the farm. This
no doubt requires alot of financial investment, such as replacing
the old and degenerated stock with new and high quality ones.

It was in this same light that Rogers and Shoemaker (1971)
pointed out that though the relative advantages of an innovation
(grade dairy farming) may be high, its adoption rate maybe slow if
it entails high initial or maintenance costs (Chitere,1976:40).
They saw, then quite the need for incentives, such as subsidies or
credit as a vital component to overcome this problem. Most farmers
in the Nzoia scheme reported experiencing increased problems with
high costs of dairy inputs, such as in treatment costs and supplementary
feeds. Implicitly, this may mean that their income levels were low
or that other demands on their financial resources were too many.
The consequence has been a gradual degrees in the levels of animal
husbandry practices from most farmers. Such farmers have appeared
to be continually unable to maintain the 'ideal' standards of grade
dairy farming in general.

This declining standards of animal husbandry practices has been
gradual, over the period since farmers settled in the scheme. This
may be partly the reason why some farmers, as we saw earlier, have

tended to resort to the less demanding zebu or 'zebu-crossed' milk animals. Rogers and Shoemaker (1971) held that in some instances, especially in the agricultural enterprises, once the subsidies or incentive is withdrawn, the adoption of the innovation usually stops (Chitere, 1976:43). That this was because the receivers perceive the incentive as a separate from the instrinsic relative advantage of the innovation. It would have therefore been worthwhile for the government to have continued the 'loaning' to the farmers in the Nzoia scheme, to such a time that they could be well established in dairy farming development.

However, it is interesting to note that despite the observed influence income has on dairy farming, the age of the farmers is more crucial in keeping the quality of the animal breed. Age thus pre-empts and is highly correlated with the nature of the animal condition that was found on the individual farms (see table 33). However, it should be understood that in social research, age appears to correlate highly with any other variables it is correlated with. This is why in the findings in the table below, financial assistance from children is a better predictor (-0.22449) of the likely animals' condition on the farms. In this case, a unit change here leads to greater change in the animal conditions, compared to any other independent variables in the table.

Table 33:   The influence of age, yearly income, monthly income,
            financial assistance from children, and additional
            income to farmers whose dairy cattle breed quality was
            considered "degenerated".

Variables	R-Square	Simple R	B	Beta
Age	0.67348	0.82066	0.13802	0.79045
Yearly income	0.73382	-0.31476	-0.00001	-0.57198
Monthly income	0.84357	-0.01473	0.00001	0.26103
Financial assistance from children	0.84932	0.31623	-0.22449	-0.14198
Additional income	0.85526	0.31008	0.00001	0.21795

In all, the independent variables (age, yearly income, monthly
income, financial assistance from children, and additional income
sources) explain about 85% of the variation in the quality of breeds
of animals. Age explains about 67% of the variation, while yearly
income is the next most important variable explaining the residual
variance in the quality of animal condition, though negatively
correlated (-0.31476). This realisation may implicitly shed light on
the fact that the amount of yearly income indicates the performance
levels of the farmers, and hence their quality of dairy cattle.
The other variables are positively correlated, but their contribution
to the explanation of the variation is not significant. This part of
our analysis also supports our hypothesis, in farm level investment
in milk production, in this case to be reflected in better quality

Table 34: <u>The influence of age, yearly income monthly income,
financial assistance from children and additional income
(independent variables) to those farmers whose dairy
cattle breed quality was reported as being "maintained"</u>

Variables	R - Square	Simple R	B	Beta
Age	0.67348	-0.82066	-0.13802	-0.79045
Yearly income	0.73382	0.31476	0.00001	0.57198
Monthly income	0.84357	-0.01473	-0.00001	-0.26103
Financial Assistance from children	0.84932	-0.31623	0.22449	0.14198
Additional income	0.85526	-0.31008	-0.00001	-0.21795

In this case again, the coefficients are equally high, only
that the relationships differ. Age is negatively correlated at
-0.82066,while yearly income at 0.31476. The other independent
variables are also negatively correlated with the dependent one,
thus a maintained breed quality. Financial assistance from
children is still the best predictor of the changes in the dependent
variable (0.22449).

In general, these findings tend towards those of George and
Chokshi (1977:17). Chitere (1976:95) however on the contrary found
that off-farm income sources were significantly related to the
farmers performance at the individual farm level. This difference
may be explained, in our case, by the fact that there were very few
farmers in the overall sample who had off-farm sources of income,

and which had no direct relationship with investment in milk
production.

The discussions in this part about the findings lean generally
towards our hypothesised relationship between income levels and
investment in dairy farming. This in this case was seen in the
amount of milk produced at the individual farm level, and the quality
of animal breed condition.

HYPOTHESIS 2:   The Intensity of the penetration of the extension service
(at the individual farm level) and how the related
animal husbandry advice in dairy farming is received
has a relation to the amount of milk produced by a farmer.

Table 35:   The relationship between the reported sources of extension
service information (independent variables) and the amount
of milk produced in the dry season on individual farms.

Variables	R - Square	Simple R	B	Beta
No training in dairy farming	0.24556	-0.49554	-5.04012	-0.32181
Attendance of A.S.K. shows	0.29193	0.42568	3.75302	0.21765
Non-reading of agricultural Newspapers	0.30699	-0.34293	-2.27725	-0.11954
Listening to agricultural Radio Programmes	0.30997	0.27501	0.96000	0.06132

The table above indicates that lack of training in dairy
farming for farmers explains more of the variation in the amount
of milk produced (dependent variable), 24%. Even then, these
variables are negatively correlated (-o.49554), and is not the
best predictor of the variation in the dependent variable (-5.04012),
compared to listening to radio programmes (0.96000). The attendance
of national agricultural shows is more positively correlated (0.42568)
with the quantitiy of milk produced in the dry seasons on individual
farms. This may be explained from the fact that such shows are
mainly practically oriented, such as in providing information on
zero-grazing of dairy animals. Such practical observations are likely
to be adopted by farmers who frequent such shows in most years.

The non-reading of agricultural related literature is negatively
related to it, (-0.34293), while though positive, listening to radio
agricultural programmes is not significant (0.27501). In general
these independent variables explain about 30% of the variation in the
dependent variable. This is not surprising, because dairy farming
as an agricultural enterprise is quite precarious, and its success
is dependent on many other influencing factors. For instance whether
a farmer has the know-how through training, reading agricultural
related newspapers or attending agricultural shows to gain more dairy
farming information, this may not be translated into reality at
the farm level due to lack of development capital, poor attendance
from veterinary staff, inadequate water supplies or even poor
marketing facilities.

The table 36 below shows that the coefficients for the
correlation of the same independent variables on the amount of milk
produced during the wet seasons is relatively lower. Non-training
in dairy farming explains 19% of the variance in the dependent variable,
but even then it is negatively related at -0.44113. It is the
listening to agricultural radio programmes and attendance of agricultural
shows that are positively and modestly correlated to the dependent
variable (0.32789 and 0.37890 respectively). However, in this table,
the lack of training in dairy farming is the best predictor of the
unit changes in the dependent variable.

Table 36:   The relationship between the reported sources of extension
service information (independent variables) and the amount
of milk produced in the wet seasons (dependent variable)
on the individual farms.

Variables	R – Square	Simple R	B	Beta
No training in dairy farming	0.19460	-0.44113	-6.03526	-0.26520
Listening to radio agricultural programmes	0.23823	0.32789	3.34361	0.14699
Attendance of agricultural shows	0.25898	0.37890	4.18659	0.16710
Non-reading of agricultural related literature	0.27022	-0.33947	-3.404149	-0.12289

The non-reading of agricultural related literature is also modestly related, but negatively (-0.33947). In all, the four independent variables explain about 27% of the variance in the dependent variable. This percentage is also attributed to some of the explanations made a while ago. These findings do not provide a strong basis for upholding our hypothesis, atleast, upto this extent. As we had seen earlier, the realisation may be that the extension service information sources per se do not matter alot. What looks relatively critical in such incidences is the very realisation that such should be considered wholly as part of the overall extension service package, to be integrated with such other services as credit facilities and improved marketing. In this case, each component part of such a package is equally desirable, in our case, in the general improvement in dairy farming development at the individual farm level.

These findings are concurrent with those of a similar study by Pollard (1981:574) who also found a small positive association between communication exposure (extension service media) and the performace of farmers. This performance in our case could be exemplified in the quantity of milk produced and supplied for sale. The author had infact found that people with non-agricultural background did better at farming than those with limited prior farming experience, and those who had always been engaged in farm work (Pollard, 1981:581).

In line with these findings, Chitere (1976:100-102) concluded
that attendance of agricultural courses does not necessarily lead
to successful farmers performance (at the individual farm level).
The same case was also observed in the case of listening to
agricultural radio programmes.

Table 37 below shows the nature of relationship of "degenerated"
quality of animal condition (breed) with extension service
communication and other socio-economic attributes of the farmers.

Table 37:   The relationship between "degenerated" animal breed
            quality (dependent variable) and sources of extension
            service information and other farmers' individual
            attributes (independent variables).

Variables	R - Square	Simple R	B	Beta
No dairy training	0.07507	-0.27399	-0.27723	-0.28369
Husband's educa-tion	0.13118	0.19325	0.00455	0.22146
Listening to radio Programmes	0.13578	0.19184	0.06106	0.06248
Non-use of A.I.	0.13929	0.04442	0.28330	0.27879
Use of A.I. servi-ce	0.15123	0.04034	0.26707	0.25321
Wife's education	0.15348	0.00311	-0.00562	-0.04560
Non-reading of agricultural rela-ted literature	0.15358	-0.11276	0.01496	0.01227

The table shows that for those farmers whose dairy animals
were found to have 'degenerated' in breed quality, lack of training
in dairy farming explained more of the variance in this dependent
variable. Though, this is not much (7.5%), and is negatively
correlated at an insignificant -0.27399. The education standard
of the husband explained more of the residual variance, but was
also weakly correlated at 0.19325. In all the dependent variable's
variation is explained by about 15% by the independent variables.

However, it is realised that the availability and use or not
of the A.I. services was a more better predictor of the quality
of animal condition here. This is so from the fact that in the
absence of the service, most farmers reported resorting to use of
inferior quality breeds of bulls, such as owned by neighbours. But
in general, the conclusion here is that the condition of the dairy
animals as was found depends greatly on many more factors than was
analysed in the study. In this case, there appears a possibility
of a wide spectrum of factors and conditions, at the individual farm
level, which explain the nature of the animal breed quality as was
seen. In this case again, the findings fall below upholding our
hypothesis. For the purposes of this study thus, we consider that
the quality of animal breed is related to the quantity of milk
production at the individual farm level. High quality breeds of
grade dairy cattle are assumed to be more healthy, and thus likely
to produce larger quantities of milk supplies.

In the case of the farmers who were found to have relatively
'maintained' the breed quality of their grade dairy cattle, non-
reading of the agricultural newspapers accounted for 10% of the
variation in the dependent variable (quantity of milk produced).
This was however negatively correlated (-0.31897) (see table 38
below). In all, these independent variables explain about 19% of
the variation in the dependent variable, and are generally weakly
correlated. Here, the best predictor of the breed quality is the
lack of training in dairy farming by farmers (-0.14246), followed
by non-reading of agricultural related literature (-0.13503), and
non-use of A.I. services (0.12246).

Table 38: The relationship between maintained breed quality (dependent
variable) and the extension and other farmers individual
attributes:

Variable	R - Square	Simple R	B	Beta
Non-reading agric-ultural literature	0.10174	-0.31897	-0.13503	-0.13760
Wife's education	0.13468	0.27050	0.02158	0.21823
No dairy training	0.17239	-0.29883	-0.14246	-0.17666
Non-use of A.I. services	0.18044	0.05240	0.12246	0.14627
Non-listening to radio Agricultural programmes	0.18672	-0.23683	-0.06518	-0.08045
Age	0.18795	-0.01392	0.00127	0.02953
Attendance of shows	0.18955	0.025623	0.05940	0.06612
Husband's education	0.19003	0.22653	-0.00386	-0.03868
A.I. services Use	0.19039	0.00433	0.03838	0.04409

This analysis does not support our general hypothesis, mainly for reasons already seen elsewhere.

This study also attempted an analysis of possible explanations why farmers reported either using the A.I. services or not. It is quite interesting to note that consideration of the quality of the A.I. service was a crucial factor in its use or not. The quality of the services as was considered by the farmers in the scheme explained 33% of use or non-use of the service. On the other hand while consideration of the quality of the service by farmers is significantly correlated at 0.57942 with non-use of A.I. service, the use of A.I. services is negatively correlated at -0.57942. In this case, farmers who consider such services in the scheme as below standard do not use them, as contrasted to those using it, whose quality consideration never mattered, in this case.

This divergence may be largely explained in terms of the proximity to the service centres themselves from the individual farmers. The non-use of the service is significantly correlated with the distance (0.43292), though the quality of the service is still the best predictor (0.33824) in the variation of the use of the service by farmers. In this case, with poor services, farmers far away from such A.I. service centres are more likely to be disillusional faster compared to those staying relatively nearer. In any case, most of those farmers who considered the A.I. service as relatively adequate resided closer to these service centres. The other independent variables (listening or not to radio programmes,

ages of the respondents, reading agricultural newspapers and
husband's education) are insignificantly related to the decisions for the
the use or not of the A.I. services in the scheme.

The foregoing discussion tends towards those in a similar study
by Chitere (1976:93) who found only a moderate association between
education and the farmers performance (in our case use or not of
the A.I. service here). He saw that there was no significant
association between agricultural course attendance (or training) and
the farmers performance. However, in our case, it has to be
considered that the nature of our findings reflect the fact that there
was almost no extension services in the scheme related to dairy
farming development. The farmers would be assumed to merely be
employing their own meagre know-how they attained during their
induction courses or through attending agricultural shows; or through
their own perceptions of the best way to do dairying. This would
be one reason why we found quite a significant number of farmers as
generally poor managers in dairy farming.

In summary, therefore, our realisation from the findings generally
negate our overall hypothesis about the significance and availability
of the extension service programme. On the other hand, this may be
due to the fact that we generally found very little of extension
services in the scheme, so that even some of the best farmers were
not the most frequently visited by the extension service personnel.

HYPOTHESIS 3: The Production of milk far above the subsistence
requirements correlates to dairy farming enterprise
as the major activity at the individual farm level.

The assumptions made in this case were that the quantity of
milk a farmer delivered for sale was in excess of the household
requirements. However, this may not be quite the case generally, as
some farmers reported using their evening milk stocks for
subsistence purposes. But for the purposes of this study, our
assumptions will be upheld, in an attempt to relate whether the
quantity of milk levels a farmer produced and delivered to the
market were related to dairy farming as the major enterprise on
the farm (see table 39).

Table 39: The relationship between dairy farming as a major activity
(independent variable) and the amount of milk offered for
sale in the dry seasons (dependent).

Variable	R - Square	Simple R	B	Beta
Amount of acreage devoted to major activity	0.32852	0.57317	0.39365	0.52243
Dairying as major activity reported on farm	0.49365	0.47041	6.57055	0.41360

These two variables explain about 49% of the variation in the
dependent variable, but significantly correlated. However, the
best predictor is whether dairy farming was reported as the major

activity being undertaken on the farm (6.57055). In this case, a unit change in dairy farming as a major activity leads to far greater changes in the quantity of milk supplied for sale.

In the wet seasons, the coefficients of the findings are relatively the same, at 0.57317 and 0.408284. These variables explain 43% of the variation in the dependent variable. This is also best predicted by dairy farming as the major activity on the farm (7.97038). In the same light, this is even supported by the fact that the amounts of milk supplied to the market in the dry seasons is negatively correlated to arable farming as the major activity on the farm (-0.47041), which explains 22% of the variance. The same tendency is reflected in the wet seasons, with correlation at -0.40284, and explaining variance by about 16% in the dependent variable.

These findings lead us into confirmation of the observed tendency for most farmers in the scheme to engage in the extensive nature of dairy farming. It is therefore crucial that to produce more milk, there will be need 'for larger pasture fields for cattle grazing, more so in the dry seasons. The available data therefore support our hypothesis, and thus upheld significantly. The fact that the amount of milk produced for sale is greatly related to dairy farming as the major activity, and the amount of acreage devoted to it, tends towards observations made by George and Chokshi (1977:2). They saw that it was imperative for farmers to make three major decisions. How much to invest in dairying; what kind of milk production

practice to adopt (extensive or intensive); and how to utilize
the milk produced at home. In this case, the degree of investment.
in dairying will be in line with the quantity of milk desired to
be produced, either for marketing or just for the subsistence needs.
This sheds light, in our case, and as the farmers mainly practiced
extensive nature of cattle grazing, on the above decisions and why
there are differences in consideration for what is the major
activity on individual farms.

There had also been the need in this part to establish the
pattern of decision making on the farm and the amounts of milk
produced at farm level. In this case, the findings indicate that
there is no significant difference in who actually makes the
decisions about farm production practices. However, the best
predictor was decision making by the husband (5.08333), followed by joint
decision between husband and wife (4.66071).

HYPOTHESIS 4:   The larger the number of dependents to each household,
                the greater the drain on financial resources, and thus
                the less there is to invest in milk production.

This hypothesis was analysed in terms of the number of
children and other dependents to a farm household, the financial
drains through school fees and other related payments, as affects
the amount of milk supplied to the market in the dry and wet seasons.
The same were also analysed in terms of their likely effect on the
quality of the dairy cattle breed kept on the farm. The assumption
was that farmers with less financial burdens were likely to be in a

better position to keep better quality cattle breeds, deriving
from the ability to purchase additional food supplements and
greater attendance to the health of animals more easily.

Interestingly however, the amounts of milk produced and
supplied to the market in dry seasons appears to be only
insignificantly related with the family size and the supposedly
financial drains. The amount of fees payments is weakly correlated at
0.26557. The number of dependants is on the other hand negatively
correlated at -0.07123 (though it has better prediction of the
variation - thus -0.19965). These two independent variables account
for 9% of the variation in the dependent variable.

In the wet seasons, they account for a mere 3% of the variation,
and are highly insignificantly correlated, at 0.13306 and -0.05155
respectively. Here again, the best predictor of the variance in
the dependent variable is the number of dependents (-0.34790)
followed by the number of children (0.32898). The dependents in
this case includes all the children born to the household, and other
relations dependent on the head of the household for social, economic
and other kinds of support. The number of children in the household
in this case does not also seem to be quite a burden, very
insignificantly correlated at 0.03418. In short therefore, financial
drains due to school fees and other economic support has no relation
to milk produced and supplied for sale. The hypothesis, up to
this part, is thus discounted and rejected.

However, for farmers who reported their animal breeds as being "highly degenerated", there is also a weak (0.25189) correlation with the number of children in the household. This is the best predictor of the variation in the reported breed quality (0.01449). The dependants number also tends towards the same correlation, at 0.23760; but the amount of fees payments is trivial (0.04645) and has no prediction (0.00000).

For farmers who reported their cattle breeds as "fairly degenerated the number of children, fees payments and total dependents were all negatively correlated (-0.20970; -0.17895; and -0.11193 respectively). The best predictor here for the variance in the dependant variable is the number of children (-0.02353). The three independent variables in this case account for 5% of the variance in the dependent variable.

There is trivial relationship between the amount of fees payments (0.15199), the number of dependents (-0.07328), and the number of children (0.06144) with the quality of cattle breed reported as just "degenerated." The best predictor independent variable here is the number of household children (0.02486), and then the total number of dependents (-0.02239). The three variables also account for 5% of the variance in the dependent variable.

In the case of those farmers who reported as having relatively maintained the breed quality of their dairy cattle, the amounts of fees payments correlated at -0.07877; the number of dependents at 0.06208 and the number of household children at 0.000785. The three independent variables accounted for only 1% of the variance in the dependent variable. This animal condition is best predicted by the total number of dependents to a household (0.00812), followed by the total number of children (-0.00487).

These findings also prove that the quantity of milk produced at farm level (assumed to be related to the nature of animal breed quality reported) is not affected significantly by financial drains by dependents and household children. The hypothesis is thus generally rejected altogether.

These findings run counter to earlier observations by Hunter (1969:37) who concluded that (in most instances) most of cash available to peasants will one way or another be needed by a relative or go into the payment of school fees. In the same light, Higgins (1959:46) also saw that high fertility was a depressive factor on the private saving. However, some of our findings concur with George and Chokshi (1977:34) who found that milk sales patterns was not related to the number of children in the family or family size. They saw that family income was not a major variable in influencing the proportion of sales. That rather, the major factor which affected the quantity of milk marketed was (simply) the level of production.

A possible induction, in our case, may derive from the
realisation that the majority of the farmers in the scheme made
very little tangible investments in the production process in
dairying. And hence the reason why the financial constraint
is not explicitly manifested here, giving the whole analysis a less
significant relationship.

However, Pollard (1981:584) found divergent relationships,
that there was an association between larger familieis and lower
output. He saw that this was because the extra assistance expected
(as labour force) was more than counteracted by the financial
drain providing for the family, and (thus) reducing investment
potential. A large family was therefore quite a burden on the farmer's
overall performance.

CHAPTER FIVE

CONCLUSIONS, POLICY RECOMMENDATIONS AND AREAS FOR FURTHER RESEARCH

5:1: CONCLUSIONS

In this chapter, the major preoccupation involves making conclusive deductions about the discussions in the previous chapters. These had shed light on some of the critical policy considerations regarding rural development problems. It was seen that problems of rural development are either at the individual farm level or regional level and, therefore, of public concern. In our case, this forms the basis of rural development differentiation among the farming communities, whether under relatively homogeneous conditions or otherwise.

This study sought to establish the various socio-economic factors which could help explain the differential capacities at farm performance generally, and more emphatically at abilities to sustain and enhance grade dairy farming innovation at the individual farm level in Nzoia Settlement Scheme. The findings show that such lines of differentiation are reflected in the individual farmer's consideration of the option for what is the major farm enterprise. This was analysed on the basis of whether the farmers engage in certain farm activities with a consciousness of the overall costs and receipts from the two major enterprises so considered, thus milk production and maize farming.

The conclusion here is that most farmers who had maize production did so without instituting the cost - benefit consideration, where profit maximisation should be the issue at hand. Most of the farmers in this category had also aversive emotions towards the dairy farming enterprise, as they considered it a relatively high risk venture, needing elaborate management and animal husbandry practices in which they were not trained. However, it was also realised that a majority of these farmers (see chapter four, part one) were not generally good farmers, compared to those who specialized in dairy farming as a major activity at farm level. They opted for maize production as a major enterprise because they were less adapted and had not fully integrated the dairy farming innovation which was introduced to the farmers on joining the scheme.

On the other hand, those farmers who did better dairy farming were generally average and above in their performance. In this case, this is, seen in terms of the overall outputs realised in the two major farm enterprises that were considered. This was the lot of farmers who had individual socio-economic attributes that were advantageous, and pertinently crucial at overall farm performance and the ability to sustain grade dairy farming innovation in the scheme. Their levels of income were relatively high, corresponding to the nature of performance at the individual farm levels. Apparently, such levels of income, from agricultural production, were found to be crucial and highly correlated with a farmer's

performance, atleast in the quantity of milk produced and supplied
to the market. In this light, such farmers were found to
relatively have income levels that were sufficient to offset
both subsistence, and to a large extent, other extra obligations
faced by them.

One major realisation is however that there is no basis to
conclude that such farmers were more placed to receive the extension
service information. There was indeed almost no specifically
dairy farming advisors in the scheme, apart from the junior
veterinary officers who were mainly preoccupied with animal
treatment. This is why it was shown that the present levels of
farmers performance was less related to the input from the extension
service information (see chapter four). Rather, the farmers'
productive capacities at the individual farm level, and with the
incidence of the income levels, was more crucial, especially in
sustaining and enhancing grade dairy innovation. In this case,
though not explicitly measured in the study, our realisation was
that farmers' performance tended to 'flock' with differential rates
of modernisation, and hence the likely corresponding rates of
innovativeness.

This realisation tends to justify our realisation that low levels
of performance of farmers tended to be associated with the
inability to sustain grade dairy farming. Since performance was
related to the levels of agricultural produce incomes accrueing to

individual farmers, and that grade dairy farming required
increased current and fixed investments, the relatively poor farmers
tended to take refuge to the traditional zebu or zebu-crossed
cattle. This has been gradual, though, over the two decades since
the farmers joined the scheme. Apparently this has been because
of the increasingly declining income levels for such farmers,
as they have had to fall to the less productive dairy cattle,
producing lower quantities of milk. In this case, the units of
production as employed by such farmers were seen to have been
smaller; and that such are small because the farmers are poor
(Mbilinyi, 1976:65). For instance, such farmers were found to
exploit less of the available land resources such as tilling only
a fraction of the total land acrage. They were less able to make
investments in such grade dairy components as planting better
quality pastures. Despite, therefore, having ample land resources,
such were found to produce on more or less peasant production lines,
with the major challenge being offsetting subsistence needs at the
individual farm level.

The revelation of the study in this connection is that there
will be more need for the extension service to focus more attention
on the less enterprising farmers. We saw that the more stereotyped
supposition that innovation usually diffuse from early adopters to
the late and usually less affluent was not the case in the Nzoia
Scheme. This is because we realised, more so in the case of an
innovation such as grade diary farming, that some of the farmers

whose performance was quite below average lived in the neighbourhoods
of very successful farmers. In this case adoption of such an
innovation is curtailed because of the high financial investments
required in the enterprise (Rogers and Shoemaker, 1971). This
shows the need for re-examining the extension package in the
region, in this case as relates to educating farmers, provision
of credit, marketing services, roads, input provision and
co-operative development.

The implication in this case is that a change in the whole
approach of the extension service should be able to catapult such
poor farmers into improved farming. They should be able then to
undertake enterprises on the farm on the basis of input - output
ratios and accordingly choose suitable farm enterprises. This
may enable such farmers to be more self-sufficient, whose result
should approximate the initial aims of setting up such settlement
schemes by the Kenyan Government.

Though this study showed that family size had no significant
association with the levels of investment in the quantity of milk
produced and offered for sale, the explanation was because there
was very little tangible investments made by farmers in this case.
For instance, the general pattern of grazing in the scheme is
extensive in nature, which as a result has less compulsion for
the farmers to purchase additional feedstuffs such as hay, maclik
and other concentrates as would be the case for zero-grazing. In

any case, there was no concrete evidence from the study that the incidence of financial drain by dependents would change, with a change in the absolute number of dependants, and lead to more investment in dairying enterprise.

In a nutshell, therefore, differentiation at the individual farm level occurs because of income disparities, which is dependent on other mitigating factors. For instance, the initial capital endowments at the disposal of the farmers when they joined the scheme appears to have been crucial. This may also be coupled with differential qualities of entrepreneurship and proper planning or not for the farm's future development goals. In addition differential degrees of risk aversion appears to have also been influential. There was also the perceived selective use of essential extension services due to differential accessibility, especially in the use or not of the artificial insemination services. This had been a major factor in the degenerative qualities of some farmers' animals, because such farmers resorted to use of poor quality bulls from neighbours. It thus affected the ability to sustain the introduced grade dairy farming innovation in the scheme. Lastly, though not least, the differential perception and energy expenditures as related to farm enterprise combinations and majors, and production levels decisions were crucial at the individual farm level.

In this case, there was observed wide variations in the technical and economic performance of farm families excelling under identical physical conditions of ecology, farm size (or in our case acrages put under farm enterprises), farming systems and access to water, farm inputs, credit extension and marketing services (Clayton, 1983: 37-41). There is the supposition that good farmers are relatively more innovative, and which when combined with such promotional activities as extension services and marketing facilities, have been sources of rural wealth, and must therefore contain the seeds of the present disparities (Roling, et al, 1973:16). Such differences arise because innovations are not adopted at the same time and pace (Rochin, 1972). And there is a complex and close link between innovation and resource mobilisation such that some innovations make (greater) demands on existing resources, such as (on) human time and settlement space (or increased cash investiments in enterprises such as grade dairy farming development). These, then, are likely to lead to differentiation amongst individual farmers in a rural setting (Carlstein, 1974;1). They appear to be the basis for differential resource utilization as was seen in our case.

5.2: POLICY RECOMMENDATIONS

The situation as observed in the Nzoia scheme needs isolation of development problems more at the individual farm level. The change agents need to be more able to assess the local situation to be able to make options for what extension programme will be

more appropriate to the needs of the local clientele, and how
to adopt research findings to the local conditions taking into
account an area's natural resources, its marketing opportunities,
land/labour relationships and the degree of sophistication of the
farmers (Tiffen, 1974). An adoption of "the individual and group-
approaches" simultaneously in educating the farmers will be quite
worthwhile in the case of the Nzoia scheme more so in grade dairy
farming. This should be able to offset the shortfall in the belief
that innovations diffuse from the early adopters and trickle down
to late adopters. In this case, this situation was not evident
in the scheme. There will thus be need for the extension agents
to organize group meetings (barazas) to educate farmers, but they
have to follow up this to the individual farms to make sure the
information is effectively utilized as recommended. This should
also go along way in solving the individual socio-economic
complications that affect rates of innovation adoptions among the
farmers.

In the same light the change agents will need to establish
conducive environment for rapport between the two parties involved,
other than the more common style of "the extension staff coming with
a package of supposedly superior practices, usually centrally adviced,
which they try to persuade the community to adopt" (Hunter, 1975:12).

A major problem regarding better grade dairy farming has been
incessant cattle deaths due to the dreaded East Coast Fever disease

(E.C.F. disease). An improvement in the efficiency of the
veterinary services, the availability of drugs at relatively
subsidized rates, and the education of the farmers to understand
the earliest disease symptoms, and thus respond faster, will be a
milestone in itself. The artificial insemination services (A.I.)
also need to be restructured and improved, in terms of availability,
and an increase in the daily runs. Otherwise the more worthwhile
undertaking will have to be the replacement of the A.I. service
with bull camps in the scheme. This should alleviate problems of
long distances reported by farmers to such centres, be able to
reduce costs on fuel and other maintenance on the vehicles involved.

The government should however also endevour to control the
number and quality of bull-breeds for those farmers who must keep
them individually. It should also be mandatory that for those
farmers who, by some personal complications, can not sustain quality
grade cattle, and want to keep cross-breeds, should do so under the
guidance of dairy farming advisors. This then means there have to
be a deployment of such agents to advice the farmers, as was
realised that there were no specifically dairy farming advisors
in the scheme then.

Such dairy farming advisors will also have to address themselve
to various critical questions in this enterprise. They have to
strive to educate farmers undertake the same on commercial basis
and improve their income levels. There is the need to teach farmers

about effective farm management, and be able to prioritise certain
farm enterprises on the basis of overall costs and benefits. This
will involve further education about record keeping practices,
which most farmers in the scheme were not doing. This probably
is the only viable way for most of them being able to economically
allocate and use their meagre resources at their disposal.

In animal husbandry management, there will also be the need
for the extension agents to make farmers realise the need for more
intensive grazing methods. This is because the impending population
problem will in no long time be quite a constraint on the present
nature of extensive grazing practised in the whole scheme. Farmers
will need to do more of zero-grazing practices, and education on
such other practices as silage and hay making will be another step
forward in the development of the enterprise.

In the line of development capital, it will have to be
imperative for the government to provide cheaper sources of
capital to catapult the production capacities of those farmers
who are below average. Such farmers should be given more
incentives to acquire loans for development. In this case, the
criteria for loan provision should not embed the notion of
creditworthness, viability of the investment and ability to provide
security (Heyer, 1973:10). Rather, the criteria in meeting the
demand (for loans) should be the repayment capacity (Belshaw,
1959:232). In addition there is need to improve the efficiency of

loan processing for farmers, to be ready in time for the planting season. For the case of the farmers in the Nzoia scheme region, it might be worthwhile to decentralise these services, say to establish a sub-branch at the divisional headquarters at Lugari, rather than Kakamega town many kilometres away. Such services could also be provided through the local co-operative society, but the usual problem of mismanagement of such institutions makes them less viable in dispersing such loans.

The provision of piped water in the scheme has been the other service so crucial to the improved grade dairy farming, but which has had maintenance problems for many years. The water supply is quite inadequate, and this trend needs to be changed. A more viable solution should be to tap water from the adjacent River Nzoia, other than the present source which is well over 20 Km away at Ziwa. This should alleviate the problem of incessant water shortages, and thus be a step further in recuperating the seemingly declining dairy farming in the scheme, for most farmers.

The other ancilliary services in the scheme pertinent to improved grade dairy farming were in the areas of communication and dipping facilities. These were found to be quite inadequate, and in some instances quite underdeveloped, especially as concerns acce roads. Most of these roads are only operational during short spells of the dry seasons, otherwise are rendered almost impassable in most times due to gullies and mud. These need alot of improvement,

especially in gravelling and murraming, to make them more
relatively passable throughout all the seasons. In this case, this
will be able to improve on the total percentage of classified roads
serving the settlement scheme region, which by 1984 was only ten percen
of which the Nzoia scheme is only part (Kakamega District Development
Plan 1984-88:22).

The nearest reliable postal services were well over seven
kilometres away, at Moi's Bridge urban centre on the Kitale-Eldoret
road. There is reason to establish a sub-post office at the nearby
Nzoia market to be able to help farmers more adequately. This
should also mean that most other farmers will see more need in
subscribing for telephone services to their farms, which should
put them more closer to the markets for their farm produce,
especially in horticulture, fruit farming and poultry development.

There were only four plunch dips in the scheme region used
communally by dairy farmers. These were inadequate, poorly
managed and thus sometimes very inneffective in combating the
problem of tick-borne diseases. There will be need to increase the
number of such dips in the scheme, to reduce the long distances
the farmers reported as having to make to dip their animals. There
will also be the need to train more qualified dip attendants to
manage dips more adequately. In addition, a solution need to be
found for most of the non-scheme farmers in sisal estate who also
dip their zebu cattle with scheme farmers. The local administration

and leaders need to provide separate dipping facilities, in this
case.

5.3: AREAS FOR FURTHER RESEARCH

The experiences from this study shed light on a number of
areas where further research would measurably contribute to
alleviating problems of rural development. In the light of this
study it was not possible to tackle all such issues because of the
limited finances, need for more elaborate research designs and
time factor.

Increased analysis in the area of resource allocation economics
on the farm would be worthwhile in such planned rural settlement
areas. In this case, analysis should be done of whether farmers
adhere to the norm of cost-benefit consideration in their production
and enterprise combinations. A research design which carters for
the various expenditures on daily basis on inputs by the farmers,
and extending to a period of a year and over would be adequate,
in this case. At the end of such a period, records on the various
enterprises outputs should be made, to enable a viable comparable
analysis. In this case, this step would help determine the worth of
farmers' engagement in certain agricultural enterprises. In the
same light, such a step would help the extension service agents
to advice the farmers accordingly.

It could also surfice to try to find out, from such record
keeping procedures, the major avenues of incomes derived from
dairy farming. In this case, there will be the need to know
whether such finances are rechannelled into more production of
milk and general improved dairy farming development, especially
for those farmers who produced lower quantities of milk.

In addition, an attempt at analysing such personal factors
(at differential performance) likely to have an influence over a
number of agro-economic and dipositional factors should be made.
In this case, such attributes as fatalism, need achievement motivation,
traditionalism, familism and overall modernity need to be measured and
analysed. These should be able to explain more why there are
perceived differences in performance at farming by individual farmers.
Their effect, combined with the use or not of the extension service
information, may just be the very explanantions for more of these
differentiation.

On the other hand there will also be a justification to establish
why there was very low reported extension work in the scheme. This
can be made possible through personal interviews with some of the
extension agents, to find out why they consider it problematic,
in their own analysis, in providing adequate and fruitfull services
to the farmers. This is especially in the area of dairy farming
development. Note should also be made of the farmers' likely
considered options in farm enterprises, other than the "imposed"
maize and grade dairy farming enterprises in the scheme when they

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THE RESEARCH QUESTIONNAIRE:

INTRODUCTION: I am a student from University of Nairobi. I
am carrying out a study on dairy farming
development in this scheme. I would very much
appreciate it if you would share your views on
certain issues that I wish to explore and which are
important for this study. Thank you.

1. Respondent's name...

2.   Sex: Male: ....

                Female:...................................

3.   Age..................................

                20----------24

                25----------29

                30----------34

                35----------39

                40----------44

                45----------49

                50----------54

                55----------59

                60 +--------

4. What is your ethnic group?...............................

5. Marital status: Single..............................

                      Married:..............................

                      No of wives..............................

                      Widowed..............................

                      Divorced..............................

                      Seperated..............................

6. What level of education did you complete?

      1. None------------------

      2. Std. 1 - 4-------------

      3. Std. 5 - 8------------

      4. Form 1 - 2-------------

      5. Form 3 - 4-------------

      6. Form 5 - 6-------------

      7. Over Form 6-------------

      8. Adult Education----------

      9. Technical Training---------

      10. University-----------------

7. What level of education did your wife/wives complete...........

8. How many children do you have in the family (family size)----

....

9. How many of the children (in 8 above) are in:

      1. Pre-primary-----------------------

      2. Primary school--------------------

      3. Secondary School-----------------

      4. Technical training---------------

      5. College/University---------------

      6. Other (specify)-------------------

10. Approximately how much fees do you pay for your children in school and/or in colleges?........................(Kshs.)

11. How many of your children are:

    (a) Employed (specify)----------------------------

(b)   School leavers seeking employment----------------

(c)   Self-Employed (specify)-------------------------

      •---

(d)   Totally Unemployed-------------------------------

12.   What do you do for a living?

(a) Farmer

(b) Teacher

(c) Housewife

(d) Unemployed

(e) Self-employed (specify)-------------------------

    (eg. Small trader in vegetable; casual labourer,

         businessman such as shopkeeper, butcher,

         middleman selling agricultural products etc).

(f)   Other (specify)-------------------------------

      ----

13.   Approximately how much income do you get from your occupation

      per month?

0 - 499	1500 - 1999
500 - 999	2000 - 2499
1000 - 1499	2500 - 2999
3000 - 3499	3500 - 3999
4000 - 4499	4500 - 4999

5000 and above---

14. Do you get financial assistance from your working children?

       Yes------------

       No------------

   If Yes, how much approximately per month from your:

       Sons--------------

       Daughters----------

15.) What other income sources do you have--------------------

    e.g. Shops---

       Butchery-----------------------------

       Middleman selling agricultural produce----------------

       Tailor--------------------------------

       Hotelier-----------------------------

16. How much other income do you receive from the other sources

   mentioned above per month?---------------------(KShs.)

17. When did you join the scheme?...............(Year)

18. (a) Did you know anything about dairy farming before

      you joined the scheme?

      Yes-----------------

      No-----------------

   (b) If yes, explain (eg.

      (i)   worked for a muzungu previously---------------

      (ii) was involved in dairy farming in the previous

         home area---------------------------------------

      (iii) gained experience from a neighbour in the previous

         home area---

(iv) attended dairy farming training before joining

the scheme---------------------------------------

(v) through attending agricultural shows; listening to

radio programmes and reading dairy farming

related newspapers-------------------------------

(vi) Other explanation -------------------------------

----

19. Were you producing any milk for sale before you joined

the scheme?

Yes-----------------

No------------------

20. (a) Have you taken any loans to develop the dairy farming

on this farm?

Yes----------------

No-----------------

If Yes, when was this?-----------------(month/Year)

(b) (i) How much amount of loan was this?

Kshs-------------------------

(ii) Or, was it in kind (eg. grass-seed; dairy animals;

milk packets etc.)------------------------------

----

21. Did you use the loan for the purpose intended or diverted

to other uses (eg. urgent need to pay school fees; diverted

to arable farming; used to do other businessess such as

stocking a shop; used to marry another wife etc.-----------

----

22. To what extent has the loan helped you in your present dairy farming?

    (a) To a very small extent

    (b) To a small extent

    (c) To some extent

    (d) To a large extent

    (e) To a very large extent

    (f)

23. Did the loan lead to more milk production?

        Yes---------------

        No---------------

24. (a) Was the loan (a complete) failure   Yes------------

                                                  No------------.

    (b) If yes, have you followed it up with a similar loan ?

        Yes---------------------------

        No---------------------------

    (c) If No, explain why?-------------------------

        ----

25. How did you repay the loan?

    (a) through milk sales--------------

    (b) through incomes from other businesses such as shop, butchers, transportation etc.

    (c) through salary attachment

    (d) through the sale of other agricultural products

    (e) any other (specify)---

        ----

26. What did you use the loan for?

    (a) purchasing high quality dairy livestock

    (b) buying animal feeds

    (c) development of pasture

    (d) building of a dairy house (parlour)

    (e) Any other use put to (specify)---------------------------

    ----

27. Have you gained from the loan in any other way other than dairy farming?

    (a) have been able to build a permanent house from milk sales proceeds;

    (b) have been more able to pay childrens' school fees etc.

    (c) managed to buy a matatu, tractor,griding mill (posho mill) etc.

    (d) Enabled me to pay the initial farm loan

    (e) Any other (specify)---------------------------------------

28. Have you completed paying your initial farm loan?

    Yes-------------

    No-------------

    If no, how much is remaining? (Kshs)----------------------

29. How many dependants do you have on this farm(numbers)--------

----

30. In which ways do you support the above dependants? eg:

    a) financial support.

    b) provided them with a piece of land for their own farming(quote acreage)---------------------------

    c) subsistence in food, milk etc-----------------

    d) Any other (specify)---------------------------

31. How many workers do you have on this farm?

    a) In dairying------------------------

    b) Other farming activities (specify)-----------------

    ----

32. (a) How much money in total do you pay these workers per

    month(Kshs.)---

    (b) Do you provide them with any free milk ---------------

    (quantity) or they buy?---------------------------------

33. Have you ever heard of othe extension service? No--------------

                                              Yes--------

    (specify) eg. veterinary officers; assistant agricutural officers;

    community development officers etc.

34. How many times did any of them (33 above) visit your farm (specify
which)

    i) Last week---------------------------

    ii) Last month-------------------------

    III) Last 3 months---------------------

    iv) Last six months-------------------

    v) Last one year---------------------

    vi) Last five years-------------------

35. What did the extension service officials come to do?

    a) to treat a sick animal

    b) for a routine work visit

    c) to advice on dairy farming methods

d) to make a plot demonstration on the farm

e) Any other (specify)------------------------------------

----

36. If they have ever come specifically to advice you on dairy
     farming and management methods, explain the nature of the
     advice-------------------,----------------------------------
     ----
     ----

37. Do you ever discuss with the extension service officials what
     you intend to do on your farm? (probe)------------------------
     ----
     ----

38. a) Have you suggested to them any project you wished to carry out
         on the farm?---

         ----

     b) Did they approve of your wish?   Yes---------------
                                             No-----------------------
         (explain why not---

         ----

39. How satisfactorily do you think the extension service carries
     out its work?
     a) very unsatisfactory
     b) Unsatisfactory
     c) Indifferent

d) Satisfactory

e) Very   satisfactory.

40. What else have you to say about the extension service
    officials?

    a) their numbers are inadequate

    b) they are inefficient in their work

    c) they are hard to reach when one has an urgent problem

    d) they only serve some people they know personally

    e) any other--

    ----

41. How far is your original home from the scheme?------------(Kms).

42. a) Do you have another farm you personally own there?

    Yes------------   (acreage)

    No-------------

    b) What farming activities do you undertake there?..........

                i)----------------------------

               ii)----------------------------

              iii)----------------------------

    c) How frequently do you alternate between these two homes?

    ----

43. What can you say is the nature of your relationship with your
    neighbours?

                a) very good

                b) good

                c) friendly

                d) negative_ (antagonistic)

e) Very negative (antagonistic)

44. a) How many dairy animals were you given when you joined the scheme?---

   b) What breeds were they

      i) Guernsey------------------

      ii) Friesian------------------

      iii) Aryshire------------------

      iv) Jersey--------------------

      v) Redpoll--------------------

45. a) What animals do you keep on your farm presently?

      i) Grade (dairy) animals---------------   no-----------

      ii) Zebu   "-----------

      iii) goats   no------------

      iv) sheep   no-----------

      v) donkeys   no-----------

      vi) others-------------------------   no-----------

   b) If Zebu cattle presently kept for what reason are they kept (eg, oxen for plóughing etc)••••••••••••••••••••••••••
   ----

46 (i) What can you say is the major activity you undertake on this farm (rank them)

	TIME SPENT/WORK
Arable farming	
Dairy farming	
Horticulture	
Poultry keeping	
any other (specify)--------	

ii) How much land acreage have you devoted to the major

activity?--

47. What is your reason for categorizing the activity mentioned

as the major one on the farm? (eg. how do you compare

incomes from other activities?------------------------------------

----

       Dairy   farming------------------------   (p.a)

       Arable farming-------------------------

       Others (specify)---------------------

48. How far do you take your milk to the collection centre?--------(Km)

49. What is your mode of _transportation?

    a)   potterage (eg.Carrying on one's head)

    b)   by bicycle

    c)   .by tractor

    d)   by pick -up

    e)   donkey-cart

    f)   lorry

    g)   other (specify)----------------------------

50. Approximately how much milk (Kgs) do you produce during:

    (i)   the dry season--------------------

    (ii)   the wet season-----------------------

51. How much milk do you leave for home consumption in:

    (i)   the dry season-----------------------

    (ii)   the wet season------------------------

52. Are there instances when you fail to produce milk completely
(i.e. zero production whether in the dry or wet seasons?)

    (i) Yes---------------(Explain)-------------------------

    (ii) No-------------------

53. Do you ever use artificial insemination services for your
dairy cattle (probe)--

----

54. (a) How easily available/accessible are the A.I. services
(eg. in terms of distance from the servicing centres?------

--(Km)

            No------------

(b) <u>OR</u> Do A.I. service officers ever come to your farm?

            No--------------------

            Yes-----------------

55. How adequate are the services of A.I. officials?

        a) Very adequate

        b) adequate

        c) fairly adequate

        d) inadequate

        e) very inadequate.

56. Other than A.I. services, what other alternative do you
have?---

----

57. Do you keep any farm records?

         i) No--------------

         ii) Yes---------------(Explain)----------------

----

58. Which farm records partaining to the following do you keep?

    a) dairy expenditure records--------------------------------

----

    b) dairy production records--------------------------------

----

    c) Arable production records------------------------------

----

    d) general agricultural production records-----------------

----

    e) extension service visits records-----------------------

----

    f) Others (specify)--------------------------------------

----

59. What is the use of such records?---------------------------

----

----

60. Have you ever invested in dairy farming at all (eg. stock replacement; pasture development; dipping facilities development) ?   Yes----------------   No--------

61- If you invested in dairy farming, how far do you think
this has rewarded your efforts(apart from higher milk
production)?

    a) has enabled him/her build a permanent house

    b) enabled him/her start a shop, butchery etc business

    c) has been able to acquire other farm development loans
       from the guarantee of repayment through proceeds
       from high milk yields

    d) Any other (specify--
----

62. How much milk were you producing when you first joined the
scheme?----------------(Kgs)

63. How does that compare with the present milk production?

    a) Now much higher

    b) there has not been an increase or decrease

    c) there is no milk production presently

64. If you produce less (or no) milk presently what explanation
can you give? 1.---

2. ---

3. ---

65. How may milking animals have you had:

    1. in the past 6 months-----------------

    2. in the past 12 months -------------

    3. in the past 5 years   -------------

    4. in the past 10 years --------------

66. Have you ever replaced your old stock of dairy animals
    since you came to the scheme?

    i) Yes----------(explain what has been your method of
       replacement(e.g. natural replacement; purchasing other
       cattle etc)-----------

    ii) No-------------------

67. What major problems do you experience in dairy farming generally?
    (Let the respondent list and then rank them according to

    their strength)   1.---

                       2.

                       3.

                       4.

                       5.

68. Who has been making the major decisions on this farm in the
    past ten years?

                       a) Husband

                       b) Wife

                       c) Husband and wife

                       d) elder son

                       e) Any other (specify)--------------

69. To whom do the extension service talk on this farm?-----------

----

70. Do you ever:

                 i) attend agricultural barazas?   YES---------

                                                      NO-----------

ii) Read agricultural newspapers?   YES-------------

No-------------

iii) Listen to agricultural radio programmes?

YES----------------

No------------------

(If yes, probe the respondent by asking him or her to mention the newspapers and radio programmes and times broadcast).

Newspapers read--

Radio programmes	Name	Time
1.	1	1.
2.	2.	2.
3.	3.	3.

71. Have you ever had any dairy farming training?

eg. from a farmers' training Centre/College?

YES-------------

NO----------------

Period (years)	no of times
1.	1.
2.	2.
3.	3.

72. Did you know that such programmes (71) exist for the benefit of farmers?

Yes----------------------

No----------------------

73. Have you ever been to an agricultural show?

                              Yes------------

                              No--------------

    If yes, a) What month is it held, and town?-----------------

             ----

             b) When was : . this year?--------------------------

74. Did you gain any dairy management knowledge from the show?

                              Yes------------

                              No--------------

75. Looking at the number of your animals, how many milk (dairy)

    animals do you think should be kept per acre?-----------------

    (stocking rate)

76. Have the extension service officials ever told you about

    this stocking rate?

                    Yes-----------------

                    No------------------

77. How do you compare with your present stocking rate?---------

    ----

78. How do you rate the condition of your animals?

         a) very highly degenerated

         b) highly degenerated

         c) fairly degenerated

         d) degenerated

         e) breed maintained

f) up-graded (Cross-check $\check{y}$

g) highly upgraded.

79. To what extent are you satisfied with the way you manage
your dairy farming on this farm?

a) to a very great extent

b) to a great extent

c) to some extent

d) to a small extent

e) to a very small extent.

80. What is your view about the present milk price offered by
K.C.C. to dairy farmers?

a) it is fair/adequate

b) inadequate to cover production costs

c) just adequate to maintain production

d) very adequate

e) any other (explain)---------------------------------

----

81. How much money is paid to you by K.C.C. per pint of milk?
--------------------(Kshs.)

82. Do you send your milk through the local co-operative union
or directly to K.C.C.?

i) Through the Co-operative---------------------------

----

ii) directly to the K.C.C. ----------------------------

(Explain in each case)

83. How do you rate the local co-operative union management since
you came to the scheme?.

    a) quite inefficient

    b) inefficient

    c) Fairly efficient

    d) Efficient

    e) quite efficient

    f) not concerned with the way the co-operative is managed or run.

84. Would you produce (i) more milk if the price of milk

                  was increased?   Yes------------

                              No------------

            (ii) more milk if its price was reduced?

                              Yes-----------

                              No------------------

                    (explain)-----------------------

----

85. Would you invest more in milk production if the price

    was i) increased?   Yes--------------   No------------

        ii) decreased?   Yes-------------   No------------

Explain)---

----

86. Are you satisfied with the present level of your milk
production? Explain (in whichever case)-------------------

----

87. Do you presently have piped water on your farm?   Y

                    Yes---------------------

                    No----------------------

(Explain---

----

88. If you have no water on your farm how far do you water your

    dairy animals? --(Kms).

89. Have you divided your farm into paddocks?

                  Yes-------

                  No-------

90. How much land have you spared for grazing on your farm

    (acreage)--

91. Is this grazing land adequate?

                  Yes-----------------

                  No------------(What other alternatives

  do you therefore employ?)

                a) grazing along the road

                b) grazing at the market place

                c) grazing on the neighbours farm

                d) Any other (specify)---------------------------

----

92. How far do you dip your animals? no of Km---------------

    no of times per week------------------

93. What do you consider as having been the objectives or
aims of creating settlement schemes?

   a) To resettle landless people (since the colonialists were
   leaving Kenya).

   b) To increase agricultural production

   c) To provide unemployed persons with the sources of income
   through their own farming.

   d) did not understand nor know the aims then.

   e) any other reason?---------------------------------------

----

--(rank them).

94. How do you compare the objectives with your own present
performance?---

----

95. How do you compare the objectives with the general performance
of the farmers as a whole in the scheme?-----------------------

----

----

96. Are there any solutions you would like to suggest from '94' and
'95' if devergent?

   a)-------------------------------------

   b)-------------------------------

   c)-------------------------------

   d)-------------------------------

97. What problems have you as an individual farmer faced in your

    dairy farming since you joined the scheme?---------------------

    a)---

    b) --

    c) --

    d) --

98. In your own view/opinion, what problems do you think the farmers

    as a whole face in this scheme in the field of dairy farming?

    a)---

    b)---

    c) --

    d) --

    e) --

99. What solutions do you envisage for these problems as a whole?

    a) --

    b) --

    cc) ---

    d) --

    e) --

    f) --

100. Are there any particular plans you have for your future dairy

    farming on this farm?

    a)---

    b)---

    cc)--