

**PERCEPTIONS OF SMALLHOLDERS ON THE EFFECTIVENESS OF
FEMALE AND MALE AGRICULTURE AND LIVESTOCK EXTENSION
FIELD OFFICERS BASED ON THE AKAP SEQUENCE: A CASE STUDY
OF MVOMERO DISTRICT**

BY

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN
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ABSTRACT

This study was conducted in villages of Mvomero District to investigate the perceptions of smallholders on the effectiveness of female and male Agricultural and Livestock Extension Field Officers (ALEFOs) in making farmers aware of technology/practices, increasing their knowledge on a technology/practices, increasing farmers' adoption and increasing farmers' productivity (AKAP) sequence of a crop (i.e. maize). The survey population comprised of farmers who grew crops and kept livestock. Data was collected in thirteen purposively selected villages, which were supervised by female agricultural and livestock extension field officers (FALEFOs) and thirteen randomly selected villages that were supervised by male agricultural and livestock extension field officers (MALEFOs). This was a cross-sectional study in which data was collected at one point in time from a selected sample of respondents. A simple random sample of 156 respondents was used and data was mainly collected using a questionnaire. The study results showed that respondents who agreed that MALEFOs gave them information based on AKAP sequence were higher compared to those supervised by FALEFOs. This implied that MALEFOs were more effective in giving information to smallholders than FALEFOs. The difference could be that FALEFOs performed other societal duties such as reproduction, production, and household chores in their homes. Also the findings showed that sex of the farmer had a significant effect on the way FALEFOs and MALEFOs gave information to smallholders base on AKAP sequence. The study found that female farmers who were supervised by FALEFOs had relatively higher levels of awareness, knowledge, adoption and productivity. Compared to

those supervised by MALEFOs. However, the study found that MALEFOs gave information on the maize-related technologies/practices equally to both female and male respondents. This study recommends that countries' extension systems especially those in developing countries should encourage more FALEFOs since they have proven to be able to work with female farmers who mostly shoulder the agricultural responsibility of the country. Barriers, which limit FALEFOs to work in rural areas, should be removed. Also this study recommends that all lead Ministries should increase incentives to its ALEFOs.


DECLARATION

I, **MARTINA DOMICIAN PANGANI**, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my original work and that it has neither been submitted nor being concurrently submitted in any other University.

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The above declaration is confirmed


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DEDICATION

To my late father Philipo Kasanga and my mother Monica Katwata who laid foundation for my education.

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LIST OF ABBREVIATIONS

AKAP	Awareness, Knowledge, Adoption and Productivity
ALEFOs	Agriculture and Livestock Extension Field Officers
FALEFOs	Female Agricultural and Livestock Extension Field Officers
FAO	Food and Agriculture Organization
GMOs	Genetically Modified Organism
GDP	Gross Domestic Product
HPI	Heifer Project International
LITI	Livestock Training Institute
MAFS	Ministry of Agriculture and Food Security
MALEFOs	Male Agricultural and Livestock Extension Field Officers
MATI	Ministry of Agriculture Training Institute
PORALG	President's Office, Regional Administration and Local Government
SNAL	SUA National Agricultural Library
UNDP	United Nation's Development Programme
URT	United Republic of Tanzania

CHAPTER ONE

INTRODUCTION

1.1 Background information

Agriculture is the foundation of the Tanzanian economy, through providing employment to the majority of the population, food and export earnings (World Bank, 1994). Agriculture remains the largest sector in the economy and hence its performance has a significant effect on output and corresponding income and poverty levels (URT, 2004). Some 84 percent of the employed population works in agriculture, producing 61 percent of both Gross Domestic Product (GDP) and merchandise export. Tanzanian's 3.5 million farm families work smallholdings with an average cultivated area of 0.9 hectares. Some 93 percent of all farmers cultivate less than 2.0 hectares each (World Bank, 1994). These farmers get crop yields, which are below the standard targets.

The falling of agricultural production has been blamed on several factors, but the most persistent criticism of the agricultural sector in Tanzania has been the ineffectiveness of the agricultural extension system (Lupatu, 1995; Haug, 1999). Further, it was contended by (Lupatu, 1995) that the Ministry of Agriculture and Food Security (MAF) through its agriculture extension service which is the body charged with the test of improving agricultural production for all farmers is unable to influence the farming practices of farmers in the rural areas, that is, to effect the transfer of improved and appropriate technology from researchers to farmers.

However, other factors mentioned which contribute to the ineffectiveness of the extension service were: low technical and educational competence of staff, poor supervision of agriculture and livestock extension field officers (ALEFO), poor performance of the extension service and lack of sufficient funds for running extension activities. Similarly, others are lack of latest technological packages suitable to different ecological zone to deliver to farmers, inadequate and unreliable source of farm information to be used by ALEFOs and few ALEFOs compared to a large number of farm families to be covered at that particular area (Kauzeni, 1989; Mwandry, 1992; Mattee and Mvena, 1988).

It has been pointed out by Mattee and Mvena (1988) that ALEFO constitute the main resource of any extension system. The professional and technical competencies of ALEFOs are probably the most important inputs into any country's agricultural extension system. Also there was a study by Hulls (1975), cited by Mattee and Mvena (1988), which revealed that there was no evidence that contact with the ALEFO had any positive influence on the farmers' adoption of recommended agricultural husbandry practices.

Agricultural and livestock extension field officers have many roles, and as defined by Swanson (1984) is that of an educator and communicator. ALEFO should identify farmers' problems and production constraints. Working closely with subject matter specialists and research workers, ALEFO should disseminate useful information about new technology and teach farmers how to use it successfully to increase production and incomes. Besides the above roles, ALEFO performance in the rural

areas as narrated by Lupatu (1995) is that they are perceived as being unable to influence farmers' agricultural practices, and thus being ineffective in their jobs.

However, other studies (Haug, 1999; Adams, 1982) have indicated that despite the many facts, ALEFOs are hampered by socioeconomic factors, government economic, political and policies influence. Others include, social economic status of farmers, inadequate logistic support in the form of transport facilities, accommodation, agricultural inputs and lack of motivation. Mostly, ALEFO are stationed throughout the countryside, and their homes and offices are in one of the larger villages or small towns, near their target area. Furthermore, most ALEFOs have a small office, a desk, a few chairs, and very limited communications equipment (Haug, 1999). Further, other studies (Maniamba, 1989; Haug, 1999; Adams, 1982) clarified more that performances also suffer when ALEFOs get salaries, which are low and sometimes late and there are few incentives. Too often the rewards and careers structures in public service provide inadequate incentives for people required to work at field level rather than in urban-comfort.

When we consider on client's or farmers' attribute (Kauzeni, 1989) found that most farmers own a small plot, which cannot provide a decent standard of living because income derived from it is small. Investment in agricultural production is critical because of financial constraints and the uncertainty of success. Even when a farmer is convinced of the efficacy of modern farming techniques, insuperable difficulties arise in connection with costs in terms of the purchase, use, maintenance or manpower. Finally, Kauzeni, (1989) clarified more that leave alone, other factors he has very little control over his environment despite a great deal of empirical

knowledge pertaining to his/her traditional farming system. In one way or another, the mentioned factors could have an impact on provision of adequate services to farmers with regard to farmer awareness, farmer knowledge through testing and experimenting, farmer adoption of technology or practices and change in farmers productivity AKAP sequence. Perhaps, provision of conducive working environment is the prerequisite for ALEFO effectiveness.

According to Swanson (1984) and Crowder (1997) among the farmers, women play a major role in agricultural production in many countries of the world. It is anticipated that agricultural extension service is not effectively reaching and benefiting these key contributors to food security. Many studies have indicated that the provision of agriculture extension services is conducted predominantly by males, only 15% of the world's and 7% of Africa's ALEFOs are female (FAO, 1993), cited by Lahai *et al.*, (2000); Swanson (1984). Agricultural extension services are geared primarily to male farmers and male operated farms and therefore lack knowledge about women farmers and fewer women are reached by extension (Mijindadi, 1993).

However, it is assumed that this imbalance has made it difficult for agriculture extension services to reach women farmers. It is widely believed that women farmers are more freely and willingly to work with female ALEFO as compared to male ALEFO (Lahai *et al.*, 2000). These proponents see communication bottlenecks between male ALEFO and women farmers due largely to traditional and religious practices, and women's lack of self-confidence as the main problem (Lahai *et al.*, 2000). Similar findings was reported by FAO (1993), cited by Lahai *et al.*, (2000) that 94 percent of ALEFOs worldwide are male, multiple studies report problems

with male extensions delivering services only to men, or focusing narrowly on traditional roles when delivering programme to women. Further, it has been found that the “dynamics of communication are most effective when extensions agents are similar to their clients in all respects except technical competence” (FAO, 1993), cited by Lahai *et al.*, (2000). In the Caribbean region, research points out that female agents are better able to communicate with women farmers than their male counterparts, even in countries with relatively few social barriers to male-female interaction (FAO, 1993), cited by Lahai *et al.*, (2000). Female workers can preferably be used since they identify better with the plight of women. Van den Ban and Hawkins (1996) contented that male ALEFO lacks the special skills to approach women. They further stated that, “where male extension workers can talk directly to the women, communication may be less open than it would be with female extension agent.”

Smallholder farmers in Mvomero District depend very much on subsistence farming to earn their livelihoods. Most of villages had ALEFOs who stimulated farmers to learn. Sukuzi (2000) contented that the job performance of ALEFO together with other factors could influence the development of either positive or negative attitude of smallholder farmers towards their ALEFO. Poor interaction between the two has some influence on the adoption of new technologies by the smallholder farmers.

Besides the above observations, smallholder farmers have not changed their farming practices so as to increase their agricultural productivity. The present study, therefore, investigated the perceptions of smallholder farmers in Mvomero District

on the effectiveness of female and male agriculture and livestock extension field officers in bringing about awareness, knowledge, adoption of technologies/practices and productivity for enhancing agriculture and livestock productivity.

1.2 Problem Statement

The village- level ALEFO, who forms the last link of the transmittal system with the farmer, is an important person in the system (Kauzeni, 1989). Villagers need competent day-to-day technical advice and information on agricultural production, which should be conveyed to them by an expert who knows thoroughly the background of the farmers because they live among them and understands fully their problems (Kauzeni, 1989). However, some studies have looked on factors affecting the job performance of ALEFO and others on the number of female and male ALEFO and their effectiveness towards dissemination of information. Our understanding of the effectiveness of the two sexes of ALEFOs in Mvomero District is still inadequate. Because of the aforesaid reasons, the inquiry into the investigation on the perceptions on effectiveness between females and male agricultural and livestock extension field officers in bringing about awareness, imparting technical knowledge, enhancing adoption and increasing productivity of smallholders in Mvomero District merits consideration.

1.3 Justification of the Study

Where agriculture is recognized as a primary industry in the true terms of the adjective, however, agricultural extension services, programs and personnel have an essential role in guiding farmers and farm communities to increase productivity and

improve living standards. ALEFOs are the key actors in providing extension services to our farm families. It is the extension officer's role to remove the farmer's barrier by providing information and insight into the smallholder's problem. Therefore clear communication is necessary between the farmer and ALEFOs. In order to be successful in our agricultural extension system, we need enough information and an understanding on how effective our female and male ALEFOs. The results of this study will assist not only in identifying the differences in effectiveness between the two sexes, but also form a basis for the policy makers, administrators and those actors in agricultural programme for formulating new strategies to overcome the situations.

1.4 Objectives of the study

1.4.1 General objective

The general objective of the study was to investigate the effectiveness of female and male agricultural and livestock extension field officers (ALEFOs) for providing agriculture and livestock information to smallholders based on the AKAP sequence.

1.4.2 Specific objectives

Specific objectives of the study were to:

- (i) Assess the socio-economic factors that affect smallholders' change in behaviour in regard to AKAP sequence.
- (ii) Examine socio economic status of ALEFOs that affect their effectiveness for imparting information to smallholders based on AKAP sequence.

- (iii) Identify the perception of smallholders towards the effectiveness of female and male ALEFOs in providing information for increasing maize production based on AKAP sequence.

1.5 Null hypothesis

There was no significant difference between female and male extension officers in creating awareness, imparting technical knowledge, enhancing adoption and increased farm productivity to smallholder farmer.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter is essentially meant to summarize literature, which relates to female and male agricultural and livestock extension field officers effectiveness. This chapter reviewed literature on extension systems in relation to agricultural extension systems, smallholders, female and male agriculture and livestock extension field officers.

2.2 Effectiveness in relation to agricultural extension

Persons belonging to different disciplines view effectiveness differently. To Agricultural extension, effectiveness refers to the extension systems ability to achieve goals (results) (Schwartz and Kampen, 1992). Similarly, Koontz and Weihrich (1993) defined the term effectiveness as a measure to which a programme or project is successful in achieving its objectives. Many studies show that it is difficult to measure effectiveness since it is a complex concept and it is even difficult in agricultural development stagnation or failure since it depends on many other factors. Evenson (1997) indicated that it is convenient to visualize extension as achieving its ultimate economic impact by providing information and educational training services through the following sequence.

A: Farmer awareness

K: Farmer knowledge, through testing and experimenting

A: Farmer adoption of technology or practices

P: Change in farmers' productivity

However, Evenson (1997) clarified more that changes in farmer behaviour will be reflected in quantities of goods produced. These, in turn, can be measured as “economic surplus,” which is the added value of goods produced from a given set of inputs made possible by extension activities. The relationship existed in AKAP sequence as postulated by Evenson (1997) was that awareness is not knowledge. Knowledge requires awareness, experience, observation, and the critical ability to evaluate data and evidence. Knowledge leads to adoption, but adoption is not productivity. Productivity also depends not only on the adoption of technically efficient practices, but of allocatively efficient practices as well. Productivity also depends on the infrastructure of the community and on market institutions. Extension services affect each part of the sequence. He postulated further that it appears, however, that the awareness–knowledge part of the sequence is where extension services are strong substitutes of farmer schooling. Through organized frequent contact, they “teach” farmers and this is more than simply informing farmers.

Similarly, Moris (1991), cited by Sonoko (2001) found that a problem, which must be faced when analyzing the effectiveness of extension service, is the complex organizational, economical and ecological setting, which impinges upon tropical smallholders. He pointed out that no one profession or academic discipline encompasses all the major components. Those who see extension as technology transfer will focus on communicating information about new varieties and husbandry innovations of farmers. Those who deal with community problems will look at local

leadership and how individual farmers participate in their communities, while those who analyze environmental trends will adopt geographical and zonal approaches.

2.3 The role of agricultural and livestock extension field officer

A great deal of responsibility for bringing about farmers' change rests on the shoulders of agricultural and livestock extension field officers (Adams, 1982). Recent experience with farming systems research shows that the primary task of the ALEFO is to understand the problems, options, aims and aspirations of the farmers among whom they are working (Adams, 1982; Allo and Schwass, 1982; Mattee, 1989). Adams (1982) found that ALEFO helps farmers to increase the productivity of their farms and improve their living standards. He/she has many roles; he is an adviser, a technician and a middleman operating between agricultural research institutions and the farm families. He /she is a change agent helping farmers to identify their problems and find their own solutions. He /she works for the creation of community harmony essential for group projects. Keregero (1981), found that ALEFO were concerned about arranging for their clientele to learn things considered necessary for them (clientele) than to deal more adequately with problems of agriculture.

However, Allo and Schwass (1982) continued to postulate that in his/her initial contacts with farmers, the ALEFO should select some simple, low cost projects which will almost certainly succeed and which will give farmers confidence in his/her ability to guide them (e.g. more suitable crop spacing and/or timing of husbandry operations). The best agricultural extension workers are those who are

interested in farmers and want to see them succeed in making a good living, not those who are mainly concerned with carrying out government orders. Mattee and Mvena (1988) contented that the extension agent must not only be able to recall important details, but also be able to understand the practices he /she is recommending, explaining them, and persuade farmers to adopt them. Similarly, Allo and Schwass (1982) supported that the ALEFO is the only person who can motivate farmers to adopt the new technologies and change their methods of farming. The agricultural and livestock extension field officer therefore must be able to communicate to and convince the clients.

Further, Mattee and Mollel (1990) generalized that accessibility to extension services by small farmers can be perceived in terms of three dimensions: that the extension worker is available for consultation by the farmers periodically or wherever necessary; that the extension worker is able to respond effectively to farmers problems and concerns, that the extension worker is able to communicate and convince farmers to adopt innovations appropriate to farmers conditions. On the other hand, an extension officer must be aware of location and availability of the resources (e.g. credit) and physical input (e.g. seeds, fertilizers, agricultural chemicals), which will be needed if a farmer, is to be able to achieve his/her planned objectives.

2.4 Farmers' attitudes towards effectiveness of female and male agricultural and livestock extension field officers

The success of agricultural extension services depends partly on the effectiveness of key actors (female and male agricultural and livestock extension field officer). Kauzeni (1989) narrated that effective ALEFO must be skillful and intelligent in receiving, understanding, using and communicating technical information. The village level ALEFO, who forms the last link of the transmittal system with the farmer, is an important person in the system. Under normal circumstances female extension workers are assumed to be ineffective in their role performing. This statement has been supported by Kraisonswasdi (1989) who found that women ALEFO throughout the world have been assigned lower positions than that of male ALEFO. Similarly, the activities, which were associated with prestige, power and authority have been allocated to men. Many studies found that 94 percent of ALEFO worldwide are males, and studies report problems with male ALEFO delivering services only to men, or focusing narrowly on traditional roles when delivering programme to women (FAO, 1993), cited by Lahai *et al.* (2000); Due, (1996). Further, it has been found that "the dynamics of communication are most effective when extensions agents are similar to their clients in all respects except on technical competence" FAO (1993), cited by Lahai *et al.* (2000).

Similarly, in the Caribbean region, research points out that "female ALEFO are better able to communicate with women farmers than their male counterparts, even in countries with relatively few social barriers to male-female interaction (FAO, 1993), cited by Lahai *et al.* (2000). The same findings were supported by Kanyama (1999),

who found that female extension officers made much effort to visit farmers and numbers of farmers visited were satisfactory. Further, Kanyama (1999) narrated that most female ALEFO were certificate holders and their level of training, logistic support and job satisfaction had an impact on job performance. Lack of in-service training, inadequate logistic supports and poor job satisfaction contributed to poor performance of the female ALEFO in general. Female workers can preferably be used since they identify better with the plight of women (FAO, 1993), cited by Lahai *et al.* (2000). It is also observed that men extension workers lack the special skills to approach women (FAO, 1993), cited by Lahai *et al.* (2000). Van den Ban and Hawkins (1996) stated that where male ALEFO talked directly with the women, communication was less open than it was with female ALEFO. In some communities women are not supposed to go meetings, or if they go, they are not supposed to speak unless asked. It may be necessary in such situations to organize meetings for women only, so they can speak freely. Shayo (1991) contented that female ALEFOs were more acceptable sociologically to train farmwomen. Women ALEFO were more acceptable to female farmers as they understood better their production networks in comparison to male ALEFO whose messages were ignored by female clients (Shayo, 1991).

Ibrahim (1991) found that female ALEFO strongly believed that they performed as competently as male ALEFO. In his study, he found that field performance of male and female ALEFO was rated better for males in Kwimba and Sengerema District. In Kilosa and Geita District, their performances were considered the same although in some cases female ALEFO performance was affected by family responsibilities.

In Magu District, there was an opinion that their differences was because of per severances where female ALEFO get tired faster than male ALEFO and so they could not cover longer distances e.g. 36 km (Ibrahim, 1991). On farmers' perception of the service rendered by female ALEFO in Kwimba District female ALEFO were perceived the same as their male counterparts (Ibrahim, (1991). Further, Ibrahim, (1991) found in Kilosa District, females were considered more theoretical then practical while in Geita and Magu Districts they were perceived to perform just like their male counterparts, and differences, if any, were attributed to personal approach.

Ibrahim (1991) found that few supervisors preferred females to male ALEFO because they indicated that females were not easy to handle. Further, supervisors stated that male ALEFO were hardy, tolerant and were full-time on the job and worked anywhere regardless of marital status, locality and social interactions. Female ALEFO were sometimes selective and could be interrupted by family responsibilities. Ibrahim (1991) concluded that feminine roles to some extent affected the performance of female ALEFO. Truitt (1999) found that to date there was no consensus on whether it is more effective for a man or a woman to deliver extension services to women.

From the above viewpoints, it could be concluded that farmers are adult learners their perceptions depend on many factors according to their needs and aspirations. Their decision on whether to be given agriculture and livestock information by either female or male ALEFO would be sought to bring about change in productivity.

2.5 Socio-economic factors influencing ALEFO effectiveness

Some of the factors such as age, gender, education level, professional training level, working experience, marital status, income levels, and field of specialization may have an impact on agriculture and livestock extension field officers effectiveness. One of the problems mentioned among many is the question of having many male ALEFOs as opposed to females. This situation is supported by Mahunda (1994), who found that most field agents were males, while the active farming, community was mostly females. It is assumed that socioeconomic factors may be influencing the effectiveness of ALEFO performance in disseminating information to smallholders and among these could be the age.

When considering age, it was expected that young extension field officers are energetic, mobile, and easily to change and can perform their duties effectively compared to older extension agents. However, aged extension officers can perform better using their experiences. Another important aspect is the gender of ALEFOs.

It is assumed that male ALEFO do perform better in many respects compared to their female counterparts particularly in patriarchal societies. The perception is supported by Kanyama (1999) who found that female extension officers face many problems including the socio cultural barriers, which affected their day-to-day activities in imparting extension information to farmers compared to their male counterparts. Similarly, Mahunda (1994) found that female ALEFO faced a number of problems because of their double roles of providing extension services to farmers and performing household chores. In addition, Ibrahim (1991) found that female

extension officers strongly believed that they perform as competently as male extension officers.

Education level of female and male ALEFO may enhance their effectiveness. Almost everywhere, the literacy rate of girls and women and their access to basic education are lower than those of boys and men (Crowder, 1997). The situation was revealed in Tanzania where the total number of female recruited into Certificate and Diploma courses offered by Ministry of Agriculture Training Institute (MATIs) and Livestock Training Institute (LITIs) included fewer female candidates (Ibrahim, 1991).

There is the perception that more education meant improved professional extension qualities. Rural problems are numerous and are concerned with a large number of people spread over a large area. They can only be dealt with by an efficient extension agent meant for that purpose. The trained extension worker will understand the technology to be transferred among the farmers by studying their problems (Supe, 1983). However, Supe (1983) pointed out that high-level trained personnel staff with graduate and post graduate degrees were expected to have an increased capacity for professional development which an individual developed the power to perform the functions specialized in extension. Further, he emphasized that specialization for ALEFO was necessary in the fields such as extension, irrigation, land use planning, agro-mechanization, production and veterinary services. In Tanzania, most of the ALEFO are specialized in different fields, but they found providing general agricultural extension services and forced to master of everything in agriculture. In a

way, this generality has reduced their provision of agricultural information efficiency.

Income level of ALEFOs may have an impact on the job performances. For example, with less income people tend to do other activities for generation of more earnings and forget their working responsibilities. This in the long run affects the effectiveness the provision of agricultural information of the ALEFOs. The situation is revealed when the salaries of ALEFOs are low as a result, most of them tend to look for other alternatives of increasing their incomes like cultivating crops, keeping livestock and running agro-chemical shops in urban. This results to most ALEFOs not performing their assigned extension services responsibilities leading to their ineffectiveness.

2.6 Government economy and policies

Prior to good job performance there must be a favorable atmosphere to enable staff to do what is required of them (Maniamba, 1989). Similarly, Riggs (1993), cited by Sonoko (2001) found that agents with high job satisfaction were satisfied for the six components of overall job satisfaction which included job it self, salary, fringe benefits, authority to run programs, supervisors and opportunity for growth. In order to be effective ALEFO has to be facilitated and supported in one way or another. Kanyama (1999) found that logistic support and job satisfaction had an impact on job performance of ALEFOs. Also, Koontz and Weihrich (1988) found that motivated staffs were able to achieve organizational goal. According to Koontz and Weihrich (1988) these include good pay, security and good working conditions, which

increased morale, as there was a positive correlation between morale and job performance. On the other hand inadequate resources, lack of transport, housing facilities to ALEFOs led to ineffective transfer of technologies on improved agricultural technologies.

Transport facility is important in order to move around farmers, especially in remote areas. Agriculture and livestock extension field officer with reliable transport facility is likely to reach more farmers when delivering extension services. Mwandry (1992) found that ALEFOs at village level lacked transport to enable them to move conveniently and enhance their job performances. Like other fringe benefits, housing facility is crucial for as ALEFOs with a good, reliable housing facility is able to live comfortably, and job performance is expected to improve. The situation was revealed in Mvomero District where ALEFOs lacked transport facilities and proper housing. The modernization of agriculture cannot be effected without a fully established and competent agricultural extension system (Mattee and Mvena, 1988). Enough and availability of funds is important for smooth running of agricultural extension services. Funds are required for training of ALEFOs, farmers, enhance communication etc. Currently, the allocation of funds for extension services has been minimal because of the unattractive socio-economic situation of the country. This has inadvertently affected the provision of agricultural information to smallholders by ALEFOs, which largely contributes to their low productivity.

2.7 Socio-economic factors of farmer influencing ALEFOs effectiveness

The perception on effectiveness of ALEFOs also depends on socio-economic status of farmers are being served. Factors like age, sex, education level, marital status, land size income, type of farm enterprises have all an impact on the adopting of innovations and can influence in developing either a positive or negative attitude towards an ALEFO (Nkonoki, 1994), cited by Sukuzi (2000). It can believe that younger farmers can be early adopters compared to older ones. Rogers (2003) indicated that there is inconsistency about the relationship of age and innovativeness and found that earlier adopters of agricultural innovations were younger.

Agricultural extension services are generally geared towards men farmers sometimes by design and sometimes by default (Saito and Weidenman, 1990), cited by Haug, (1999). Furthermore, Haug (1999) indicated that most ALEFOs were men and they tended to view women farmers as less important, partly because 94 percent of agricultural and livestock extension field officers were males (FAO, 1993), cited by Lahai *et al.* (2000) who most found delivering services only to men. Due to this male farmers are in the position of being frequently contacted compared to female farmers and, hence, being aware of many things and be in the position of being earlier adopters. The extensions who are advising these farmers can be perceived as most effective (Truitt, 1999). The same situation was found in Mvomero District where the number of male ALEFO was relatively higher than female ALEFOs. Further, as opposed to above findings it was observed that male ALEFOs gave the maize-related technologies/practices equally to both female and male farmers.

Unlike urban farmers, most rural farmers are uneducated. It is perceived that farmers with more years of formal education have the chance of being earlier adopters compared to those with no or few years of formal education (Rogers, 2003). Similarly, literate farmers are likely to be earlier adopters than illiterate farmers (Rogers, 20003). Some technologies require a farmer to read and write. It because of these reasons that most farmers in Tanzania and in Mvomero in particular could not easily adopt most of the agricultural innovations brought about by female and male ALEFOs.

Social status is indicated by such variables as income levels, possession of wealth, occupational prestige, and self-perceived identification with a social class. However, measured social status is usually positively related with innovativeness (Rogers, 2003) Studies show that farmers with high status are earlier adopters than those with low status because they are wealthier and have large sized units. Their social status forces them to look for assistance from ALEFO who later on is perceived as effective. Income level of farmers has an impact on the adoption of recommended agricultural practices. Mlozi (1994) study in the city of Dar-es-Salaam found that farmers with high incomes were able to facilitate Agricultural and Livestock Extension Field Officer by providing them vehicles to attend to their projects.

Adams (1982) argues that ALEFO frequently find it difficult to communicate with poor, illiterate farmers and tend to find prosperous farmers congenial to work with. Farmers with high incomes usually have a more favorable attitude to change and may seek out the ALEFO; he/she may then find it difficult to resist the offer of cool shade

and generous refreshment in the heat of the day (Mlozi, 1994). Sometimes they have incentives to reward ALEFO and hence to concentrate much on them by creating awareness, imparting knowledge enhancing adoption and hence farm productivity. In contrast farmers with low income might be denied similar access to knowledge about farm productivity.

Some new ideas are costly to adopt and require large initial outlays of capital. Only the wealthy units in a system may be able to adopt the innovations (Rogers, 2003). Income may enhance labour and ability to purchase farm inputs. Low level of income implies difficulties in buying farm inputs like improved seeds (Bengesi-Msuya, 2005). When considering Mvomero District, the similar situation was observed where by farmers who grew vegetables, sugarcane and those who kept livestock used to seek agricultural information from ALEFO. The reasons were that farmers were able to give ALEFO some incentives in kind and cash.

Farmers with larger sized units tend to be earlier adopters compared to those with small sized units (Rogers, 2003). In order to have good returns by minimizing risks, farmers have to adopt those innovations, which made good returns. The reason behind is that farmers might invest a lot without gaining substantial amount of farm produce compared to what has been invested. Therefore, these farmers were expected to seek and follow advice given from their ALEFOs.

The main farm enterprises of most smallholders are crop production and livestock keeping. Majority of the smallholders in Tanzania own very small land size ranging

from 1-2 acres and produce for subsistence only. Usually, the farmers do not ask for assistance from ALEFOs, unlike the livestock keepers who always keep on looking for advice from veterinarians. The reason for this is that most livestock keepers are commercial oriented and likely loss to animals could cause substantial loss. These therefore are likely to be earlier adopters of innovations compared to small crop producers.

Marital status of farmers has an impact on being an innovator and, hence accepting or rejecting practices advised. For a example Reij and Bayer (2001) found that although women often do a large share of the farm work, it was usually the man who were the household heads and were therefore more likely to take credit for any changes made on their farms. Similar conditions happened when there was a large number of female-headed households, the number of women innovators increased. Married women sometimes were constrained by having to wait for the husbands approval before starting up new initiative on the farm (Reij and Bayer, 2001). Study results in Mvomero District revealed that most farmers were married and most female farmers interviewed were not heads of households. This implied that most of the married women interviewed were likely to receive agricultural information through their husbands.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

This chapter describes the research methodology and is divided into six sections. The first section provides an introductory part followed by a section on the characteristics of the study area. The third and fourth sections describe the research design and the sampling procedures, respectively. The fifth section is concerned with pre-testing of the instrument and the sixth section explains on data collection procedures, processing and analysis.

3.2 Description of the study area

This study was conducted in Mvomero District, which is one among the six districts in Morogoro region. Other districts include Morogoro rural, Kilosa, Kilombero, Ulanga, and Morogoro municipality. There were 26 study villages, which included Changarawe, Doma, Melela, Sangasanga, Tangeni and Nyandira. Others included Langali, Kibaoni, Misegese, Mlali, Kipera, Wami Dakawa, Wami Sokoine. Others included Mgudeni, Dibamba and Misufini. Still others were Hembeti, Kidudwe, Lusanga, Manyinga, Kilimanjaro, Kichangani, Mbogo, Lubungo B, Wami Luhindo, and Mabana. The choice of the district as the area of study was because of its accessibility by roads to various villages, passable at all times, and the financial and time constraints faced the researcher.

The District lies at an altitude from 400 to 2000 meters above sea level and in 2006 had a total area of 7 325 (km²), with a potential arable land of 5 493.75 (km²)

(Mvomero District Planning Report, 2003). In June 2005, Mvomero District had four divisions with 17 wards and 100 villages. According to the 2002 National Census, the District had a total population of 260 525 of whom 131,256 (50.4%) were males and 129 269 (49.6%) were females (Mvomero District Planning Report, 2003). There were about 58,314 households with an average family size of 4.5 persons. The District had binomial type of rainfall namely short rains, which start from October to December, and long rains starting from February to, May/June with an average rainfall of 600 to 2000mm (Mvomero District Planning Report, 2003).

3.3 The research design

This study employed a cross sectional design whereby data were collected at a single point in time from a sample selected to represent some large population. A cross-section survey consisted of asking questions to a representative sample of village farmers. According to Babbie (1990), the design was suitable for description purposes as well as the determination of relationship between and among variables. In this study, questionnaires were the main techniques used for data collection and this design was considered favourable because of the limited time available for collecting data.

3.4 Sampling procedures

3.4.1 The study population and sample

The population of the study consisted of all farmers growing food and cash crops and livestock keepers in the twenty-six surveyed villages. The list of all farming households in the respective villages in Mvomero District therefore constituted the

sampling frame. Data were collected from 26 out of the 100 villages, among them 13 were supervised by female ALEFOs, which were purposively selected for the study since they were few. Thirteen villages, which were supervised by male ALEFOs, were randomly selected from a total of 26 villages. The sample involved six farmers (three females, three males) who were randomly selected from each of the 26 villages using a list of farmers available in the village roster book. Therefore, total sample sizes of 156 farmers were surveyed.

3.5 Pre-testing of the instrument

Pre-testing of the questionnaire was done in Mvomero ward, under similar field conditions whereby 14 farmers were randomly selected who were later not included in the final study. This was done to check for any discrepancies and ambiguities in wording of items, clarity and comprehensiveness so as to obtain the reaction of respondents with respect to certain items of the questionnaire. After pre-testing the questionnaire, was revised accordingly and used for data collection during the actual survey.

3.6 Data collection procedures

Secondary data involved reviewing of literature most of which was obtained from books, websites, thesis, and unpublished reports at SUA National Agricultural Library (SNAL), offices and other resource persons. Other information was gathered from government offices at the regional and district. Primary data was collected using a self-administered, structured questionnaire (Appendix 2), which was administered to farmers in their homes/village executive secretary's offices. The

questionnaire had close-ended and open-ended questions. Open-ended questions were used to tape different comments and opinions of the respondents. To assess farmers' perceptions on the effectiveness of male and female ALEFO, a Likert-scale type interview items were used. According to Bernard (1994), Likert-scale type of interview items results in a single score that represents the degree to which a person is favorable or unfavorable with respect to the question asked. In this study, a five point Likert scale was used, where by respondents were presented with a number of statements and asked to indicate their views by selecting one of the following statement which might fit their feelings: Strongly disagree; Disagree; Neutral; Agree; and Strongly agree.

3.7 Data processing and analysis

Data collected from the primary sources were organized, coded, processed and analysed using the Statistical Package for Social Sciences (SPSS) 11.5 computer programme. Descriptive statistical analysis performed to yield frequencies and percentages. The influence on each of the identified work-related characteristics of the farmer was described and determined by using the cross tabulations and chi-square test of significance. The significance level of $\alpha=0.05$ was used in deciding whether there was a significant variation among variables.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Overview

Chapter four presents and describes the findings of the study. It is divided into seven main sections. Section one presents the characteristics of the respondents, while section two describes the respondents socio-economic characteristics. Section three covers types of agricultural practice that were applied while section four present problems encountered by respondents. Section five discusses respondents' sources of agricultural information. Moreover, section six and seven present respondents' perceptions towards the effectiveness of female and male ALEFO and the influence of sex and education level on respondents' awareness, knowledge, adoption and productivity.

4.2 Some characteristics of respondents

This section discusses some characteristics of the respondents, who grew crops and kept livestock and how these characteristics influenced the perceptions on the effectiveness of ALEFO. Table 1 shows the general characteristics of respondents that include sex, age, marital status, household size and education levels.

Table 1 shows some characteristics of respondents of the study. Less than half (i.e. 76 (48.7%)) of respondents were females and slightly more than half (i.e. 80 (51.3%)) were males. Many studies indicated that many males were involved in many agricultural activities and projects. Due to women's many reproductive and

productive roles, they are often not available in many cases. Men, therefore, benefit most from the extension services (Bwana, 1996). Age of respondents ranges from 18 to 61 years and as Table 1 also shows that 60.3% of the respondents were in the age categories of between 29 and 50 years whereby a third of the respondents 48 (30%) were between 40-50 years, 46 (30%) were 29-39 years old. The age structure implied that most of respondents were in the active working group. However, the age category of 18-28 years, which was regarded as the youth group, accounted the lower percent.

Table 1: Some characteristics of the respondents (n = 156)

Variable	Number	Percent
Sex		
Female	76	48.7
Male	80	51.3
Age		
18 – 28	17	10.9
29 – 39	46	29.5
40 – 50	48	30.8
51 – 61	30	19.2
Above 61	15	9.6
Marital status		
Married	123	78.8
Single	13	8.3
Window	11	7.1
Divorce	9	5.8
Household size		
None	5	3.2
1 – 3	54	34.6
4 – 6	57	36.5
>6	40	25.6
Education level		
No formal education	17	10.9
Attained adult education	13	8.3
Attained primary education	119	76.3
Completed form II	5	3.2
Completed form IV	2	1.3

Most, of the respondents were married (123 (78.8%)), few 13 (8.3%) were single, widowed were 11 (7.1%) and divorced were nine (5.8%). Household size ranged from one to six children as 57 (36.5%) of the respondents indicated to had 4-6 people followed by 54 (34.6%) who had 1-3 people. Forty (25.6%) of the respondents had more than 6 people in their household and about a third of the respondents indicated to had 1-3 and 4-6 people in their households (Table 1). With regard to level of education, it was expected that the extent to which respondents were educated would influence their adoption of agricultural innovations (Rogers, 2003). However, Rogers (2003) argued that educated farmers have more contact with extension officers than farmers with less education. The study results found that the majority of respondents, 119 (76.3%) had attained primary education, 17 (10.9%) had no formal education, and 13 (8.3%) had attained adult education. Few, five (3.2%) of the respondents had completed form II and only two respondents (1.3%) had completed form IV. From these findings one could say that most rural children after completing primary education they usually remained in the villages and took up farming activities, while those who finished secondary school education tended to migrate to urban areas to look for jobs.

4.3 Respondents' sources of incomes

Respondents' socio-economic aspects included sources of income, acreage of major crops cultivated, and their ranks, livestock owned and their ranks. The study findings showed that of all the 156 respondents, 150 (96.2%) indicated that the first major source of income was crops production, while 92 (59%) mentioned livestock production as the second economic activity.

Table 2: Respondents sources of incomes (n=156)

Variable	Number	Percent
First main source of income		
Salaried employment	2	1.3
Crops production	150	96.2
Livestock production	4	2.6
Second main source of income		
Salaried employment	1	0.6
Crops production	4	2.6
Livestock production	92	59.0
Petty businesses	29	18.6

However, few, 29 (18.6%) of the respondents depended on petty business (off-farm activities) as their second sources of income. Other petty businesses included food vending, local brewing, casual labour, selling vegetables and other food crops, which helped farmers to earn extra income to ensure household food security and sustained livelihoods. Few respondents mentioned salaried employment as source of income.

4.3.1 Acreage for crop production and land ownership

Table 3 shows the general picture of acreage cultivated crops and land ownership in the study area. More than half, 55 (35.3%) of the respondents had crop acreages ranging between 3-4 acres followed by others 42 (26.9%) who had between 1-2 acres. Of all respondents, few 31(20%) and 25 (16%) indicated that their crop acreage ranged between 5 to 6 and above 6 acres respectively. Similar results were obtained by the World Bank (1994), which indicated that 93 percent of all the farmers in Tanzania cultivated each less than 2.0 hectares.

Table 3: Acreage for crop production and land ownership. (n=156)

Variable	Number	Percent
The acreage for crop production		
Less than one acre	2	1.3
1-2 acres	42	26.9
3-4acres	55	35.3
5-6 acres	31	19.9
Above 6 acres	25	16.0
Rent land		
Yes	51	32.7
No	104	66.7
The size of the rented land		
Less than one acre	1	0.6
1-2 acres	25	16.0
3-4acres	11	7.1
5-6 acres	1	0.6
Above 6 acres	1	0.6

Land ownership is an important aspect for most rural farmers. Findings of this study revealed that two thirds, 104 (67%) of the respondents indicated that they owned land, and one third (33%) rented it. Those who rented land, who were few (33%), the size rented ranged from 1-4 acres and was common in the mountainous villages of Nyandira, Langali and Kibaoni in which land was scarce and in the villages surrounded by sugarcane plantations like Kidudwe, Lusanga, Manyinga, Kilimanjaro and Kichangani villages.

4.3.2 Crops grown and their acreage

The major crops grown in the study villages included maize, rice, vegetables, sorghum, sugarcane and beans as shown in Table 4. Other crops grown by respondents in small areas included sunflower, sesame, root and tubers and banana.

About half, 89 (57%) of the respondents indicated that they grew maize on 1 to 2 acres, where as 37 (24%) grew it on 3 to 4 acres.

Table 4: Crops grown and their acreage (n=156)

Variable	Number	Percent
Acreage of maize		
Less than one acre	6	3.8
1 – 2	89	57.1
3 – 4 acre	37	23.7
5 – 6 acre	10	0.4
Above 6 acre	6	3.8
Acreage of paddy (rice)		
Less than one acre	10	6.4
1 – 2 acre	50	32.1
3 – 4 acre	13	8.3
5 – 6 acre	2	1.3
Above 6 acre	5	3.2
Acreage of vegetables		
Less than one acres	7	4.5
1 – 2 acre	17	10.9
3 – 4 acre	4	2.6
Acreage of sorghum		
Less than one acre	2	1.3
1 – 2 acre	15	9.6
3 – 4 acre	4	2.6
Above 6 acre	1	6.0
Acreage of chewing sugarcane		
Less than one acre	2	1.3
1 – 2 acre	6	3.8
3 – 4 acre	3	1.9
Above 6 acre	2	1.3
Acreage of beans		
< 1 acre	6	3.8
1 – 2 acres	11	7.1

Most of respondents grew maize for food consumption as well as a source of income to fulfill their food, basic needs. Less than half, 50 (32%) of the respondents grew paddy on 1-2 acres, while few respondents indicated to grow vegetables, sorghum, chewing sugarcane and bean on small acreages. The study found that maize and rice were considered as their main staple food, while vegetables and chewing sugarcane saved as cash crops followed by root crops and tubers, which were regarded as drought resistant crops. Interestingly enough maize, vegetables and sorghum were grown in the mountainous villages, the low land villages and in the drought prone villages of, Changarawe, Kibaoni, Langali, Misegese and Nyandira. Other villages included, Doma, Kipera, Lubungo B, Melela, Mlali, Tangeni and Sangsanga. On the other hand rice and chewing sugarcane were grown in the low lying villages like Dibamba, Hembeti, Mgudeni, Misufini, Wami- Dakawa, Wami-Luhindo. Still others included were Kichangani, Kidudwe, Kilimanjaro, Lusanga, Mabana, Manyinga and Mbogo. Also, the study found that most of respondents in the mountainous villages owned land in drought prone villages in which crop yield was low. It was observed that respondents needed extension agents to teach them improved practices in order to increase the farm productivity.

4.3.3 Maize variety grown

Maize varieties grown in the study villages were Staha, TMVI, Katumaini, Kilima, Ilonga composite, Kito and some local varieties (Table 5). Of all the respondents, about half, 81(52%) indicated that they grew Staha maize variety followed by 29 (18.6%) respondents who grew local variety. Few respondents indicated that they grew other varieties such as Kito-14 (9.0%), TMVI, 13 (8.3%), Ilonga composite five

(3.2%) Katumaini three (1.9%) and Kilima one (0.6%). The reasons for growing Staha variety of maize could be its good performance in the study villages, hence the variety's popularity to farmers. However continued efforts extension officers in the District to ensure that smallholders are taught to plant staha, which yields highly, step up.

Table 5: Maize variety grown and its sources, (n = 156)

Variable	Number	Percent
Maize variety		
Staha	81	51.9
TMVI	13	8.3
Katumani	3	1.9
Kilima	1	0.6
Ilonga composite	5	3.2
Local varieties	29	18.6
Kito	14	9.0
Source of maize seeds grown		
Bought seeds from shop	86	55.1
Bought seeds from others	26	16.7
Stored own maize seed from last harvest	21	13.5
Given seeds by relatives	13	8.3

Further, Table 5 shows the common sources of maize seed. Study results indicated that about half 86 (55%) of the respondents got their maize seeds from input shops while 26 (16.7%), indicated that they got their seed by buying from other farmers, 21 (14%) and 13 (8%) of the respondents indicated that they got, from own maize seed stored last year and given by their relatives, respectively.

The implications of these results is that about half of smallholders did not buy maize seed from input shops perhaps for two main reasons: not knowing the advantages of buying maize seed every season; and not having money to buy maize seed. The result of not using new maize seed was translated into low maize yields that smallholders got per acre annually because own seed from last year's crop in shelf lowered maize yield.

4.3.5 Livestock owned

The study found that respondents commonly owned livestock that included chickens, goats, pigs, ducks, cattle, and sheep as indicated in Table 6. The study results in Table 6 shows that about half, 80 (51.4%) of the respondents indicated that they kept chickens, followed by 24 (15.4%) who raised goats, 21 (13.5%) kept pigs, 19 (12.2%) kept ducks, 17 (10.9%) raised cattle and 5 (3.2%) kept sheep. The keeping of livestock in the study villages was based on four reasons: ethnicity, cultural, economic and considerations for provisioning of food. In the mountainous villages of Nyandira, Langali, Kibaoni and Misegese, which were inhabited by the Luguru ethnic group, pigs were predominantly kept to provide manure which was use to fertilize vegetable plots and pork and/or lard was every where in the villages. Here goats and chickens were kept for cultural reasons (funerals, ceremonies, rituals) and to provide food (meat, milk).

Table 6: The types and number of livestock owned by respondents (n = 156)

Variable	Number	Percent
Chickens owned		
Less than 5	9	5.8
5 - 10	33	21.2
11 - 16	13	8.3
17 - 22	15	9.6
More than 22	10	6.4
Goats owned		
Less than 5	5	3.2
4- 10	11	7.1
17 - 22	1	6.0
More than 22	7	46.0
Pigs owned		
< 5	12	7.7
5 - 10	5	3.2
11 - 16	2	1.3
17 - 22	1	6.0
More than 22	1	6.0
Ducks owned		
< 5	3	1.9
5 - 10	12	7.7
11 - 16	1	0.6
17 - 22	1	6.0
> 22	2	1.3
Cattle owned		
< 5	5	3.2
5 - 10	5	3.2
17 - 22	1	0.6
> 22	6	3.8
Sheep owned		
5 - 10	1	0.6
17 - 22	1	0.6
> 22	3	1.9

On the other hand the Masai ethnic group who resided in the drought prone low land villages of Wami Sokoine and Wami Luhindo kept mainly local breeds of cattle for both food provisioning (milk, blood, meat) and to earn money. Here too, goats were kept and used for food and sold to earn money. However, apart from the Masai tribe, few respondents in the low land villages of Manyinga, Kilimanjaro and Kichangani got diary cattle from the Heifer Project International (HPI). The respondents benefited on the bases of getting heifer from the project and pay back cow within a specified period of time (Kopa Ng'ombe Lipa Ng'ombe). Here, cattle were kept for both food provisioning of milk and to earn money.

4.4 Agricultural practices

4.4.1 Agronomic practices

Several agronomic practices were used by respondents such as early land preparation, early planting, use of proper spacing, early and 2-3 weedings, proper thinning, inorganic fertilizer application and proper storage. Table 7 below shows the three common agronomic practices normally done by the respondents in the study villages.

Table 7: Common agronomic practices (n=156)

Variable	Number	Percent
First common practice		
Early land preparation	144	92.3
Early and 2-3 weeding	1	0.6
Second common practice		
Early land preparation	8	5.1
Early planting	138	88.5
Third common practice		
Early planting	1	0.6
Proper spacing	22	14.1
Early and 2-3 weeding	108	69.2
Proper thinning	9	5.8
Proper fertilizer application	3	1.9
Proper storage	2	1.3

Study results revealed that most 144 (92%) of the respondents practiced early land preparation, as the first step towards sowing seeds, the second important practice was early planting which was mentioned by 138 (89%) of the respondents. Other practices were early and 2-3 weedings mentioned by 108 (69.2%) of the respondents and proper spacing indicated by 22 (14%) of the respondents. Few, nine (6%) of the respondents indicated to do thinning.

4.4.2 Use of fertilizer

Study results Table 8 show that most of the respondents (ie. 119 (76%)) indicated that they did not use either inorganic fertilizer or organic manure to fertilize their farms. This might be due to high costs of inorganic fertilizers, or that most respondents grew food crops, for which most believed that they did not need inorganic fertilizers. Also, the plots that respondents cultivated were too small and most reasoned that they could not break-even if they applied inorganic fertilizer. Fertilizer among smallholders was normally used on cash crops and the price factor was therefore an important aspect that smallholders considered. Thus, it was difficult for smallholders to buy inorganic fertilizers for a crop, which was only marginally marketable.

Table 8: Responses about the use of inorganic fertilizers or organic manure (n=156)

Variable	Number	Percent
Used inorganic Fertilizer in maize		
Yes	28	17.9
No	119	76.3
Amount of fertilizer applied/acre in 2004/2005 season		
5-10kg	4	2.6
17-22kg	4	2.6
23-28kg	2	1.3
More than 28kg	15	9.6
Used farmyard manure		
Yes	30	19.2
No	117	75.0
Amount applied/acre in 2004/2005 season		
Less than 100kg	1	0.6
100-200kg	3	1.9
201-301kg	8	5.1
302-402kg	1	0.6
403-503kg	2	1.3
More than 503	14	9.0

Of all the respondents, 117 (75%) of them reported that they did not use farmyard manure in their plots. Animal wastes can make a substantial contribution to nitrogen, phosphorous, potassium and other nutrient needs in the soil but handling procedure

from sources to the farm may be costly. In this study, few 28 (17.9%) and 30 (19.2%) respondents indicated that they used inorganic fertilizers and farmyard manure, respectively. The amount applied per acre was more than 28 kilogram's for inorganic fertilizers and more than 503 kilogram's for farmyard manure, which is not enough for one acre. The recommended amounts were 50 kilograms for inorganic fertilizer and one tone of farmyard manure.

4.4.3 Maize spacing

Different farmers in study villages used different spacing for maize as portrayed in Table 9. The study results revealed that slightly, one third, 51 (32.7%) of the respondents reported to use the recommended spacing for maize of 75 cmx60cm whereby two plants per hole were left. However, this showed that the extent of adoption was low. According to the respondents, views the reasons were: thinning reduces the number of plant per acre and hence reduces crop yields. In addition, planting with the recommended seed rate of 8 kilograms of maize per acre and following proper spacing was declared as labour intensive to them.

Table 9: Maize spacing that respondents used (n = 156)

Variable	Number	Percent
Maize spacing		
60cm x 30cm	15	9.6
60cm x 45cm	12	7.7
75cm x 30cm	5	3.2
75cm x 60cm	51	32.7
90cm x 60cm	60	38.5
75cm x 45cm	3	1.9

For example, Table 9 shows that percent of the respondents 22.4 planted maize using their own spacing such as of 60cm x 30cm were 15 (9.6%), 60cm x 45cm were 12 (7.7%), 75cm x 30cm were five (3.2%) and 75cm x 45cm were three (1.9%) and these spacing were not recommended by Ilonga Agricultural Research Center. The implications for two thirds of the respondents not using the recommended spacing meant that the crop yields obtained were low.

4.4.4 Maize produced, consumed and sold

Study results in Table 10 shows the average maize produced in bags per acre for the year 2003/2004 and 2004/2005 seasons and amount consumed and sold in a household. Study results in Table 10, reveals that there was a low level of maize produced per acre as the average production per acre for the two seasons ranged from two to seven bags. Of all the 156 respondents, about a third, 58 (37%) and less than a quarter, 32 (21%) indicated that they harvested an average of two to four and five to seven bags of grain maize in 2003/2004 cropping season, respectively. Similarly, of all the 156 respondents about a third, 55 (35%) and 49 (31%) indicated that they harvested an average of less than two bags and two to four bags of grain maize in 2004/2005 cropping season, respectively (Table 10). However, of all the respondents, about half of 87 (56%) indicated that in all cropping seasons they consumed more than 82 percent of the grain maize they had produced. Further, about half, 88 (56%) reported that they sold less than 20 percent of the grain maize they had produced (Table 10). The implications of these findings are two fold. First, most, on average of 78 percent of the respondents got an average range of two to seven bags of grain maize per acre.

Table 10: Average maize production (bags/acre) for 2003/2004 and 2004/2005, amount consumed and sold (n = 156)

Variable	Number	Percent
Average maize production (2003/2004)		
Less than 2 bags	19	12.2
2-4 bags	58	37.2
5-7 bags	32	20.5
8-10 bags	28	17.9
11-13 bags	4	2.6
More than 13 bags	4	2.6
Average maize production (2004/2005)		
Less than 2 bags	49	31.4
2-4 bags	55	35.3
5-7 bags	27	17.3
8-10 bags	11	7.1
11-13 bags	2	1.3
More than 13 bags	2	1.3
Amount (%) of maize consumed in the household		
Less than 20%	9	5.8
20-40%	31	19.9
41-61%	17	10.9
62-82%	87	55.8
More than 82%		
Amount (%) of maize sold		
Less than 20%	88	56.4
20-40%	24	15.4
41-61%	23	14.7
62-82%	9	5.8
More than 82%	2	1.3

This amount of maize was inadequate to sustain the number of people (i.e. six per household) in a household since they don't meet the recommended amount of three bags weighted 90 kilograms each of grain maize per household member per year. Second, because smallholders sold little maize it was difficult for them to adopt

agricultural innovations brought to them by ALEFO (i.e. use of inorganic fertilizers, seed, pesticides etc).

4.5 Farmers` problems in agricultural production

4.5.1 Crop-related problems

This section discusses crop-related problems, which included drought, prevalence of insect pests, destruction of crops by wild life, high input costs, lack of markets, land scarcity and a Masai cattle. Others included lack of income, lack of agricultural implement and crop diseases, which are shown in Table 11, bellow. Of all the respondents, one third, 57 (36.5%) and 56 (35.9%) reported that drought and high input costs limited agricultural production. Few respondents mentioned other crop-related problems such as prevalence of insect pests 13 (8.3%), destruction of crops by wild life- nine (5.8%), and crop diseases-seven (4.5%), with other insignificant problems shown in Table 11.

Table 11: Crop problems, measures taken to solve them, reason for not solving (n-156)

Variable	Number	Percent
Crop problems		
Drought	57	36.5
Prevalence of Insect pest	13	8.3
Destruction by Wild life	9	5.8
High input costs	56	35.9
Lack of markets	2	1.3
Land scarcity	4	2.6
Destruction of Masai cattle	2	1.3
Lack of income	1	0.6
Lack of agricultural implement	3	1.9
Diseases	7	4.5
Measures to solve crop problems		
Yes	9	5.8
No	145	92.9
Reasons for not solving		
Lack of income	7	4.5
Lacking means of controlling	136	87.2
Lack of knowledge	1	0.6

Of the 156 respondents, most 145 (92.9 %) indicated that they did not take any steps to solve the crop-related problems. There were some crop related problems that were beyond farmer's control such as drought, but most of the reported ones were within smallholders' capability and they could control them. In most of the surveyed villages, there was a still belief that the government was the one to solve their problems perhaps due to a hang over of socialism depending syndrome. Interestingly enough, study results showed that lack of income was not a major problem to solving smallholders' problems as it was mentioned by only one respondent (Table 11). Most respondents, 136 (87%) indicated that the main reason for not solving the crop-related problems was that they knew that had no means of controlling the problems. Perhaps this further explained the fatalistic attitude of most rural people, i.e "the belief that all events are naturally or supernaturally predetermined" (Webster's Encyclopedic Dictionary, 1988).

4.5.2 Livestock -related problems

Table 12 shows respondents responses to a number of livestock-related problems, which included diseases, wild animals, inadequate feed, grazing land and drought, and others are shown in Table 12. Over half, 90 (58%) of the respondents indicated that livestock diseases were the major problems limiting livestock production. Other minor livestock-related problems included input costs (3.2%), inadequate grazing land (1.9%), drought (1.3%), inadequate livestock feed (1.3%) and attack of animals by wild life (0.6%).

Table 12: Livestock problems, measures taken to solve them, reasons for not solving (n=156)

Variable	Number	Percent
Livestock problem		
Livestock diseases	90	57.7
Wild animals	1	0.6
Inadequate feeds	2	1.3
High input cost	5	3.2
Inadequate grazing land	3	1.9
Drought	2	1.3
Measure to solve livestock problem		
Yes	39	25.0
No	62	39.7
Reasons for not solving		
Lack of income	10	6.4
Uncontrollable	53	34.0

Over one third, 62 (40%) of the respondents reported that they were not able to solve the livestock-related problems, while 39 (25%) indicated that they were able to solve them. About one third, 53 (34%) of the respondents mentioned that they were not able to solve the livestock-related problems, and treated them as uncontrollable ones.

4.6 Respondents' sources of agricultural information

Ability of smallholders to produce crops and livestock depends largely on either they had current information, which might have been received from several sources. Study results showed that smallholders had different sources from where they received agricultural information for managing their farms. There was a wide range of agricultural information sources as shown in Table 13 below. Respondents were asked to indicate three main sources from where they received agricultural information. About half, 77 (49%) of the respondents indicated that their first main

source of agricultural information about crop production were ALEFOs. Few, 31 (20%), 15 (10%) and 11 (7%) of the respondents indicated that they got agricultural through inheritance from parents, neighbours/friends/relatives, and from the radio. respectively. Further, of all, few, 29 (19%), 23 (15%) and 12 (8%) reported that second main sources of agricultural information were agricultural shows, livestock extension officers and the radio (Table 13). Moreover, the same findings were indicated by Van den Ban and Hawkins (1996) who mentioned that farmers got knowledge and information they needed from other farmers, government extension organizations, private companies, other government agencies, marketing boards and other mass media.

Table 13: Respondents' main sources of agriculture and livestock information (n=156)

Variable	Number	Percent
First main source of information		
Extension worker (crops)	77	49.4
Extension worker (livestock)	8	5.1
Radio	11	7.1
Training institution	9	5.8
Neighbours/friend/relatives	15	9.6
Research centers	2	1.3
Inherit from parents	31	19.9
Second main source of information		
Extension worker (crops)	3	1.9
Extension worker (livestock)	23	14.7
Radio	12	7.7
Magazine	1	0.6
Book/booklets	3	1.9
Training institution	2	1.3
Neighbors/friend/relatives	7	4.5
Research centers	6	3.8
Agricultural shows	2	1.3
Inherit from parents	29	18.6
Seminar	6	3.8
Third main source of information		
Radio	6	3.8
Magazine	4	2.6
Book/booklets	2	1.3
Training institution	7	4.5
Neighbours/friend/relatives	2	1.3
Research centers	1	0.6
Inherit from parents	9	5.8
Seminar	6	3.8

The implications of study results shown in Table 13 is that about half of the respondents did get agricultural and livestock information from the ALEFOs. But there were others (50%) who did not get the agricultural/livestock information. On the other hand, lack of commitments for extension visited a day (Mwandry, 1992), which could be accelerated by lack of morale for extension officers since they work under extremely difficult conditions (Mattee, 1989). Study observations revealed that ALEFOs gave most information to livestock keepers despite little improvement seen in livestock husbandry. The result of not getting assistance from agriculture and livestock extension field officers was translated into low maize production that smallholders got per acre annually, or unit animal.

4.7 Respondents' perception on the effectiveness of female and male agricultural and livestock extension field officers

The overall objective of this study was to investigate respondent's perceptions on the effectiveness of female and male ALEFOs in providing information through AKAP for increased crop and livestock productivity. To achieve this, the study adopted a Likert scale – type of interview items for soliciting opinions of farmers concerning six statements: awareness creation, knowledge, adoption and productivity. Sets of questions were asked to respondents to find out whether a female or male ALEFO created awareness, imparted knowledge, facilitated farmers' adoption of technologies/practices and increased crop and livestock productivity. From the items, respondents were requested to indicate whether they strongly agreed, agreed, were neutral, disagreed or strongly disagreed with each of the statement. Strongly agreed and agreed statements were treated as positive attitude and strongly disagreed and

disagreed statements were treated as negative attitudes towards the effectiveness of female and male ALEFO in delivering information, while the neutral items showed that farmers new nothing. In this study, both strongly agreed and agreed ratings were combined, the averages were calculated, and obtained values were taken as indicators for positive attitude of farmers on a particular statement. The next section presents respondents' perceptions results on the effectiveness of female and male ALEFO for creating awareness.

4.7.1 Effectiveness of female and male ALEFO in creating awareness on maize-related technologies/practices

The term aware is defined as to be conscious or informed of something. Respondents' perceptions on whether they thought that a female or male ALEFO created awareness on selected improved agricultural and livestock skills and knowledge as provided on Table 14. Study results showed that respondents' perceptions on how female and male ALEFOs gave information for creating awareness on selected maize- related improved skills and knowledge differed. Table 14 shows that 26 (17%) of the respondents that were advised by male ALEFOs agreed that they had received information that made them aware of the use of improved varieties of maize compared to only 13 (8%) of the respondents in the villages that were advised by female ALEFOs.

Table 14: Respondents' opinion under female and male ALEFOs supervision on receiving awareness information on maize-related technologies/practices (n=156)

Informed respondents on the use of	Respondents advised by FALEFOs		Respondents advised by MALEFOs	
	n	%	n	%
Improved maize variety	13	8.3	26	16.7
Proper spacing	14	8.7	24	15.4
Inorganic fertilizer	11	7.1	17	11.2
Farmyard manure	12	7.7	18	11.6
Proper weeding	14	7.2	24	15.7
Insecticide for stored grain maize	13	8.3	23	15.1
Average total percent	12.8	7.9	22	14.3

When considering other crop-related information for awareness creation that was provided to respondents, about 24 (15.4%), 17 (11.2%), 18 (11.6%), 24 (15.7%), 23 (15.1%), of respondents were agreed to had been made aware of use of proper spacing, use of inorganic fertilizers, use of farm yard manure, on importance of weeding, and use of pesticide for stored maize by male ALEFO respectively. However, only 14 (8.7%), 11 (7.1%), 12 (7.7%), 14 (7.2%) and 13 (8.3%) of the respondents who were advised by female ALEFO agreed to had been given awareness information respectively. Further Table 14 shows that male ALEFOs were twice on an average of 14.3% effective in giving information to their farmers for creating awareness on selected crop-related skills and knowledge than were female ALEFOs with an average of 7.9%.

4.7.2 Effectiveness of female and male ALEFOs in giving the technical knowledge on maize-related technologies/practices

Table 15 shows the percent averages of respondents' responses that agreed to have received selected technical knowledge on the maize cultivation from female and male ALEFOs. Twenty-three (15%), 22 (14%), 21 (14%) and 20 (13%) of the respondents that were advised by male ALEFOs agreed that they had received selected technical knowledge on maize cultivation. These practices included importance of weeding, use of correct spacing, planting improved maize varieties and applying insecticide in stored grain maize. Similarly, for the same selected technical knowledge, few, on an average of 11 (7.3%) respondents advised by female ALEFOs indicated to have received the technical knowledge on maize cultivation (Table 15).

Table 15: Respondents' opinion under female and male ALEFOs supervision on receiving the technical knowledge on maize-related technologies /practices (n=156)

Taught how to use	Respondents advised by FEMALEFOs		Respondents advised by MALEFOs	
	n	%	n	%
Improved maize variety	12	7.7	21	13.5
Proper spacing	12	8.0	22	14.1
Inorganic fertilizer	9	5.8	16	10.3
Farmyard manure	9	5.3	13	8.3
Proper weeding	14	8.9	23	14.8
Insecticides in stored grain maize	12	8.0	20	13.1
Average total percent	11	7.3	18	12.4

The study findings in Table 15 shows that male ALEFOs were more effective in giving selected technical knowledge pertaining to maize production than were female ALEFOs.

4.7.3 Effectiveness of female and male ALEFOs in enhancing adoption on maize-related technologies/ practices

There are many factors, which influence one to adopt something. Some of these factors include the relative advantage, compatibility, triability and observability of the innovation to the farmers and increased contact with extension officers (Adams, 1982; Rogers, 2003; Van den Ban and Hawkins, 1996). One of the reasons for low smallholders agricultural production in Tanzania is the low adoption of recommended agricultural technologies/practices. Table 16 shows the percentage averages of respondents' responses who agreed that they had adopted the maize-related agricultural technologies that female and male ALEFOs advised them.

Table 16: Respondents' opinion under female and male ALEFOs supervision on adopting the maize-related technologies/ practices (n=156)

Used	Respondents advised by		Respondents advised	
	FALEFOs		by MALEFOs	
	n	%	n	%
Improved maize variety	8	5.0	13	8.0
Proper spacing	12	8.0	19	12.0
Inorganic fertilizer	4	2.0	6	4.0
Farmyard manure	4	3.0	8	5.0
Proper weeding	15	9.0	25	16.0
Insecticides stored grain maize	13	8.0	19	12.0
Average total percent	9	5.8	15	9.5

Of all respondents, 25 (16%), 19 (12%), 19 (12%) who were advised by the male ALEFOs agreed that they did 2-3 weeding in maize plots, used proper spacing of 75 cm by 60 cm and used insecticide to control insect pests in stored maize respectively (Table 16). For similar statements, respondents who were advised by female ALEFOs agreed as 15 (9%), 12 (8%) and 13 (8%). The other insignificant responses are as shown in Table 16. However, study results showed that few an average of 15 (9.5%) of the respondents who were advised by male ALEFOs mentioned that they were more satisfied compared to those advised by female ALEFOs that is only nine (5.8%). Based on the study findings male ALEFOs were more effective in enhancing respondents' adoption of recommended agricultural technologies /practices compared to female ALEFOs.

4.7.4 Effectiveness of female and male ALEFOs in giving information that increased maize production

Table 17 shows, the average percent of respondents' responses who agreed that they had increased their maize production after being given information on maize-related agricultural technologies by female and male ALEFOs. Study results showed that of all respondents, 25 (15%), 18 (11%), 18 (11%), and 15 (10%) who were advised by male ALEFOs agreed that they had increased maize production by doing 2-3 weeding, using proper spacing, applying insecticide in stored grain maize and planting improved maize variety, respectively. However, for similar statements, respondents who were advised by female ALEFOs agreed as follows: 15 (9%), 12 (8%), 13 (8%) and nine (6%) respectively.

Table 17: Respondents' opinion under female and male ALEFOs supervision on increased maize production (n=156)

Increased production by use of	Farmers advised by female ALEFOs		Farmers advised by male ALEFOs	
	n	%	n	%
Improved maize variety	9	6.0	15	10.0
Proper spacing (75 x 60cm)	12	8.0	18	11.0
Inorganic fertilizer in maize farm	3	2.0	6	4.0
Farmyard manure	5	3.0	7	5.0
Weeding 2-3	15	9.0	25	15.0
Insecticides in stored grain maize	13	8.0	18	11.0
Average total percent	10	6.0	15	9.3

It is anticipated that if farmers are made aware, knowledgeable of a certain agricultural, innovation, there are possibilities of increasing their crop productivity. Findings of this study revealed the same situation. Table 17 shows that of all the respondents who were supervised by male ALEFOs 15 (10%), 18 (11%), 25 (15%), and 18 (11%) mentioned that they had been given awareness information on plating improved maize variety, using proper spacing, doing proper weeding and use of insecticide for stored maize respectively of which such information had increased their maize production. On the other hand 9(6%, 12(8%), 15(9%) and 13(8%) who were supervised by female ALEFOs few respondents agreed that they had increased maize production by practicing the same agricultural innovations. On productivity point of view, findings revealed that respondents who were supervised by MALEFOs experienced high crop production compared to those supervised by FALEFOs. If this was proven to be the case in other villages in the District and the country at large it would have deleterious effects on household food security.

4.8 Opinion based on respondents' sex and education levels on the awareness creation, knowledge, adoption and increased productivity

The aim of this section describes the relationship between identified variables and maize technologies that female and male ALEFOs transferred to the smallholders in the study areas

4.8.1 Opinion based on respondents' sex in villages with female ALEFOs on AKAP

Table 18 shows the influence of sex of respondents and their awareness to agricultural-related technologies/practices of maize that female ALEFOs gave them. Studies show that women farmers find it easier to interact with female agents who may be understanding of their circumstances and problems (Endeley, 1990; Koons, 1998; Saito, 1990; Blumberg, 1989), cited by Lahai *et al.* (2000). However, communication bottlenecks between male ALEFOs and women farmers occur largely due to traditional and religious norms such as purdarisation (wife seclusion), and women's lack of self-confidence (Lahai *et al.*, 2000). The findings of this study are in line with the other study findings. Table 18 shows that on an average, nine (27%) of women who were supervised by female ALEFOs mentioned that sex did influence the manner in which maize-related technologies were delivered to them. Few, seven (18.3%) of the male respondents indicated this as a problem. This implied that women farmers were more concerned with sex of the ALEFOs when receiving information than male farmers.

Table 18 : Opinion based on respondents' sex and the awareness statement on maize-related technologies/practices as given by FALEFOs (n=72)

Awareness on the use of	Female respondent (n=32)		Male respondent (n=40)		Value	Df	Sign. Level
	n	%	n	%			
Improved maize variety	8	25.0	8	20.0	5.340	2	0.069**
Proper spacing	10	31.3	8	20.0	14.490	2	0.001*
Inorganic fertilizer	6	18.8	6	15.0	5.310	2	0.070**
Farmyard manure	8	25.0	6	15.0	6.120	3	0.106**
Proper weeding	10	31.3	8	20.0	3.960	2	0.138**
Insecticide for stored grain maize	10	31.3	8	20.0	3.960	2	0.138**
Average total percent	9	27.0	7	18.3			

* = Significant at 0.05; ** Not significant at 0.05

However, the results of this study showed that there was no statistical significant differences between female and male respondents supervised by female ALEFOs regarding being given awareness information on the use of improved maize variety, use of inorganic fertilizers, use of farm yard manure, weeding and use of insecticide for stored grain maize at $p < 0.069$, $p < 0.070$, $p < 0.106$, $p < 0.138$ and $p < 0.138$ respectively (Table 18). On the other hand, there was a statistical difference between female and male supervised respondents on who gave awareness information on use of proper spacing at $p < 0.001$.

Influence on technical knowledge Table 19 shows the influence of sex of respondents and the technical knowledge statement of improved maize practices for respondents who were supervised by female ALEFOs.

Table 19: Opinion based on respondents' sex on the technical knowledge statement of improved maize practices as given by FALEFOs (n=72)

Taught how to use	Female respondent (N=32)		Male respondent (N=40)		Value	Df	Sign. Level
	n	%	n	%			
	Improved maize variety	8	25.0	6			
Proper spacing	10	31.3	8	20.0	7.200	2	0.027*
Inorganic fertilizer	4	12.5	6	15.0	8.862	2	0.012*
Farmyard manure	4	12.5	6	15.0	8.862	2	0.012*
Proper weeding	8	25.0	8	20.0	7.200	3	0.066**
Insecticide for stored grain maize	8	25.0	8	20.0	0.720	2	0.698**
Average total percent	7	21.9	7	17.5			

* = Significant at 0.05; ** Not significant at 0.05

The study results indicated that there were statistical significant differences of means between female and male respondents who were supervised by female ALEFOs on how the female ALEFOs gave maize-related technical knowledge. As Table 19 shows differences were observed on technical knowledge which included use of improved maize variety at $p < 0.020$; proper spacing at $p < 0.027$, use of inorganic fertilizer at $p < 0.012$, and use of farmyard manure at $p < 0.012$. Study findings also revealed that to somewhat female respondents indicated to had received more technical knowledge from the female ALEFOs than male respondents. For example, of all the female respondents 10(31%) and eight (25%) indicated that female ALEFOs provided them with technical knowledge on the use of improved maize varieties and use of proper spacing compared to only six (15%) and eight (20%) of their male counterparts on the same statements. Results were the opposite for technical knowledge statement concerning the use of inorganic fertilizer and use of

farmyard manure where the percentages of female respondents agreeing were less 12.5 percent and 12.5 percent respectively compared to 15 percent for male respondents (Table 19).

The reasons for these differences in technical knowledge acquisition for male respondents could be two folds. First, those male respondents bought and used inorganic fertilizers especially those in the mountainous study villages. Second, the use of farmyard manure was increasing especially among male respondents in the lowland study villages. Usually males transported the farmyard manure to the fields.

Making farmer's aware and imparting technical knowledge are some of the preconditions for agricultural technology adoption, because full technology adoption is facilitated by many factors such as the availability, cost, relevance, compatibility of the technology, with the and traditional norms and its appropriateness. Table 20 shows responses of respondents who were supervised by female ALEFOs on how their se influenced to adopt selected maize related improved practices.

Table 20: Opinion based on respondents' sex on adoption of maize practices as given by FALEFOs (n=72)

Used	Female respondent (N=32)		Male respondent (N=40)		Value	Df	Sign. Level
	n	%	n	%			
Improved maize variety	8	25.0	8	20.0	3.764	2	0.152**
Proper spacing	8	25.0	8	20.0	11.829	3	0.008*
Inorganic fertilizer	0	0.0	0	0.0	5.294	1	0.021*
Farmyard manure	4	12.5	0	0.0	11.250	2	0.004*
Proper weeding	10	31.3	8	20.0	11.829	2	0.003*
Proper insecticide for stored grain maize	10	31.3	8	20.0	8.010	2	0.018*
Average total percent	8	20.9	6	13.3			

* = Significant at 0.05; ** Not significant at 0.05

Study findings revealed that sex of the respondents influenced the level of adoption of five maize-related practices. Similarly, study results showed that there were a statistical significant difference of means between respondents' sexes and the adoption of improved maize related practices (Table 20). The differences were observed in the use of proper spacing at $p < 0.008$, use of inorganic fertilizer at $p < 0.021$, use of farmyard manure at $p < 0.004$, proper weeding $p < 0.003$ and use of insecticide in stored grain maize at $p < 0.018$. In these maize related improved practices the percentages of female respondents who indicated to had adopted the practices were slightly higher (25, 12.5, 31.3 and 31.3) as opposed to male respondents (20, 0, 20 and 20) for same statements, respectively.

Study results in Table 21 shows that there were a statistical significant differences of means based on sex of respondents in crop productivity since they have used proper spacing at $p < 0.008$, used inorganic fertilizer at $p < 0.021$ and used farm yard manure at $p < 0.04$ where by 25% and 12.5% of female respondents increased their production compared to 20% of male respondents.

Table 21: Opinion based on respondents' sex on increased maize production as given by FALFEOs (n=72)

Increased maize production by the use of	Female respondent (n=32)		Male respondent (n=40)		Value	Df	Sign. Level
	n	%	n	%			
Improved maize variety	10	31.3	8	20.0	3.22	2	0.20**
Proper Spacing	8	25.0	8	20.0	11.83	3	0.01*
Inorganic fertilizer	0	0.0	0	0.0	5.29	1	0.02*
Farmyard manure	4	12.5	0	0.0	11.25	2	0.00*
Proper Weeding	10	31.3	8	20.0	3.73	2	0.16**
Insecticide for stored grain maize	10	31.3	8	20.0	3.73	2	0.16**
Average total percent	8	21.9	6	13.3			

* = Significant at 0.05; ** Not significant at 0.05

On the other hand, there was no statistical evidence by sex of respondents in crop productivity due to use of improved maize seeds at $p < 0.200$ where 31.3% of females and 20% of males agreed to had increased maize production. Also proper weeding at $p < 0.155$ was responded by ten (31.3%) of the female and 20% of male and eight (20%) of males agreed to had increased maize production under female ALEFO supervision. Generally it can be noted that female farmers received much support from female ALEFOS, A finding which is confirmed by Lahai *et al.* (2000) study in Nigeria.

4.8.2 Opinion based on respondents' sex on the awareness creation, knowledge, adoption and increased productivity (AKAP) as given by MALEFOs

Table 22 shows the responses of female and male respondents on their awareness to maize-related technologies/practices given to them by MALEFOs. Studies show that provision of agricultural extension services are predominantly conducted by male ALEFOs and agricultural information is geared primarily to male farmers and male operated farms (Lahai *et al.*, 2000). However, these study findings differ in some respects. For example, study results displayed in Table 22 show that, on average, few, 7.2 (18.4%) and 6.5 ((17.1%) of female and male respondents respectively indicated to have received the maize-related awareness technologies/practices from the MALEFOs. This had two implications. First MALEFOs reached few smallholders in the villages they supervised probably due to lack of transport facilities and low working morale. Second, MALEFOs equally contacted both female

and male smallholders meaning that MALEFOs did not discriminate the provision of information based on clientele's sex.

Table 22: Opinion based on respondents' sex on the awareness statement about improved maize practices as given by MALEFOs (n=77)

Awareness on the use of	Female respondent (n=39)		Male respondent (n=38)		Value	Df	Sign. Level
	n	%	n	%			
Improved maize variety	8	20.50	39	23.7	0.68	2	0.71**
Proper spacing	8	20.50	4	10.5	2.79	2	0.25**
Inorganic fertilizer	6	15.40	4	10.5	19.71	4	0.00*
Farmyard manure	6	15.40	6	15.8	26.16	4	0.00*
Proper weeding	8	20.50	8	21.1	10.23	3	0.02*
Insecticide	7	17.95	8	21.1	6.66	3	0.08**
Average total percent	7.2	18.40	6.5	17.1			

* = Significant at 0.05; ** Not significant at 0.05

Further, the study results in Table 22 show that MALEFOs equally gave the awareness information to both female and male respondents, especially on the use of improved maize varieties at $p < 0.7$, use of proper spacing at $p < 0.2$ and use of insecticide for controlling stored grain maize at $p < 0.08$. On the other hand, few female respondents indicated that MALEFOs unequally gave them awareness information which included use of inorganic fertilizers at $p < 0.00$, use of farmyard manure at $p < 0.00$ and use of proper weeding at $p < 0.02$ (Table 22).

Further, Table 23 shows the responses of respondents on the technical knowledge related to maize-related technologies/practices that MALEFOs gave them. Study results indicated that on average, few, six (15.4%) and five (13.6%) female and male

respondents, respectively indicated to had received the technical knowledge on maize-related technologies/practices from MALEFOs. As indicated for female supervised respondents, MALEFOs also contacted and provided few respondents with technical knowledge on maize-related technologies/practices in the study villages. Observations revealed that this was perhaps due to lack of transport and low morale of MALEFOs in teaching smallholders.

Table 23: Opinion based on respondents' sex on technical knowledge statement about improved maize practices as given by MALEFOs (n= 77)

Taught how to use	Female respondent (n=39)		Male respondent (n=38)		Value	Df	Sign. level
	n	%	n	%			
Improved maize variety	7	17.95	5	13.20	12.79	4	0.01*
Proper spacing	7	17.95	6	15.80	9.02	3	0.03*
Inorganic fertilizer	4	10.26	4	10.50	1.57	4	0.82**
Farmyard manure	4	10.26	3	7.90	7.35	4	0.12**
Proper weeding	8	20.50	6	15.80	12.12	3	0.01*
Insecticide for stored grain maize	6	15.40	7	18.40	13.42	3	0.00*
Average total percent	6	15.40	5.2	13.60			

* = Significant at 0.05; ** Not significant at 0.05

As opposed to Lahai *et al.* (2000) findings, this study found that MALEFOs gave more technical knowledge in maize-related technologies/practices to female respondents than males. This was so in technical knowledge related to use of improved maize variety seven (17.9%), proper spacing seven (17.9%), use of farmyard manure four (10.3%) and proper weeding eight (20.5%) were relatively higher than male respondents five (13.2%), six (15.8%), three (7.9%) and six (15.8%), respectively.

On the other hand, MALEFOs gave less technical knowledge to female respondents related to use of inorganic fertilizer, four (10.3%) and to use of insecticide in stored grain maize, six (15.4%) compared to male respondents, four (10.50%) and seven (18.4%), respectively. Generally, Table 23 shows that MALEFOs were not biased in providing technical knowledge based on the respondents' sex. However, female respondents indicated that MALEFOs uncqually gave them technical knowledge which was related to use of improved maize variety at $p<0.01$, use of proper spacing at $p<0.03$, use of proper weeding at $p<0.01$ and use of insecticide for stored grain maize at $p<0.00$ (Table 23).

Table 24 shows respondents' opinions based on sex about their adoption of selected maize-related technologies/practices that were offered by MALEFOs. Study findings revealed that few, five (11.5%) and five (14%) of female and male respondents, respectively indicated that they had adopted the maize-related technologies/practices that MALEFOs advised them. Also, study findings indicated that more male respondents adopted maize-related technologies/practices compared to females. This was revealed in maize related technologies/practices on the using proper spacing, seven (18.4%), use of inorganic fertilizers, three (7.9%) and use of farmyard manure, three (7.9%). Other maize related technologies/practiced that adopted included proper weeding, eight (21.1%) and use of insecticide for stored grain maize, seven (18.4%), which were relatively adopted by more female respondents.

Table 24: Opinion based on respondents' sex on adoption of improved maize practices as given by MALEFOs (n=77)

Used	Female respondent (n=39)		Male respondent (n=38)		Value	Df	Sign. level
	n	%	n	%			
Improved maize variety	5	12.8	4	10.5	4.55	3	0.21**
Proper spacing	6	15.4	7	18.4	20.17	3	0.00*
Inorganic fertilizer	1	2.6	3	7.9	31.40	4	0.00*
Farmyard manure	2	5.1	3	7.9	12.69	4	0.01*
Proper weeding	8	20.5	8	21.1	20.66	3	0.00*
Proper insecticide	5	12.8	7	18.4	7.59	3	0.06**
Average total percent	5	11.5	5.3	14.0			

* = Significant at 0.05; ** Not significant at 0.05

Further, the study results in Table 24 shows that MALEFOs gave equal information both to female and male respondents for adoption of maize-related technologies pertaining to the use of improved maize varieties at $p < 0.21$ and use of insecticide for stored grain maize at $p < 0.06$. On the other hand, MALEFOs gave unequal information for the adoption of maize related technologies/practices to female and male respondents, which included the use of proper spacing at $p < 0.00$, use of inorganic fertilizer at $p < 0.00$, use of farmyard manure at $p < 0.01$ and proper weeding at $p < 0.00$ (Table 24).

Study results in table 25 shows respondents' opinions based on sex about technologies/practiced that increased maize production that MALEFOs advised them. Again, study findings indicated that few, five (12%) female and five (13.1%) male respondents had increased maize production after MALFEOs had advised them. However, study findings showed that there were statistical significant differences between female and male opinions related to technologies/practices that they

received from MALEFOs. These included the use of proper spacing at $p < 0.00$, the use of inorganic fertilizers at $p < 0.00$, the use of farmyard manure, at $p < 0.00$) and use of proper weeding, at $p < 0.02$ (Table 25). Also, there were slightly more female respondents supervised by MALEFOs who indicated to having increased maize production by using improved maize variety, six (15.4%), and proper weeding, eight (20.5%) as a opposed to male respondents for the same statements, five (13.2%) and seven (18%) respectively.

Table 25: Opinion based on respondents' sex on maize production as given by MALEFOs (n=77)

Increased maize production by use of	Female respondent (n=39)		Male respondent (n=38)		Value	Df	Sign. Level
	n	%	n	%			
Improved maize variety	6	15.4	5	13.2	4.49	3	0.21**
Proper spacing	6	15.4	6	15.8	13.99	3	0.00*
Inorganic fertilizer	1	2.6	3	7.9	15.48	4	0.00*
Farmyard manure	2	5.2	3	7.9	17.49	4	0.00*
Proper Weeding	8	20.5	7	18.0	9.83	3	0.02*
Insecticide in stored maize	5	12.8	6	15.8	1.78	2	0.41**
Average total percent	5	12.0	5	13.1			

* = Significant at 0.05; ** Not significant at 0.05.

On the other hand, there was no statistical significant difference based on sex of the respondents for increasing maize production due to information that MALEFOs gave them on use of improved maize variety at $p < 0.21$ and use of insecticide for stored grain maize at $p < 0.41$. Generally, it was noted that both female and male respondents were equally received support from MALEFOs as opposed to (Haug, 1999; Lahai *et al.*, 2000) findings.

4.8.3 The opinion based on respondents' education level in villages with FALEFOs on AKAP

Table 26 shows the opinions of respondents based on their education levels about their awareness to maize-related technologies/practices that FALEFOs gave them. Other studies show that through education, an individual becomes more critically aware of the need and scope for social change (Mdemu, 2000). Table 26 shows that on average, FALEFOs gave information to few respondents purporting to make them aware of the maize-related technologies/practices. This could be probably due to lack of transport and low morale of FALEFOs to advise smallholders. Further, respondents' highest education level in the study villages supervised by FALEFOs was primary education. Furthermore, observations showed that this education level that most smallholders had was not enough for them to process the modern complex information (e.g., use of pesticide in maize, use of insecticide in maize, GMOs, etc), which was vital for agricultural change and development. However, education level did influence the manner in which maize related technologies were delivered to them.

Table 26: Respondents' opinions based on education levels on the awareness of maize improved technologies/practices as given by FALEFOs (n=72)

Statement on use of:	Level of education						Chi – square test		
	No formal education (n=4)		Attained adult education (n=20)		Attained primary education (n=48)		Value	Df	Sig. level
	n	%	n	%	n	%			
Improved maize									
variety	2	50.0	4	20.0	10	20.9	8.59	4	0.07**
Proper spacing	2	50.0	6	30.0	10	20.9	15.55	4	0.00*
Inorganic fertilizer	2	50.0	4	20.0	6	12.5	16.02	4	0.00*
Farmyard manure	2	50.0	4	20.0	8	16.7	28.26	6	0.00*
Proper weeding	2	50.0	6	30.0	10	20.9	23.05	4	0.00*
Insecticide for stored									
grain	2	50.0	6	30.0	10	20.9	23.05	4	0.00*
Average total	2	50.0	5	25.0	9	18.8			
percent									

* = Significant at 0.05; ** Not significant at 0.05

Further, study findings indicated that there was a highly statistical significant difference between respondents of different education levels related on how FALEFOs gave them the awareness information on the use of proper spacing at $p < 0.00$, use of inorganic fertilizer at $p < 0.00$, use of farm yard manure at $p < 0.00$, use of proper weeding at $p < 0.00$ and use of insecticide for stored grain maize at $p < 0.01$ (Table 26).

Further, study findings displayed in Table 27 shows respondents' opinions based on their education levels regarding the technical knowledge on maize-related technologies/practices that FALEFOs gave respondents. The study found that on average, FALEFOs gave information to few respondents pertaining to technical knowledge on maize-related technologies/practices. However, respondents' education background is an important factor in determining the degree of

understanding and being ready to accept and apply innovations (Mdemu, 2000; Swanson, 1984). Also, study findings revealed that there were highly statistical significant differences at $p < 0.01$ between respondents' education levels and the way FALEFOs gave information to respondents pertaining to technical knowledge on maize-related technologies/practices. This implied that FALEFOs provided unequal technical knowledge to respondents based on their education levels, mostly favoring the educated ones. This finding conforms with those of Rogers (2003), Swanson (1984), Mlozi (1994).

Table 27: Opinions based on respondents education level and technical knowledge statement on improved maize practices as given by FALEFOs (n=72)

Taught how to use	Level of education						Chi – square test		
	No formal edu. (n=4)		Attained adult edu. (n=20)		Attained primary edu. (n=48)		Value	Df	Sig. level
	n	%	n	%	n	%			
Improved maize variety	2	50.0	4	20.0	8	16.65	27.39	4	0.00*
Proper spacing	2	50.0	6	30.0	1	20.8	18.67	4	0.00*
Inorganic fertilizer	0	0.0	4	20.0	6	12.5	27.69	4	0.00*
Farmyard manure	0	0.0	4	20.0	6	12.5	27.69	4	0.00*
Proper weeding	2	50.0	6	30.0	8	16.65	24.07	6	0.00*
Insecticide for stored grain maize	2	50.0	6	30.0	8	16.65	23.16	4	0.00*
Average total percent	2	33.3	5	25.0	8	16.0			

* = Significant at 0.05; ** Not significant at 0.05.

Table 28 shows opinion of respondents based on their education levels and statements on adoption of maize-related technologies/practices that FALEFOs gave

them. There is a positive relationship between farmers' education level and rate of adoption of innovation (Mdemu, 2000). The author argued that, more educated farmers had better chances of expressing their views than less educated ones as they had enhanced information processing abilities. These study findings indicated that FALEFOs did not differ in the way they gave information that led to respondents to adopt maize-related technologies/practices that was related to use of inorganic fertilizer at $p < 0.35$ and use of farmyard manure at $p < 0.34$ (Table 28). The reasons for these differences could be two folds. First, it was observed that respondents complained about the high input cost, hence, most did not use the inorganic fertilizers in maize production. Second, the use of farmyard manure was little because it was tedious to transport to fields given that most fields were about five kilometers away.

Table 28: Opinions based on respondents' education level and statements on adoption of maize technologies/practices as given by FALEFOs (n=72)

Used	Level of education						Chi – square test		
	No formal edu. (n=4)		Attained adult edu. (n=20)		Attained primary edu (n=48)		Value	Df	Sig. level
	n	%	n	%	n	%			
Improved maize variety	2	50.0	2	10.0	4	8.35	15.09	4	0.01*
Proper spacing	2	50.0	6	30.0	8	16.65	19.70	6	0.00*
Inorganic fertilizer	0	0.0	0	0.0	4	8.3	2.12	2	0.35**
Farmyard manure	0	0.0	0	0.0	4	8.3	4.50	4	0.34**
Proper weeding	2	50.0	6	30.0	10	20.8	9.50	4	0.05*
Insecticide for stored grain maize	2	50.0	6	30.0	10	20.8	23.05	4	0.00*
Average total percent	2	33.3	3	17.0	7	13.9			

* = Significant at 0.05; ** Not significant at 0.05

On the other hand, study findings revealed that there were statistical significant differences between respondents' opinion based on education levels and statements on adopting pertaining to the use of improved maize variety at $p < 0.01$, use of proper spacing at $p < 0.01$, proper weeding at $p < 0.05$ and use of proper insecticide for stored grain maize at $p < 0.01$ that FALEFOs gave them.

Further, study results in Table 29 shows the respondents' opinions based on education levels and statements on maize-related technologies/practices for increasing maize productivity that FALEFOs gave them. Study findings revealed that FALEFOs gave few respondents on maize-related technologies/practices for increasing maize productivity. Moreover, study results show that there were statistical significant differences on maize-related technologies FALEFOs gave respondents on the use of improved maize variety at $p < 0.01$, use of proper spacing at $p < 0.01$, proper weeding at $p < 0.05$ and use of insecticide for stored grain maize at $p < 0.05$.

Table 29: Respondents' opinion based on education levels on increased maize production as supervised by FALEFOs (n=72)

Increased maize production by use of:	Level of education						Chi – square test		
	No formal edu. (n=4)		Attained adult edu. (n=20)		Attained primary edu. (n=48)		Value	Df	Sig. level
	n	%	n	%	n	%			
Improved maize variety	4	100.0	4	20.0	12	25.0	12.97	4	0.01*
Proper spacing	2	50.0	6	30.0	8	16.65	19.70	6	0.00*
Inorganic fertilizer	0	0.0	0	0.0	0	0.0	2.12	2	0.35**
Farmyard manure	0	0.0	0	0.0	4	8.3	4.50	4	0.34**
Proper weeding	2	50.0	6	30.0	10	20.8	9.50	4	0.05*
Insecticide on grain maize	2	50.0	6	30.0	10	20.8	9.50	4	0.05*
Average total percent	2	41.7	4	18.3	7	15.3			

* = Significant at 0.05; ** Not significant at 0.05.

On the other hand, there were no statistical significant differences between opinions based on respondents' education level and the maize-related technologies/practices for increasing maize productivity. These included use of inorganic fertilizer at $p < 0.35$ and use of farmyard manure at $p < 0.34$. These findings implied that respondents' education levels had no differences in the way FALEFOs gave information for increasing maize productivity.

4.8.4 Opinion based on respondents' education levels in villages with MALEFOs on (AKAP)

Table 30 shows the opinion based on respondents' education levels on awareness concerning maize-related technologies/practices that MALEFOs gave them. Study findings indicated that few, respondents based on their education levels were on the opinion that was aware on maize-related technologies/practices from MALEFOs. Further, study results show that there were statistical significant differences between

respondents' education levels and the way MALEFOs gave awareness information on all six maize-related technologies/practices at $p < 0.01$.

Table 30: Opinion based on respondents' education levels on awareness statement of maize improved practices as given by MALEFOs (n=75)

Use of	Level of education						Chi-square test				
	No formal education (n=6)		Attained adult education (n=4)		Attained primary education (n=60)		Completed form two (n=5)		Val ue	Df	Sign. Level
	n	%	n	%	n	%	n	%			
Improved maize variety	1	16.66	2	50.0	13	21.3	1	20.0	37.228	8	0.00*
Proper spacing	1	16.66	1	25.0	12	19.67	1	20.0	45.092	8	0.00*
Inorganic fertilizer	0	0.0	1	25.0	9	14.75	1	20.0	144.996	16	0.00*
Farmyard manure	0	0.0	1	25.0	10	16.39	1	10.0	131.730	16	0.00*
Proper weeding	1	16.66	1	25.0	15	24.59	1	10.0	52.240	12	0.00*
Insecticide for stored grain	1	16.66	1	25.0	12	19.67	1	20.0	84.050	12	0.00*
Average total percent	1	11.1	1	29.16	45	19.4	1	16.7			

* = Significant at 0.05; ** Not significant at 0.05

Study results implied that education level of respondents had an important role in awareness creation, (Table 30). Study findings in Table 31 shows the respondents' opinion based on their education levels on the technical knowledge that MALEFOs gave them. On average, few respondents received technical knowledge concerning maize-related technologies/practices. Generally, study findings revealed that MALEFOs unequally provided technical knowledge to respondents based on their education levels for all six maize related technologies/practices at $p < 0.01$. The reason for these differences in technical knowledge acquisition could be due to respondents' inability to understand the maize related technologies/practices that MALEFOs gave them, which was made worse because of the respondents' low formal education levels.

Table 31: Respondents' opinion based on education levels on technical knowledge of improved maize practices as given by MALEFOs (n=75)

Use of	Level of education								Chi-square test		
	No formal education (n=6)		Attained adult education (n=4)		Attained primary education (n=60)		Completed form two (n=5)		Value	Df	Sign. Level
	n	%	n	%	n	%	n	%			
Improved maize variety	1	16.66	0	0.0	11	18.03	1	20.0	81.405	16	0.00*
Proper spacing	1	16.66	0	0.0	13	21.31	1	20.0	77.752	12	0.00*
Inorganic fertilizer	0	0.0	0	0.0	8	13.11	1	20.0	57.865	16	0.00*
Farmyard manure	0	0.0	0	0.0	6	9.83	1	20.0	33.335	16	0.01*
Proper weeding	1	16.66	1	25.0	13	21.31	1	20.0	54.521	12	0.00*
Insecticide for stored grain	1	16.66	1	25.0	10	16.39	1	20.0	70.912	12	0.00*
Average total percent	1	11.1	0	8.0	10	16.66	1	20.0			

* = Significant at 0.05; ** Not significant at 0.05

Table 32 shows respondents' opinion based on their education levels about statement on adopting the maize related technologies/practices that MALEFOs gave information on them. The study findings showed that, MALEFOs gave information to few respondents pertaining to adopting the maize-related technologies/practices.

Table 32: Respondents opinion based on their education levels on adoption of improved maize practices as given by MALEFOs (n=75)

Use of	Level of education								Chi-square test		
	No formal education (n=6)		Attained adult education (n=4)		Attained primary education (n=60)		Completed form two (n=5)		Value	Df	Sign. level
	n	%	N	%	n	%	n	%			
Improved maize variety	1	16.66	1	25	7	11.47	1	20	10.264	12	0.51**
Proper spacing	1	16.66	1	25	11	18.03	1	20	28.334	12	0.01*
Inorganic fertilizer	0	0.00	0	0	3	4.9	1	20	58.508	16	0.00*
Farmyard manure	0	0.00	1	25	4	6.55	1	20	192.131	16	0.00*
Proper weeding	1	16.66	1	25	12	21.31	1	20	56.328	12	0.00*
Insecticide for stored grain	1	16.66	1	25	10	16.39	1	20	40.256	12	0.00*
Average total percent	1	11.10	1	20.83	8	13.11	1	20			

* = Significant at 0.05; ** Not significant at 0.05.

Further, study findings revealed that there were statistical significant differences between respondents' education levels and the way MALEFOs gave information pertaining to adopting the maize-related technologies/practices. This was observed on the use of proper spacing at $p < 0.01$, of inorganic fertilizer at $p < 0.00$, use farmyard manure at $p < 0.00$, proper weeding at $p < 0.00$ and use insecticide for stored grain maize at $p < 0.00$. On the other hand, MALEFOs equally gave information pertaining to improved maize variety at $p < 0.5$. Field observations revealed that most respondents were not aware of the importance of using improved maize variety, which affected the yield of maize.

Table 33 shows respondents' opinion based on their education levels and information statements that MALEFOs gave respondents for increasing maize production. The study results indicated that MALEFOs gave such information to few. Similarly, study findings revealed that there were statistical significant difference between respondents' education levels and the way MALEFOs gave them information on maize-related technologies/practices for increasing the crop's production. This was observed on information pertaining to the use of proper spacing at $p < 0.01$, use of inorganic fertilizers at $p < 0.01$, use of farmyard manure at $p < 0.01$ and use of insecticide of stored grain maize at $p < 0.01$.

Table 33: Respondents' opinion based on education levels on maize production as influenced by MALEFOs (n=75)

Use of	Level of education								Chi-square test		
	No formal education (n=6)		Attained adult education (n=4)		Attained primary education (n=60)		Completed form two (n=5)		Value	Df	Sign. Level
	n	%	N	%	n	%	n	%			
Improved maize variety	1	16.66	1	25	9	13.95	1	20	17.560	12	0.13**
Proper spacing	1	16.66	1	25	9	14.75	1	20	40.458	12	0.00*
Inorganic fertilizer	0	0	0	0	4	5.75	1	20	120.192	16	0.00*
Farmyard manure	0	0	1	25	4	5.75	1	20	115.935	16	0.00*
Proper weeding	1	16.66	1	25	12	19.65	1	20	11.786	12	0.46**
Insecticide for stored grain	1	16.66	1	25	9	13.9	1	20	38.121	8	0.00*
Average total percent	1	11.1	1	20.83	8	12.3	1	20			

* = Significant at 0.05; ** Not significant at 0.05

On the other hand, MALEFOs equally gave respondents based on their educational level information for increasing maize production pertaining to the use of improved maize variety at $p < 0.13$ and use of proper weeding at $p < 0.46$. The reason for this

could be of two folds. First, most smallholders did not buy improved maize seed from the input shops since respondents indicated that seed was expensive. Secondly, from field experience most smallholders weeded their maize fields even without being taught by an outsider it was a common practice that every farmer performed.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Overview

This chapter presents the conclusion and recommendations based on the study findings. The general objective of the study was to investigate the effectiveness of female and male agricultural and livestock extension field officers (ALEFOs) for providing agriculture and livestock information to smallholders based on the AKAP sequence. This study was conducted in 26 villages in Mvomero District. The specific objectives of this study were to: assess the smallholders' socio-economic factors that affect their change in behaviour due to AKAP sequence; examine the ALEFOs socio-economic factors that affect their effectiveness to imparting information to smallholders based on AKAP sequence and identify the perception of smallholders towards the effectiveness of female and male ALEFOs in providing information for increasing maize production based on AKAP sequence.

The study employed a cross sectional design whereby data were collected at a single point in time from a sample of selected respondents from some large population of smallholders involved in agricultural production. In this study, questionnaires were the main techniques used for data collection. Data were analysed using the Statistical Package for Social Sciences (SPSS) 11.5 computer programme in which descriptive statistical analysis were performed to yield frequencies and percentages. Cross tabulations and chi-square test of significance were also performed to identify the relationship of the studied variables and the magnitude of association.

5.2 Conclusion

The study findings indicated that 58 (37%) of the respondents had harvested 2 to 4 bags/acre/year in the 2003/2004 and 2004/2005 cropping seasons of maize. These yields were not enough given the current national household consumption recommendation of 3 bags of cereals/year/person. The average number of people per household in the study village ranged from 5-7. Further, study findings revealed that, low maize production was due to several inhibiting factors such as low education level of smallholders, few extension officers' contacts, drought and high input costs.

5.3 Opinion of smallholders on ALEFOs advice

Generally, the study found that Female Agricultural and Livestock Extension Field Officers (FALEFOs) contacted and advised few respondents concerning maize-related technologies/practices. This was observed in provision of awareness information, imparting of technical knowledge that enhancing adoption and increased productivity (the AKAP Sequence). Furthermore, the percent average of the respondents who were supervised by FALEFOs indicated to receive advice on maize-related technologies with regard to AKAP sequence was low 12.8 (7.9%), 11 (7.3%), nine (5.8%) and 10 (6%) compared to those supervised by MALEFOs 22 (14.3%), 18 (12.4%), 15 (9.5%) and 15 (9.3%) respectively. This could be due to double roles (reproduction, production, professional) that FALEFOs had compared to MALEFOs. On the other hand, FALEFOs gave slightly more nine (27%), seven (21.9%), eight (20.9%) and eight (21.9%) information on maize-related technologies/practices to more female respondents compared to male respondents

seven (18.3%), seven (17.5%), six (13.3%) and six (13.3%) respectively. The reason could be that women farmers find it easier to interact with female agents who may be understanding of their circumstances and problems (Endeley, 1990; Koons, 1998; Saito, 1990; Blumberg, 1989), cited by Lahai *et al.* (2000). Further, FALEFOs provided unequal information to technical knowledge to respondents based on their education levels, mostly favored the more educated ones. This finding conforms with that of Rogers (2003), Swanson (1984), Mlozi (1994).

As explained for FALEFOs, MALEFOs also gave information to few respondents concerning the maize-related technologies/practices with regard to AKAP sequence. However, the percent average of respondents who had received advice from MALEFOs on maize-related technologies was higher compared to those that FALEFOs supervised. Based on the study findings, this implied that MALEFOs were more effective in providing information on maize-related technologies /practices than were FALEFOs. Similarly, it was noted that there was slightly equal percent average seven (18.4%), six (15.4%), five (11.5%) and five (12%) of female and seven (17.1%), five (13.6%), five (14%) and five (13.1%) of male respondents that MALEFOs gave information on maize- related technologies/practices based on AKAP sequence. This implied that MALEFOs were not biased in giving information to respondents based on their sex orientations-this was not the case for FALEFOs. On the other hand, as observed from FALEFOs, MALEFOs provided unequal information to technical knowledge to respondents based on their education levels, mostly favored the more educated ones.

5.4 Recommendations

In view of the findings of this study, the following recommendations are made.

- (i) A number of factors (e.g. few extension contacts, high input costs and drought) were found to constrain the utilization and transfer of maize-related technologies for increased maize production. This study recommends that the Mvomcro District Council should increase the number of ALEFOs, subsidize inputs such as inorganic fertilizers and revive irrigation projects. Also the Ministry of Agriculture, Food Security and Cooperative (MAFSC) in conjunction with Presidents' Office, Regional Administration and Local Government should give loans to its ALEFOs so that they can buy motorcycles, bicycles for them to reach more farmer and advice them to increase crop/livestock production.
- (ii) This study found that, in respect of their gender, ALEFOs contacted few smallholders perhaps due to low morale and lack of transport. The study recommends that MAFSC should increase salaries, and builds good houses in rural areas to encourage them to stay there. For example, observations revealed that there were poor basic facilities for ALEFOs, which acted as disincentives for them to stay and work in rural areas.
- (iii) This study found that besides the gender of smallholders, MALEFOs equally gave information to both sexes on maize-related technologies/practices based on AKAP. On the other hand, the study found that FALEFOs gave information on maize-related

technologies/practices mostly to female respondents nine (27%), seven (21.9%), eight (20.9%) and eight (21.9%) than to male respondents seven (18.3%), seven (17.5%), six (13.3%) and six (13.3%). This was perhaps due to the fact that female farmers found it easier to interact with FALEFOs who understand their circumstances and problems (Endeley, 1990; Koons, 1998; Saito, 1990; Blumberg, 1989), cited by Lahai *et al.* (2000). The same situation was also observed by FAO (1993), cited by Lahai *et al.* (2000) who found that female ALEFOs could preferably be used since they identify better with the plight of women. Further, it has been found that "the dynamics of communication are most effective when extensions agents are similar to their clients in all respects except on technical competence" (FAO, 1993), cited by Lahai *et al.* (2000). This study recommends that the government should recruit and appoint more FALEFOs since there were more female farmers in rural areas who mostly shoulder the agricultural responsibility of this country. This is due to the fact that studies found that 94 percent of ALEFO worldwide were males, and studies report problems with male ALEFO delivering services only to men, or focusing narrowly on traditional roles when delivering programme to women (FAO, 1993), cited by Lahai *et al.* (2000) ; Due (1996).

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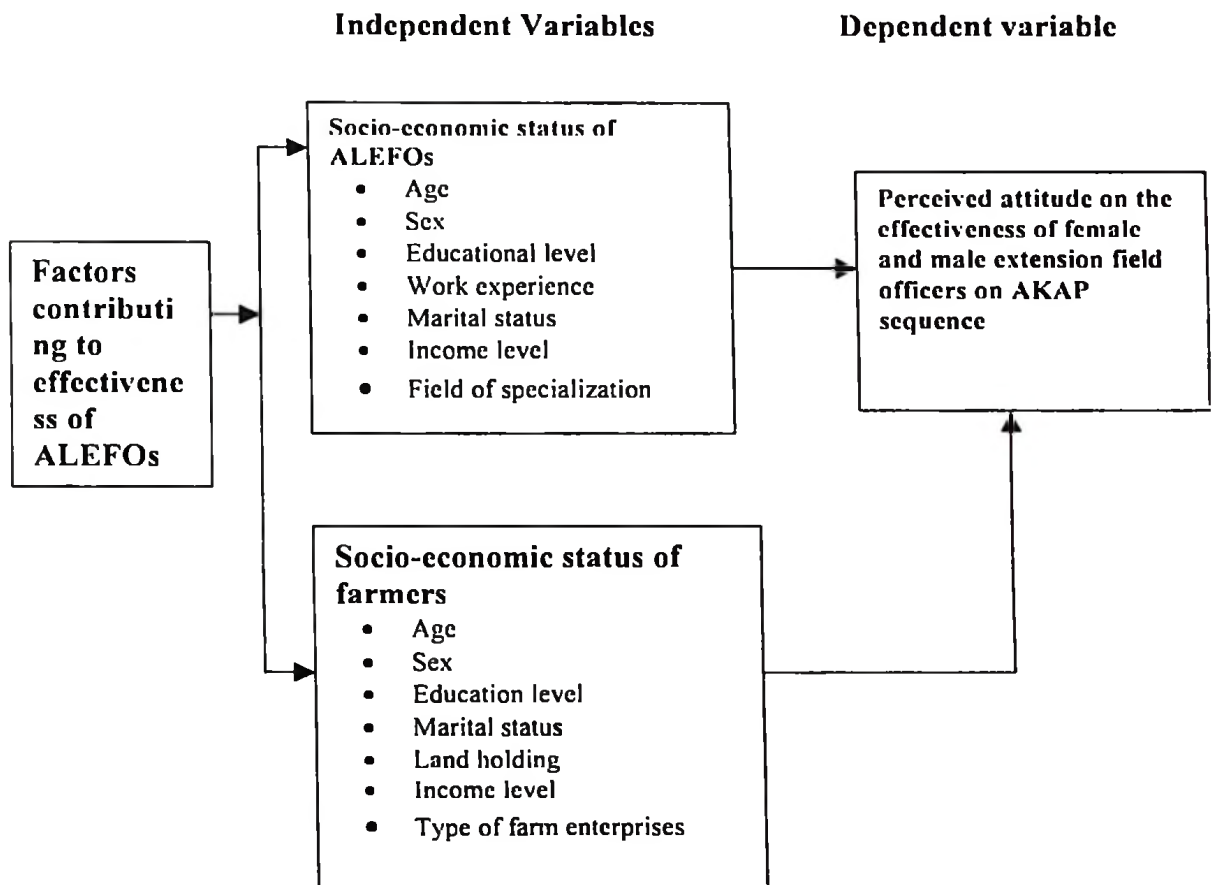
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APPENDICES

Appendix 1 : Conceptual frame work for perception on effectiveness of female and male Agricultural and Livestock Extension Field Officers in Mvomero District.



Appendix 2: Questionnaire for Farmers

TITLE: PERCEPTIONS OF SMALLHOLDERS ON EFFECTIVENESS OF FEMALE AND MALE AGRICULTURE AND LIVESTOCK EXTENSION FIELD OFFICERS BASED ON THE AKAP SEQUENCE: A CASE STUDY OF MVOMERO DISTRICT

All responses given will be treated in a confidential manner

SECTION A: GENERAL INFORMATION

1. Ward.....
2. Name of village.....
3. Date of interview.....
4. Respondent number.....
5. Name of respondent

Please circle the item, phrase or word that is applicable.

6. Sex of respondent. 1. Female 2. Male
7. What is your age? (Years).
1. 18-28 2. 29-39 3. 40-50 4. 51-61 5. Above 61
8. What is your marriage status?
1. Married 2. Single 3. Widowed 4. Divorced
9. What is your household size? (Children).
1. None 2. 1-3 3. 4-6 4. Above 6
10. What is your household size (dependents)?
1. None 2. 1-3 3. 4-6 4. Above 6
11. What is your highest level of education?
1. No formal education 2. Attained Adult education
3. Attained Primary education 4. Completed Form II
5. Completed Form IV 6. Completed Form VI
12. What are your two main sources of income? (1). For most important. (2). For least important.
1. Salaried employment 2. Crops production 3. Livestock production.
4. Mixed farming 5. Others, specify.....
13. If your major source of income in question 12 is crop production, what is the acreage? --- Acres
14. Do you rent land 1. Yes 2. No
15. If answered yes in question number 14 above what is the size of the rented land in acreage for crop production -----? (Out of question 13).
16. What types of major crops do you grow and type of livestock do you keep? (Check all those applicable in order of importance (1= most important 3 = least important).

Types of crops grown	Number of acres	Rank in order of importance	Type of livestock kept	Number of livestock kept	Rack

17. Mention three problems that you encounter in your crop production activities
 1. 2. 3.
18. Do you take any measures to solve crop related production problems?
 1. Yes 2. No
19. If answered No in question 18 above, give two reasons.
 1. 2.
20. Mention three problems that you encounter in your livestock keeping activities?
 1. _____ 2. _____ 3. _____
21. Do you take any measures to solve livestock related problems?
 1. Yes 2. No
22. If answered No in question 21 above, give two reasons.
 1. ----- 2. -----

SECTION B: SPECIFIC INFORMATION ON EXTENSION SERVICES.

23. What type of maize variety does you normally, grow 1. _____ 2. _____ 3. _____
24. What are the main sources of maize seed that you grow?
 1. _____ 2. _____ 3. _____
25. Can you mention seven agronomic practices that you normally do for maize production?
26. Do you use fertilizers in maize production? 1. Yes 2. No
27. If answered yes in question number 26 above, how much did you apply in 2004/2005 season for maize? _____ Kg.
28. Do you use inorganic fertilizer in maize production? 1. Yes 2. No
29. If answered yes in question number 28 above, how much did you apply in 2004/2005 season for maize? _____ Kg.
30. What maize spacing do you normally use? _____
31. What was the average maize production for the previous two seasons?
 1. 2003/2004 _____ bags per acre
 2. 2004/2005 _____ bags per acre
32. How much (%) of this? in question number 31 above was consumed in the household? _____ (%)
33. How much (%) of this? in question number 31 above was sold?
 _____ (%)
34. What type of cattle breeds do you keep? 1. _____ 2. _____ 3. _____
35. What are the main sources of your cattle breeds? 1. _____ 2. _____ 3. _____
36. Can you mention five cattle husbandry practices that you normally do?
 1. _____ 2. _____ 3. _____ 4. _____ 5. _____
37. What is the average milk production for the previous two years?
 2003/2004 _____ liters/cow /day
 2004/2005 _____ liters/cow /day
38. How much (%) of this? in question number 37 above was consumed in the household? _____ (%)
39. How much (%) of this? in question number 37 above was sold?
 _____ (%)
40. From which sources do you get the agriculture and livestock information (circle three most important sources).

1. Extension worker (crops)
 2. Extension worker (livestock)
 3. Radio
 4. Magazine
 5. Books/Booklets
 6. Posters
 7. Letters
 8. Training Institutions
 9. Neighbours/friends/relatives
 10. Research centers
 11. Cinema/Video shows
 12. Agricultural shows
 13. Others specify).....
41. Please read each statement carefully and tick only one ward/phrase on the column provided that best reflects your perception of the way you feel about female and male agriculture and livestock extension officers with regard to their awareness, knowledge. Adoption and productivity (AKAP) sequence.

The rating scale is designed as follows: -

- SA - Strongly Agree
 A - Agree
 N - Neutral
 D - Disagree
 SD - Strongly Disagree

Farmer's attitudes towards female Agriculture and Livestock Extension Field Officer (ALEFO)

S/N	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	Awareness on maize					
1	Female extension officer provided me with information on the use of improved maize variety to plant					
2.	Female extension officer provided me with information on spacing to use for maize					
3.	Female extension officer provide me with information on how to use inorganic fertilizers					
4.	Female extension officer provide me with information on how to use farm yard manure for maize production					
5.	Female extension officer informed me on the importance of doing 3 weeding in maize crop					
6.	Female extension officer explained to me the importance of using pesticides to control storage insect pests in maize					
	Knowledge of farmer on maize					
7.	Female extension officer taught me on how to plant the improved variety of maize					
8.	Female extension officer taught me the proper spacing to use when planting maize					
9.	Female extension officer taught me how to apply inorganic fertilizer in maize					
10.	Female extension officer taught me how to apply farmyard manure in my maize farm					

11.	Female extension officer taught me on importance of doing 3 weeding in maize crop					
12.	Female extension officer taught me how to apply pesticides for controlling storage insect pests in maize					
	Adoption of recommended technologies/practices for maize crop					
13.	I plant the improved maize variety in my farm for three years as advised by the female extension officer					
14.	I use the 75 cm x 60 cm spacing for on pure stand of maize as recommended by the female extension officer					
15.	I use CAN and SA inorganic fertilizers at the recommended rate and time as advised by the female extension officer					
16.	I use farm yard manure in my maize farm as recommended by the female extension officer					
17.	I always do 2-3 weeding in my maize farm as advised by the female extension officer .					
18.	I apply insecticide for stored maize grain as recommended by the female extension officer					
	Maize Productivity					
19.	I have increased my maize production by using the improved maize variety as advised by the female extension officer					
20.	I have increased maize production by using proper spacing as recommended by the female extension officer					
21.	I have increased maize production by using inorganic fertilizer as advised by the female extension officer					
22.	I have increased maize production by using farm yard manure as advised by the female extension officer					
23.	I have increased maize production by doing 2-3 weeding as advised by the female extension officer					
24.	I have increased maize production by applying proper pesticides for controlling storage insect pests as recommended by female extension officer					
	Awareness on cattle keeping					
25.	Female extension officer provided me with information on how to select the best breed of cattle to keep					

26.	Female extension officer provided me with information on the proper ways of feeding of cattle					
27.	Female extension officer provided me with information on the proper ways of housing cattle					
28.	Female extension officer provided me with information on proper ways of milking					
29.	Female extension officer provided me with information on proper ways of vaccinating cattle against Foot and Mouth Disease and Brucellosis					
30.	Female extension officer provided me with information on the proper animal drugs to use to control cattle worms					
31.	Female extension officer provided me with information on dipping cattle to control tick borne diseases					
32.	Female extension officer provided me with information on proper ways of growing forage					
33.	Female extension officer provided me with information on proper ways of feeding calves.					
	Knowledge on cattle keeping					
34.	Female extension officer taught me on how to select the best breeds of cattle to keep					
35.	Female extension officer taught me on the proper way of feeding cattle.					
36.	Female extension officer taught me on the proper way of housing cattle					
37.	Female extension officer taught me the proper ways of milking					
38.	Female extension officer taught me on the proper ways of carrying out vaccination against Foot and Mouth Disease and Brucellosis					
39.	Female extension officer taught me the proper animal drugs to use to control cattle worms					
40.	Female extension officer taught me on the proper ways of dipping cattle to control tick borne diseases					
41.	Female extension officer taught me on the proper ways of growing forage					
42.	Female extension officer taught me the proper ways of feeding calves					
Adoption of recommended technologies/practices for cattle keeping						
43.	I keep the best cattle breed as recommended by the female extension officer					

44.	I do proper cattle feeding as recommended by the female extension officer					
45.	I do proper cattle housing as recommended by the female extension officer					
46.	I do milking in a proper way as recommended by the female extension officer					
47.	I vaccinate against Foot and Mouth Disease and Brucellosis as recommended by the female extension officer					
48.	I use proper drugs to control cattle worms as recommended by the female extension officer					
49.	I do proper ways of dipping cattle to control tick borne diseases as recommended by the female extension officer					
50.	I grow forage in the proper ways as recommended by the female extension officer					
51.	I feed calves in the proper ways as recommended by the female extension officer					
	Cattle productivity					
52.	I have increased the milk produced/cow by using the best breed as recommended by the female extension officer					
53.	I have increased the milk produced/cow by using proper ways of feeding as recommended by the female extension officer					
54.	I have increased the milk produced/cow by constructing a proper cattle shed as advised by the female extension officer					
55.	I have increased the milk produced/cow by carrying out proper vaccination against Foot and Mouth Disease and Brucellosis as recommended by the female extension officer					
56.	I have increased the milk produced/cow by using proper animal drugs to control cattle worms as advised by the female extension officer					
57.	I have increased the milk produced/cow by doing proper dipping to control tick borne diseases as recommended by female extension officer					

58.	I have increased the milk produced/cow by growing forage as recommended by the female extension officer					
59.	I have reduced calf mortality by using the proper ways of feeding calves as recommended by the female extension officer					
60.	I have increased the amount of milk/cow by doing proper milking as recommended by the female extension officer					

Farmer's attitudes towards Male Extension Officer

S/N	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	Awareness on maize					
1	Male extension officer provided me with information on the use of improved maize variety to plant.					
2.	Male extension officer provided me with information on spacing to use for maize.					
3.	Male extension officer provide me with information on how to use inorganic fertilizers					
4.	Male extension officer provide me with information on how to use farm yard manure for maize production					
5.	Male extension officer informed me on the importance of doing 3 weeding in maize crop					
6.	Male extension officer explained to me the importance of using pesticides to control storage insect pests in maize					
	Knowledge of farmer on maize					
7.	Male extension officer taught me on how to plant the improved variety of maize					
8.	Male extension officer taught me the proper spacing to use when planting maize					
9.	Male extension officer taught me how to apply inorganic fertilizer in maize					
10.	Male extension officer taught me how to apply farmyard manure in my maize farm					
11.	Male extension officer taught me on importance of doing 3 weeding in maize crop					
12.	Male extension officer taught me how to apply pesticides for controlling storage insect pests in maize					
	Adoption of recommended technologies/practices for maize crop					
13.	I plant the improved maize variety in my farm for three years as advised by the male extension officer					

14.	I use the 75 cm x 60 cm spacing for on pure stand of maize as recommended by the male extension officer					
15.	I use CAN and SA inorganic fertilizers at the recommended rate and time as advised by the male extension officer					
16.	I use farm yard manure in my maize farm as recommended by the male extension officer					
17.	I always do 2-3 weedings in my maize farm as advised by the male extension officer					
18.	I apply insecticide for stored maize grain as recommended by the male extension officer					
Maize Productivity						
19.	I have increased my maize production by using the improved maize variety as advised by the male extension officer					
20.	I have increased maize production by using proper spacing as recommended by the male extension officer					
21.	I have increased maize production by using inorganic fertilizer as advised by the male extension officer					
22.	I have increased maize production by using farm yard manure as advised by the male extension officer					
23.	I have increased maize production by doing 2-3 weedings as advised by the male extension officer					
24.	I have increased maize production by applying proper pesticides for controlling storage insect pests as recommended by male extension officer					
Awareness on cattle keeping						
25.	Male extension officer provided me with information on how to select the best breed of cattle to keep					
26.	Male extension officer provided me with information on the proper ways of feeding of cattle					
27.	Male extension officer provided me with information on the proper ways of housing cattle					
28.	Male extension officer provided me with information on proper ways of milking					
29.	Male extension officer provided me with information on proper ways of vaccinating cattle against Foot and Mouth Disease and Brucellosis					

30.	Male extension officer provided me with information on the proper animal drugs to use to control cattle worms					
31.	Male extension officer provided me with information on dipping cattle to control tick borne diseases					
32.	Male extension officer provided me with information on proper ways of growing forage					
33.	Male extension officer provided me with information on proper ways of feeding calves					
	Knowledge on cattle keeping					
34.	Male extension officer taught me on how to select the best breeds of cattle to keep					
35.	Male extension officer taught me on the proper way of feeding cattle					
36.	Male extension officer taught me on the proper way of housing cattle					
37.	Male extension officer taught me the proper ways of milking					
38.	Male extension officer taught me on the proper ways of carrying out vaccination against Foot and Mouth Disease and Brucellosis					
39.	Male extension officer taught me the proper animal drugs to use to control cattle worms					
40.	Male extension officer taught me on the proper ways of dipping cattle to control tick borne diseases					
41.	Male extension officer taught me on the proper ways of growing forage					
42.	Male extension officer taught me the proper ways of feeding calves					
	Adoption of recommended technologic/practices for cattle keeping					
43.	I keep the best cattle breed as recommended by the male extension officer					
44.	I do proper cattle feeding as recommended by the male extension officer					
45.	I do proper cattle housing as recommended by the male extension officer					
46.	I do milking in a proper way as recommended by the male extension officer					
47.	I vaccinate against Foot and Mouth Disease and Brucellosis as recommended by the male extension officer					

48.	I use proper drugs to control cattle worms as recommended by the male extension officer					
49.	I do proper ways of dipping cattle to control tick borne diseases as recommended by the male extension officer					
50.	I grow forage in the proper ways as recommended by the male extension officer					
51.	I feed calves in the proper ways as recommended by the male extension officer					
	Cattle productivity					
52.	I have increased the milk produced/cow by using the best breed as recommended by the male extension officer					
53.	I have increased the milk produced/cow by using proper ways of feeding as recommended by the male extension officer					
54.	I have increased the milk produced/cow by constructing a proper cattle shed as advised by the male extension officer					
55.	I have increased the amount of milk/cow by doing proper milking as recommended by the male extension officer					
56.	I have increased the milk produced/cow by carrying out proper vaccination against Foot and Mouth Disease and Brucellosis as recommended by the male extension officer					
57.	I have increased the milk produced/cow by using proper animal drugs to control cattle worms as advised by the male extension officer					
58.	I have increased the milk produced/cow by doing proper dipping to control tick borne diseases as recommended by male extension officer					
59.	I have increased the milk produced/cow by growing forage as recommended by the male extension officer					SPE SS44
60.	I have reduced calf mortality by using the proper ways of feeding calves as recommended by the male extension officer					15.7.34 PZ

THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION