

**Effectiveness of Information Flows in Livestock
Technologies among Small-scale Farmers in Kilifi
District**

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Declaration

This MA project paper is my original work and has not been submitted for examination in any other university

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This MA project paper has been submitted for examination with our approvals as university supervisors.

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Abstract

The agricultural sector in Kilifi district has been faced by poor performance due to insufficient rainfall, poor prices, and poor rural access roads. The poor performance is also reflected in the inability of the district to satisfy its food needs thus remaining a net food importer (KDDP2002-2008). Barriers to information have played a role in low uptake of dairy technologies and an understanding of the various factors will help in unraveling this circumstances surrounding the low levels of dairy technologies uptake.

A study was carried out in Kilifi district with an objective to examine how effective the information flow of livestock technologies is among small-scale farmers in Kilifi district. The study will add value to increase the understanding of information flow in the district to improve on how can assist in better understanding of farmers conditions to acceptance of livestock technologies. Sampling method used was a combination of both probability and non-probability sampling methods like purposive and cluster sampling. Data was collected using a questionnaire and 108 small-scale dairy farmers were interviewed in Kilifi district and the factors that influenced the small-scale farmers to adoption dairy technologies analyzed.

The small-scale farmers apart from having local animals most of them had grade animals. The group formed the basis for discussions in which information of livestock technologies was passed on to the small-scale farmers.

Chapter one

i. Introduction

The agricultural sector in Kenya has been faced by poor performance due to insufficient rainfall, poor world commodity prices and poor rural access roads. For the second consecutive year maize production declined from 25.0 million bags in 1999 to 22.0 million bags in 2000 resulting in the importation of 4.54 million bags of maize for relief and commercial purposes (Economic survey 2001). Also volume of milk declined from 180m litres in 1999 to 137m litres in 2000. The horticulture exports remained the same at the 1999 levels, in, which 99.0 tones were exported out of the country. Thus the agricultural sectors GDP growth rate accelerated from 1.2% in 1999 to negative 2.4 % in 2000 (Economic survey 2001).

Livestock are important to the majority of the rural poor in developing countries contributing in many ways to rural livelihood and livestock are a source of cash, assets to the poor and women, act as a central component of farming system, means of allowing the poor to capture private benefits from common property resources and a source of livelihood. The national agricultural extension policy framework recognizes the need to diversify and decentralize the provision of extension services to farmers. The extension service is one that has for years been provided by the government. An improvement in the marketing, research and financial services promote demand driven agricultural research and technology development (strategies and measures). A vibrant agricultural sector leads to improve service delivery translating into increased production and yields (National Development plan 2002-2008).

Social linkages are a process, along which messages are transmitted to farming community from some source i.e. mass media channels or interpersonal channels. Research institutions like International Livestock Research Institute and Kenya Agricultural Research Institute have employed various social linkages to pass on dairy technologies to farmers. Some of these include: joint field visits, quarterly coordination meetings, monthly seminars, working groups/ networks, jointly organized farmer managed on-farm trials and demonstrations. The agricultural research institutes have over the years developed livestock technologies and packaged them. The livestock technologies have then been passed on to the extension agents for dissemination to dairy farmers (Matata J. B. W. et al 2001). This has resulted to a low adoption of the livestock technologies by farmers. Until recently the extension service under the Ministry of Agriculture were the lead parties in technology transfer They have, over the years, implemented various transfer methods implemented, such as the training and visit (T&V) method, farmer extension groups, and women groups and farmer field school.

Coast province is about 15% of Kenya's land area and has a higher population percentage of people that is within 100km of the Indian Ocean but has a larger area of 400km from the ocean. The Coast Province accounts for more than 10% of the high and medium potential agricultural land of Kenya (Central Bureau of Statistics, 1996). Of the six Districts in the Province, Kilifi and Kwale Districts contain 62% of the high potential area of the Province (230,000 ha of the 373,000 ha total), and 55% of the high and medium potential combined (639,000 ha of the 1.169,000 ha total). The rural and urban population is concentrated in the coastal areas of Kilifi, Kwale and Lamu Districts (Greer and Thorbecke 1986, Foeken et al 1989).

Efforts has been put by various stakeholders in the livestock sector (government, dairy farmers, donors and research institutions to developed and validated appropriate agricultural technologies for the different agro ecological zones of the country including the dry lands. However, uptake and the consequent use of agricultural technologies remain minimal at farm level (KARI Strategic Plan 2000). The coverage remains limited and relatively few of these improved methods have spread beyond the confines of communities that are the focus of intensive on-farm activities by KARI and partners (ATIRI manual 2001).

The government in Kilifi District has started initiatives in the dairy sector with assistance from other research bodies i.e. smallholder dairy project (daily nation, 2003). The sources of the technologies include: Heifer Project International, Kenya agricultural Research Institute, International livestock research institute, Ministry of agriculture, Kilifi plantations, other organizations dealing in livestock and farmers themselves. The livestock technologies that have been introduced over the years to farmers include: *Ukuzaji na ulishaji wa nyasi aina ya napier*; Control ticks and reduce cattle loss; Feed lupin seed with maize for cheaper dairy feed; Pasture reseeding in the ASAL; Make silage for dry season through conserving surplus forage; Recommended Zero grazing unit; Fodder technologies on-farm including legumes, grasses and multi-purpose trees and Better forages for coastal lowlands for more milk from cows.

Communication processes operate as a sub-system of a wider web of social linking. Whatever the form and media of the processes, the latter are imbedded into those

networks or systems of social relations of which they represent a sub-system. The 'new technologies' appeared enveloped with a strong halo of ideological connotations

ii. **Statement of the problem**

Livestock production in Kilifi District has maintained an average of 2.7 billion shillings from 1999 to 2001 but the actual production per unit has declined over the years. This decline has been due to unreliable rainfall which was exacerbated by over dependency on rainfed farming, inadequate marketing channels, poor method of production, poor use of breeding stock and chemicals, poor extension service, poor technology transfer between researchers and extension services, limited credit facilities, unstable agricultural prices leading to low profitability and inadequately equipped extension staff in terms of transport, implements and demonstration inputs (kilifi district development plan 2002-2008). The poor performance is also reflected in the inability of the district to satisfy its food needs thus remaining a net food importer.

The living conditions in large parts of the Coast Province can best be described as harsh (leegwater et al 1991). The high population growth and a thriving tourist industry in the coastal Kenya have resulted in a great demand for milk. It's estimated that the region has a shortfall of 58million litres of milk per year, which has to be met by transfers from the hinterland (Staal S J and Mullins G, 1996). To increase milk production in the coast region the MALD has been encouraging farmers to keep dairy animals under the zero grazing farming method (Maarse et al 1998).

The National Dairy Development Project (NDDP) was launched in 1980 by the government of Kenya with assistance from the Netherlands government. The project was intended to support small dairy development in Kenya by introducing improved zero grazing. The overall objective of NDDP was to help to meet the national wide demand for milk. This project was under the ministry of agriculture and livestock development and marketing. Dairy farming in Kilifi district has a total cattle population estimated at 213,000 head of which 13,000 are of improved breed (MALD 1986) most of the cattle are of the small East African Zebu type found in the hinterland under traditional rangeland husbandry system. The Dairy Development Project (DDP) program had one limitation which was, much as it was a small scale intensive dairy farming it was capital intensive and the economic risks were high therefore the majority of the farming household in Kilifi district could not afford to invest in it. Thus farmers who practiced zero grazing or semi zero grazing was limited (MALD 1986).

The adaptive research, on farm and intensified collaboration with other partners has served to bridge smallholder dairy farmers to research organizations. These interactions have increased the relevance of research and induced a greater responsiveness to practical issues facing farmers. However, coverage remains limited and relatively few of these improved methods have spread beyond the confines of communities that are the focus of intensive on-farm activities by research institutions and partners (ATIRI manual 2001). Information and technology commonly are diffused through a social network, which can be defined as a group of people who share certain bonds, usually as a result of family or traditional social obligations. Social networks may play a fundamental role in the adoption of new technologies particularly if they require collective action, which cannot

be accomplished by a single individual. Social networks also affect the flow of farmers' own experimental information (Billon R. M 2001)

The reliance of the research-farmer-extension agent in the development of livestock technologies (i.e. the transfer of technology model) is a cause of the low level of adoption of farm technologies by farmers (Chitere P. O. 1996) i.e. research is a monopoly of the agencies. The research input is proportionally greater than that of its collaborators in the initial stage of technology generation but gradually decreases towards dissemination.

While important impacts of these approaches ('farmer-to-farmer' model, farmers' agricultural networks, farmers' research committees and farmer field schools) have been reported, understanding of their successes, difference, complementarities and comparative advantages in relations to various agro-ecological and socio-cultural conditions and types of technology-generation is limited. Barriers to Information have played a role in low uptake of dairy technologies and an understanding of the various factors help in unraveling of these circumstances surrounding the low levels of dairy technology uptake. Farmers are not isolated individuals but members of social networks and that these networks can play an important role in the diffusion or lack thereof of information and technology.

The research questions seek to address are;

1. What are the social economic factors influencing the adoption of livestock technologies among small-scale farmers in Kilifi district ?
2. How does information flow on livestock technologies leading to awareness of small-scale farmers in Kilifi district?

3. What are the sources of information that influence awareness of the various communication channels by small-scale farmers in Kilifi District?

iii. Objectives and scope of the study

Main objective

To examine how effective the information flow of livestock technologies is among small-scale farmers in Kilifi district.

Specific objectives

1. To investigate the social economic factors influencing the adoption of livestock technologies among small-scale farmers in Kilifi district.
2. To study information flow on livestock technologies leading to awareness of small-scale farmers in Kilifi district.
3. To examine the sources of information that influence awareness of dairy technologies by small-scale farmers in Kilifi District.

Scope of the study

The study will be exploratory in nature as will be looking at the way dairy-farming information flows from research institutions to the final users who are the dairy farmers. Will examine the effects of developed dairy information to see how this affects the keeping of grade animals in Kilifi district. The aim of the study is to examine how the farmers get information on dairy farming and how this affects their adoption of dairy technologies. The study limits itself to three divisions Kaloleni, Vitengeni and Bahari divisions in Kilifi district. The study covers the community-based groups in the district. This is because there has been a shift in research from dealing with the individual farmer

to group of farmers so as to increase the adopters of technologies. The area has different geographical and ecological areas. The agro ecological zones and boundaries not yet been used officially to define the locations of households. A sample of households within the zones has been drawn.

iv. Justification of the study

The coast region has been at the forefront to develop better working relations with other collaborators, institutions in farming systems research and extension. Memorandums of understandings have been established to facilitate better working relations to promote the dissemination of agricultural technologies. Client system is receiving and passing on the right information to where and when needed. The information passed on is the needed information. The medium and avenues used are the right ones. The respond expected forthcoming in good time for timely action. This study intends to evaluate the situation to better understand these linkages so as to give both the research institute and extension agents the social dimensions of facilitating livestock dissemination of technology.

Various scholars and researcher in this area have published extension information in agriculture but with a focus to the whole country of Kenya. Also information is there on the constraints in the production and marketing in Kilifi district (Echessah P.N.1994). Little has been done in this are of information flow of livestock technologies in Kilifi district. Thus the study will add value to increase the understanding of information flow in the district to improve on how can assist in better understanding of farmers conditions to acceptance of livestock technologies. The study will also add information by

producing a range of information materials by disseminating it findings to various stakeholders

v. Definition of Key terms

Communication is the process by which the information is conveyed among a group, through a common system of symbols; transferring the information through a given channel from a source or sender to a destination or recipient.

Diffusion is a process by which innovations spread to members of a social system and as the ideas are new some degree of risk for the receiver is entailed due to the fact that the receiver may not be aware of the usefulness of the new idea.

Dissemination pathways are the route or channel by which information and technology reach the user. Means that the user searches for potential useful information or what the researchers use to make their output known.

Adoption of new idea entails going through the *Awareness stage, Interest stage, Evaluation stage, Trial / experimentation stage, and Adoption stage* of the adoption process and the use of certain type of information sources (Lionberger, 1960).

Social linkage is a process, along which messages are transmitted to the farming community from some source i.e. Mass media channel, Interpersonal channels. Defined as a group of people who share certain bonds, usually as a result of family or traditional social obligations

Livestock technologies are packaged information about a technologies in dairy that are passed on from the research institutions to the end users who are the livestock farmers

Extension has been defined as 'the conscious use of communication of information to help people form sound opinions and make good decisions' (Van de Ban, 1988). Recent views on extension stress that for an extension agency; good information management is crucial to adequate functioning (Box L., 1990).

Chapter two

Literature review

Introductions

The dairy sector in Kilifi district has undergone change over the last couple of years from when the local communities living in the region kept indigenous livestock. The small-scale dairy farmer is able to keep exotic / grade livestock breeds that improves on the standard of living of the family particularly so the nutrition levels of the children are improved. Kilifi district is generally an agricultural district. The population that is working in the agricultural sector is 440,000 people, which is 80% of the household income in the district. Kilifi district is one of the poorest districts in Kenya in terms of the absolute poverty 66.3% and is ranked 41 of all the districts in the country. This poverty level contributes about 26% to the national poverty level of the country. In the first part of this section will cover the issues on the dairy / livestock sector in Kilifi district. In this section will look at the socio-economic features of the dairy farmer, government programs in dairy farming, rural livestock programs and agricultural extension. The second part of the literature review will deal with issue about information flow of livestock technologies in Kilifi district where will look at technical information and guidance, suggestions of farmers on dairy farming communication avenues, and public information and organization.

2.2 Dairy sector in Kilifi district

The dairy sector in Kilifi district has been changing over the years. The number of dairy animals has been increasing, as have grade animals. This is due to an introduction of

various programs that have been started by the government. The National Dairy Development Project (NDDP) was launched in 1980. The smallholder dairy project started in the 1990s

2.2.1 Socio-economic features of the dairy farmer

Success of communication system and organization is one that fits in clients' habits and interests both socially and economically. Age, education, farm size, status quo, family composition, language usage farm usage and income.

Size of farm since many new technological advances require large-scale operations and substantial economic resources and produce benefits which permit expansion of farming operation. Large farms also have potential for diversification, which reduces risk (Rogers E. M., Shoemaker F.F. 1971)

2.2.2 Government programs in dairy farming

The government through the ministry of agriculture in Kilifi district initiated the National Dairy Development Program with the assistance of the Netherlands government has been involved in improving the livestock breeds in Kilifi district. The objective of the project was to improve dairy management practice on mixed farms of smallholder mainly through the introduction of zero grazing dairy systems. This had an advantage of high prices of milk and marketing opportunities in the urban and tourist centres.

The government in the 1990s started initiatives in the dairy sector with assistance from other research bodies' i.e. smallholder dairy project (daily nation, 2003). The project

provides high quality and wide ranging research information to support smallholder dairy farmers, stakeholders and policy-makers since 1997. The project led by the ministry of agriculture with core funding from Department for International Development (DFID). It combines the research capacities of KARI and ILRI with the experiences and networks of the ministry of agriculture.

The sources of livestock technologies include Heifer Project International, Kenya Agricultural Research Institute, International livestock research institute, Ministry of agriculture, Kilifi plantations, other organizations dealing in livestock and farmers themselves. The livestock technologies that have been introduced over the years to farmers include: *Ukuzaji na ulishaji wa nyasi aina ya napier*; Control ticks and reduce cattle loss; Feed lupin seed with maize for cheaper dairy feed; Pasture reseeding in the ASAL; Make silage for dry season through conserving surplus forage and Better forages for coastal lowlands for more milk from cows.

The Kenya Agricultural Research Institute has a livestock department; the livestock production research is carried out under Dairy research, Poultry research, Sahiwal breeding and Small ruminant research programmes and Pasture and Fodder programmes. Livestock health research is organized under Tick and Tick borne diseases research, Livestock Helminthology (livestock worms), Viral diseases (rinderpest and rinderpest like diseases) research and Bacterial mycoplasma (pleuro-pneumonia) diseases research programmes. The Animal Health and Production Program have the overall objective of achieving a sustainable increase in livestock productivity in different agro-ecological areas by developing, packaging and disseminating appropriate technologies for livestock

health and production. The programme is therefore geared towards developing technologies and knowledge systems that will address major constraints hampering livestock productivity and health in the diverse agro-ecological zones of Kenya and by fostering the adoption/adaptation process of new technology.

2.2.3 Rural livestock programs and agricultural extension.

These include livestock extension and advisory services, dairy production, processing and marketing and ranch improvement. The role of the extension service is to provide information to extension clients in order to allow them better use of available resources by increasing technological options and organizational skills that in turn allow them to take greater advantage of production and marketing opportunities (NAEP2001). As in many other developing countries, government agricultural services are short of funds and concentrate in regions where cash crops can be produced for export (Ishag O. S., 1997). Remote areas are neglected even though they may be important for local market and have some farming potential. An improvement of the communication links through agricultural information center, posters, leaflets, practical demonstrations, village meetings and participatory rural appraisals are important.

Livestock farmers according to (Leegwater P. 1991) are faced with a number of problems such as low disposable income, high agricultural input prices and marketing, insufficient know how and skills and other organizational problems, animal diseases like East Coast Fever and a raising prices of grade dairy animals. While the extension staffs are faced with problems in transportation, housing, low salaries and almost non-promotion prospects, and low staffing in some areas.

2.3 Information flow of livestock technologies in kilifi district

Formal linkage mechanisms have been developed which formed a solid base for more intensive collaboration in the coast province between Ministry of Agriculture and livestock development and KARI in 1993 (Maarse L., 1998). The experiences of the coast network shaped the institutional arrangements and protocols of a new formal network under the new name "coast research- extension cluster" The principle mechanisms were joint field visits, quarterly coordination meeting, monthly seminars, working groups/ networks and jointly organized farmer managed on-farm trials. Joint field visits played a crucial role in the realization of a fruitful partnership and have acted as an eye opener that helped to remove barriers between researchers, farmers and extension workers (Maarse L., 1998). Improved interaction modified the agricultural knowledge and information system in ways that stimulated the various actors to look jointly for new and more suitable technology options.

Farmers are not isolated individuals but members of social networks and that these networks can play an important role in the diffusion or lack thereof of information and technology. Communication plays a vital role as it helps different actors beware of problems, which require government policy clearly and accurately. It also assists in analyzing the possible solutions and deciding which solutions will be preferred i.e. negotiations. Also informing the relevant actors and monitoring if implemented (Van de Ban, 1996).

2.3.1 Technical information and guidance

In the 1970s MOA established agriculture information centers at the district level to assist in compiling information for extension workers and farmers. Regular radio programs and agricultural handbooks. Journals available are Kenya Farmers 1954, Kenya Dairy Farmers 1954 and Farmers Gazette 1983. Are various magazines that have come up dealing in agriculture and include, Topic Africa. Approaching few farmers at the expense of non-progressive majority and the effectiveness of government programs reduced due to barriers created in communication flow and feedback as a result of development of elite group. Farmers' contacts to extension officers, the ratio of extension officers to the farmers and the awareness of the existence of such officers Nos. of TAs, AOs, AAOs

2.3.2 Suggestions of farmers on dairy farming

The promotion of innovations by dairy farmers is encouraged in the district. Farmers are encouraged to participate in PRA meeting where discussions are held and all parties involved. Participation takes place not only through communications but also in communication. No social existence is conceivable without a network of communication (Van de Ban, 1996). These play a vital role in social functioning, maintenance and change. Modes of communication and participation relate to varieties of social relations and structures. They encompass private conversations, folk media, and advertising, traditional gatherings etc. they can range from informal, casual exchange to highly complex institutionalized and ritualized forms of conveying and receiving messages. Insights in learning communication and organization among farmers and between farmers and researchers, the interaction of farmers and scientific knowledge systems among

others it generates questions on institutional organization and capacity, access of farmers to information, research agendas and markets.

Influence the rural farmers in their development work communication means or avenues through which farmers get to know the programs and the suggestions of farmers towards these programs

2.3.3 Viability of communication avenues

There is a glaring lack of media of communication and centers of knowledge- generation which reflect peoples perceptions, understandings aspirations and which can act as avenues for developing people's self-concept and identity in contemporary terms.

Primary means of communication still remain what are called traditional (The examples of prayer, devotional singing and dancing, folk theatre, religious events and rituals etc, have been shown to have a liberative potential in terms of people's action). The so-called modern mass media have only modified but not replaced them. The radio and press have given larger regional and national dimensions to these inbuilt process, but have not altered the basic character of people's reliance on the word of mouth and the speakers' standing for information. (Kishore Saint, Fernandes W., Tanadon R. ed 1981). The people, even though illiterate are by no means passive recipients. They have a highly developed capacity for assessing their validity and veracity by perceiving the tonal quality (The gestures, the posture and the expression on the speakers face).

The carriers of knowledge can be mass, group or individual avenues that have been used. Avenues are: radio, mobile cinema, local paper, national dailies, posters, magazines,

photographs, video slides, tape recorder, Barazas. agricultural shows, demonstrations, home visits, field days. public meetings, drama, folk songs, chalk board, group interviews system. training the leader system, workshops, group discussions system. sensitization of stakeholders, tours and visits, extension officers, neighbors, personal letters etc

2.3.4 Public information and organization.

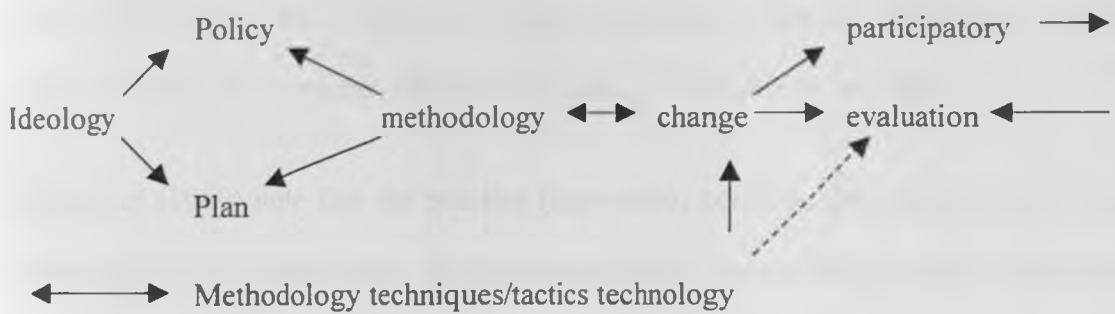
Information from other sources which assists in the development of the livestock sector. There are other stakeholders who participate in community development and some of them include Non governmental organizations like Heifer Project International. Plan international etc. Farmers also from their own organization that assists in the processing and marketing of there produce. Nos. of organizations farmers belongs to, how many introduced to such organizations and number of member in such organizations.

2.4 Theoretical framework

In carrying out this study the theories that are applied are the Ideology to Technology Chain by Viji Srinivasan (Fernandes W., Tanadon R. ed 1981) based on participatory evaluation combined with an earlier model diffusion and adoption model by Rogers E. M. and Lionberger H. F and the group discussion and group polarization of attitude Kurt Lewin 1947. He is also noted for his work on attitude change through informationally rich and interactionally rich group dynamics; in a classic experiment, he showed that women who talked openly and freely were more likely to adopt dietary practices helpful to the food shortage in WWII. The action research model and the participatory research model are related. The differences in the two models is that in the action research model

emphasizes collaboration between workers and management, and denies the structural antagonism between those groups recognized by the participatory research model. Action research does not challenge or often even address existing power relationships in either knowledge production or material production, but seeks to resolve conflicts between groups

Participatory evaluation: from Ideology to technology



Ideology to Technology Chain by Viji Srinivasan (Fernandes W., Tanadon R. ed 1981).

The involvement of people/ dairy farmers in the process as it is placed in its total socio-political context and the social relations is to be analyzed.

The livestock technologies are in the methodology techniques / tactics technology. The linear model of technology transfer is based on the idea that technology packages will be developed by research institutes and transferred by extension staff to farmers. The dissemination of livestock technology involves the communication of the developed livestock technologies to the recipient client farmers and the final adoption of this livestock technology will result from how well the farmers need and understand can be of use to them.

Participatory evaluation is a process meant to raise the consciousness of the people. It is a common search for prescription for action by external evaluators and people working together. In reality, it gets broken in many places. The main points where it gets broken are between 'methodology' and 'change' and then between 'methodology' and 'techniques/ tactics/ technology'. This is because at both these points outside inputs (e.g. information about available technology) are required, often these inputs have to come from government officials or technocrats who, often than not assume that they have superior technology and information which they want to offer or impose on a captive audience which they consider inferior (Fernandes W., Tanadon R. ed 1981)

Lionberger (1960) note that the practice (innovation) could be discontinued due to the problem of lower incomes, lack of finances etc for this reason change agents should not be satisfied by merely adoption. In dairy farming a farmer may adopt grade animals and yet fail to adopt the recommended management practices. Are factors affecting the spread of innovations Compatibility; trialability; complexity; relative advantage; observability (Rogers 1983). Which are the attributes of the innovators.

In the information rich environment available to many decision-makers in industrial societies, the ability to allocate time to process information is a real limiting factor. Therefore, the ability to easily organize, access and process information is the most important element of decision-making and provides for informed participants in the decision-making process.

2.5 Conceptualization of variables

The conceptual Model (Fig. I) portrays the conceived relationship based on the discussions of past literatures and the assumptions given in this chapter. The model indicates both independent and dependent variables, which goes to explain the adoption of information for active participation in development work. The variables have been divided into:

Socio-economic characteristics

It has been conceived herein that the socio-economic characteristics viz. Age; Occupation; Social status; Family background; Economic Status; Education; Language usage and Farm holding have a vital role on the client as far as the using of communication avenues and adoption of relevant information is concerned.

Mass communication avenues will tend to favour the elite with good income while Group Communication avenues will favour the averagely educated with average income. Though individual communication avenues can serve all categories of beneficiaries, it will be of greater value to the illiterate and poor rural people.

In the process of adoption of latest information disseminated through these avenues, the socio-economic features play a vital role. The need to adoption will be aroused if, in most cases it favours that individuals socio-economic background. This in turn will lead to either negative or passive participation depending on the impact of the information so passed on.

Communication avenues

Communication avenues are of three types i.e.

Mass communication avenues

Mass communication avenues are those avenues with mass approach. These are mostly instructional in nature and tend to reach many people with the same message at the same time. The avenues lack that personal face-to-face contact. These avenues if used where the clientele is composed of educated people who are affluent, then adoption will be fast and less expensive. Mostly the mass avenues fail to work in a less affluent community with less education.

Group communication avenues

Group communication avenues have group approach, are instructional in nature and tend to reach many people with the same message at the same time. In group communication avenues, the instructor is usually physically present at the time of conversation. The avenues work more effectively where the client is got sufficient time to spare and are relatively educated.

Individual communication avenues.

These avenues have an individual face-to-face approach and, depending on the medium of instruction, suit all categories of beneficiaries at any time in any situation. It is clear that communication avenues directly affect the need, awareness, interest, evaluation and even trial of new ideas by the client system. Evident too is that communication avenues, if viable will lead to participation in development programmes, participation in organizations and above all smooth gaining and passing on of information.

Stages of adoption:

Adoption of information is not an unorganized phenomenon. It follows the stages of

Need -As per the individual's socio-economic characteristics, information passed on through communication avenues first creates the need to know more about that information on the part of the client.

Awareness -After the need has been created, then the individual goes on to be aware of the information so passed on. Its existence and value to him.

Interest -After awareness then interest is created on the part of the individual to know more.

Evaluation -After the interest has been created, then the individual goes on to evaluate the information: How and what he will benefit from the information so passed on and how it will affect his life in general.

Trial -Under this stage the individual puts the information so gained into practice to see practically what he as an individual or may be his community, as a whole will benefit from the information. If the information proves beneficial to the client then it is adopted.

Adoption

Adoption can be grouped into four main parts as indicated below:

Participation in development programmes.

After information has successfully passed through stages of adoption and types of adopters have been distinct, the result is that the adopters will participate in development programmes.

Participation in organization.

Social, Economic, political, Religious and Cultural organizations are carriers of a people's Cultures, Civilization and their very survival. If information is well conceived and well passed on, then ultimately the people participate in these organizations to enhance and sustain their life.

Smooth gaining and passing on of information.

Smooth gaining and passing on of information, just like participation in development work and participation in organization depend on the successful passage of information through the stages of adoption. This if successful will lead to a meaningful interaction and health relation between the people

Passive participation.

If information is not well conceived and well passed on, the result is that some people will be carried along with the development of a community without their active involvement in developing that community. Thus, rendering them social parasites.

Types of adopters:

In the adoption process, the adopters have been identified as belonging to five groups;

Innovators are those who adopt a new idea much early than others. These innovators are very few in number.

Early adopters are younger than those who have a slower adoption rate, but not necessarily younger than innovators. Early adopters test untried ideas in their own situation, have large farms, higher education, high income are active participants and read papers and journals.

Early majority these are slightly above average in age, education and farming experience (they are generally average).

Late majority these are 'Late adopters'. They have less education and are in majority. These are not very active participants.

Laggards these are those who adopt the new practices in the last. They have least education, oldest and participate least.

Hence, information for and information from the public for development has been viewed as a process with three major conditions to be met for its success. These conditions are;

Deep and knowledgeable thought on how public information should be organized: At this stage, thought has to be given to the type of information there is on the type of information needed and for what purpose.

Careful execution. At this stage care is needed in choosing both the avenues of information and the audience.

Knowledgeable evaluation. Here what is needed is a deep and knowledgeable evaluation of the existing information system for necessary and timely changes where need arises.

Public Information as it is conceived in the present study will still remain a far cry if its organization, system and functioning is divorced from the above-mentioned conditions.

Conceptual model

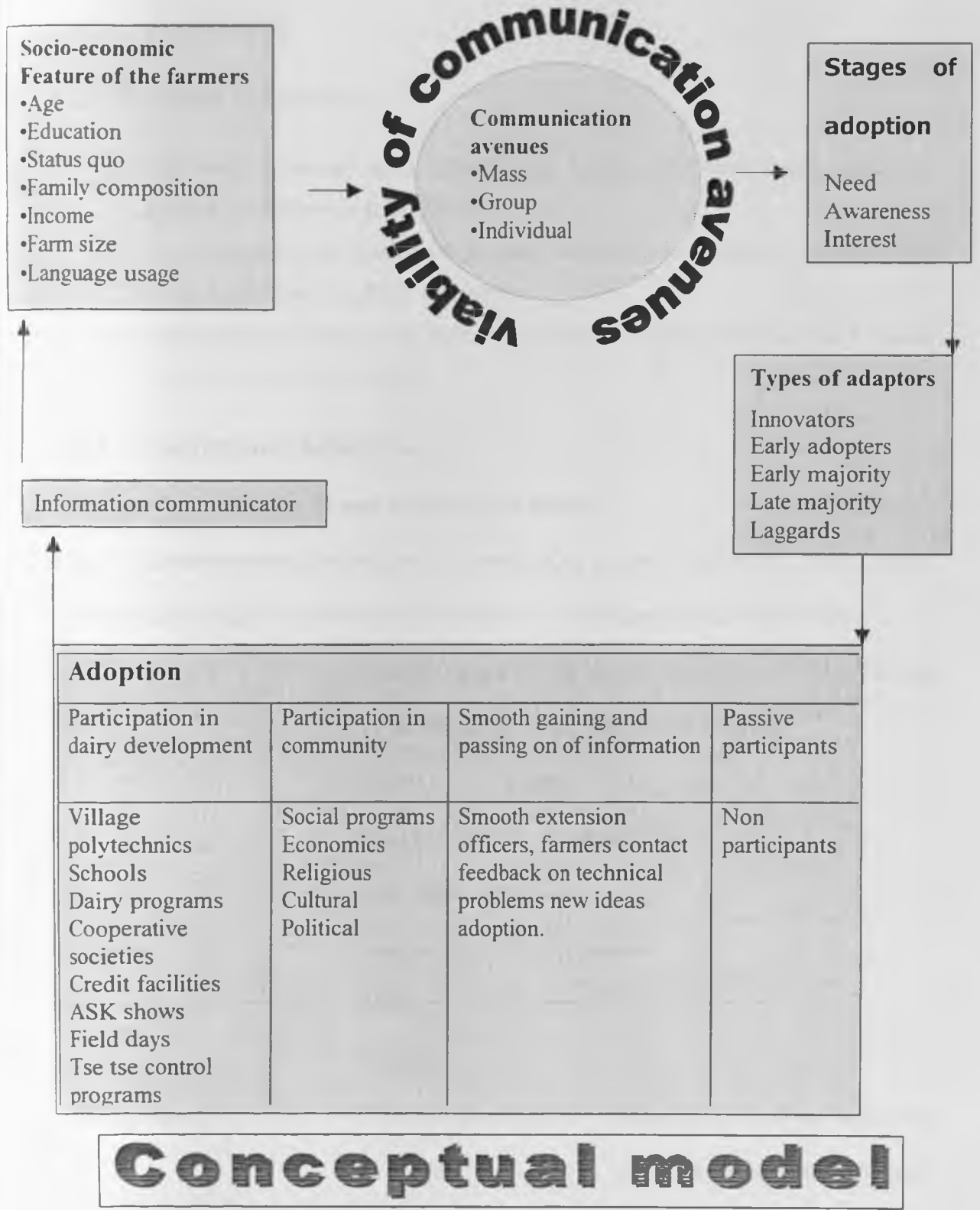


Fig1.

2.6 Hypotheses

The hypotheses for the study are:

1. That social economic factor influences the adoption of livestock technologies by small-scale farmers in Kilifi district.
2. That access to information on livestock technologies influences awareness by small-scale farmers in Kilifi district.
3. That sources of information influence awareness of dairy technologies by small scale farmers in Kilifi district

2.7 Operational definitions

The operationalization of each variable is as follows:

a). **Socio-economic indicators** this covers Age; gender, Occupation; Social status; Family background; Economic Status; Education; Language usage and Farm size

Age Number of years lived from birth to time of study. The age of the respondents was classified as follows;

<25yrs Young

26- 45 years Middle age

> 45 years Old age

Gender whether one is male or female

Male

Female

Occupation: This is defined in terms of farming and is where is farming as a full time activity and combined with off farm activities. Classified as follows;

Farming only

Full time.

Farming plus off-farm activities part time

Sources of Income:

Economic activity the person is involved in to generate some financial gain. It was classified under

Main source agricultural farming

Secondary source business salary etc

none

Education

The number of years in schooled or in formal education has been classified into

None no formal or informal education

Primary 1 to 8years

Secondary 8 to 12 years

Above above 12years

Languages usage

The act of communication between to or more persons both the use of vernacular, Kiswahili, English and other languages were classified into

speak verbal communication only

speak write and read full communication

cannot speak, write nor read no communication

Farm size:

The number of acres the farmer owns. The variable was classified as under:

< 3 acres

3 to 6 acres

6-9 acres

>.9 acres

Family size

The number of family members per household was operationalized as follows.

< 4 persons small

5-7 persons medium

>8 persons large

b). **Adoption indicators** these include influence of zero grazing project on respondents knowledge of recommended extension recommendations, Farmer suggestions on zero grazing project, type of grazing used and type of dairy cattle kept

Influence of zero grazing projects on respondents: If the zero grazing projects has influenced the farmer and he/she has adopted it technology This was classified into

Influenced created impact

Not influencedno impact

Farmer suggestions on zero grazing project Suggestions of respondents on zero grazing projects. Suggestions if changes are to be made on projects or not on the projects to be started in future.

Continue as it is

Change it

Type of grazing system used

The grazing method used by the dairy farmers when keeping dairy animals

Zero grazing

Semi zero grazing

Open grazing

Type of dairy cattle Kept by the dairy farmers

Grade cattle

Crossbred cattle

Local Cattle

Both Grade and local Cattle

c) Awareness indicators If the dairy farmers are aware of the projects being implemented in the area. Classified into

Yes aware

Not aware

Knowledge of extension recommendations

Zero grazing

AI breeding

Management of dairy animals

Shed construction

Tick control

Fodder production

d). Access to information indicators

Farmer/Extension Officer contact: Frequency of farmer contact with extension officer.

this was classified into groups:

5-7 days a week

Fortnightly

Monthly

Rarely

No contact

Mechanisms of information flow

Monthly seminars

Working groups/ networks

Jointly organized farmer managed on-farm trials

e) **Sources of information indicators** include sources on how to get information on dairy and communication avenues

Source of information the dairy farmer used to seek / get information on dairy farming

Agricultural information center

Posters,

Leaflets

Practical demonstrations

Village meetings

Participatory rural appraisals

Grouping of communication avenues The communication avenues have been classified into three groups namely;

Mass communication avenues mass approach radio, newspaper, Magazines

Group communication avenues those avenues with group approach like workshops, demonstrations, and discussions

Individual Officer extension officer, neighbour, personal letter

Chapter three Research methodology

i. Area of study

Kilifi district receives an average annual rainfall ranges from 400mm in the hinterland to 1200mm at the coastal belt. The region also has a bimodal rainfall pattern. There are two rainfall seasons in a year, with the long rains starting in April to June with a peak in May. The short rains are from October to December. The rains are more prominent in the south while in the hinterland and rangeland are unreliable. The annual mean minimum temperature range between 22.5⁰ C and 24.5⁰ C (April, May and June) and a maximum temperature 26⁰ C to 30⁰ C in the coastal belt and 30⁰ C to 34⁰ C in the hinterland.

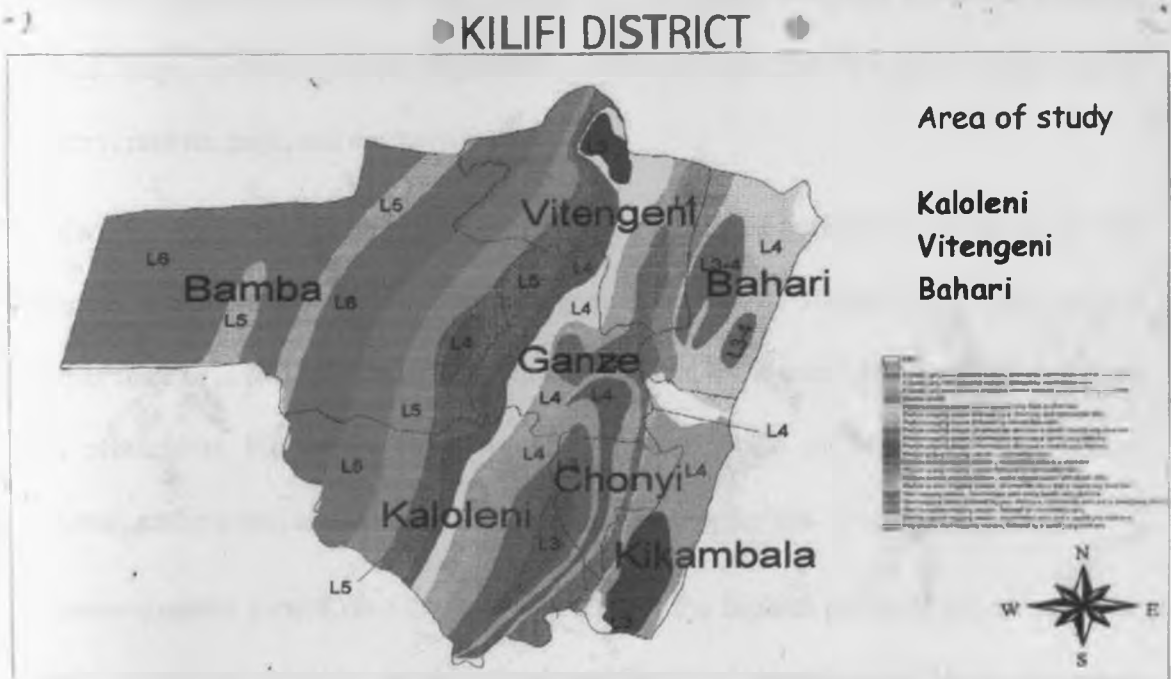


Fig 2 Map of Kilifi District

The district is generally hot and humid all year round with an average relative humidity of 60% along the coastal belt while the evapo-transpiration increases (Braun 1982). The district has five agro-ecological zones, as shown in the map above (Fig 2) (Foeken D. et al 1989) which include:

Lowland ranching zone. Coast lowland 6 (CL6) varies in altitude of 90-300 m above sea level the mean temperatures are 27°C and with a rainfall amount of 350 to 700 mm per annum find buffalo gourds, stunted mangroves and coconuts, sparsely populated area where ranching being main activity.

Livestock –millet zone. Coast lowland 5 (CL5) has lower agricultural potential than CL4 and has a rainfall of about 700-900mm per annum. It is suitable for dry land farming and livestock ranching. In this zone find cashew nuts, coconuts, cowpeas, simsim, pineapple, fodder crops, buffalo gourds, vegetables, livestock kept include cattle, sheep, goats, poultry, rabbits, pigs, and donkeys.

Cashewnut- cassava zone. Coast lowland 4 (CL4) stretches northwards along the coastal plain up to Sokoke Forest. It has an average precipitation of 900mm and a mean annual temperature of 24°C and has an agricultural potential with same crops as CL3 but with less production. Find crops like Sorghum, sweet potatoes, sunflower, simsim, maize, coconut, cashew nut, tomatoes, cassava, banana, pineapples and mangoes.

Coconut-cassava zone. Coast lowland 3 (CL3) has the highest potential for crops in the district spreading along the coastal uplands and low-level coastal plains. Have an average precipitation of 1300mm per annum and a mean annual temperature of 24°C. Sorghum, cowpeas, sweet potatoes, sunflower, chilies, vegetables, banana, bixa, mangoes, paw

paw, sisal, avocados, rainfed and irrigated rice, simsim, maize, coconut, cashew nut, tomatoes, cassava, natural fodder, Napier grass and legumes.

Coconut-cassava zone and Cashew nut- cassava zone CL4 –CL3 mainly found in Bahari division it's the smallest of all the zones and varies in altitude 300-310mm above sea level. Has a mean temperature of 27⁰C and annual precipitation of 900mm per annum. The area has potential for those crops grown in CL3 and CL4.

Over 90% of the population depends on agriculture for their living. The main food crop grown is maize. Other food crops grown include sorghum, rice, cowpeas, green grams, beans cassava, sweet potatoes and ground nuts (Waajenberg H 1994). Coconut and cashew nut are two important cash crops in the district. Other crops grown for cash include mangoes, citrus, pineapple and banana.

The most fertile soils are located in the southeastern part of Kilifi district (MPND, 1989). In the other parts most soils are chemically poor (Boxen et al 1987).

Improved dairy cattle found in CL4 (Coast Lowlands) closer to the coast on medium and large-scale farms. The number of smallholder farms in CL3 zone increased through DDP program (MALD 1986). The medium potential livestock breeds are Ayrshire, Guernsey, Jersey, Brown Swiss Sahiwal and cross breeds with local cattle. Research has and is being done on tick borne diseases and trypanosomiasis, rural extension and training of farmers, construction of communal dips, provision of veterinary services and artificial Insemination and the provision of credit facilities.

Kilifi district is one of the districts in the coast province of Kenya and has a total area of 4,888 sq km in which 4,779 sq km is land and the water area covers 109 sq km. The

district is divided into several administrative boundaries, which include Kikambala, Chonyi, Ganze, Vitengeni, Bamba, Bahari and Kaloleni.

ii Sampling

The population of Kilifi district is about 90,311 persons with a population density of 114 persons per sq km (1999 population census). The population of the area is large and scattered. The sampling method to be used will be a combination of probability and non-probability sampling. In Probability sampling have used the multi-stage cluster sampling and in the non-probability used the purposive sampling method. The district is selected purposively since have been working in the coast province for over two years and know the area relatively well. Singleton et al 1988: 152 describes purposive sampling as a form of sampling. The investigator relies on his/her expert judgment to select units that are representative or typical of the population. The general study is to identify important sources of variations in this population and then to select a sample that reflects this variation. One might select a single unit or sub-population that is thought to be typical of the population in input respect or select a few units that correspond to key population differences.

Cluster sampling according to Mugenda 1999 is a sampling method that is used where it is not possible to obtain the sampling frame since the population is large or scattered over a large geographical area. It involves selection of intact groups and all the members of the groups are included in the sample.

The district has 7 divisions and will sample 3 divisions in the area as a representative of the other divisions as fall within similar agro-ecological zones (coast lowlands 3 to coast lowland 6). The divisions are to be sampled purposively and include Kaloleni division,

Vitengeni division and Bahari division. A sample of the small-scale dairy farmers that will give the diverse agro-ecological features of the district will be selected i.e. Livestock –millet zone CL 5 Vitengeni division and Kaloleni division, Coconut-cassava zone CL 4 Kaloleni division, Vitengeni division and Bahari division and Cashewnut- cassava zone CL 3 Kaloleni division and Bahari division. See fig 1 above. The agro ecological zones and boundaries not yet been used officially to define the locations of households (Kilifi district development plan 1997-2001).

Assisted by the Ministry of Agriculture extension staff the community groups that keep animals will be identified and depending on the number, individual farmers in the groups will be interviewed using a questionnaire. Information gotten from the ministry of agriculture and livestock development in Kilifi district indicates that there were 6 dairy farmers groups in Kaloleni, 9 dairy farmers groups in Bahari and 3 dairy farmers groups

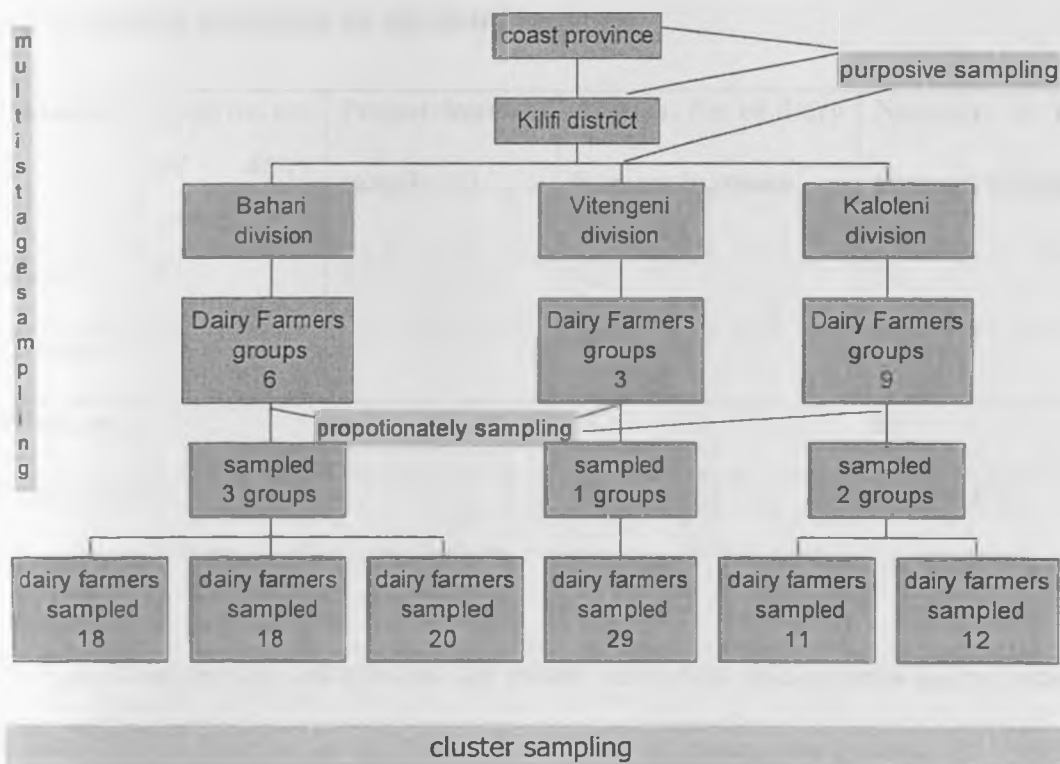


Fig. 3 Dairy Farmers in Kilifi sampled

in Vitengeni divisions.

The Dairy Development Project (DDP) program had one limitation which was, much as it was a small scale intensive dairy farming it was capital intensive and the economic risks were high therefore the majority of the farming household in Kilifi district could not afford to invest in it. Thus farmers who practiced zero grazing or semi zero grazing was limited (MALD 1986). With the above limitation farmer groups will be the point of departure. The groups will be used to get the small-scale dairy farmers in the district. See Fig 4 below. The groups are the ones, which are involved in livestock and in one way or another been involved with the ministry of agriculture.

The selected groups in the division will be treated as clusters and by sampling the groups in the division equally will interview the dairy farmers in those groups.

Fig 4 Cluster sampling of the dairy farmers

Division	Approx. no. Of dairy groups	Proportionate sample 1/3	Approx. No of dairy farmers in group	Number. of Dairy farmers sampled
Bahari	9	3	82	56
Kaloleni	6	2	50	23
Vitengeni	3	1	28	29
Total sample				108

Note assumptions are that notified the groups and made arrangements during when to conduct the interviews. Got information on when the groups meet during the week and

during the days they normally hold the meetings interviewed the individual dairy farmers and latter left them to go on with their meetings. Are assuming that not all the members of the group came for the meetings.

iii Method of data collection

The research was done through a survey and visits made to the district headquarters in Kilifi. Information was sought from the Department of Agriculture and other related departments on the available Community Based Organizations in the district and their areas of operation. Other visits were made to the locations to interview the leaders representing the Community Based Organizations. A list of the Community Based Organizations working in the district was compiled to the sample frame for conducting interviews to the small-scale farmers in the region and data collected. A questionnaire was used to study the activities they are engaged in.



Fig 5 Interviewing dairy farmers in Kaloleni division

The collection of primary data was through:

Unstructured questions administered to the local leaders, agricultural officers etc. The local leaders and representatives of the community were interviewed for purposes of triangulating the information gathered from the Community Based Organizations.

Questionnaire. Commonly was used to obtain important information about the population. Each question in the questionnaire was developed to address a specific objective, research question or hypothesis of the study. Used both structured and unstructured questions

Structured or closed ended questions these types of items refers to questions which are accompanied by a list of all possible alternatives from which the respondents select the answers that best describes their situation. As shown in fig 5 above.

Unstructured or open-ended questions refers to questions which give the respondent complete freedom of response, permits the respondent to respond in his / her own words.

Observation technique utilized to record what the researcher observes during data collection (Mugenda 1999). Observe the type of infrastructure, crops grown, land size, type of household and other indicators of general standard of living of people.

Secondary data i.e. archival records. Was used to supplement the primary and add value to the data collected.

The data collected concerns the household characteristics, dairy farming and production, milk sales, and the various ways the livestock farmers get that information i.e. agricultural information center, posters, leaflets, practical demonstrations, village meetings and participatory rural appraisals



Fig 6. Interviewing dairy farmer Kaloleni division



**Fig 7 Enumerator interviewing dairy farmers using a questionnaire
Vitengeni division**

iv Problems encountered in the field

Conducted a questionnaire survey in which interviewed 108 dairy farmers in Kilifi district. The sample size was 119 dairy farmers. The shortfall was because of a number of problem /challenges encountered in the field. Limitations were in time money and cost of conducting the research. Initially had planned to met and interview the dairy farmers on their set days when they held their meetings. The number of group members who turned up for the interviews and discussions was low in some cases thus had to follow up by visits to group members homes where met and interviewed the group members. This ended up taking longer than expected in term of cost and time of carrying out the interviews. With also having to follow up on the members in their homesteads there also was the issue if the distance between one member's homestead to another which tended to scattered thus traveling long distanced between members of the group.

Also the harsh weather pattern made accessibility to dairy farmers homesteads difficult. This was due to poor and inaccessible roads in the district.

v Method of data analysis

Both Descriptive and inferential statistics have been used.

Descriptive statistics is a simple statistical method concerned with organizing and summarizing data to make it more intelligible (Singleton 1998). This will be done through formulation of tables, percentages and frequency tables etc.

This will be applied first of all to reduce the huge amount of data for the researcher to identify the existing relationships e.g. frequency of contact between farmers and extension agents, the commonly used communication avenues etc

Inferential statistics are statistical methods that deal with the kind of inferences that can be made when making generalization from data that affect the entire population.

The statistics was used to give a true data characteristics and to test the truth or falsify the hypothesis.

Chapter four

4.0 Factors Influencing Farmers Access to Livestock Technologies in Kilifi district

4.1 Introduction

The research findings are presented by use of descriptive statistics. Among the statistical tools employed are frequency, percentages, tables and pie charts.

Farmers' access to livestock technologies in Kilifi district is influenced by a number of factors. Some of the factors are

1. Socio-economic features of the dairy farmer
2. Rural livestock and agriculture in Dairy farming in the study area
3. Information flow on livestock technologies in Kilifi district
4. Suggestions of farmers on dairy farming
5. Viability of communication avenues

4.2 Socio-economic features of the dairy farmer

The socio- economic features of the dairy farmer in study area were age, gender, education level, farm size, occupation, sources of income family size and language usage Kilifi District comprises of seven divisions and of the seven divisions a study was conducted in three divisions. The sample size was 119 dairy small-scale farmers to be sampled but due to problems encountered in the field managed to sample 108 dairy small-scale farmers. The table 1 below shows the areas sampled and the groups of dairy small-scale farmers in the area.

Table 1 number of dairy farmers interviewed per division

Division	Group sampled	Number interviewed	Sub location	Frequency	Total
Bahari	Mpenda Kula	20	Matsangoni	9	
	Mwangaza	18	Mkongani	47	
	Kaza Mwando	18			56
Kaloleni	Neema	11	Myalani	10	
	Jitahidi	12	Ribe	4	
			Makobeni	6	
			Kaloleni	2	
			Chauringo	1	
					23
Vitengeni	Imani thabiti	29	Madamani	26	
			Matanomanne	2	
			Sokoke	1	
					29
			Total		108

The main occupation for the small-scale farmers was farming which was a full time activity for the farmers interviewed. The main sources of income for the farmer interviewed were agricultural farming where food crops were grown and livestock kept. Other sources of income were from family member were the family member was involved in business, working and earning a salary or from manual labour.

Classifying the sample according to gender majority of the dairy small-scale farmers interviewed were females which was 85.2 % of the total as shown in Table 2 below

Table 2 Genders

Gender	Frequency	Percent
Male	16	14.8
Female	92	85.2
Total	108	100.0

51.9% of the dairy small-scale farmers interviewed in Kilifi district belonged to the 25 to 45 yrs of age group as shown in the table below

Table3 Age

Age	Frequency	Percent
< 25yrs	9	8.3
25 to 45yrs	56	51.9
> 45	43	39.8
Total	108	100.0

Half of the dairy small-scale farmers (50.9%) can speak write and read while 48.1 can only speak. The languages they communicate in are English, Kiswahili and Kigiriama as shown in table 4 below.

Table 4 Language use

Language	Frequency	Percent
Can only speak	52	48.1
Speak, write, read	55	50.9
Cant speak, write, read	1	.9
Total	108	100.0

A good number of the dairy small-scale farmers interviewed did not attend any from of formal education (49.1%) while 51.9 % attended some form of formal education. Of those who attended formal education the majority went to primary education (37.0%). This is as shown in table 5 below.

Table 5 Education level

Education Level	Frequency	Percent
None	53	49.1
Primary < 8yrs	40	37.0
Secondary 8-12yrs	11	10.2
> 12yrs	4	3.7
Total	108	100.0

The dairy small-scale farmers interviewed 40.7% had a farm size of between 3 to 6 acres of land for agricultural farming. Only 25.9% had acres > 9. as shown in table 6 below

Table 6 Farm size

Acres	Frequency	Percent
< 3	27	25.0
3 to 6	44	40.7
6 to 9	9	8.3
> 9	28	25.9
Total	108	100.0

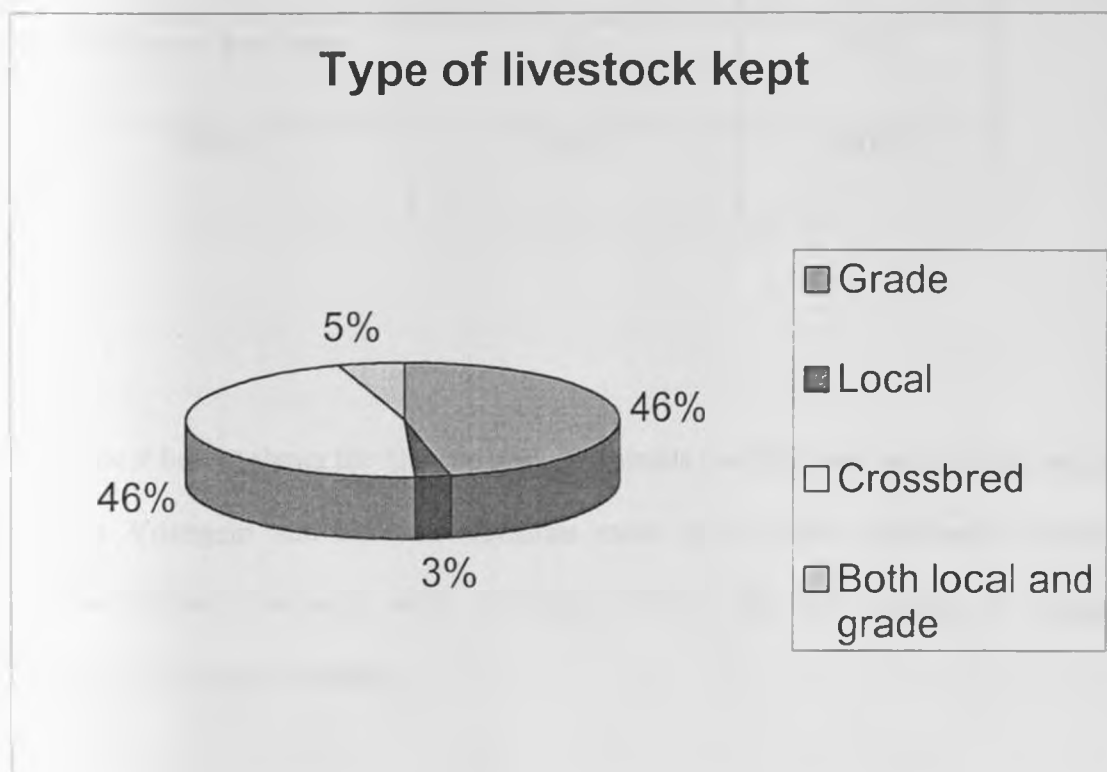
The socio-economics features of the dairy farmer are important in the adoption of livestock technologies as they play a vital role in influencing the acceptability of the dairy technologies.

4.3 Rural livestock and agriculture in Dairy farming in the study area

The Dairy Industry Act CAP 336 of the Laws of Kenya guides dairy industry. The government under the Ministry of Agriculture has started development projects in Kilifi district aimed at improving the local breeds of cattle in the area. Also there are non-governmental organizations that have come up to assist the small-scale farmers in improving their cattle. One such NGO is Heifer Project International (HPI). The

organization started the smallholder dairy project of which the farmers in Kilifi district have been able to benefit from. Majority of the farmers interviewed benefited from this project with 100 dairy small-scale farmers having grade or either crossbred animals as shown in Table 7 below

Table 7 Type of livestock kept by the dairy farmers



The dairy farmers used different methods of grazing their animals. The extension agents recommended that for the grade animal zero grazing method be applied. 86.1% of the dairy farmer interviewed used the zero grazing method as shown in Table 8 below.

Table 8 Grazing method used by the dairy farmers

Grazing method	Frequency	Percent
Zero grazing	93	86.1
Semi zero grazing	3	2.8
Open grazing	2	1.9
Both zero and open	10	9.3
Total	108	100.0

The table 9 below shows the number of dairy animals the 108 dairy small-scale farmers had. In Vitengeni and Kaloleni divisions most of the dairy small-scale farmers interviewed had crossbreds while in Bahari division the dairy small-scale farmers interviewed had grade animals.

Table 9 total number of animals kept

Division	Breed kept	Total
Vitengeni	Grade	13
	Crossbred	53
	Local	8
	Both local and grade	27
Kaloleni	Grade	6
	Crossbred	78
	Both local and grade	2
	Local	7
Bahari	Grade	83
	Crossbred	30
Total		307

The Friesian-Sahiwal (figure 8) cross is a very good cow for milk production in dry areas e.g. Nakuru, Machakos, Baringo, Koibatek, Kajiado, Kilifi Districts.

The crossbred is good because she

Gives high milk yield: an average of 2,500 kg in a lactation (10 kg per day) as compared to the Sahiwal, which gives 1,500 kg in a lactation.

Calves grow fast so heifers can be served early.

Is easy to handle.

Has few calving problems.

Is easy to milk.

Have strong hooves and legs and finds feed easily.



Fig 8 Sahiwal dairy cow



Fig 9 Napier grass at Kari Mtwapa

The extension agent give recommendations of the acreages to grow Napier grass for the dairy animals and the dairy farmers in the smallholder dairy project had planted a minimum of one acre. Figure 9 shows Napier grass grown at the KARI research centre.

Farmers were also interviewed about benefits from an NGO (heifer project international small-holder dairy project) program in the district the program aimed at assisting the small-scale farmers acquire grade animal and helped in reducing malnutrition levels in the district. The results of the interview were that, out of the 108 dairy small-scale

farmers interviewed 103 of them were or had worked and benefited from the NGO program as shown in Table 10 below.

Table 10 whether farmer benefited from NGO program

Response	Frequency	Percent
Yes	103	95.4
No	5	4.6
Total	108	100.0

The NGOs (heifer project international, plan international) that the farmers worked with also provided the groups with dairy animals and 97 of the dairy small-scale farmers got them from the NGO. 3 of the dairy small-scale farmers were able to increase their livestock after getting grade animals from the NGO. This is as shown in Table 11 below

Table 11 Sources of Dairy cattle

	Frequency	Percent
NGO	97	89.8
Bought	6	5.6
Ngo and bought	3	2.8
None	2	1.9
Total	108	100.0

4.3 Suggestions of farmers on dairy farming

The dairy small-scale farmers interviewed suggested that the smallholder dairy project should continue (87.0 %) as it is as shown in Table 12-below. The suggestions put forth by the dairy small-scale farmer is that certain guidelines should be in place to encourage them add more effort rather than in the past where projects were handed down to them. Thus most of them did very little and ended up not adopting the technologies.

Table 12 Suggestions made by the respondents about the project

Suggestions	Frequency	Percent
Continue project as they are	94	87.0
Change the project	14	13.0
Total	108	100.0

4.4 Information flow on livestock technologies in Kilifi district

Development projects initiated by the research institutions have relied upon the extension agents to pass on information to dairy farmers. Information on livestock technologies flows from the research institutions and extension agents to the small-scale farmers in Kilifi district. The dairy small-scale farmers interviewed were aware of where to get information on matters affecting them in dairy farming. Majority of them (38.9%) were aware of the projects going on at the location level as shown in Table 13 below.

Development projects in the district have benefited the dairy small-scale farmers in various ways such as; a source of income, provide manure for crop farming, reduced malnutrition levels etc.

Table 13 Awareness of sources of information about dairy farming

Level	Frequency	Percent
District	23	21.3
Division	26	24.1
Location	42	38.9
Sub location	17	15.7
Total	108	100.0

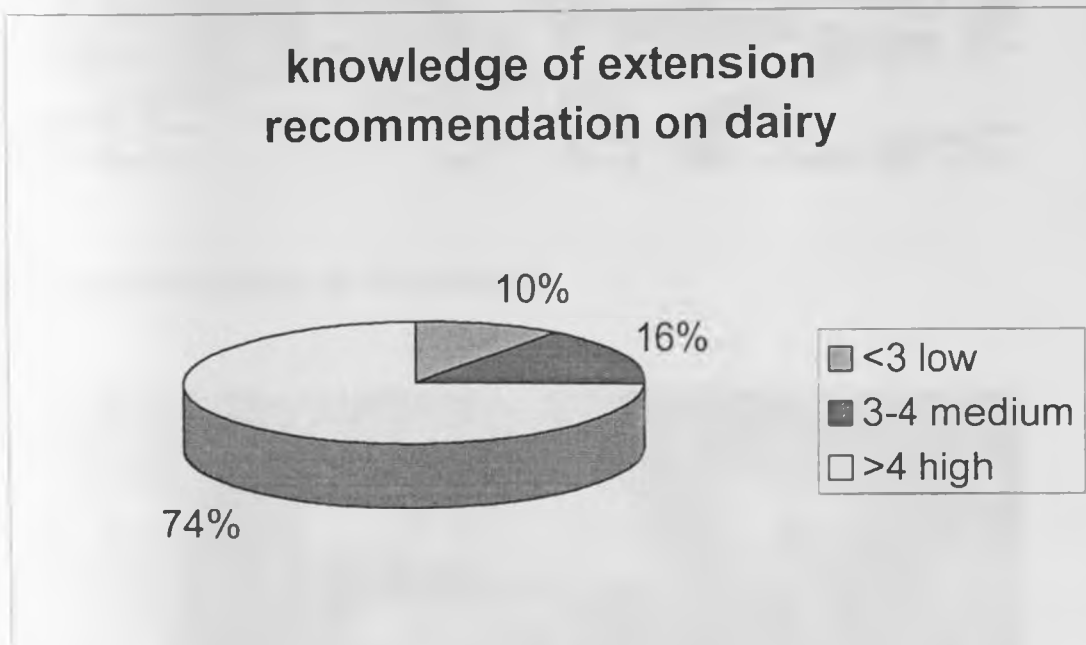
The dairy farmers were influenced by the project as show in Table 14 below of the interviewed farmers 84.3% were influenced. The influenced dairy farmer had adopted the zero grazing units in part or in whole as recommended by the extension agents

Table 14 influences of zero grazing projects on respondents

	Frequency	Percent
Influenced	91	84.3
Not influenced	17	15.7
Total	108	100.0

The small-scale farmers were interviewed about their knowledge of the extension recommendation. The recommendations were on zero grazing, AI. Breeding, management of the dairy animals, shed construction, tick control or washing of the animals, fodders production. The dairy farmers were then graded on their knowledge of the recommendation from low to high. Were low indicated that the farmer identified less than three recommendations and high indicated the farmer able to identify above 4 recommendations as shown in Table 15 below.

Table 15 knowledge of extension recommendation on dairy



The dairy farmers in the study area belonged to different groups and in each of these groups had benefited from getting grade animals. The extension agents and the NGO assisting in the program provided some from of training to the group members. Figure 10 shows a zero grazing unit built by the dairy farmer for keeping the grade cattle using

locally available materials while figure 11 show the dairy farmer providing water to the grade cattle.



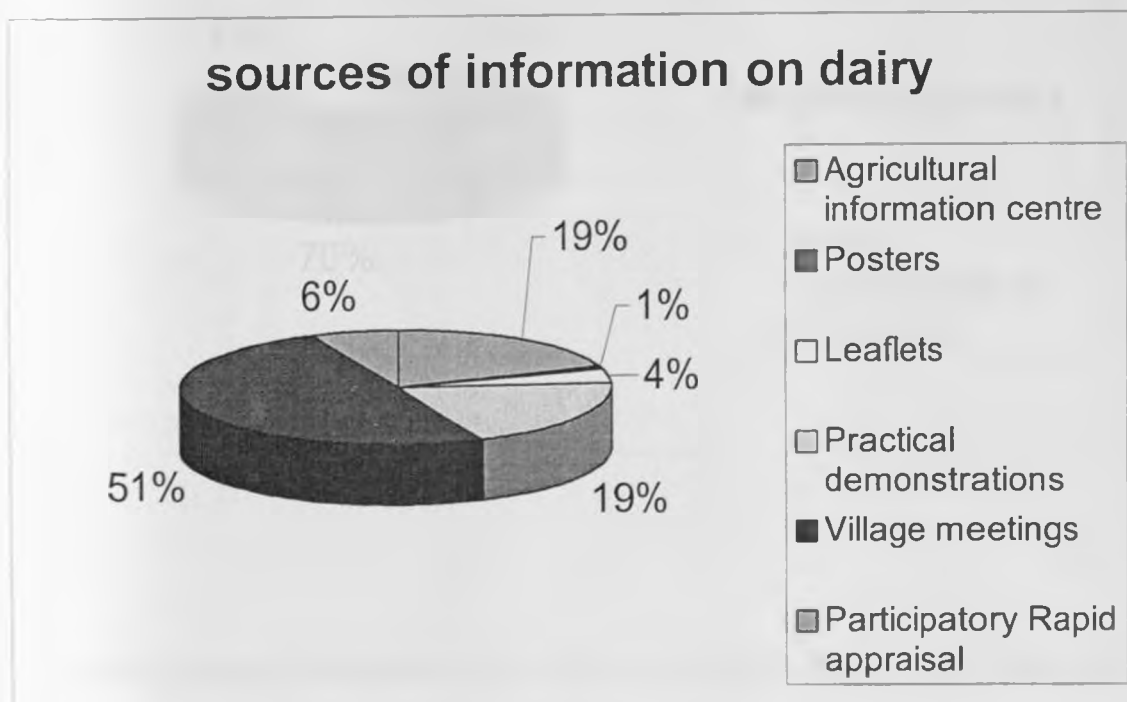
Fig 10 zero grazing at Matsanqoni



Fig 11 providing water to the cow

The dairy farmers rely on various sources of information on dairy small-scale farming. The challenges and problems they face in the dairy sector forces them to search for sources that will answer their queries and improve on the milk yields of their dairy animals. Thus 50% of the farmers interviewed said that in village meetings they learned more about dairy farming. The agricultural information centers and the practical demonstration followed village meetings with 19% of the dairy small-scale farmers using them as shown in Table 16 below.

Table 16 source of information on dairy



The dairy small-scale farmer interviewed said that they have various mechanisms through which information flowed to them. They mostly used the group (70.4%) as shown in Table 17 below. This is where various stakeholders are involved in issues affecting dairy

pregnant and at times get a bull that they were not sure about; Prices of inputs were high and the requirements of the grade cattle were higher than that of the local animals making more expensive to manage and look after as was the need for constant cleaning and spraying against diseases. This also reduced the time on crop cultivation and other domestic work to attend to the grade animals that kept.

4.6 Viability of communication avenues

Viable communication avenues are useful in assisting the dairy farmer to learn about their surrounding area and greatly assist in understanding of their environment.

Communication avenues have been divided into

Mass media avenues

Group avenues

Individual avenues

4.5 DIFFERENCES BETWEEN MASS, GROUP INDIVIDUAL COMMUNICATION AVENUES:

MASS

They have mass approach

Mostly instructional in nature

Strives to reach many people at the same time with the same message

No face-to-face contact between the instructor and the recipient

The avenues mostly suit affluent and educated client

GROUP

They have group approach

Relatively instructional

Strive to reach many people at the same time with the same message

The instructor faces more than one person at a time

The avenues suits averagely educated and affluent client

INDIVIDUAL

They have individual approach

With a face to face discussion atmosphere in most cases

The essence is to deal with one person at a time

There is face-to-face personal contact. Mostly one person at a time

The avenues suits all types of people

The communication avenues that the dairy farmers use are mass, group and individual avenues. The mass avenues used by the dairy farmers are radio, local new papers and posters Radio was used by 94.4% of the dairy farmers as shown in Table 18.

Table 18 mass media sources of information used by the respondents

Sources	Frequency	Percent
Radio	102	94.4
Local paper	1	.9
Posters	5	4.6
Total	108	100.0

Group avenues are commonly used by the dairy farmers in the form of group discussion method (51.9%) as shown in table 19 below.

Table 19 group avenues

Group avenues	Number	Percent
Barazas	15	13.9
Agricultural show	3	2.8
Demonstrations	6	5.6
Home visits	4	3.7
Field days	9	8.3
Public meetings	9	8.3
Drama	2	1.9
Tours travel	3	2.8
Group discussion	56	51.9
Stakeholders meetings	1	.9
Total	108	100.0

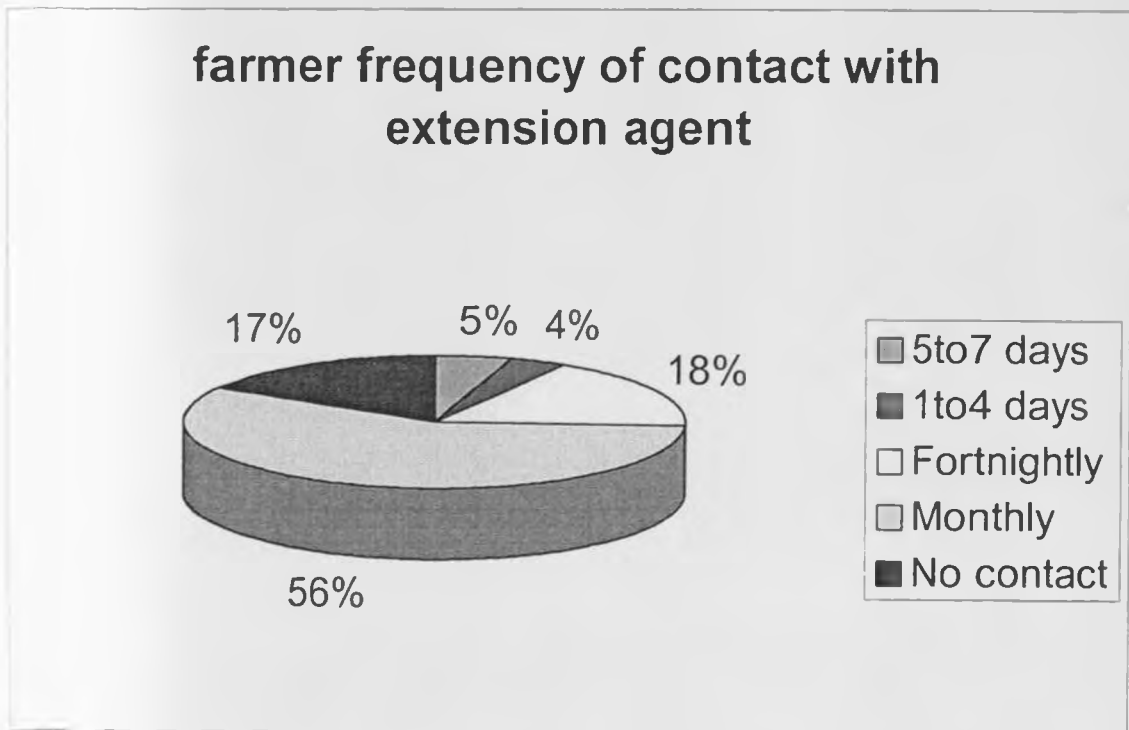
Individual Avenue is where the individual dairy farmer communicates face-to-face to get information on dairy farming. The extension officer is often contacted in this case 75.9% as shown in the table 20 below.

Table 20 farmers use of individual extension method

Individual avenues	Number	Percent
Extension officer	82	75.9
Neghbour	26	24.1
Total	108	100.0

The dairy small-scale farmer gets in touch with the extension agent to get information on issues affecting him/her. Table 21 below shows that 57.4% of the dairy farmers contact the extension staff ones a month.

Table 21-farmer frequency of contact with extension agents



Martin and Taylor 1995 evaluated the impact of a multimedia extension program that promoted a variety of technologies in Honduras. They categorized farmers as either adopters or non-adopters. Their focus was on effectiveness of technology transfers method rather than assessment of programs impacts. They found that in contrast to impersonal multimedia techniques training and visits extension methods have a multiplier effect through personal contact of experts and friends and are very effective in motivating technology adoption. But mass communication media have a lower per farmer contact cost.

Chapter five

Summary, conclusion and recommendations

Overall the channels of communication the dairy farmers got information were the group avenues and the individual avenues. The group avenue was used to get information in the groups as issues that were affecting the individual dairy farmers were discussed and the challenges faced solved. The farmer adopted the keeping of grade cattle as was profitable to them and also because it reduced the dependence from the household for money and as a source of nutrition for the family.

Small-scale farmers using group approach in the communication of information was more effective in the adoption of livestock technologies leading to more farmers having the grade animals and improving their standard of living.

Studies have shown that the use of manure for crop production is a key driving force to adoption and that nutrient cycling through dairy animals is important for sustaining smallholdings thereby contributing to food security on farms with cattle.

Raw milk is mostly not handled by traders but delivered directly to household and restaurants. This has brought about a rise in informal raw milk outlets.

Fodder production is a necessity for the dairy farmers in Kilifi district as it reduces the cost incurred in purchasing inputs. Fodder crops that the farmers grow included Napier grass, legumes, grasses and multi-purpose trees

The existing social linkages should be strengthened to improve on the adoption of livestock technologies in the district. This is in line to how the individual dairy farmers relate to one another and the interaction with the extension and research institutions.

The dairy farmers in the groups are more receptive to livestock technologies when a sense of commonality is developed thus shared interests developed leading to adoption of new technologies.

Extension and knowledge dissemination have had limited impact on dairy development due to few extension staff, individual farmer extension approaches used, cultural and gender barriers and high investment requirements. Only minimal revisions of extension approaches have been made in the sector (Omiti J. and Muna M. 2001).

(Staal S. J, 1996) argues that the farmers are suffering not because of liberation per se but because there is a lack of appropriate policy structure to guide the industry's stakeholders. On a positive side of the liberation has brought down the prices of milk but on a negative side liberation has distorted the established marketing channels and informalised Empowering farmers to become better managers and decision makers, seeks to assist them in developing the ability of making critical and informed decisions that render production systems more productive, profitable and sustainable in the face of changing environmental, technical and socio-economic conditions. the entire sector.

Recommend that the challenges the small-scale dairy farmers face in dairy be improved on to encourage more farmers' take up dairy farming as an alternative source of income.

Information plays a key role in knowledge generation and assists in improving the standard of living of the dairy farmers. Empowering farmers to become better managers and decision makers, seeks to assist them in developing the ability of making critical and informed decisions that render production systems more productive, profitable and sustainable in the face of changing environmental, technical and socio-economic conditions.

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Appendices

Sample of questionnaire

Effectiveness of information flow in livestock technologies among small-scale Farmers in Kilifi District

Location

Questionnaire No District Division

Sub-location Village Enumerator

Name of the interviewee _____

Name of the head of household _____

1. Personal characteristics

a) Sex of the head of household Male Female

b) What is the age of the interviewee?

i. < 25yrs _____

ii. 26-45yrs _____

iii. > 45 yr _____

c) Languages use

i. Can only speak _____

ii. Speak write and read _____

iii. Can't speak write and read _____

d) What is the education level of the interviewee?

i. None _____

ii. Primary (1 to 8years) _____

iii. Secondary (8 to 12 years) _____

iv. Above 12years _____

e) Currently employed other than farming?

i. Yes _____ ii No _____

f) Past occupation other than farming?

i. Self _____ ii Spouse _____

g) How many children do you have? _____

i) How many boys? _____ Girls _____

ii) Are any children working? Yes _____ No _____

iii) If yes how many _____

2. Livestock Keeping

a) i) Membership in livestock keeping groups?

i. Yes _____ ii No _____

ii) if yes what is the name of your group? _____

b) When did you join? _____

ii) Why? _____

c) How big is the family farm in acres?

i. < 3 _____ ii. 3-6 _____

iii. 6-9 _____ iv. >.9 _____

d) How is the land used/

i. Homestead _____

ii. Crops _____

iii. Grazing _____

e) How long has the household been farming in years?

i.< 10yrs _____ ii. 10-20yrs _____

iii. 20-30yrs _____ iv. 30-40ys _____

v. > 40 yr _____

f) Has any family member participated in agricultural training?

i) Yes _____ ii) No _____

if yes who

i. Male head of household _____

ii. Wife, _____

iii. Son, _____

iv. Daughter, _____

v. Others _____

g) What are the sources of income other than dairy?

i. Farm crops _____

ii. business (snacks, makuti etc) _____

ii. Salary (husbands) _____

iii. family members (children) _____

iv. Sale of milk _____

v. manual labour _____

h) What are the numbers of animals kept

i. Cows _____

ii. Bulls _____

iii. young bulls _____

iv. heifers bull calves _____

v. cow calves _____

i) Average milk production _____

j) Destination of milk production

- i. Local sales _____
- ii. Sales outside location _____
- iii. Home consumption _____
- iv. Left over _____

k) Prices of milk in the market?

- i. Kshs. 15 _____
- ii. Kshs. 20 _____
- iii. Kshs. 25 _____
- iv. Kshs. 30 _____
- v. Kshs.35 _____

l) Demand of milk in the market?

- i. high _____
- ii. Medium _____
- iii. low _____

m) What type of grazing used?

- i. Zero grazing _____
- ii. Semi zero grazing _____
- iii. Open grazing _____

n) What type of breed do you keep?

- i. Grade animals _____
- ii. Local animals _____
- iii. Cross bred and local _____

o) Knowledge of extension recommendation in dairy farming

- i. Zero grazing _____
- ii. AI breeding _____
- iii management of dairy animals _____
- iv. Shed construction _____
- v. tick control _____
- vi. fodder production _____

3. Grade cattle

a) When did the household obtain the grade animals

Year: _____ Season: _____

b) How did the households obtain the grade animal (s)

i. Through NGO _____

ii. Bought _____

iii. Others (name them) _____

c) Did the household obtain information on how to keep and maintain the grade animals?

i. Yes _____ ii. No _____

ii. From who?

i. Extension staff _____

ii. NGO _____

iii. others (Name them) _____

d) What are the challenges encountered in the keeping of the grade animals?

i. Sourcing for drugs _____

ii. prices of inputs _____

iii. Feeding during dry season _____

iv. breeding (semen quality) _____

v. Diseases _____

vi. Taken over crop production hours _____

vii. milk marketing _____

viii. lack of money for inputs _____

4. local cattle

a) How did the household obtain the local animals?

- i. Through NGO _____
- ii. Bought _____
- iii. Others (Name them) _____

b) Did the household obtain information on how to keep and maintain the local animals?

- i) Yes _____ ii) No _____

ii) From who?

- i. Extension staff _____
- ii. NGO _____
- iii. Others (name them) _____

c) What are the challenges encountered in the keeping of the local animals?

- i. Sourcing for drugs _____
- ii. prices of inputs _____
- iii. Feeding during dry season _____
- iv. breeding (semen quality) _____
- v. Diseases _____
- vi. milk marketing
- vii. Taken over crop production hours _____

viii. lack of money for inputs _____

5. Impact

a) Level of awareness in zero grazing projects

i) Aware _____ ii) No aware _____

b) Influence of projects on respondents

i) Influenced _____ ii) Not influenced _____

c) Suggestions of respondents towards dairy farming projects

i. Those who suggest continuation of projects _____

ii. Those who suggest change or implementation of projects _____

d) Source of information the dairy farmer used to seek / get information on dairy farming

i. Agricultural information center, _____,

ii. Posters, _____

iii. Leaflets, _____

iv. Practical demonstrations, _____

v. Village meetings _____

vi. Participatory rural appraisals _____

e) Mechanisms of information flow

i. Monthly seminars _____

ii. Working groups/ networks _____

iii. Jointly organized farmer managed on-farm trials _____

f) Communication avenues used

I. Mass avenues

i. radio, _____

ii. local paper, _____

iii. posters, _____

iv. magazines, _____

II Group avenues

- i. Barazas, _____
- ii. agricultural shows, _____
- iii. demonstrations, _____
- iv. home visits, _____
- v. field days, _____
- vi. public meetings, _____
- vii. drama, _____
- viii. folk songs, _____
- ix. tours and visits, _____
- x. group discussions system, _____
- xi. sensitization of stakeholders, _____

III Individual avenues

- i. Extension officers, _____
- ii. neighbours, _____
- iii. personal letters _____

g) Farmers extension officers contact

- i. 5-7 days a week _____
- ii. fortnightly _____
- iii. monthly. _____
- iv. rarely _____
- v. no contact _____

Thank you, for your time, Bye