

**INFLUENCE OF SMALLHOLDER DAIRY FARMERS' PARTICIPATION IN
MICROFINANCE ON DAIRY FARMING IN LONGISA SUB-COUNTY,
BOMET COUNTY, KENYA**

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**A Thesis Submitted to the Graduate School in Partial Fulfillment for the Requirements
of the Award of Degree of Master of Science in Community Studies and Extension of
Egerton University**

EGERTON UNIVERSITY

OCTOBER, 2016

DECLARATION AND RECOMMENDATION

Declaration

This thesis is my original work and has not been presented in any University or other institution of learning for any awards.

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DEDICATION

This work is dedicated to all my family members for their prayers, constant encouragement and understanding. They endured hard times while they stood by me as I laboured on this work.

ACKNOWLEDGEMENTS

First, my gratitude goes to Almighty God who has given me the strength and good health during the entire period to complete this work. I also owe my gratitude to Egerton University for granting me an opportunity to undertake my studies at the institution. I express my gratitude to my supervisors, Prof. Rose A. Mwonya and Dr. Lydia N. Kinuthia for their technical advice, professional supervision, inspiration and guidance in the course of the research work.

I also acknowledge the Chairperson, Department of Applied Community Development Studies for generous support in this work. I further acknowledge the smallholder dairy farmers in Longisa sub-county who were sampled to participate in this study for their genuineness as they responded to the research instruments.

Lastly, I would like to appreciate the support and encouragement from members of my family whose direct or indirect contribution enabled me to accomplish this task. May God bless them abundantly.

ABSTRACT

The livestock sector is an important component of the Kenyan economy and contributes about 40% of the agricultural Gross Domestic Product (GDP) which is about 10% of the national GDP. Dairy farming sub-sector plays a very significant role in the development of the Kenyan economy due to its impact on the GDP, alleviation of poverty, food security, employment creation and provision of raw materials to milk processors. Over 70% of the dairy farmers in Kenya are smallholders. Lack of credit services has been known to constrain agricultural development among the smallholder farmers in developing countries. Microfinance aims at providing the needed credit services to smallholder farmers. Smallholder farmers in Longisa sub-county, Bomet County have accessed microfinance services since the 1990s. However, the dairy production has been far below the expected potential in the area. The study used a cross sectional survey research design because it allows researchers to collect data from a large sample and to use it in intensive analysis. The smallholder dairy cattle farmers constituted the respondents of the study. A proportionate stratified random sampling method was used to ensure each location was represented. Simple random sampling was used to select 152 respondents for study. The questionnaire used to collect data was developed by the researcher and validated by experts in applied community development. The research instruments were pilot tested to determine the reliability of the instrument in Bomet Central sub-county which neighbours Longisa sub-county. Stratified random sampling was used to select the pretest sample size of 30 smallholder dairy farmers. Using Cronbach's alpha, an index of 0.92 for the questionnaire was established. This implied that the reliability of the instrument was good. Descriptive statistics as well as inferential statistics technique were used to analyse data with the help of Statistical Packages for Social Sciences (SPSS version 20). Simple linear regression was used to determine the influence of the amount of credit accessed on the amount of milk produced. Ordered logistic regression was used to determine the influence of the amount of credit accessed on the breeds kept and animal husbandry while simple linear regression and ordered logistic were used to determine the influence of the amount of credit accessed on the training received by smallholder dairy farmers. To make reliable inferences from the data, all statistical tests were verified at $\alpha = 0.05$ level of significance. The study revealed that the amount of microfinance credit accessed by smallholder in dairy farming have a significant and positive influence on the amount of milk produced per cow per lactation, the breeds of cattle kept as well as animal husbandry practices in the study area. This study recommends that smallholder dairy farmers should embrace microfinance credit in financing their dairy farming for them to realize higher milk yields. Farmers should also take advantage of the available and upcoming microfinance institutions in their effort to obtain the necessary finances for breed improvement and animal husbandry practices.

TABLE OF CONTENTS

DECLARATION AND RECOMMENDATION	ii
COPYRIGHT	iii
DEDICATION.....	iv
ACKNOWLEDGEMENTS	v
ABSTRACT.....	vi
TABLE OF CONTENTS	vii
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF ABBREVIATIONS AND ACRONYMS	xii
CHAPTER ONE	1
INTRODUCTION.....	1
1.1 Background Information	1
1.2 Statement of the Problem	4
1.3 Purpose of the Study.....	4
1.4 Objectives of the Study	4
1.5 Hypotheses of the Study	5
1.6 Significance of the Study	5
1.7 Scope of the Study.....	5
1.8 Assumptions of the Study.....	6
1.9 Limitations.....	6
1.10 Operational Definitions of Terms.....	7
CHAPTER TWO	10
LITERATURE REVIEW	10
2.1 Introduction	10
2.2 Status of Dairy Farming in Kenya.....	10
2.3 Significance of Dairy Farming in Improving Livelihoods	12
2.4 Animal Husbandry Practices in Kenya	13
2.5 Role of Microfinance Institutions in Poverty Alleviation	14
2.6 Operations of Micro Finance Institutions (MFIs)	15
2.7 Training on Dairy Farming.....	17
2.8 Summary of Reviewed Literature	17

2.9 Theoretical Framework	18
2.10 Conceptual Framework	19
CHAPTER THREE	21
RESEARCH METHODOLOGY	21
3.1 Introduction	21
3.2 Research Design	21
3.3 Study Area	21
3.4 Study Population	22
3.5 Sampling Procedure and Sample Size	23
3.6 Instrumentation	24
3.7 Data Collection Procedure	25
3.8 Data Analysis	26
CHAPTER FOUR.....	28
RESULTS AND DISCUSSION	28
4.1 Introduction	28
4.2 Characteristics of the Respondents.....	28
4.3 Credit Borrowing by Smallholder Dairy Farmers	37
4.4 Influence of the Amount of Credit Accessed on the Amount of Milk Produced per Cow per Lactation by Smallholder Dairy Farmers	43
4.5 Influence of the Amount of Credit Accessed on the Breeds of Cattle Kept by the Smallholder Dairy Farmers	45
4.6 Influence of the Amount of Credit Accessed on Animal Husbandry Practices in Dairy Farming among Smallholder Dairy Farmers	48
4.7 Influence of the Training Received on Dairy Farming by Smallholder Dairy Farmers	52
CHAPTER FIVE	63
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS	63
5.1 Introduction	63
5.2 Summary of Findings	63
5.3 Conclusions	64
5.4 Recommendations	65
5.5 Suggestions for Further Research.....	65

REFERENCES.....	67
APPENDIX A: QUESTIONNAIRE FOR SMALLHOLDER DAIRY FARMERS.....	73
APPENDIX B: MAP OF LONGISA SUB-COUNTY, BOMET COUNTY	81
APPENDIX C: RESEARCH AUTHORIZATION.....	82
APPENDIX D: RESEARCH PERMIT	83

LIST OF TABLES

Table 1 Accessible Population in Longisa Sub-County per Location	22
Table 2 Sample Size per Location in Longisa Sub-County	24
Table 3 Summary Table for Hypothesis Testing	27
Table 4 Respondents' Age Brackets	30
Table 5 Acreage of Land Occupied by the Different Crops Grown	32
Table 6 Acreage of Land Under Livestock Production	32
Table 7 Non- Farm Activities	33
Table 8 Reason for not Being Satisfied with the Extension Services Provided	35
Table 9 Farm Machinery and Implements Owned	35
Table 10 Adequacy of all Farm Machinery and Implements in Farming.....	36
Table 11 Amount of Credit Accessed.....	42
Table 12 Amount of Milk (Litres) Produced per Cow	43
Table 13 Influence of the Amount of Credit Accessed on the Amount of Milk Produced per Cow per Lactation.....	44
Table 14 Ordered Logistic Regression Results for the Influence of the Amount of Credit Accessed on dairy Breeds of Cattle Kept	46
Table 15 Mode of Feeding Practiced by Farmers in the Study Area.....	48
Table 16 Feed Supplements Used by the Farmers.....	49
Table 17 Type of Housing Structure.....	50
Table 18 Ordered Logistic Regression for the Influence of the Amount of Credit Accessed on Animal Husbandry Practices	51
Table 19 Reason for not Being Satisfied with the Extension Services Provided	56
Table 20 Linear Regression Results on the Influence of the Training Received by Smallholder Farmers on the Amount of Milk Produced	57
Table 21 Ordered Logistic Regression Results on the Influence of the Training Received by Smallholder Farmers on the Breeds Kept	59
Table 22 Ordered Logistic Regression Results on the Influence of the Training Received by Smallholder Farmers on Animal Husbandry	60

LIST OF FIGURES

Figure 1. Influence of Smallholder Dairy Farmers' Participation in Microfinance on Dairy Farming	20
Figure 2. Gender of the Respondents.....	28
Figure 3. Marital Status of the Farmers	29
Figure 4. Respondents' Highest Level of Education	30
Figure 5. Major Crops Grown in the Study Area.....	31
Figure 6. Whether the Respondent Receive Extension (Training and Advisory) Services on Dairying.....	33
Figure 7. Source of Extension Information.....	34
Figure 8. The Satisfaction Levels of the Respondent with the Extension Services Provided .	34
Figure 9. Awareness of MFIs Institutions Operating in the Study Area	37
Figure 10. MFI's Operating in the Area	38
Figure 11. Households' Borrowing of Loan from Microfinance Institution for Use in Dairy Farming	38
Figure 12. Other Purposes of the Loan Taken	39
Figure 13. Formal Banks Where Loan was Obtained.....	40
Figure 14. Access of Loan from SACCOs.....	41
Figure 15. SACCOs Providing Loan to Households in the Study Area	41
Figure 16. Non-Bank and Non-SACCO Microfinance Organizations	42
Figure 17. Dairy Cattle Breeds Kept.....	46
Figure 18. Feed Supplementation	49
Figure 19. Proportion of Households who had Received Trainings	52
Figure 20. Most Significant Knowledge and Skills Gained by the Dairy Farmers from MFI's Trainings.	53
Figure 21. Training Duration	54
Figure 22. Whether the Respondent Receive Extension (Training and Advisory) Services on Dairying	54
Figure 23. Source of Extension Information.....	55
Figure 24. The Satisfaction Levels of the Respondent with the Extension Services Provided	55

LIST OF ABBREVIATIONS AND ACRONYMS

ACZ	Agro-Climatic Zone
AI	Artificial Insemination
BEEP	Bright Enriched Empowerment Programme
CAIS	Central Artificial Insemination Station
CBOs	Community Based Organizations
EPZA	Export Processing Zones Authority
FBP	Farm Business Plan
FAO	Food and Agricultural Organization of the United Nations
GDP	Gross Domestic Product
GPS	Global Positioning System
IDF	International Dairy Federation
IFAD	International Fund for Agricultural Development
KAGRC	Kenya Animal Genetic Resources Centre
KAPP	Kenya Agricultural Productivity Programme
KCB	Kenya Commercial Bank
KCC	Kenya Co-operative Creameries
KDB	Kenya Dairy Board
KFA	Kenya Farmers Association
KNBS	Kenya National Bureau of Statistics
KWFT	Kenya Women Finance Trust
MFIs	Micro Finance Institutions
MoA	Ministry of Agriculture
MoALF	Ministry of Agriculture, Livestock and Fisheries
MoLD	Ministry of Livestock Development
NACOSTI	National Commission for Science Technology and Innovations
NBFIs	Non-Bank Financial Institutions
RoSCAs	Rotating Savings and Credit Associations
SACCOs	Savings and Credit Cooperatives
SPSS	Statistical Package for Social Sciences
SSA	Sot Savings Association
UNDP	United Nations Development Programme
UPAL	Urban and Peri Urban Livestock

CHAPTER ONE

INTRODUCTION

1.1 Background Information

A smallholder dairy farmer is one with an average farm size less than two hectares of land and whose primary source of income is dairy farming and depends primarily on household members for labour. Smallholder dairy farmers operate less than two hectares of land under dairy and have low resource base (World Bank, 2003). According to Narayan and Gulati (2002) smallholder dairy farmer as those practicing a mix of commercial and subsistence farming or either, where the family provides the majority of labour and the farm provides the principal source of income.

Agriculture is the main driver of the Kenyan economy contributing about twenty five percent (25%) of the Gross Domestic Product (GDP). The sector provides over eighty percent (80%) of employment and sixty percent (60%) of the national income (Ministry of Agriculture, 2010). Eighty percent (80%) of the Kenyan population live in the rural areas and derives their livelihoods from the sector. One of the major subsectors of agriculture is livestock that contributes forty percent (40%) of the agricultural Gross Domestic Product (GDP) which is equivalent to ten percent (10%) of the national GDP.

Livestock sector mainly constitute dairy, poultry, apiculture and aquaculture farming. Dairy farming in Kenya plays a key role in food security, creation of employment, generation of incomes and enhancement of livelihoods of farmers, traders, processors and other individuals engaged in the entire dairy value chain (Muia, Kariuki, Mbugua, Gachui, Lukibisi, Ayako & Ngunjiri, 2012). The dairy farming is the largest contributor of the livestock GDP (Muriuki, 2011). The Kenya National Bureau of Statistics, KNBS (2010) estimates that 3.4 million heads of dairy cattle produce approximately 3.1 billion litres of milk per year. Smallholder farmers dominate the dairy farming industry in Kenya where they own about eighty percent (80%) of the total dairy herd (Government of Kenya, 2012). There are about 1.5 million milk-producing households who account for about eighty five percent (85%) of the annual total milk production (Muriuki, 2011). The factors that have promoted a major shift in dairy technology leading to shifts towards a more market oriented smallholder dairy production include suitable climate, improved fodder technology, improved dairy cattle populations, rising urban populations and incomes as well as high consumption of milk and other dairy products (Muia *et al.*, 2012).

Kenya is said to be self-sufficient in dairy production (Muriuki, 2011). However, Rosegrant, Cline, Susler, and Valmonte-Santos, (2005) projected that by 2025, the demand for milk and other dairy products will increase by twenty five percent (25%) in developing countries. This is attributed to high human population growth, increased urbanization, high disposable incomes and increasing opportunities for the domestic and export markets. Kenya has the potential to meet her own domestic demand by increasing the production (Cherono, 2005). There is need to exploit this opportunity through improvement in specialized dairy cattle population, intensifying use of inputs, value addition to milk and other dairy products as well as improving linkages for sale of milk and acquisition of inputs (Muia, et al., 2012).

After the liberalization of dairy industry in the 1990s (Technoserve, 2008), the dairy sector in Kenya suffered a major blow in which farmers were forced to pay for services that were initially not charged and also the control of milk prices was left to a free economy (Muriuki, 2011). In addition to this, budgetary constraints as well as the socio-economic crisis of the late 1970s and early 1980s forced the Kenyan government to decontrol the milk prices thus liberalizing the industry (Ngigi, 2002). The reforms in the dairy sector included sale of veterinary drugs to enhance cost recovery, liberalization of feed markets and control of prices thereof, transfer of the management of cattle dips to the local communities, privatization of Artificial Insemination (AI) and clinical services (Omiti, 2002). Thus, farmers had to look for alternative sources of funding from both mainstream banks and Microfinance Institutions (MFIs) so as to finance these services.

Microfinance institutions have made considerable progress in providing the much needed credit and savings facilities for the smallholder farmers thereby growing in terms of number of organizations, clients and donor funding (Duvendack, Palmer-Jones, Copestake, Hooper, Loke & Rao, 2011). The smallholder farmers have thus, been able to build strong microenterprises, increase their incomes and subsequently participate more in economic growth and development (North, 2012). Additionally, the MFIs have tried to develop products that are responsive to cash flow cycles and marketing relationships of farming communities (Duvendack, et al., 2011). MFIs have made considerable efforts in ensuring that the number of people living below poverty line has reduced globally (North, 2012).

In Kenya, microfinance covers a wide array of institutions which include the indigenous rotating savings and credit associations (RoSCAs), self-help groups, financial savings and

credit cooperatives (SACCOs). MFIs also include non-bank financial institutions (NBFIs) such as credit NGOs (Seibel, 2007). In some occasions, they may also include moneylenders (shylocks) as well as private deposit collectors. These institutions have been seen as an avenue to break the cycle of poverty which affects about half of the Kenyan population (Karugu & Kanyagia, 2007). The institutions offer financial services, education and trainings to the farmers in a bid to improve their capacity.

Dairy farming is among the key drivers of the economy of Longisa sub-county, Bomet County. The area has a favourable climate for dairy farming indicated by medium altitude and high rainfall evenly distributed throughout the year. Dairy cattle, mainly improved local breeds are the main species of livestock kept for milk and other dairy products (Ministry of Kenya, 2005). Several MFIs have been in operation in Bomet County since 1990s which offer credit services to farmers. For instance K-Rep began operating in the county in 1999 with initial two branches in Ndanai, and Makimeny ward but has thus far expanded to the entire county.

Agricultural Finance Corporation (AFC), Faulu Kenya, Equity Bank, Kenya Women Finance Trust (KWFT), Trans National Bank and Kenya Commercial Bank (KCB) are among the established financial institutions which have operated in the county for over five (5) years. Some of the financial programmes available in the study area include Kenya Agricultural Productivity Programme (KAPP), Njaa Marufuku Kenya, Youth Enterprise Fund, Uwezo Fund and Women Enterprise Fund.

Additionally, cooperatives such as Kenya Cooperative Creameries (KCC), Kenya Farmers Association (KFA) and Savings and Credit Cooperatives (SACCOs) as well as agribusiness processors also offer microfinance credit services to farmers in the county (Government of Kenya, 2010). For example Sot Savings Association (SSA) has been in operation since 2012 and offers inputs as well as credit to its registered members within Bomet County.

The credit accessed is utilized in dairy farming through financing AI services for breed improvement, purchasing of feeds, expanding the land area under dairy farming and in value addition. However, there is limited information on the extent to which the microcredit accessed from the MFIs in the County has influenced the dairy farming. This is because the industry is still predominated by low milk production and limited diversification in terms of breeds of cattle reared. Additionally, there is very minimal value addition on milk with majority of it

(58%) being sold directly to consumers at the household level in raw form (Government of Kenya, 2010).

1.2 Statement of the Problem

Smallholder dairy farmers find it hard to access credit from the formal financial service providers. Dairy farming is practiced in the rural areas where it is mainly used as a poverty reduction strategy. The study area is characterized with continued decline in annual milk production. The area produces an average of 1200 litres against a potential of 4000-6000 litres per cow per lactation as realized in other countries like United States. In addition, there is continued keeping of local breeds and low use of AI services for breed improvement in the study area. Although farmers' participation in microfinance can help in improving milk production per cow per lactation as well as dairy breeds and adoption of better animal husbandry practices, this potential has not been adequately harnessed in the study area despite the existence of these institutions for now over 20 years. Microfinance is seen as one avenue of promoting dairy farming through provision of credit, education and trainings hence helping in alleviating poverty. Microfinance can be an important toolkit in providing social change and improving the livelihoods of smallholder dairy farmers through improved farming. It is therefore necessary to urgently find out the influence of smallholder dairy farmers' participation in microfinance on dairy farming in Longisa sub-county, Bomet County.

1.3 Purpose of the Study

The purpose of this study was to investigate the influence of smallholder dairy farmers' participation in microfinance on dairy farming in Longisa sub-county, Bomet County, Kenya.

1.4 Objectives of the Study

There were five objectives in this study:

- i) To identify the number of smallholder dairy farmers who borrow from microfinance institutions in Longisa sub-county, Bomet County.
- ii) To determine the influence of the amount of credit accessed on the amount of milk produced per cow per lactation by smallholder dairy farmers in Longisa sub-county, Bomet County.
- iii) To establish the influence of the amount of credit accessed on the breeds of cattle kept by smallholder dairy farmers in Longisa sub-county, Bomet County.

- iv) To determine the influence of the amount of credit accessed on animal husbandry practices in dairy farming among smallholder dairy farmers in Longisa sub-county, Bomet County.
- v) To determine the influence of the training received on dairy farming practices by smallholder dairy farmers in Longisa sub-county, Bomet County.

1.5 Hypotheses of the Study

The study hypotheses were as follows:

- Ho₁ The amount of credit accessed has no influence on the amount of milk produced per cow per lactation by smallholder dairy farmers in Longisa sub-county, Bomet County.
- Ho₂ The amount of credit accessed has no influence on the breeds of cattle kept by the smallholder dairy farmers in Longisa sub-county, Bomet County
- Ho₃ The amount of credit accessed has no influence on animal husbandry practices in dairy farming among smallholder dairy farmers in Longisa sub-county, Bomet County.
- Ho₄ The training received by smallholder farmers has no influence on dairy farming practices in Longisa sub-county, Bomet County.

1.6 Significance of the Study

The results generated from this study may be useful in understanding how smallholder dairy farmers' participation in microfinance influence the dairy farming in the study area and how this study can be replicated in other parts of their operations. It may also be helpful to policy makers in government and NGOs as they may understand whether the credit accessed has been used to improve or retrogress the dairy farming in Longisa sub-county, Bomet County and the country at large. This study may add to the existing body of knowledge on microfinance and dairy farming. The findings of the research will be published in agricultural research journals thus contributing to knowledge and reference materials in libraries across the world. Finally, the findings may be useful to other researchers through the recommendations for further research made based on the findings.

1.7 Scope of the Study

The study focused on the influence of smallholder dairy farmers' participation in microfinance on dairy farming. It also identified dairy farmers who borrow credit, looked at the amount of credit accessed and training received by smallholder farmers on dairy farming only. Aspects of dairy farming studied were amount of milk produced per cow, breeds of dairy cattle, feeds,

housing structures and veterinary services. The study focused on dairy cattle only. The study was restricted to Longisa sub-county where Cheboin, Kapkimolwa, Kimuchul, Kiplabotwa, Kiprerer, Tegat, Kembu and Chemaner locations were studied. Only smallholder dairy farmers were included in the study.

1.8 Assumptions of the Study

The following assumptions were made:

- i) The dairy cattle were in healthy condition and that the milk production was not affected by outbreak of diseases.
- ii) The smallholder dairy farmers in Longisa keep indigenous, exotic and cross breeds (herds).

1.9 Limitations

The study was limited by the poor record keeping due to high levels of illiteracy among the smallholder dairy farmers in the study area. However, the researcher employed probing technique to ensure accuracy of the production information given. This made the process of data collection hard.

1.10 Operational Definitions of Terms

The key words and variables that were used in the study were defined as follows:

Access to Credit: A smallholder farmer can be said to have access to credit if one or more members of the household can get that credit (International Fund for Agricultural Development, IFAD, 2006). In this study, access to credit was viewed as the ability of at least one household member to get credit from MFIs for dairy farming.

Access: According to the oxford dictionary (2012), to access is to have the right or opportunity to have or use something that will bring you benefits. This definition was used in the study.

Animal Husbandry Practices: Husbandry entails the practices that are put forth in caring for something (Oxford dictionary 2012). In this study, animal husbandry was viewed as the practices that farmers put in place in their daily routines of caring for animals in dairy farming. The practices included sourcing for animal feeds, feeding, animal health, veterinary services and housing.

Borrow: This refers to the act of receiving credit from financial institutions. The term was used to mean smallholder dairy farmers who had accessed credit from microfinance institutions for a period of four years between 2011 and 2014.

Breeds: Oxford Dictionary (2016) defines a breed as a produce (an animal or plant) by mating or hybridizing two different species, breeds, or varieties. This study considered breed as a dairy cattle with distinctive appearance and having been developed by deliberate selection.

Credit Accessed: Refers to the amount of loan in Kenya Shillings (Kshs) that a smallholder dairy farmer gets from financial institutions. The variable was measured by the amount of loan an individual got from microfinance institutions for a period of four years between 2011 and 2014.

Dairy Animals are those reared for milk production. This study considered dairy animals as breeds of cattle kept for production of milk either for domestic consumption or for sale.

Dairy Production: Dairy production is a branch of agriculture that entails all activities relating to long-term production of milk through dairy animals such as cattle, goat and camel. In this study, dairy production implies the production of raw milk from dairy cattle.

Dairy farming: This is the rearing of dairy cattle breeds for the purpose of milk production. This study dealt with both indigenous and exotic breeds.

Influence: Oxford Dictionary (2016) defines the term influence as “The capacity to have an effect on the character, development, or behaviour of someone or something, or the

effect itself'. In this study, influence was viewed as effects (positive or negative) of MFIs on dairy farming.

Lactation – this is the period of time that a dairy cattle secretes its milk from the mammary glands. This study considered lactation as a 305 days period after calving down.

Microfinance Institution: Seibel (2007) defines MFI as a system of financial intermediation between micro savers and micro borrowers. It also include micro insurance and other financial services such as money transfers. This study considered microfinance institutions as organizations that offer credit to smallholder farmers for use in dairy farming.

Microfinancing: Seibel (2007) defines micro financing as services offered by MFIs. In this study, micro financing and/or microcredit was viewed as the amount in Kenya shilling that the smallholder farmers accessed per year from various lending institutions, credit NGOs, government institutions, private lenders and borrowers as well as community based saving institutions. Credit accessed from agribusiness actors, traders and processors were also included in the definition.

Participation: This is the involvement of dairy cattle farmers in accessing credit from micro finance institutions as well as receiving training services on how to properly utilize the accessed funds in dairy farming. Participation was measured with respect to smallholder farmers' involvement in accessing credit for use in dairy farming and receiving of training on dairy farming with respect to breeds, feeds, mode of feeding, veterinary services and housing of dairy cattle. The participation by smallholder dairy farmers in microfinance was assessed for a period between the year 2011 and 2014. A duration of four years was expected to solve respondents recalling problems while still remaining adequate in determining the influence of farmers' participation in microfinance in dairy farming.

Smallholder Dairy Farmers: World Bank (2003), defined smallholder farmers as those farmers that operate less than two hectares of land under dairy and have low resource base. In addition, Narayan and Gulati (2002), defined smallholder dairy farmer as “a farmer, practicing a mix of commercial and subsistence farming or either, where the family provides the majority of labour and the farm provides the principal source of income.” In this study, a smallholder dairy farmer was defined as one with an average farm size less than two hectares of land and whose primary source of income is dairy farming and depends primarily on household members for labour.

Training: The United Nations Development Programme (UNDP) defines training as the development of conditions that allow individual participants to acquire and enhance knowledge and skills (UNDP, 2011). In this study it was measured with respect to content covered (feeds, animal health, housing, Farm Business Plan (FBP), insurance, record keeping, veterinary services, financing dairy farming/product loan, financial management, how to improve milk yields, selection of good dairy breeds), skills gained and training duration.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section details the past documented literature on dairy industry development in various parts of the world. The section gives an overview of the Kenyan dairy farming: the major players and breeds of dairy cattle, the role of various financial institutions in dairy industry development, the significance of credit services on dairy farming, the role played by microfinance in the industry as well as the role of training received by smallholder dairy farmers. A theoretical paradigm that guided this study is provided at the end of the section together with a conceptual framework.

2.2 Status of Dairy Farming in Kenya

The dairy farming was in existence in Kenya before the colonial period. Kenyan communities kept indigenous dairy cattle either for prestige, subsistence or insurance during the times of drought and other natural calamities. The main breeds of cattle kept include East African zebu and Boran cattle, among others. Cross-bred dairy cattle production in Kenya started after 1954 when a colonial policy paper (the 1954 Swynnerton Plan), allowed them to engage in commercial agriculture. After independence in 1963, many foreigner settlers who opted to leave the country sold land and dairy cattle to Kenyan smallholders resulting in an increase in the dairy cattle population owned by Kenyans (Muriuki, 2011).

Otieno et al., (2009) noted that non-indigenous dairy cattle contribute about sixty percent (60%) of the national milk production while the indigenous breeds contribute about forty percent (40%). These animals are concentrated in the Rift Valley and the Central provinces of Kenya which account for over eighty percent (80%) of all dairy cattle found in Kenya. The Zebu cattle account for seventy percent (70%) of all cattle in Kenya and are distributed across all agro-ecological zones of the country.

2.2.1 Trend in Dairy Farming in Kenya

Kenya has a well-developed and the largest dairy herd in sub-Saharan Africa (Otieno *et al.*, 2009). This implies that if the industry is well developed further, Kenya can earn more from foreign exchange earnings and improve her economy and balance of trade. Dairy farming can act as an avenue through which food security can be addressed. It has been shown that Kenya exports of milk and other dairy products increased from 117.5 million in 1998 to Ksh 140.6

million in 2002. However, the value of imports of these products decreased from Ksh 353 million in 1998 to 135 million in 2002. This shows that the balance of trade has continuously increased which implies that the dairy industry has developed substantially over the years (Muriuki, 2011). This coupled with continued increase in the dairy stock has ensured that there is more milk in Kenya.

The number of dairy cattle increased from 600000 heads at independence to 3.3 million in 2005 (Export Processing Zones Authority [EPZA], 2005). About eighty percent (80%) of the existing dairy cattle are kept by the smallholder farmers. These dairy populations comprise of the Guernsey, Jersey, Friesian, Ayrshire and *Bosindicus* (local zebu, Boran and Sahiwal) (Bebe, Udo, Rowlands & Thorpe, 2002).

In Longisa sub-county, MFIs have existed since late 1990s and have always rendered microcredit services to farmers in this area (MoA, 2011). The MFIs have provided farmers with the much needed funding to improve their dairy stocks. The institutions have been targeted by the donor funding institutions so as to keep helping the farmers to improve their dairy breeds (North, 2012). However, the influence of this credit on the breeds kept by the small holder farmers in the sub-county is largely unknown. In addition, farmers access varying amount of credit. Thus, it is expected that a variation in the number of animals kept is proportionate to the amount of the credit accessed. Therefore, this study investigated whether the amount of credit accessed influences the breeds of dairy cattle kept by the smallholder farmers in Longisa sub-county, Bomet County.

2.2.2 Major Players in the Dairy Farming in Kenya

The exotic dairy breeds in Kenya were introduced by the European settlers in 1902. This also culminated into the origin of market oriented dairy farming. To this effect, Kenya Cooperative Creameries (KCC) was formed in 1925 to process and market milk for farmers locally and abroad. Genetic quality improvement began in 1946 after the formation of the Central Artificial Insemination Station (CAIS), currently Kenya Animal Genetic Resources Centre (KAGRC) in Kabete. Dairy marketing was to be regulated by the Kenya Dairy Board (KDB) formed in 1958 to regulate dairy marketing (Kenya Dairy Board 2008).

According to Government of Kenya (2008), the total number of dairy cattle in Kenya is about 3.8 million. Much of the milk production emanates from grade and zebu cattle which produce

seventy percent (70%) of the total milk. There has been significant increase in milk production in Kenya over the years. And it is estimated that except for drought years, milk production is in excess of 3.1 billion litres per year, thus making the country self-sufficient in milk (Government of Kenya, 2010). Rift Valley province leads in milk production producing fifty two percent (52%) of the total dairy products followed by Central province at (31.3%). Eastern, Nyanza and Western provinces produce 9.4%, 4.7% and 2.6% respectively (Kenya Dairy Board, 2008). This therefore implies that the Rift Valley province is the main producer of milk in Kenya. The processing capacity of the country is 2.5 million litres per day. The dairy sector offers employment to various players along the milk value chain including milk vendors, milk processors, and farmers. It is estimated that the value chain in the dairy industry offers 365,000 jobs annually (KNBS, 2009).

The dairy sector accounts for 3.5% of the total GDP. Most of the milk production in Kenya is by smallholder dairy farmers who account for 75-80% of the total milk produced (Otieno et al., 2009). Although smallholder dairy farmers contribute the highest percentage of the dairy farming in Kenya, the productivity per unit animal in these farms is low. The low productivity is attributed to among other factors, poor animal breeds, mode of feeding, limited access to veterinary and AI services and erratic payments. Nonetheless, the potential for increasing dairy productivity by the smallholder farmers and the country's productivity remains great. For example the productivity per animal among the smallholder farmers is as low as 1,200 litres per annum while the world's best animal husbandry practices yield about 4000-6000 litres annually (FAOSTAT, 2010; Muriuki, 2011). An increased production in the dairy sector will enhance the incomes of farmers, their nutritional status, supply dairy products to the increasing urban population and reduce poverty among the smallholder farmers (Fischer & Ghatak, 2010).

The dairy farmers in Longisa sub-county keep both exotic cattle breeds and the improved local breeds. They also keep indigenous cattle such as the Small East African Zebus, dairy sheep and dairy goats. However, the dairy production in Longisa sub-county is low. Smallholder dairy farmers produce as low as 1,200 litres of milk per lactation (Government of Kenya, 2007). This is despite the fact that they receive credit from MFIs.

2.3 Significance of Dairy Farming in Improving Livelihoods

Dairy farming is practiced both in rural, urban and peri urban areas. Smith et al., (1996) estimated that 8,000 million people are engaged in Urban and Peri Urban Livestock (UPAL)

activities globally. Amar-Klemesu and Maxwell (2000) noted that in Accra, Ghana, fourteen percent (14%) of the households practice UPAL. In Kampala, Uganda, FAO (2005) estimate that thirty percent (30%) of the population are involved in UPAL. In Kenya, livestock industry contributes about ten percent (10%) of the GDP. Dairy farming forms a major part of the livestock sector. It is a major source of livelihood for many rural, urban and peri urban smallholder farmers. The 6-800,000 small scale dairy farmers in Kenya rely on dairy farming for their livelihoods and it acts as their main economic activity (Otieno et al., 2009).

Dairy farming provides farmers with milk, manure and other marketable products such as calves and cullings. Republic of Kenya (2002) indicated that an estimated 2.3 billion litres of milk worth Ksh 35.2 billion was produced in 2000. Of this sixty three percent (63%) was marketed, thirty percent (30%) was consumed at the household level and the remaining was fed to calves. This shows the significance of livestock in rural, urban and peri urban areas which are constantly faced by the challenge of food security, unemployment and poverty (EPZ, 2005). Despite the significance of the dairy sector in the national economy, food security and improving of household incomes, the sector is faced by numerous challenges ranging from financial, technical to institutional (Otieno et al., 2009). The MFIs come in to address the financial dimension of these challenges. This is because, as noted by Devendra, (2001), most smallholder dairy farmers lack adequate access to veterinary services, feeds and credits to purchase inputs. The sector has been targeted by many MFIs as an avenue to poverty reduction through provision of credit for purchasing inputs and seeking the AI services for breed improvement (Karugu & Kanyagia, 2007). If the sector is fully targeted and the dairy farmers are able to access micro credit, they will be able to increase their milk production. This will enable them to improve their livelihoods and ultimately reduce the menace of food security.

2.4 Animal Husbandry Practices in Kenya

Animals are very hardy and are products of their own environment (Aregheore, 2002). There are various dairy farming systems found in Kenya. The systems are influenced by the agro-climatic zone (ACZ), disease prevalence, genotype of the cattle (improved or local), objective of production, land availability, labour and infrastructural development (MoA, 2010). The dairy farming systems practiced in Kenya can be divided into four broad categories namely: The zero-grazing system which is an intensively managed system where cows are fed on rations that are relatively high in concentrates and stored forages. Open grazing system is pasture based where animals roam freely, finding their feed and are thought of having no production cost

because they exist and reproduce without contribution or inputs from the owner. This system requires little or no skills and involve minimal labour (Ramsay, 1999). In the tethering system, animals are tied to a tree or stake but have to be moved often to ensure that they can reach feed. Tethering and open grazing are more pasture-based systems, which are the primary production systems in the country. The semi-zero grazing system is a combination of zero and open grazing systems. It reduces costs but still requires the feeding of concentrates to improve milk production levels.

Small-scale dairy farming is practiced in high rainfall areas that are also suitable for exotic dairy cattle. This is practiced mainly in the Central and Rift Valley provinces as well as the Coastal lowlands. Smallholder dairy farmers are concentrated in the urban and peri urban areas of these areas which have easy access to milk marketing channels. The smallholder farmers keep between two and three cows, with their followers (heifers), on 1 hectare of land on average (Otieno et al., 2009). Large institutions such as Agricultural Development Corporation engage in large scale dairy farming. They keep many animals and it is estimated that they keep 500,000 dairy cattle in this system. The dominant breed kept is Fresian although Ayrshire and Guernsey breeds are also kept (Government of Kenya, 2005). However, although the MFIs have provided credit to the smallholder dairy farmers in Longisa sub-county, the influence of this credit on the breeds of cattle kept is not well known. Thus this study sought to find out the influence of microfinance credit accessed on the breeds kept by the smallholder dairy farmers in Longisa sub-county of Bomet County.

2.5 Role of Microfinance Institutions in Poverty Alleviation

Microfinance has been shown to be a major avenue through which financial services can be provided to the poor who would otherwise be excluded from them. The poor suffer from not only low access to financial information but also from lack of collaterals to secure loans (World Bank, 2008). It becomes hard for the poor to borrow from the formal financial service providers. Microfinance offers innovative loan contracts which have ensured that the extension of small loans to the poor is possible and the repayment rates have also been recorded to be high. Alleviation of poverty is a multidimensional process that cannot be achieved by the provision of microfinance services alone. Any effective strategy aimed at poverty alleviation should focus not only on economic and financial aspects of the communities but also on their social and cultural dimensions of development (North, 2012).

The poor have benefited from credit and saving facilities rendered by the MFIs and these services have played a significant role in filling an important gap left by the mainstream financial banks. With credit access from microfinance, some dairy farmers in the study area have been able to improve their dairy breeds, access veterinary/health care management services, buy modern feeds (supplements), improve dairy housing units and modernize their mode of feeding. This can be demonstrated by the increasing repayment rates and the rapid growth of the demand for the microfinance among the Kenyan communities. Experience with these institutions show that provisions of micro financial services enable the poor to build strong enterprises to increase their incomes and participate in economic growth. Although, the role played by the MFIs is indispensable among the poor, alleviating poverty cannot be achieved in isolation (Duvendack, *et al.*, 2011). This implies that other factors of production should be available. This is by ensuring availability of productive resources such as land, capital and level of education. This will enable the smallholder dairy farmers to improve their living conditions and participate in decision making processes on issues that affect them directly or indirectly.

2.6 Operations of Micro Finance Institutions (MFIs)

Seibel (2007) defines MFIs as system of financial intermediation between micro savers and micro borrowers. MFIs also include micro insurance and other financial services such as money transfers. Microfinance and the solutions it offers to the credit markets in the developing countries is widely acknowledged in literature. The most famous approach used is the group lending method. In this approach, individuals without collateral form a group which may comprise of neighbors or members of a community who are well acquainted with each other in order to obtain a loan. Each member of the group obtains individual loan but then they agree to jointly guarantee each other's loan. That is, in case one member of the group defaults on loan, then each member accepts the liability and pays equal portion of it to the lender (Laffont & Rey, 2003). This approach has its own shortfalls since the joint liability in group loaning has negative effects on group formation and directly influences the projects group members involve in. However, it encourages the borrowers to repay their loans without the lender imposing costly sanctions (Ghatak & Guinnane, 1999). This approach is advantageous to the lender since there are reduced costs of audit and at the same time group members monitor each other (peer monitoring) (Besley & Coate, 1995).

Apart from joint liability, there are other repayment incentive mechanisms that have been developed in order to ensure that loan contracts are in tandem with specific needs in the area of operations. Such mechanisms include targeting of women, collateral substitute, promise of future loans for diligent repayers and regular public repayments and meetings. Additionally, some MFIs offer educational and training services to the borrowers with a view to improving their livelihoods as well as their repayment abilities (Armendrariz de Aghion & Morduch, 2005).

Nonetheless, many MFIs are turning to individual lending contracts as opposed to group lending since group lending has proved unsuitable for wealthier individuals. Thus renown MFIs such as the Grameen Bank in Bangladesh and BancoSol in Bolivia have turned to offering individual loan contracts to their well-off clients (Armendrariz de Aghion & Morduch, 2000). Group monitoring may prove difficult especially in sparsely populated areas when long distances have to be covered in attending meetings. Thus MFIs offer loans depending on the clientele. When the borrowers are poor, the effect of monitoring dominates and thus group loans are preferable.

On the other hand, if the cost of joint liability is increased, better-off individuals may go for individual loans (Madajewicz, 2004). The challenge with group lending is that group members may decide to collude against particular members ensuring that they receive smaller loans. Some borrowers may decide to default because other group members will repay on their behalf (Laffont & Rey, 2003; Rai & Sjostrom, 2004). In Longisa sub-county, MFIs offer both group and individual loans. Group lending is nonetheless more dominant in Longisa sub-county.

In Kenya Microfinance is governed by the Microfinance Act, No. 19 of 2006 (GoK, 2006). It makes provisions for licensing, regulation and supervision of microfinance business and for connected purposes. The Act of Parliament defines Microfinance business in two perspectives. The business that receives money, by way of deposits or interest on deposits, which is lent to others or used to finance the business; or the business that provides loans or other facilities to micro or small enterprises and low income households. For an institution to provide microfinance services, it must be licensed under this Act by the Central Bank of Kenya as a company or a wholly-owned subsidiary of a bank or financial institution with the main objective to carry out such business. The institution carrying out micro financing must have a

minimum capital of sixty million Kenya Shillings. Contrary to these requirements, it is an offence that attracts a fine worth Kshs. 0.3 million or three years imprisonment (GoK, 2006).

2.7 Training on Dairy Farming

Training or capacity building is a conceptual approach referring to strengthening the skills, competencies and ability of people and communities in developing societies to overcome their exclusion and suffering (Deborah, 2005). The United Nations Development Programme (UNDP) defines training as the development of conditions that allow individual participants to acquire and enhance knowledge and skills (UNDP, 2011). Singh (1999) further observes that training is needed because of the gaps in knowledge and gaps in technology information. Training received by smallholder farmers on dairy farming with respect to skills gained, content covered (feeds, mode of feeding, animal health, veterinary services, housing breeds of dairy cattle) and duration of training is believed to have significant influence on dairy farming.

Cole (1997) observes that benefits of training include high performance since training helps to improve quality and quantity of output. On the other hand, a systematic training programme helps to reduce the time lost and time required in reaching the acceptable level of performance. At the same time, it creates uniformity of procedures. Informal training and best methods of performing work can be standardized for work procedure practices to help to improve the quality of performance. It also leads to economy in using materials, machinery and equipment in farming activities.

2.8 Summary of Reviewed Literature

The literature reviewed has shown that MFIs through their provision of microfinance services have the potential to improve food security by providing the much needed credit for dairy farming. The dairy industry has been shown to be a major contributor of household wealth and food security in Kenya. Through provision of credit services from MFIs as well as trainings, the dairy farmers in Kenya should be able to increase the amount of milk produced, improve their breeds and practice better animal husbandry. However, in Longisa sub-county, although there have existed MFIs for over 20 years now, the dairy production is still low. This study sought to find out if indeed smallholder farmers participation in microfinance have played any role on dairy farming.

2.9 Theoretical Framework

The influence of smallholder dairy farmers' participation in microfinance on dairy farming was guided by Mission Drift Theory by Ghosh and Van Tassel, (2008). The theory states that by bringing financial services to the poor, MFI has proved to be a powerful tool for poverty alleviation. This is especially by targeting the poor people who lack collaterals to secure loans from the big commercial banks and other financial service providers. However, the MFI's interest rates are normally too high to the extent of hundred percent (100%) (Armendariz de Aghion & Morduch, 2005). The MFIs charge such high rates in order to be self-sufficient and be able to cover their operation costs. As they reach self-sufficiency levels, they are able to borrow from the commercial banks and reduce their dependency on donor funding. If MFIs are able to borrow from the commercial market, then they would have a larger asset base and be able to reach a larger number of poor people (Armendariz, 2011).

However, as they pursue the profitability aspects, the MFIs turn into commercial institutions and thus their focus changes from poor smallholder dairy farmers to wealthier clients who can absorb larger loans. The wealthier borrowers crowd out the poorest and the original mission of MFIs of alleviating poverty is lost (Ghosh & Van Tassel, 2008). This phenomenon is known as the mission drift. Since the MFIs in Longisa sub-county have been providing credit to farmers, farmers should be able to improve their dairy farming. However, due to the high interest rates and short repayment periods, there is likelihood that the poor are becoming poorer. In addition, as the MFIs change their focus from the groups to dealing with individuals, the wealthier clients may be crowding out the poor smallholder dairy farmers. This way, the poor continue in the vicious cycle of poverty and borrowing which may be constraining dairy farming in Longisa sub-county. Additionally, the amount of credit accessed may be declining for the poor farmers as the terms change in order to include individual wealthier borrowers. MFIs have majorly targeted women in the past. However, as the MFIs shift their attention towards the wealthier clients, the poor will be left out since most of them are resource constrained. The ultimate result is low dairy production.

The theory also advocates that care is supposed to be taken by MFIs in their operations to avoid mission drift. Microfinance institutions could potentially deviate from their mission by extending larger loan sizes neither because of "progressive lending" nor because of "cross-subsidization" in search of profits. There should be caution in the interplay between their own

mission, the cost differentials between poor and unbanked wealthier clients, and region-specific clientele parameters.

2.10 Conceptual Framework

The conceptual model in figure 1 shows the interaction between the dependent, independent and intervening variables in this study. The smallholder dairy farmers' participation in microfinance was viewed as the independent variable with a direct influence on the dairy farming (dependent variable). The independent variable has a potential to influence the amount of milk produced, the breeds of dairy cattle kept as well as the animal husbandry practices. For instance the amount of credit accessed influences the smallholder farmers' ability to purchase inputs such as feeds and drugs. These in turn influence the amount of milk a cow produces. Similarly the amount of credit accessed influences the farmer's ability to seek for AI and other veterinary services thus affecting the breeds kept.

Credit access by farmers enables them to improve their herd by buying exotic breeds. However, this relationship is affected by the availability of other productive resources such as (land, capital), social aspects such as gender and level of education of the household head (intervening variables). For instance a farmer may access credit for dairy herd improvement, but lack of knowledge on the right breeds to keep or the size of land required for this purpose may affect the dairy farming. Similarly cultural and social factors such as gender relations in access and control over productive resources may influence how the credit accessed is utilized in dairy farming. The intervening variables were included in the study although not as specific objectives. The researcher ensured that the sampled dairy farmers were homogenous with respect to the intervening variables in order to control their influence. This was in terms of gender of the household head, productive resources (capital, land size) and level of education.

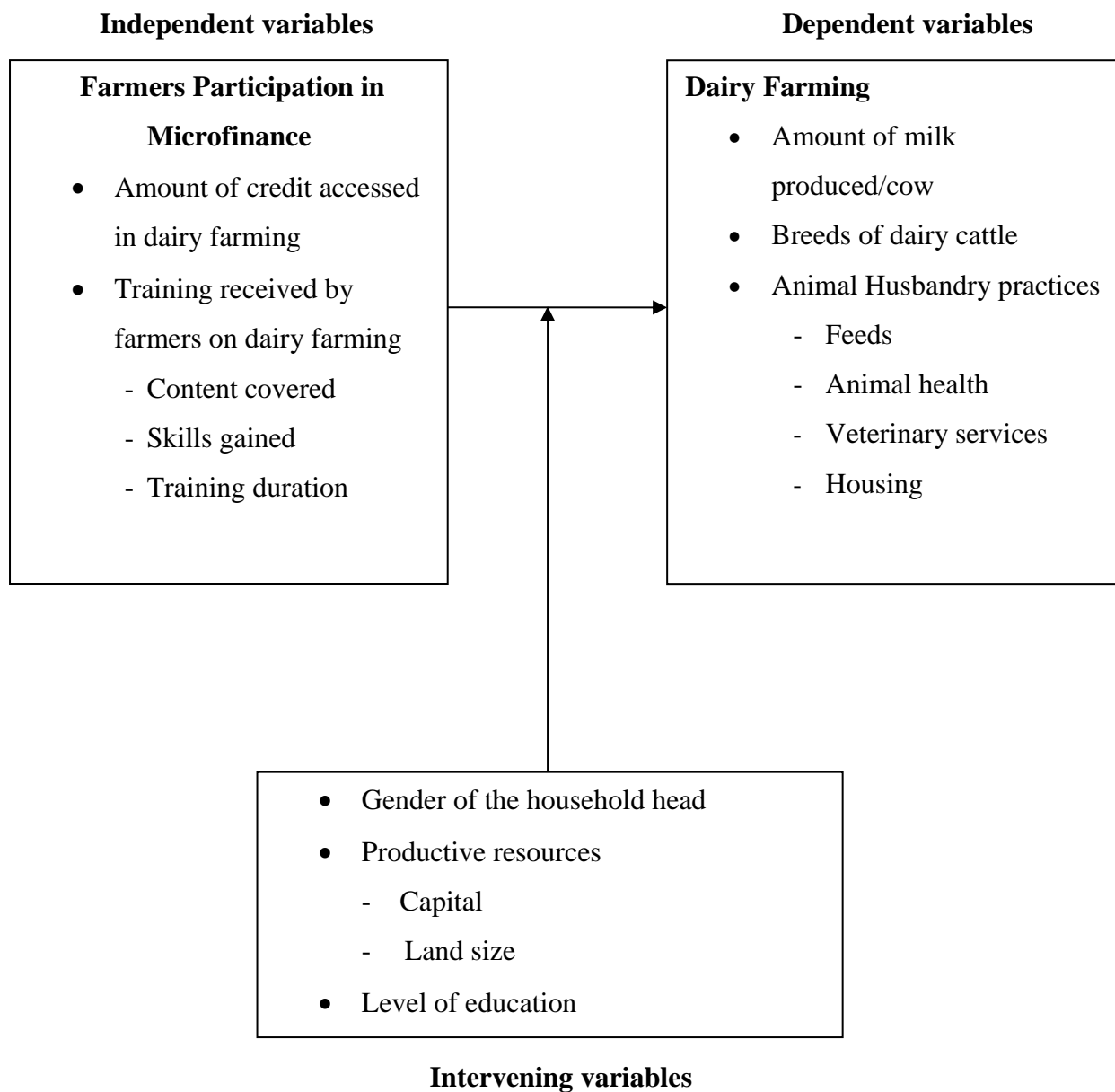


Figure 1. Influence of Smallholder Dairy Farmers’ Participation in Microfinance on Dairy Farming

Source: Researcher (2015)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section details the procedures that were used in conducting the study. It describes the research design, study area, study population, sampling procedure and sample size, instrumentation, data collection procedure and how the collected data was analysed. A summary of how the hypothesis was tested is presented at the end of this section.

3.2 Research Design

A cross sectional survey research design was used in this study. This is a present oriented methodology used to investigate populations by selecting samples to analyse and discover occurrences (Oso & Onen, 2008). The design enabled the study to describe the influence of smallholder dairy farmers' participation in MF on dairy farming without having to manipulate variables as in experimental research. This design allows researchers to collect data from a large sample and to use it in intensive analysis. It helps the researcher to get respondents' opinions and feelings on issues relevant to the study. This design allows the researcher to use hypothesis. Also, since it collects data at a point in time, cross sectional survey research design is cost effective as it saves time and money (Bhattacharjee, 2012).

3.3 Study Area

Longisa sub-county is located in Bomet County at an altitude of 1700m to about 2100 meters above sea level. The GPS coordinates for the study area is 0.78° S (latitude) and 35.35° E (longitude). It occupies an area of 257.9km². The sub-county has a cool climate with an average annual rainfall of approximately 1425 mm per year and a mean temperature of about 18°C. The average slope of the land ranges between fourteen percent (14%) and twenty two percent (22%) (Ministry of Agriculture, 2010). Soils are mainly clay loams with average pH of between 5.0 and 6.5. These features make this sub-county a high potential area characterized by its ability to promote dairy farming. The study area lies in the LH1 zone implying that it has high potential in dairy farming as well as crop growth. The main agricultural activities in this area are crop and animal production. Various crops are grown which include: Irish potatoes, maize, beans, vegetables such as cabbages and kales and fruits. Semi zero grazing and tethering is practiced but much of dairy farming is done through free range. The area has a total population of 97,862 of which 47,661 are males and 50,201 are females. The area has a population density of approximately 379 persons per km² (KNBS, 2010). The area has a total

of 5720 households. The sub-county has eight locations namely; Cheboin, Kapkimolwa, Kimuchul, Kiplabotwa, Kiprerer, Tegat, Kembu and Chemaner. Their household populations are 634, 802, 700, 630, 581, 632, 872 and 869 respectively (MoALF, 2014). All these locations were included in this study. The Sub-county was selected because of its fair representation of an agricultural zone in Kenya where rural farmers are significantly involved in smallholder dairy farming.

3.4 Study Population

The target population was 5720 households of smallholder dairy cattle farmers in Longisa sub-county while the accessible population was all 5720 households involved in smallholder dairy cattle farming in Longisa sub-county (MoALF, 2014). Table 1 shows the accessible population of households per location.

Table 1

Accessible Population in Longisa Sub-County per Location

Location	Households
Cheboin	634
Kapkimolwa	802
Kimuchul	700
Kiplabotwa	630
Kiprerer	581
Tegat	632
Kembu	872
Chemaner	869
Total	5,720

Source: (MoALF, Longisa, 2014)

The population of smallholder dairy farmers was arrived at on the basis of the fact that every household keeps at least a dairy cow. These are the smallholder dairy cattle farmers in Longisa Sub-county with an average farm size of less than two (2) hectares of land.

3.5 Sampling Procedure and Sample Size

The sampling frame was 5720 households of smallholder dairy cattle farmers in Longisa sub-county (Longisa Sub-County MoALF, 2014). Stratified random sampling was used to obtain the sample from different locations (strata) in the Sub-county. For uniformity purposes proportionate stratified sampling method was used to ensure all the locations are represented in the study. Simple random sampling was used to select (respondents) smallholder dairy cattle farmers from each strata. The following formula was used to come up with an appropriate sample size for the study as per Nassiuma (2000).

$$n = \frac{NC^2}{C^2 + (N - 1)e^2}$$
$$n = \frac{5720 (0.25^2)}{(0.25)^2 + (5720 - 1) 0.02^2}$$
$$n = \frac{357.5}{2.3501}$$
$$n = 152$$

Where: n = Sample size,

N = Population size

C = Coefficient of variation which is fixed between 0 – 30%

e = Margin of error which is fixed between 2-5%.

The sample size was calculated at 25% coefficient of variation, 2% margin of error and a population of 5720 households.

Twenty five percent (25%) coefficient of variation was used to ensure that the sample size is wide enough to justify the result being generalized for Longisa sub-county. Two percent (2%) margin of error was used because the study was a cross sectional survey, whereby the independent variables were not to be manipulated. Using the above formula, a sample of 152 smallholder dairy cattle farmers was selected.

Table 2 shows the population of 5720 households of smallholder dairy cattle farmers and the percentage proportion for each location (strata) in Longisa sub-county. It also shows the calculated sample size for each location and the total sample size for the study.

Table 2

Sample Size per Location in Longisa Sub-County

Location	Households	Proportion percent	Sample size
Cheboin	634	11.1	17
Kapkimolwa	802	14.0	21
Kimuchul	700	12.2	19
Kiplabotwa	630	11.0	17
Kipreres	581	10.2	15
Tegat	632	11.0	17
Kembu	872	15.2	23
Chemaner	869	15.2	23
Total	5720	100.0	152

Source: (MoALF, Longisa, 2014)

3.6 Instrumentation

A researcher administered questionnaire was used to collect primary data for this study. The questionnaire consisted of both closed-ended and open-ended questions. Closed ended questions provided a basis for quantifying the data obtained. The open ended ones provided useful information that can be used in explaining observation in the study (Bhattacharjee, 2012).

The instrument had six sections. Section A contained information on demographic characteristics of the farmers; aspects such as decision making in the households, age, gender, marital status, level of education, resources owned and their control. Section B contained credit information on farmers' participation in microfinance. Section C contained items that would aim to determine the amount of milk produced. Section D contained items that would be used to establish the breeds of dairy cattle kept by smallholder farmers. Section E was aimed at determining the animal husbandry practices in dairy farming among the smallholder farmers while section F contained information about training received from microfinance institutions.

3.6.1 Validity of the Instrument

Experts from the Department of Applied Community Development Studies, Faculty of Education and Community Studies and experts in MFIs and dairy farming research from Egerton University were used to determine the validity of the instrument. The experts were also used to assess what concepts the instrument aimed at measuring and determined whether the items or indicators accurately depicted the concepts of interest. This ascertained both the face and the content validity of the instrument. Content validity occurs when an instrument provides adequate coverage of the subject being studied. This includes measuring the right things and having an adequate sample. Face Validity involve only a casual, subjective inspection of an instrument to judge whether it covers the content it purports to measure (Howell et al., 2005; Bhattacharjee, 2012).

3.6.2 Reliability of the Instrument

Reliability of a research instrument is its ability to yield consistent results or data after repeated trials (Mugenda & Mugenda, 2003; Kothari, 2008). The instrument was pretested using 30 (thirty) dairy farmers from Bomet Central sub-county to ensure that there are no deficiencies and ambiguities in the final instrument. According to (Kathuri & Pals, 1993; Mugenda & Mugenda, 2011), 20-30 cases are sufficient for pretesting of instruments in survey studies. Bomet Central and Longisa sub-counties both have similar climatic conditions, practice dairy farming and have access to MFIs services. Stratified random sampling was used to obtain the respondents in which the locations (Mugango, Ndaraweta, Sigorwet, Sibayan, Itembe, Kanusin, Mutarakwa, Kamokoso, Njerian, Kyogong) were the basis of the strata. For uniformity purposes proportionate method was used to ensure each stratum is represented. Simple random sampling was used to select (respondents) smallholder dairy cattle farmers from each stratum for pretesting. The reliability of the estimated using Cronbach alpha coefficient where a coefficient of 0.7 and above was accepted. However, if a lower coefficient is obtained from the pretest, the questionnaire was to be revised and adjusted accordingly (Kothari, 2008 & Mugenda, 2011).

3.7 Data Collection Procedure

With the recommendation of the Board of Post Graduate Studies of Egerton University, a permit was acquired from the National Commission for Science Technology and Innovations (NACOSTI). The Sub-county Commissioner and chiefs in the sub-county were informed of

researcher's presence. The MoAL&F provided the sampling frame. Respondents were assured that the information provided through the questionnaire was treated as confidential.

3.8 Data Analysis

Descriptive and inferential statistics were used for data analysis. Descriptive statistics (means, frequencies and percentages) were used to describe the amount of credit accessed, training received by smallholder dairy farmers, the amount of milk produced, breeds of dairy cattle kept and animal husbandry practices. Simple linear regression was used to determine the influence of the amount of credit accessed on the amount of milk produced. The following regression equation was used:

$$Y_i = \beta_0 + \beta_1 X_i + u_i$$

Where:

Y_i are the amount of milk produced (parameter estimate) for each respondent

X_i are the amount of credit accessed (parameter estimate) for each respondent

β_0 is the regression constant

β_1 is the coefficient for the amount of credit

u_i are an unobservable error terms; a random disturbance

Ordered logistic regression was used to determine both the influence of the amount of credit accessed on the breeds kept as well as influence of amount of credit accessed on animal husbandry. Simple linear regression was used to determine the influence of the amount of credit accessed on the training received by smallholder dairy farmers. The Statistical Package for Social Sciences (SPSS) aided the analysis. To make reliable inferences from the data, all statistical tests were verified at $\alpha = 0.05$ level of significance. Themes were used to analyse the qualitative data. Table 3 provides a summary of the nature of data analysed as well as the method of analysis used in each objective.

Table 3

Summary Table for Hypothesis Testing

Hypothesis	Independent variable	Dependent variable	Test statistics
Ho ₁ . The amount of credit accessed has no influence on the amount of milk produced per cow per lactation by smallholder dairy farmers in Longisa sub-county, Bomet County.	Amount of credit accessed	Amount of milk produced	Simple linear regression
Ho ₂ . The amount of credit accessed has no influence on the breeds of dairy cattle kept by the smallholder farmers in Longisa sub-county, Bomet County.	Amount of credit accessed	Breeds of dairy cattle	Ordered logistic regression
Ho ₃ . The amount of credit accessed has no influence on animal husbandry practices in dairy farming among the smallholder farmers in Longisa sub-county, Bomet County.	Amount of credit accessed	Animal husbandry practices in dairy farming	Ordered logistic regression
Ho ₄ . The training received by smallholder farmers has no influence on dairy farming in Longisa sub-county, Bomet County.	Training received <ul style="list-style-type: none"> • Skills gained • Content (Breeds, feeds, animal health, veterinary services and housing of dairy cattle) • Training duration 	Dairy farming <ul style="list-style-type: none"> • Amount of milk produced • Breeds of dairy cattle kept • Animal husbandry 	Simple linear regression Ordered Logistic Regression

CHAPTER FOUR RESULTS AND DISCUSSION

4.1 Introduction

The study investigated the influence of smallholder dairy farmers' participation in microfinance on dairy farming in Longisa sub-county, Bomet County, Kenya. This chapter presents the results, interpretation and discussion of the findings of the study. The results are presented qualitatively and quantitatively. The responses from the respondents were analysed using Statistical Package for the Social Sciences (SPSS) version 20 for windows. A total of 152 questionnaires were distributed as per the sampling techniques used in the study. All 152 questionnaires were collected from the respondents making return rate of 100.0% which the study found to be significant enough in achieving its objectives.

4.2 Characteristics of the Respondents

The subjects for the study comprised of smallholder dairy farmers in eight locations of Longisa Sub-county. The study gathered information on the respondents' personal attributes. These attributes encompassed the gender, marital status, age and level of education.

4.2.1 Gender of the Respondent

On the issue of gender, the results of the study showed an almost equal distribution of male and female as shown in Figure 2.

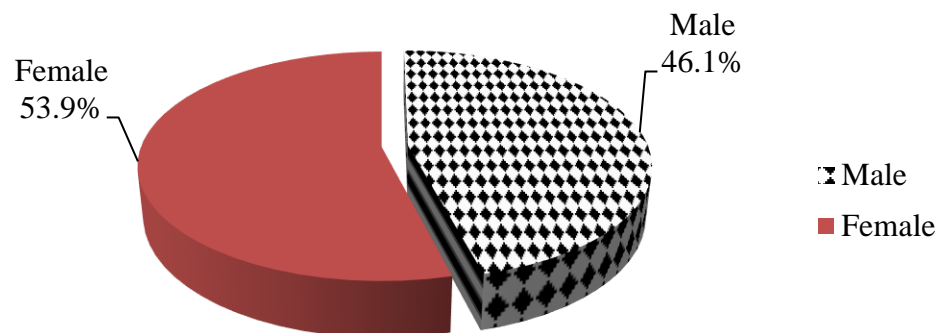


Figure 2. Gender of the Respondents

Source: Field Data (2015)

About 54% of the respondents were female while 46% were male. This may imply that dairy farming related decisions such as how to seek and access financing, dairy breeds to be kept and animal husbandry practices to be implemented may not be dominated by any gender.

4.2.2 Marital Status of the Respondent

Majority (75.7%) of the farmers were married. This is depicted in Figure 3.

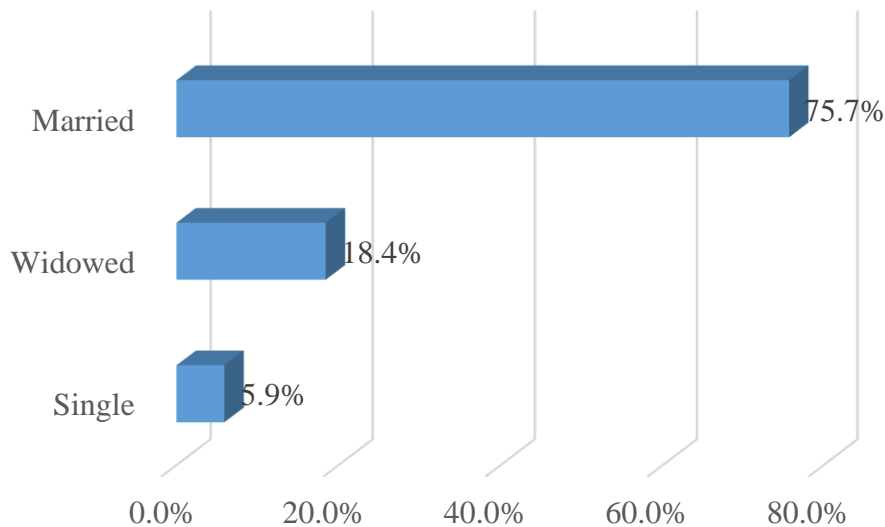


Figure 3. Marital Status of the Farmers

Source: Field Data (2015)

Some of the respondents were widowed (18.4%) while a few were single (5.9%). Since majority of the agricultural activities in the study area were labour intensive and utilizing family labour, married farmers may thus be advantaged as far as labour acquisition is concerned.

4.2.3 Respondents' Age

Majority (45.4%) of the respondents were aged 31 - 40 years. About 23.0% of the total respondents were aged 21 - 30 years while 17.1% were aged 41-50 years. There were very few respondents aged 51 years and above (a cumulative of 14.5%) as shown in Table 4.

Table 4

Respondents' Age Brackets

Age brackets	Frequency	Percent	Cumulative Percent
21-30 years	35	23.0	23.0
31-40 years	69	45.4	68.4
41-50 years	26	17.1	85.5
51-60 years	7	4.6	90.1
61 years and above	15	9.9	100.0
Total	152	100	

Note. Range = 25 – 65 years, Mean Age = 38.49, Std. Deviation = 11.37, n = 152

Source: Field Data (2015)

The mean age of the respondents was 38.49 with a standard deviation of 11.37 years. A cumulative percentage of 85.5% of the respondents were aged between 21 – 50 years. This implies that farming in the study area is popular among the young and middle aged persons. Age have an influence on dairy farming productivity and production due to the effect of technology adoption. According to Khandker, Begum, Hasan, Sarker, Asaduzzaman and Bhuiyan (2014) young and middle aged farmers are generally receptive to adoption of new technology in farming.

4.2.4 Level of Education of the Farmers

Most of the respondents had less than tertiary level of education as shown in Figure 4.

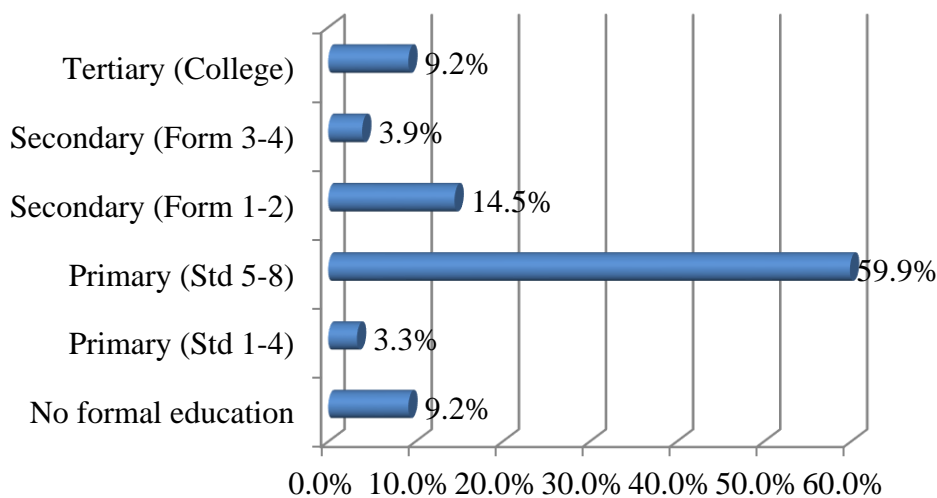


Figure 4. Respondents' Highest Level of Education

Source: Field Data (2015)

Majority (59.9%) of the respondents had primary (Standard 5 – 8) level of education. This was followed by respondents with secondary (Form 1 -2) 14.5% level of education. About 9.2% of the respondents had no formal education while a similar proportion had tertiary (college) level of education. These results imply that majority of the dairy farmers may lack adequate formal education which is necessary for better modern dairy farming. In addition to this, the level of education of the household head can influence the kind of decision that may be made on behalf of the entire household with regard to dairy farming. More educated farmers are likely to make better decisions as well as quickly adopt new technologies in farming as compared to their less educated counterparts.

4.2.5 Crop Growing in the Study Area

The most popular crops grown in the study area are grains/cereals such as maize as grown by 97.9% of the households (Figure 5). Other major crops grown in the study area include: vegetables (63.9%), cash crops (37.5%) and fodder (13.1%).

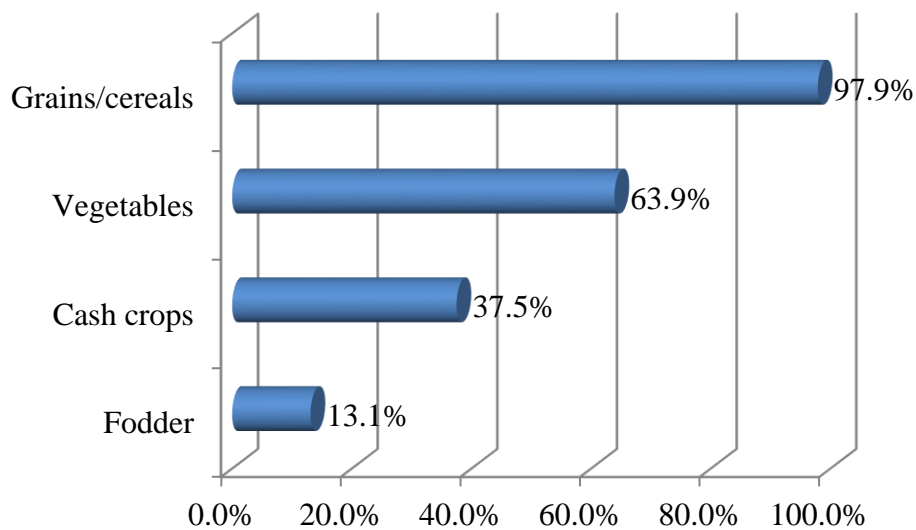


Figure 5. Major Crops Grown in the Study Area

Source: Field Data (2015)

The acreage of land occupied by the different crops grown by households in the study area is shown in Table 5. The results show that grains/cereals occupied most land as represented by a mean of 0.661 acres per household with a standard deviation of 0.362. Due to the importance of dairy farming in the area, plots of land under fodder was found to occupy the second largest portion of land as represented by a mean of 0.625 acres and a standard deviation of 0.000 per

household. Cash crops (pyrethrum, tea and coffee) were cited to occupy an average of 0.542 acres with a standard deviation of 0.436 among the sampled households. Vegetable crops occupied an average of 0.37 acres with a standard deviation of 0.047.

Table 5

Acreage of Land Occupied by the Different Crops Grown

Major crop grown	Minimum	Maximum	Mean	Std. Deviation
Grains/cereals	.20	2.00	.661	.362
Fodder	.25	1.00	.625	.000
Cash crops	.10	2.00	.542	.436
Vegetables	.10	.75	.357	.047

Source: Field Data (2015)

4.2.6 Livestock Kept in the Study Area

Some of the major livestock kept in the study area include dairy cattle, goats/sheep and poultry. The area under each livestock enterprise is shown in Table 6.

Table 6

Acreage of Land Under Livestock Production

Livestock enterprise	Minimum	Maximum	Mean	Std. Deviation
Dairy production	.03	5.00	.7587	.62929
Goats/sheep production	.50	.50	.5000	.

Source: Field Data (2015)

Dairy production occupies majority of the land as far as livestock production in the study area is concerned. On average each household in the study area dedicates about 0.759 acres of land to dairy farming. About 0.5 acres of land is dedicated to goats/sheep production.

4.2.7 Non-farm Activities in the Study Area

The most popular non-farm activities practiced in the study area include general business, casual work, trade involving cereal business and salaried employment as shown in Table 7.

Table 7

Non- Farm Activities

Non- farm activities	Frequency	Percent
Non-agricultural business	17	39.5
Casual Worker	5	11.6
Agricultural commodity traders	13	32.6
Salaried employment	7	16.3
Total	43	100.0

Source: Field Data (2015)

About 39.5% of the non-farm activities practiced in the study area relate to non-agricultural business. This is closely followed by agricultural commodity trading as practiced by 32.6% of the households. About 16.3% of the non-farm activities in the area relate with salaried employment while 11.6% of the non-farm activities practiced in the area is casual work.

4.2.8 Extension Services in the Study Area

This study sought to determine whether the sampled households were receiving extension (training and advisory) services. The results are indicated in Figure 6.

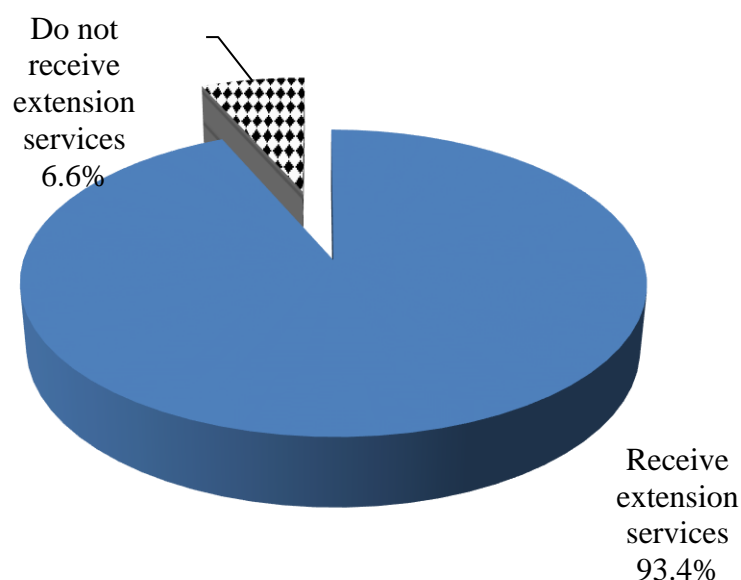


Figure 6. Whether the Respondent Receive Extension (Training and Advisory) Services on Dairying

Source: Field Data (2015)

The results in Figure 6 shows that majority of the households were receiving extension services on dairy farming as represented by 93.4% of the households. However, about 6.6% of the households were not accessing extension services for use in dairy farming.

Some of the major sources of extension services in the study area are depicted in Figure 7.

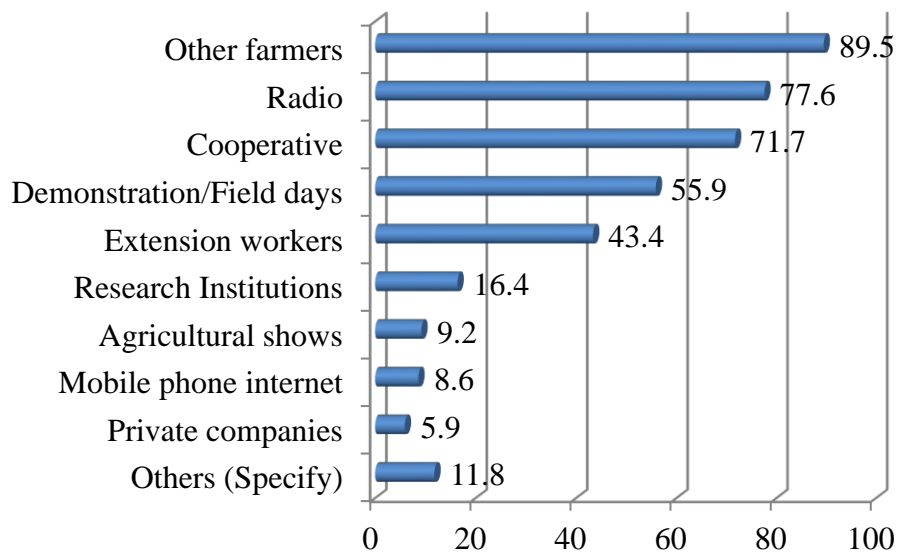


Figure 7. Source of Extension Information

Source: Field Data (2015)

This study noted that majority of the households are not satisfied with the extension services received as depicted in Figure 8:

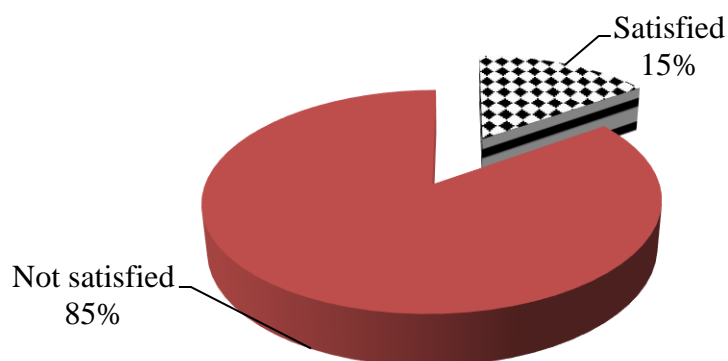


Figure 8. The Satisfaction Levels of the Respondent with the Extension Services Provided

Source: Field Data (2015)

Some of the reasons why the respondents were not satisfied with the extension services are shown in Table 8.

Table 8

Reason for not Being Satisfied with the Extension Services Provided

Reason	Frequency	Percent
No training	126	95.5
Venue for training are far	6	4.5
Total	132	100.0

Source: Field Data (2015)

The results in Table 8 shows that majority of the households (95.5%) cited that they were not satisfied with the extension services since they did not receive any training from such service providers. Other households (4.5%) cited that the venue available for trainings were far, and thus a reason for lack of satisfaction through the services. This implies that most dairy farmers may not be well empowered with important farming information and hence the reason for realizing low milk yields, keeping poor breeds and not implementing good animal husbandry practices.

4.2.9 Farm Machinery and Implements Owned in the Study Area

Some of the farm machinery and implements owned by households in the study area include jembes, chaffcutter, pangas, hammer and spades as shown in Table 9.

Table 9

Farm Machinery and Implements Owned

Farm machineries in farming:	Yes	No
Wheelbarrow	23 (15%)	129 (85%)
Chaffcutter	8 (5%)	144 (95%)
Spades	118 (78%)	34 (22%)
Hammer	138 (91%)	14 (9%)
Sickle	87 (57%)	65 (43%)
Jembe	151 (99%)	1 (1%)
Panga	150 (99%)	2 (1%)
chain strainer	4 (3%)	148 (97%)
Others (Specify)	25 (16%)	127 (84%)

Source: Field Data (2015)

The results in Table 9 show that 99% of the households own jembes and was closely followed by 99% of the households that owned pangas. About 91% and 78% of the households owned hammers and spades respectively. This study noted that only a few households owned expensive farm machinery and implements such as tractors, wheelbarrows, chaffcutters and chain strainers. The high endowment with low cost assets and low endowment with high cost assets among the dairy farmers in the study area implies that most farmers may not have adequate incomes that can support the purchase of expensive farm machinery and implements. This further implies that there is less probability of undertaking mechanized farming activities in the study area.

Majority of the households cited the adequacy of all farm machinery and implements in farming as not adequate as shown in Table 10.

Table 10
Adequacy of all Farm Machinery and Implements in Farming

Adequacy levels	Frequency	Percent
Adequate	33	21.7
Moderate	54	35.5
Inadequate	60	39.5
Very inadequate	5	3.3
Total	152	100.0

Source: Field Data (2015)

The results indicated in Table 10 shows that majority of the households generally have inadequate farm machinery and implements as represented by 39.5% of the respondents. This was closely followed by households who cited that their farm machinery and implements are moderately adequate as represented by 35.5% of the respondents. About 21.7% of the households cited to have farm machinery and implements in adequate levels while just 3.3% cited their farm machinery and implements as very inadequate.

4.3 Credit Borrowing by Smallholder Dairy Farmers

The first objective in this study was to identify the number of smallholder dairy farmers who borrow credit for dairy farming in Longisa sub-county, Bomet County. This objective was analysed using descriptive statistics (frequencies and percentages).

This study noted that an overwhelming majority of the households in the study area were aware of microfinance institutions operating in the area. This is as depicted in Figure 9.

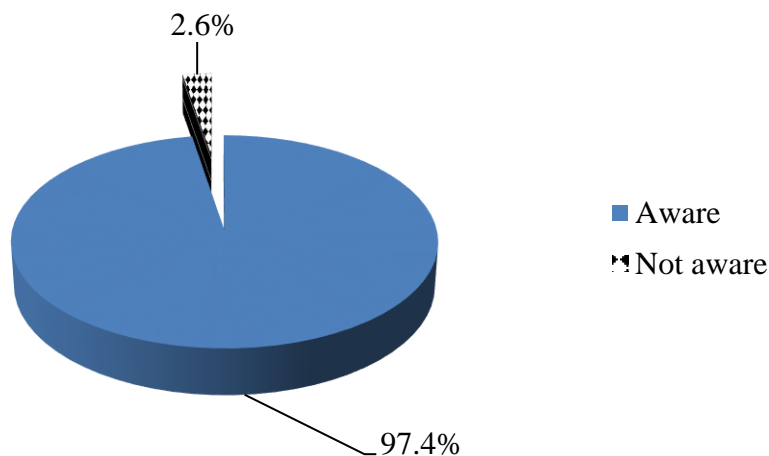


Figure 9. Awareness of MFIs Institutions Operating in the Study Area

Source: Field Data (2015)

Figure 9 shows that 97.4% of the households were aware of the microfinance institutions in the study area and only 2.6% of the households claimed not to be aware. Kenya Women Finance Trust (KWFT) and Equity bank are among the major institutions in the study area offering microfinance products to the dairy farmers. Some of the MFIs operating in the study area were identified as depicted in Figure 10.

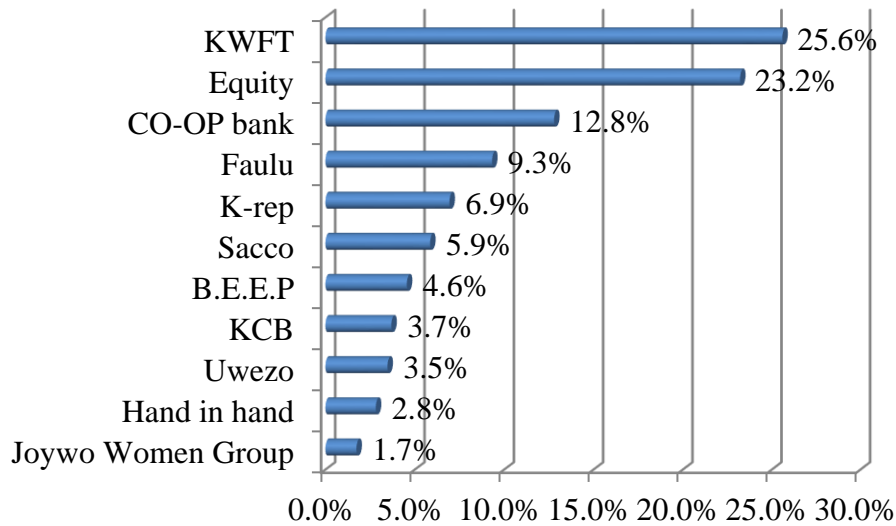


Figure 10. MFI's Operating in the Area

Source: Field Data (2015)

About 25.6% of the respondents cited KWFT as a microfinance institution operating in the area and was closely followed by 23.2% of the respondents that cited that Equity bank had microfinance products that it offers to the residents. Some of the other organizations with microfinance loan products operating in the area include Co-operative bank, Faulu Kenya, K-Rep, various SACCOs, B.E.E.P, KCB, Uwezo Fund, Hand in Hand and Joywo Women Group.

Figure 11 depicts the proportion of households that had borrowed loan from microfinance institution for use in dairy farming within the past four years.

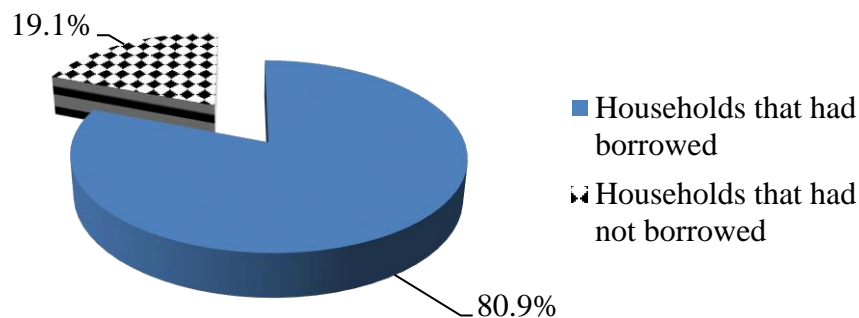


Figure 11. Households' Borrowing of Loan from Microfinance Institution for Use in Dairy Farming

Source: Field Data (2015)

The results in Figure 11 shows that majority of the households had borrowed loan from microfinance institutions for use in dairy farming as represented by 80.9% of the households.

Some of the microfinance loan obtained by households for use in dairy farming was diverted to other uses as indicated in Figure 12.

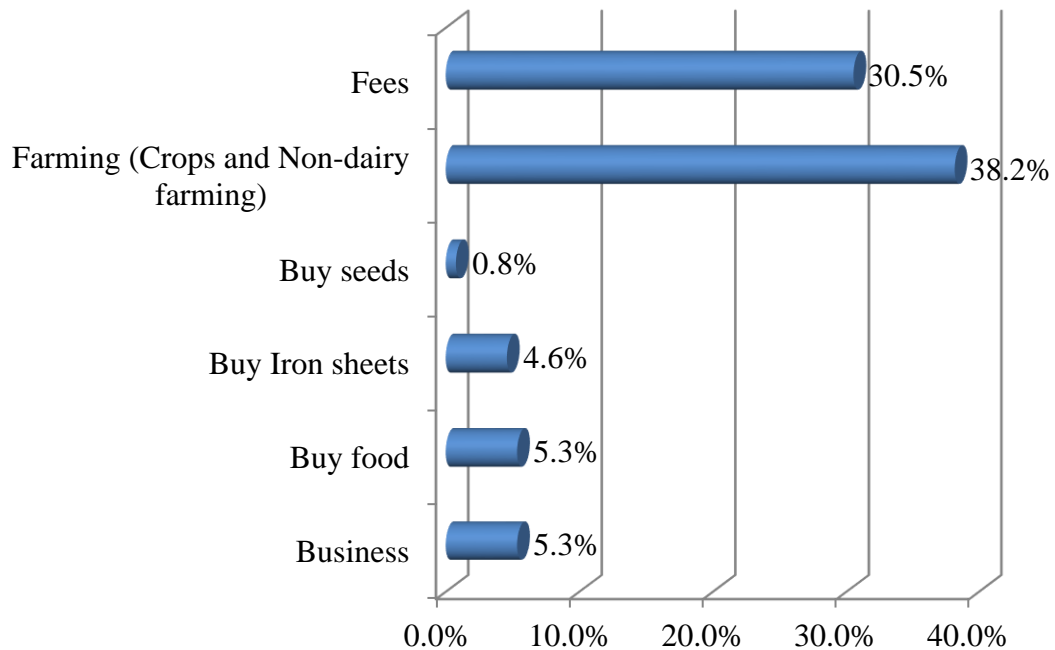


Figure 12. Other Purposes of the Loan Taken

Source: Field Data (2015)

Figure 12 shows that a sizeable proportion of the households (38.2%) had diverted the microfinance loan initially meant for use in dairy farming into other forms of farming (poultry, food crops and cash crops). About 30.5% of the households had used the loan in payment of school fees while others (less than 10.0%) each had injected the money in non-dairy business, purchase of family food, buying of iron sheets and purchase of seeds.

Loans are normally diverted to cater for emergency needs that may arise in a household as well as in situations where the borrower sees another more viable or lucrative opportunity (Birech, 2013). Given that cash is tangible and the complexity of household economies, it is clear that most attempts to divert a loan are normally naïve. Institutions should organize training programmes in preparing their clients enough for the proper utilization of the loan acquired.

The loan should also be given at an appropriate time so that it can be used for the intended purpose.

Some of the loan borrowed for use in dairy farming was microfinance products from Equity bank (Figure 13).

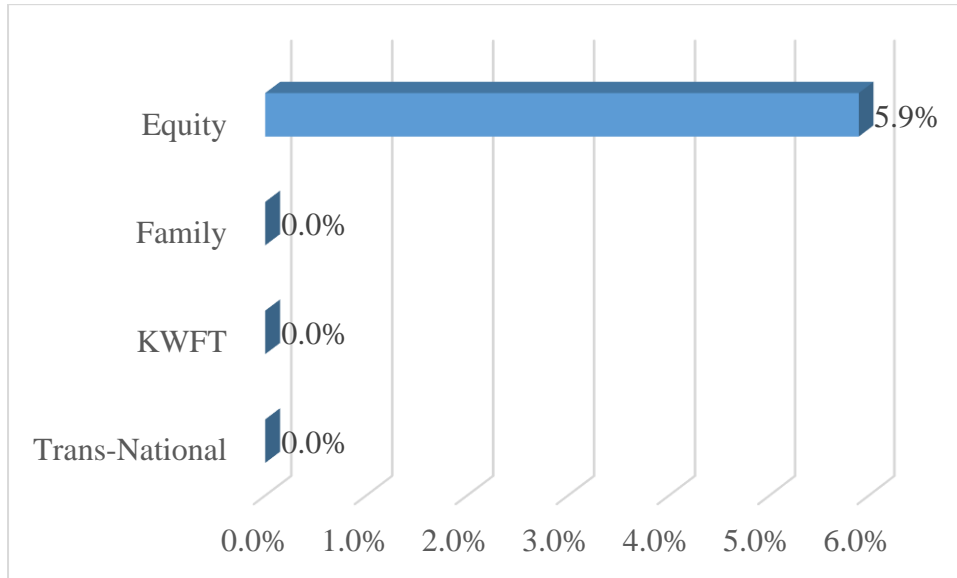


Figure 13. Formal Banks Where Loan was Obtained

Source: Field Data (2015)

The results in figure 13 shows that about 5.9% of the loan borrowed for use in dairy farming was accessed from Equity Bank. However, none of the households had benefited with microfinance products from the other three formal banks (KWFT, Trans-National Bank and Family Bank) operating in the study area.

Some of the loan accessed by households for use in dairy farming was sourced from Savings and Credit Cooperative Societies (SACCOs) as depicted in Figure 14.

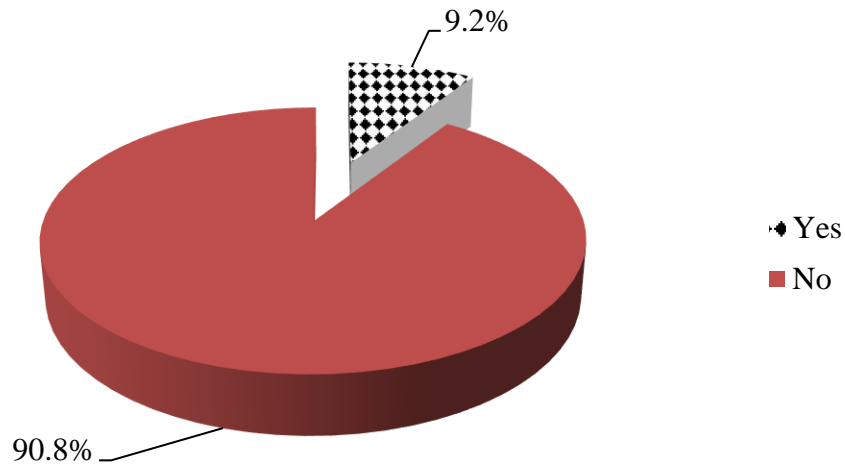


Figure 14. Access of Loan from SACCOs

Source: Field Data (2015)

The results in Figure 14 show that 9.2% of the households had accessed loan from SACCOs. However, majority of the households (90.8%) did not source their loans from SACCOs.

Some of the SACCOs operating in the study area include *Sot Dairy* and *Fruarisha*. Figure 15 shows the proportion of households who had benefited from various SACCOs loans within the last four years.

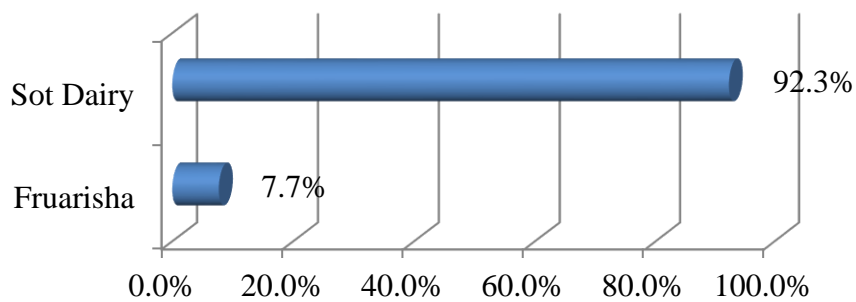


Figure 15. SACCOs Providing Loan to Households in the Study Area

Source: Field Data (2015)

The results in Figure 15 show that most households (92.3%) benefited from Sot Dairy SACCO loans with 7.7% of the households benefiting with loans from *Fruarisha* SACCO.

There existed some informal groups in the study area that were advancing microfinance credit to dairy farmers in the study area. Figure 16 shows the distribution of informal groups that had given credits to the sampled households.

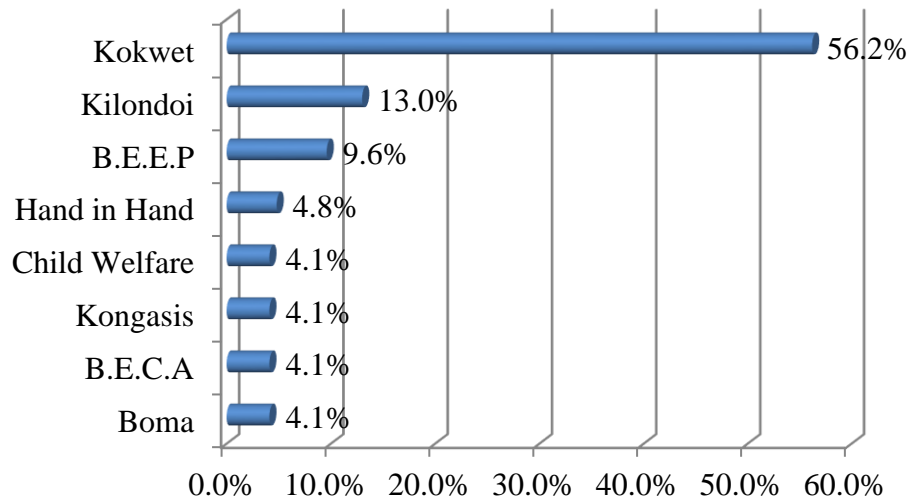


Figure 16. Non-Bank and Non-SACCO Microfinance Organizations

Source: Field Data (2015)

Figure 16 shows that majority of the households in the study area had accessed microfinance loans from Kokwet informal group as represented by 56.2% of the respondents. About 13.0% and 9.6% of the households had also benefited with microfinance loans from *Kilondo* and *B.E.E.P* respectively. Some of the other non-bank and non-SACCO microfinance organizations serving in the study area include *Hand in Hand*, *Child Welfare*, *Kongasis*, *B.E.C.A*.

This study observed that majority of the MFIs in the study area were offering small loans (most of them were less than Kshs. 30,000) as shown in Table 11.

Table 11

Amount of Credit Accessed

Amount borrowed	Frequency	Percent
Less than 10,000	30	19.7
10000 - 19999	27	17.8
20000 - 29999	20	13.2
30000 - 39999	13	8.6
40000 and above	14	9.2

Source: Field Data(2015)

The results in Table 11 shows that majority of the households had borrowed less than Kshs. 10,000 from MFIs within the past four years as represented by 19.7% of the respondents. This was closely followed by households that had borrowed Kshs. 10,000 - 19,999 and Kshs. 20,000 – 29,999 as represented by 17.8% and 13.2% of the respondents, respectively. It was just a cumulative of 17.8% of the households that had borrowed Kshs. 30,000 or more for the last four years.

4.4 Influence of the Amount of Credit Accessed on the Amount of Milk Produced per Cow per Lactation by Smallholder Dairy Farmers

The second objective of this study was to determine the influence of the amount of credit accessed on the amount of milk produced per cow per lactation by smallholder dairy farmers in Longisa sub-county, Bomet County. In pursuing this objective, a null hypothesis, ‘the amount of credit accessed has no influence on the amount of milk produced per cow per lactation by smallholder dairy farmers in Longisa sub-county, Bomet County’ was formulated and analysed using simple linear regression.

The study sought to determine the amount of milk produced per cow per lactation by smallholder dairy farmers in Longisa sub-county, Bomet County. The results are summarized in Table 12.

Table 12

Amount of Milk (Litres) Produced per Cow

Breeds of cattle	N	Per lactation	Per day
Indigenous	52	1027.7	3.3696
Cross	73	2254.1	7.3904
Exotic	7	4683.9	15.3571

Source: Field Data (2015)

The results in Table 12 shows that the average amount of milk for per lactation and per day for each indigenous cow reared by smallholder dairy farmers in the study area is 1027.7 and 3.37 litres, respectively. The average amount of milk for per lactation and per day for each cross breed reared is 2254.1 and 7.39 litres, respectively. The average milk production per lactation and per day for each exotic dairy cattle is 4683.9 and 15.36 litres, respectively. This implies

that the area milk production data is higher than region average of 3.29 litres per day noted by Muriuki (2011) but still lower than the potential of 10.96 – 16.44 litres per cow per lactation period as realized in other countries like United States (FAOSTAT, 2010).

Test of Hypothesis H₀₁

The first hypothesis in this study stated, “H₀₁: The amount of credit accessed has no influence on the amount of milk produced per cow per lactation by smallholder dairy farmers in Longisa sub-county, Bomet County”. The hypothesis was tested using simple linear regression. Table 13 shows the influence of the amount of credit accessed on the amount of milk produced per cow per lactation by smallholder dairy farmers in Longisa sub-county, Bomet County.

Table 13

Influence of the Amount of Credit Accessed on the Amount of Milk Produced per Cow per Lactation.

Variable	Coef.	Std. Err.	T	P>t
Amount of credit accessed	0.27	0.03	10.538	0.001
Constant	2.98	0.21	14.4	0.001

F (1, 15) = 7.52, Prob> F = 0.03, R² = 0.83, Adj R² = 0.81, * = Significant at 5% level

Results in Table 13 reveal that the coefficient for the amount of credit accessed was statistically significant at 5%. The F – ratio (1, 15) for the fitted model was 7.52 with a probability value of 0.03. The R² and adjusted R² of 0.83 and 0.81 respectively were above the statistical threshold of 20% confirming that the amount of milk produced was significantly influenced by the amount of credit accessed. It further implies that amount of credit accessed account for about 81% of the variance in milk produced per cow per lactation, other factors notwithstanding. Based on these results, the null hypothesis was rejected. Thus the amount of credit accessed has a significant influence on the amount of milk produced per cow per lactation by smallholder dairy farmers in Longisa sub-county.

These results agree with Omillo, Ng’ang’a, and Bennett (2013) who argued that in rural set-ups, microfinance has been crucial in providing services that enable buying of farm inputs/implements, buying and treating animals among others, all of which contribute to significant increase in the amount of milk realized.

This study is also consistent with Bichanga and Njage (2014) who established that micro-finance is a strategy of poverty reduction in which when properly positioned can act as a useful tool for improvement of dairy farming in which farmers are able to get better milk production and consequently better incomes.

This study also agrees with Atuya (2013) who observed that microfinance credit plays a crucial role in alleviation of poverty at household level in Nakuru County and Kenya at large. Microfinance credit helps in poverty reduction by making finance accessible to low income earners, less educated and those in the informal sector which helps in expansion of dairy farm business that support increased milk production.

The results of this study are also consistent with IFAD (2013) in which it was observed that microfinance credit supports better milk production in the dairy sector. Through a well-organized public-private sector agreement in which cooling machines as well as other key assets are able to be purchased, most farmers stand to benefit and elevate their levels of production

4.5 Influence of the Amount of Credit Accessed on the Breeds of Cattle Kept by the Smallholder Dairy Farmers

The third objective of this study was to establish the influence of the amount of credit accessed on the breeds of cattle kept by smallholder dairy farmers in Longisa sub-county, Bomet County. In pursuing this objective, a null hypothesis, ‘the amount of credit accessed has no influence on the breeds of cattle kept by the smallholder dairy farmers in Longisa sub-county, Bomet County’ was formulated and tested using ordered logistic regression.

In order to understand the dependent variable much better, this study sought to establish the dairy cattle breeds kept by smallholder dairy farmers in Longisa sub-county, Bomet County. Figure 17 summarizes the relative proportion of dairy cattle breeds in the study area.

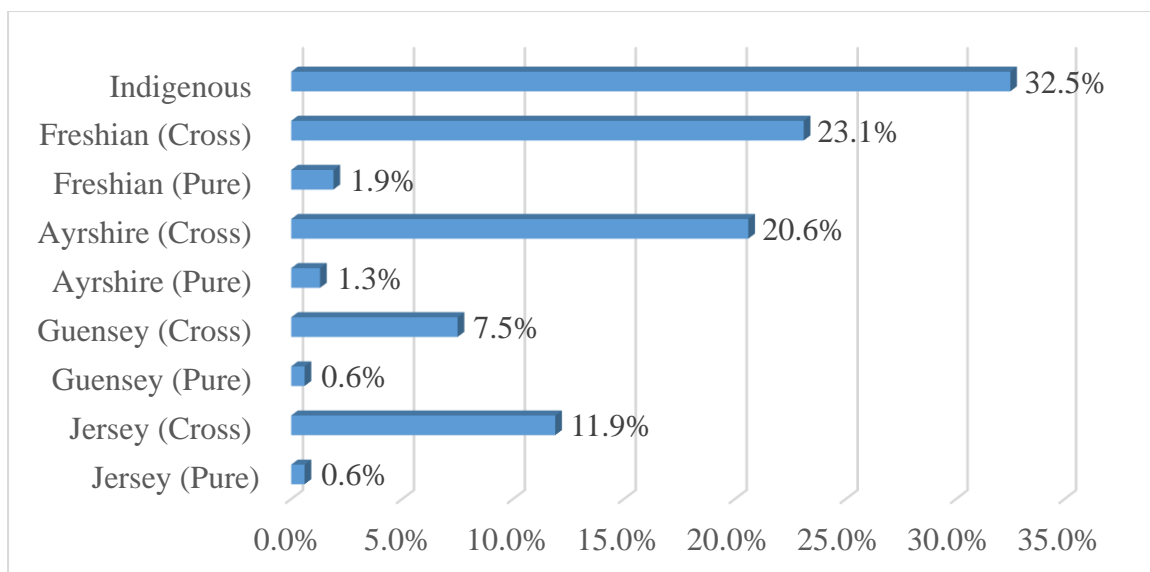


Figure 17. Dairy Cattle Breeds Kept

Source: Field Data (2015)

The results in Figure 17 shows that the most common dairy breed in the study area is indigenous as represented by 32.5% of all the cattle. This is followed by Fresian /Zebu and Ayrshire/Zebu as represented by 23.1% and 20.6%. About 11.9% of the dairy cattle in the study area are Jersey (cross). Each of the pure breeds in the study area (either Fresian, Jersey, Guernsey and Ayrshire) was less than 2%.

Test of Hypothesis H_{02}

The second hypothesis stated, “ H_{02} : The amount of credit accessed has no influence on the breeds of cattle kept by the smallholder dairy farmers in Longisa sub-county, Bomet County”. The hypothesis was tested using ordered logistic regression. Table 14 shows the influence of the amount of credit accessed on the breeds of cattle kept by smallholder dairy farmers in Longisa sub-county.

Table 14

Ordered Logistic Regression Results for the Influence of the Amount of Credit Accessed on dairy Breeds of Cattle Kept

Extent of shift from indigenous to exotic breeds	Coef.	Std. Err.	Z	P>|z|
Amount of credit accessed	0.095*	0.042	2.26	0.024

N = 152, LR = 122.96, LR χ^2 (1) = 12.53, Prob> chi2 = 0.000, Pseudo R²=0.441,

* = Significant at 5% level

The results in Table 14 reveal that the coefficient for the amount of credit accessed (0.095) was positive and statistically significant at 5%. The log likelihood for the fitted model of 122.96 and the log likelihood chi-squared value of 12.53 ($\text{Prob} > \chi^2 = 0.000$) indicate that the two parameters are jointly significant at 5%. Pseudo R^2 of 0.441 meet the statistical threshold of 20% confirming that the breeds of cattle kept by the smallholder dairy farmers in the study area were well attributed to the independent variables considered in the model.

Based on these results, the null hypothesis was rejected. Thus the amount of credit accessed has a significant influence on the breeds of cattle kept by the smallholder dairy farmers in Longisa sub-county, Bomet County. The positive sign of the coefficient imply that greater access to microfinance credit lead to higher shift from indigenous to exotic breeds of cattle.

These results agree with Omillo, Ng'ang'a, and Bennett (2013) whom in their study on the role of microfinance institutions in Bunyala District, Western Kenya, noted that availability of microfinance has played a very big role in improving the life of the people and that their services have positive effects on the farmers' improvement of dairy breeds among other areas such as dairy enterprise development, nutrition and diets.

These results also agree with Khandker (2005) whom in his study on Microfinance and Poverty in Bangladesh found positive effects of participation in microfinance on agricultural development, especially in dairy farming where smallholder farmers were able to adopt better high yielding dairy cattle breeds.

These results also agrees with Taiwo (2012) whom in the study on the impact of Microfinance on welfare and poverty alleviation in Southwest Nigeria found that there has been significant effort towards poverty alleviation and economic development through microfinance. The study concluded that Microfinance Institutions had successfully helped the poor to improve their standard of living and social status through improved dairy farming that is marked by improved breeds.

The use access to of microfinance credit was also found to have positive effects on smallholder livestock farmers' ability to improve their dairy breeds and bring better performance of this sector (Republic of Kenya, 2006). With the intervention of microfinance institution by

provision of needed credit at fair terms, dairy farmers are able to buy improved breeds of cattle that are able to produce higher milk yield.

4.6 Influence of the Amount of Credit Accessed on Animal Husbandry Practices in Dairy Farming among Smallholder Dairy Farmers

The fourth objective of this study was to determine the influence of the amount of credit accessed on animal husbandry practices in dairy farming among smallholder dairy farmers in Longisa sub-county, Bomet County. In pursuing this objective, a null hypothesis, ‘the amount of credit accessed has no influence on animal husbandry practices in dairy farming among the smallholder farmers in Longisa sub-county, Bomet County’ was formulated.

Animal husbandry was assessed with respect to the mode of feeding, supplementation of the feeds and animal housing. This variable was considered ordinal because a farmer could either adopt free grazing at the lowest level and zero grazing at the highest level. In the same way, the farmer could choose to be supplementing locally available animal feeds with dairy meal, molasses, cotton seed cake, wheat bran, minerals and others, or not. Likewise, there is a possibility of different housing structure where dairy cattle may be reared (permanent concrete structure, semi-permanent structure or even no structure at all). Table 15 shows the relative proportion of the farmers using each of the possible modes of feeding.

Table 15

Mode of Feeding Practiced by Farmers in the Study Area

Feeding mode	Frequency	Percent
Zero grazing	1	.7
Semi zero grazing	8	5.3
Tethering	110	72.4
Free/open grazing	33	21.7
Total	152	100.0

Source: Field Data (2015)

The results in Table 15 shows that majority of the farmers were using the tethering mode of feeding as represented by 72.4% of the total respondents. About 21.7% of the households were however practicing free or open grazing. A few households were practicing semi zero grazing

and zero grazing as represented by 5.3% and 0.7% respectively. These results imply that majority of the households have not adopted high standard mode of feeding in their animal husbandry practices.

As far as the supplementation of feeds by the sampled smallholder dairy farmers was concerned, the results are depicted in Figure 18.

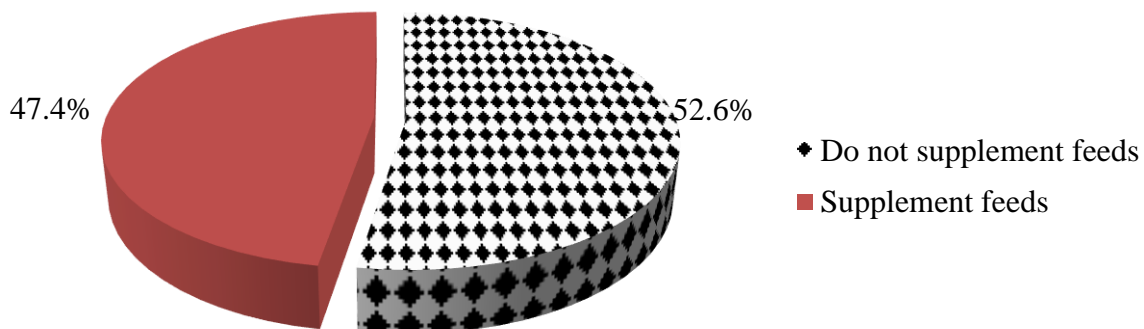


Figure 18. Feed Supplementation

Source: Field Data (2015)

The results in Figure 18 show that 52.6% of the smallholder farmers in the study area do not supplement feeds for their dairy cattle. The 47.4% of the smallholder dairy farmers who were supplementing feeds for their animals confirmed to be using concentrates such as dairy meal, molasses, cotton seed cake and wheat bran as indicated in Table 16.

Table 16

Feed Supplements Used by the Farmers

Feed supplements/concentrates	Frequency	Percent
Dairy meal	61	84.7
Molasses	58	80.6
Wheat bran	15	20.8
Cotton seed cake	3	4.2

Source: Field Data (2015)

Majority (84.7%) of the smallholder dairy farmers were using dairy meal to supplement the locally available cattle feeds in the study area. This was closely followed by farmers who were

using molasses as represented by 80.6% of the respondents. The use of wheat bran and cotton seed cakes was not very popular as only 20.8% and 4.2% of the farmers supplementing their animal feeds were using such concentrates, respectively.

Table 17 shows the type of housing structures used by smallholder dairy farmers in the study area.

Table 17

Type of Housing Structure

Type of housing structure	Frequency	Percent
Permanent concrete structure	1	.7
Semi-permanent structure	5	3.3
No structure	146	96.1
Total	152	100.0

Source: Field Data (2015)

The results in Table 17 shows that majority of the smallholder dairy farmers had no structures where they kept their animals as represented by 96.1% of the respondents. It was only 3.3% and 0.7% of the dairy farmers who had semi-permanent and permanent structures, respectively.

Test of Hypothesis H₀₃

Objective four was translated into the following hypothesis:

H₀₃ The amount of credit accessed has no influence on animal husbandry practices in dairy farming among the smallholder farmers in Longisa sub-county, Bomet County.

The hypothesis was tested using ordered logistic regression. Table 18 shows the influence of the amount of credit accessed on animal husbandry practices in dairy farming by smallholder dairy farmers in Longisa sub-county, Bomet County.

Table 18

Ordered Logistic Regression for the Influence of the Amount of Credit Accessed on Animal Husbandry Practices

Animal husbandry (feeds, supplementation and housing)	Coef.	Std. Err.	Z	P>|z|
Amount of credit accessed	0.092*	0.042	2.17	0.030

N = 152, Log Likelihood = 108.20, LR χ^2 (1) = 9.63, Prob> χ^2 = 0.000, Pseudo R²=0.78,

* = Significant at 5% level

Results in Table 18 reveal that the coefficient for the amount of credit accessed was positive and statistically significant at 5%. The log likelihood for the fitted model of 108.20 and the log likelihood chi-squared value of 9.63 indicate that the two parameters are jointly significant at 5%. Pseudo R² of 0.78 meet the statistical threshold of 20% confirming that the animal husbandry practices by the smallholder dairy farmers in the study area was well attributed to the amount of credit accessed. Based on these results, the null hypothesis was rejected. Thus the amount of credit accessed has a statistically significant influence on animal husbandry practices in dairy farming among the smallholder farmers in Longisa sub-county, Bomet County. This implies that greater access to credit enable smallholder farmers to practice better animal husbandry.

These results agree with Mhunzi (2012) whom in his study on the role of microfinance institutions in poverty alleviation in Dar-Salaam region, Tanzania observed that microfinance institutions can be credited for good farming practices, especially in the dairy sector where the clients have increased their incomes, profits and capital invested through modern dairy farming with better animal husbandry.

This study is consistent with Malik (2011) findings that microfinance had played a key role in the improvement of animal husbandry practices in Pakistan and Bangladesh where majority of the peoples' livelihood is dependent on agricultural activities. The impact was greater in Bangladesh than in Pakistan. This variance was attributed to differences in terms of microfinance outreach. Microfinance is more developed and extensive in rural outreach in Bangladesh than in Pakistan.

This study also agree with Sopheana et al., (2011) who noted that despite some negative effects associated with micro credit, microfinance has generally improved dairy farming and the welfare of households through support of good animal husbandry (animal feeds, feeding, animal health, veterinary services and housing). The impact was however much better where microfinance credit was advanced to households after clear efforts ascertainment of the households' financial situation. This avoided the credit risk of both MFIs and borrowers.

The results of this study are also consistent with IFAD (2013) that noted microfinance credit supports the introduction of improved technology, especially in the dairy sector. In this way, modern animal husbandry practices are promoted in the rural areas of the country.

4.7 Influence of the Training Received on Dairy Farming by Smallholder Dairy

Farmers

The fifth objective of this study was to determine the influence of the training received on dairy farming by smallholder dairy farmers in Longisa sub-county, Bomet County. In pursuing this objective, a null hypothesis, 'the training received by smallholder farmers has no influence on dairy farming in Longisa sub-county, Bomet County' was formulated.

Figure 19 depict the proportion of households receiving trainings from microfinance institutions on different topics on dairy farming.

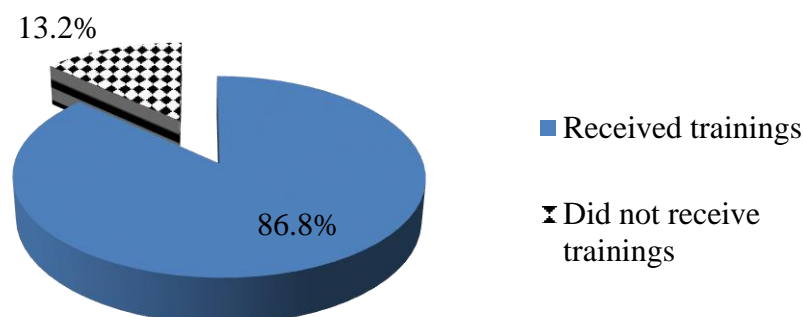


Figure 19. Proportion of Households who had Received Trainings

Source: Field Data (2015)

The results indicate that majority of the households had been receiving trainings on dairy farming from microfinance institutions as represented by 86.8% of the total households. However, about 13.2% of the households had no access to the trainings.

Some of the most significant knowledge and skills gained by the dairy farmers from the trainings offered by the microfinance institutions are depicted in Figure 20.

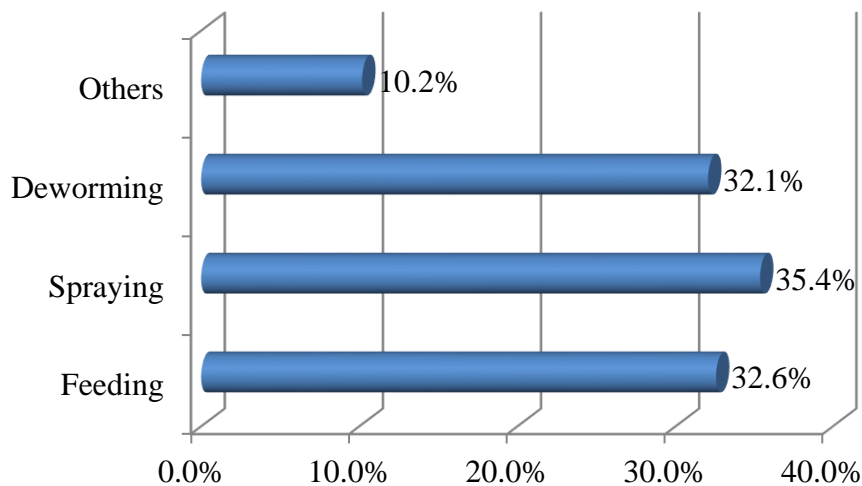


Figure 20. Most Significant Knowledge and Skills Gained by the Dairy Farmers from MFI's Trainings.

Source: Field Data (2015)

The results in Figure 20 show that the most significant knowledge and skills gained by the dairy farmers from the training received involve spraying of dairy animals against external parasites as represented by 35.4% of the total responses. This was closely followed by feeding (32.6%) and deworming (32.1%). Other significant knowledge and skills gained by 10.2% of the dairy farmers from the trainings offered by the microfinance institutions include training on animal health, housing, farm business plan (FBP), insurance, record keeping, veterinary services, how to finance dairy farming/product loan, financial management, how to improve milk yields and selection of good dairy breeds.

Most of the trainings received by the dairy farmers from the microfinance institutions were noted to take one day as shown in Figure 21.

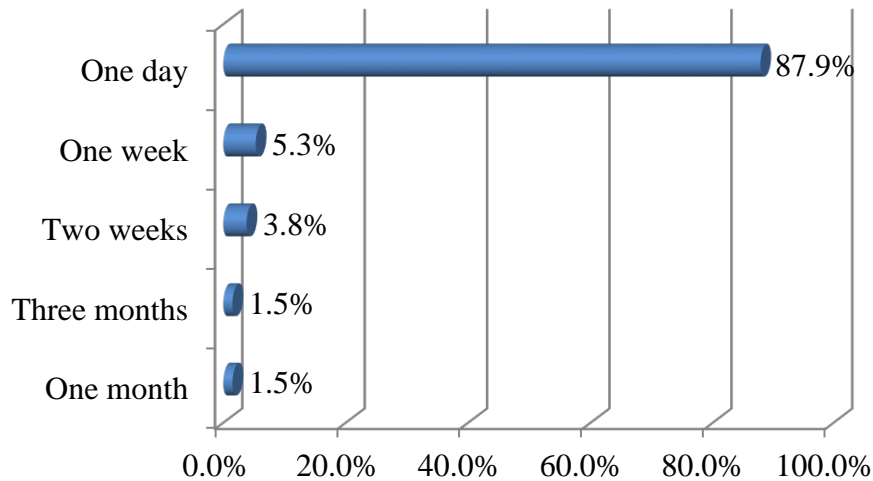


Figure 21. Training Duration

Source: Field Data (2015)

The results in Figure 21 shows that majority of the trainings received by farmers were one day in duration as represented by 87.9% of the responses. A few trainings were noted to take one week (5.3%), two weeks (3.8%), three weeks (1.5%) and one month (1.5%).

This study sought to determine whether the sampled households were receiving extension (training and advisory) services. The results are indicated in Figure 22.

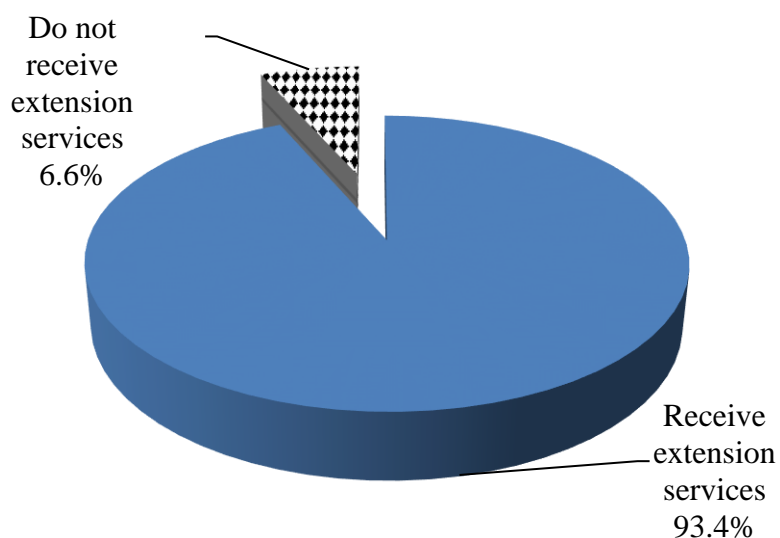


Figure 22. Whether the Respondent Receive Extension (Training and Advisory) Services on Dairying

Source: Field Data (2015)

The results in Figure 22 shows that majority of the households were receiving extension services on dairy farming as represented by 93.4% of the households. However, about 6.6% of the households were not accessing extension services for use in dairy farming

Some of the major sources of extension services in the study area are depicted in Figure 23.

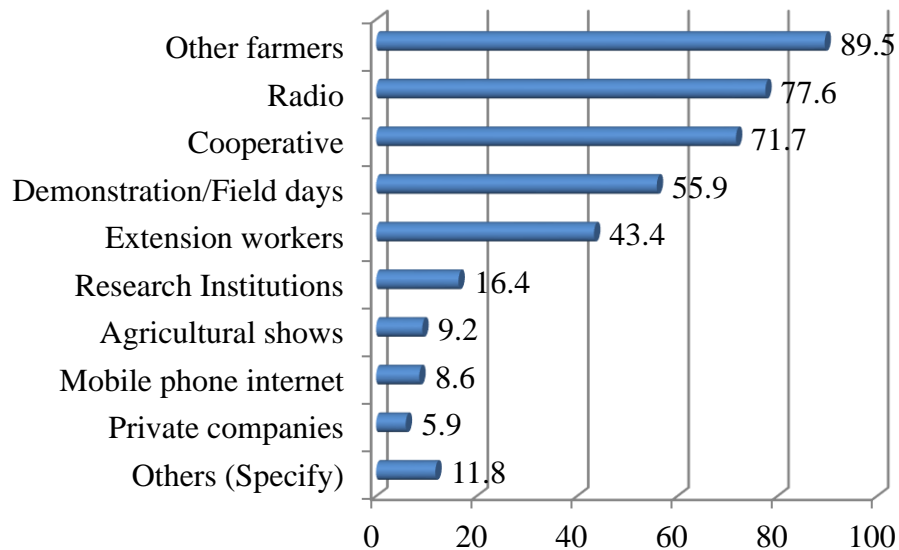


Figure 23. Source of Extension Information

Source: Field Data (2015)

This study noted that majority of the households are not satisfied with the extension services received as depicted in Figure 24.

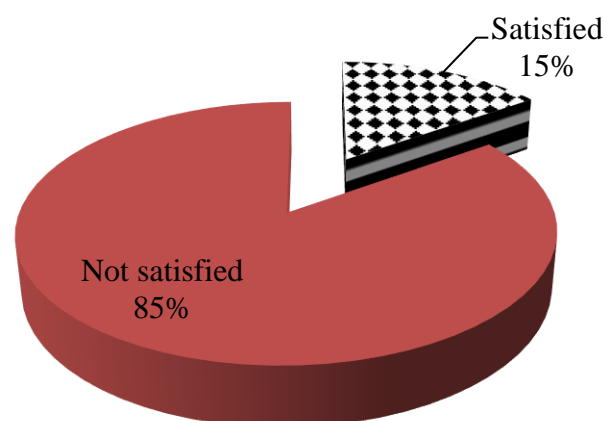


Figure 24. The Satisfaction Levels of the Respondent with the Extension Services Provided

Source: Field Data (2015)

Some of the reasons why the respondents were not satisfied with the extension services are shown in Table 19.

Table 19

Reason for not Being Satisfied with the Extension Services Provided

Reason	Frequency	Percent
No training	126	95.5
Venue for training are far	6	4.5
Total	132	100.0

Source: Field Data (2015)

The results in Table 8 shows that majority of the households (95.5%) cited that they were not satisfied with the extension services since they did not receive any training from such service providers. Other households (4.5%) cited that the venue available for trainings were far, and thus a reason for lack of satisfaction through the services. This implies that most dairy farmers may not be well empowered with important farming information and hence the reason for realizing low milk yields, keeping poor dairy breeds and not implementing good animal husbandry practices.

Test of Hypothesis H₀₄

Objective five was translated into the following hypothesis:

H₀₄ The training received by smallholder farmers has no influence on dairy farming in Longisa sub-county, Bomet County.

The hypothesis was tested using simple linear regression and ordered logistic regression. Table 19, 20 and 21 shows the influence of the training received by smallholder farmers on dairy farming in Longisa sub-county, Bomet County.

The influence of the training received by smallholder farmers on the amount of milk produced was analysed using simple linear regression. Table 19 shows the regression results. Training received was captured as a dummy variable depending on whether a farmer received the services from microfinance institutions or not.

The results reveal that three coefficients were significant at 5% level. The F – ratio for the fitted model was 6.43 (Prob> F = 0.000) indicating that all parameters are jointly significant at 5%. The adjusted R² of 0.33 was also above the statistical threshold of 20% confirming that the amount of milk produced was well attributed to the independent variables considered in the model.

Table 20

Linear Regression Results on the Influence of the Training Received by Smallholder Farmers on the Amount of Milk Produced

Amount of milk produced	Coef.	Std. Err.	T	P>t
Feeds	0.637	2.454	0.26	0.80
Animal health	4.532*	1.169	3.88	0.00
Housing	4.026*	1.330	3.03	0.00
Farm business plan (FBP)	1.360	1.211	1.12	0.26
Insurance	1.750	1.272	1.38	0.17
Record keeping	2.123	1.964	1.08	0.28
Veterinary services	0.241	1.328	0.18	0.86
How to finance dairy farming/product loan	4.794*	1.695	2.83	0.01
Financial management	1.395	1.686	0.83	0.41
How to improve milk yields	3.125	1.998	1.56	0.12
Selection of good dairy breeds	1.031	1.368	0.75	0.45
_cons	1.660	3.752	0.44	0.66

N = 152, F (12, 140) = 6.43, Prob> F = 0.000, R² =0.39, Adj R² =0.33,

* = Significant at 5% level

Training on animal health was observed to have a significant and positive relationship with the amount of milk produced at 5% level. The positive sign on the variable imply that the amount of milk produced increase with the reception of trainings on animal health. This therefore suggests more milk may be realized from the study area with increased farmers training with respect to maintaining their dairy herd healthy (control of external and internal parasites/pest and disease control).

Training on dairy animal housing was observed to have a significant and positive relationship with the amount of milk produced at 5% level. The positive sign on the variable imply that the amount of milk produced was more where the farmers were given trainings on how to house their dairy cattle. The increase in the amount of milk produced may be due to the fact that better housing is associated with better animal husbandry and hence better milk production.

Training on how to finance dairy farming (product loan) was observed to have a significant and positive relationship with the amount of milk produced at 5% level. The positive sign on the variable imply that the amount of milk produced increased with the farmers' access to trainings on the subject. This therefore suggests that milk production may be improved if microfinance may increase their trainings on their different loan products available to dairy farmers.

The influence of the training received by smallholder farmers on the breeds kept was analysed using ordered logistic regression. Table 21 shows the regression results.

The results reveal that five coefficients were significant at 5% level. The log likelihood for the fitted model of 104.73 and the log likelihood chi-square value of 81.87 indicate that the study parameters are jointly significant at 5%. Pseudo R^2 of 0.281 is also above the statistical threshold of 20% confirming that the breeds kept by the smallholder dairy farmers in the study area was well attributed to the training received.

Table 21

Ordered Logistic Regression Results on the Influence of the Training Received by Smallholder Farmers on the Breeds Kept

Extent of shift from indigenous to exotic breeds	Coef.	Std. Err.	Z	P>z
Feeds	1.049	1.071	0.980	0.327
Animal health	1.922*	0.525	3.660	0.000
Housing	2.058*	0.629	3.270	0.001
Farm business plan (FBP)	1.439*	0.529	2.720	0.007
Insurance	0.625	0.546	1.140	0.252
Record keeping	2.965*	0.901	3.290	0.001
Veterinary services	1.191*	0.592	2.010	0.044
How to finance dairy farming/product loan	1.200	0.719	1.670	0.095
Financial management	0.147	0.689	0.210	0.831
How to improve milk yields	3.122*	0.851	3.670	0.000
Selection of good dairy breeds	0.663	0.571	1.160	0.246

N = 152, LR $\chi^2 = 81.87$, Prob> $\chi^2 = 0.000$, Pseudo R² = 0.281, Log likelihood = -104.73,

* = Significant at 5% level

Training on animal health was observed to have a significant and positive relationship with the breeds kept at 5% level. The positive sign on the variable imply that the dairy breed kept improves (moving away from indigenous) with the reception of trainings on animal health. This therefore suggests better breeds are kept when farmers get more training on animal health.

Training on animal housing, farm business plan (FBP), record keeping and veterinary services were observed to have a significant and positive relationship with the breeds kept at 5% level. The positive sign on these variables imply that the adoption of exotic breeds is greater when farmers are able to receive trainings on subjects related to animal housing, farm business plan, record keeping and veterinary services.

The influence of the training received by smallholder dairy farmers on animal husbandry in the study area was analysed using ordered logistic regression. The dependent variable, animal husbandry was measured with respect to the mode of feeding (zero grazing, semi zero grazing,

tethering, free/open grazing), supplementation of feeds and type of housing structure (permanent concrete structure, semi-permanent structure, no structure) adopted. This study considered the trainings received on feeds, animal health, housing, farm business plan (FBP), insurance, record keeping, veterinary services, how to finance dairy farming/product loan, financial management, how to improve milk yields and selection of good dairy breeds as the independent variables. Table 22 shows the regression results.

Table 22

Ordered Logistic Regression Results on the Influence of the Training Received by Smallholder Farmers on Animal Husbandry

Animal husbandry	Coef.	Std. Err.	Z	P>z
Feeds	0.154	1.263	0.120	0.903
Animal health	1.372*	0.585	2.350	0.019
Housing	1.833*	0.623	-2.940	0.003
Farm business plan (FBP)	0.883	0.585	1.510	0.131
Insurance	0.706	0.643	1.100	0.272
Record keeping	2.586*	1.021	2.530	0.011
Veterinary services	1.376*	0.695	-1.980	0.048
Financing dairy farming/product loan	0.416	0.820	0.510	0.612
Financial management	3.933*	0.881	-4.460	0.000
How to improve milk yields	1.290	1.019	1.270	0.206
Selection of good dairy breeds	3.301*	0.727	4.540	0.000

N = 152, LR χ^2 (12) = 72.41, Prob> χ^2 = 0.000, Pseudo R² = 0.325, Log likelihood = 75.25,

* = Significant at 5% level

Results in Table 22 reveal that six coefficients were significant at 5% level. The log likelihood for the fitted model of 75.25 and the log likelihood chi-squared value of 72.41 (P-value = 0.000) indicate that the study parameters are jointly significant at 5%. Pseudo R² of 0.325 is also above the statistical threshold of 20% confirming that the animal husbandry practices by the smallholder dairy farmers in the study area were well attributed to the training received.

Training on animal health was observed to have a significant and positive relationship with the animal husbandry practices in the study area at 5% level. The positive sign on the variable imply that the animal husbandry improves with the training received on animal health.

Training on animal housing was also observed to have a significant and positive relationship with the animal husbandry practices at 5% level. The positive sign on these variables imply that the more the trainings on animal housing received by the smallholder dairy farmers in the study area, the more there is a shift from free/open grazing towards tethering towards semi zero grazing and towards zero grazing.

Training on record keeping was also observed to have a significant and positive relationship with the animal husbandry practices in the study area at 5% level. The positive sign on this variable imply that smallholder farmers who had received trainings on record keeping were more likely to have progressed from open/free grazing to tethering, and to semi-zero grazing, and eventually to zero grazing.

Training on veterinary services was also observed to have a significant and positive relationship with the animal husbandry practices in the study area at 5% level. The positive sign on this variable imply that smallholder farmers who had received trainings on veterinary services were more likely to practice better animal husbandry as opposed to those who had not received such trainings.

Training on financial management was observed to have a significant and positive relationship with animal husbandry practices in the study area at 5% level. The positive sign on this variable imply that better animal husbandry is practiced by the farmers who had received trainings on financial management as opposed to their counterparts who had not received such trainings.

Training on selection of good dairy breeds was also observed to have a significant and positive relationship with the animal husbandry practices in the study area at 5% level. The positive sign on this variable imply that smallholder farmers who had received trainings on selection of good dairy breeds were more likely to have progressed from open/free grazing to tethering, and to semi zero grazing, and eventually to zero grazing.

These results agree with IPA (2009) that noted that MFI's non-financial assistance, such as technical advice and training increase agricultural productivity, not only in crop but also in

dairy farming. Since such support can be costly and may require more staff time or expertise than is available; and as such, it may not be an appropriate strategy for all MFIs. IPA (2009) recommended that partnerships between public and private sectors stakeholders could help farmers without placing an undue burden on lenders.

This study also agree with Zahidul-Islam and Tenaw (2009) who argued that microfinance credit can significantly turn around the dairy sector and help farmers increase their level of milk produced and consequently realize higher incomes. However, the impact of microfinance participation should be coupled by appropriate trainings that may enable farmers to make informed decisions about the use of credit received.

The results of the study are consistent with those of Carroll et al., (2012) whom in their exploration of the effectiveness of social lender model in meeting smallholder financing needs and improving production found that farmers using financial resources drawn from MFI's require training to utilize them effectively in order to enhance their success in agriculture and realize greater profitability. Farmers who were given basic financial training were able to utilize their loans more prudently and were able to improve their production.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This section presents summary of key study findings as well as conclusions and recommendations which are logically arranged in line with the objectives of the study. Some areas of further research have also been suggested.

5.2 Summary of Findings

The following were the salient findings of this study:

- i) Majority (97.4%) of the households in the study area were aware of microfinance institutions operating in the area. Likewise, majority of the households had borrowed loan from microfinance institutions for use in dairy farming as represented by 80.9% of the households. Some of the microfinance loan obtained for use in dairy farming was diverted to other forms of farming (poultry, food crops and cash crops), payment of school fees, purchase of family food and buying of iron sheets. Most of the MFIs were offering small loans (mostly less than Kshs. 30,000). Consequently, majority of the households had borrowed less than Kshs. 10,000 from MFIs within the past four years.
- ii) The amount of credit accessed was noted to influence the amount of milk produced per cow per lactation among smallholder dairy farmers in the study area. Farmers who had accessed microfinance credit in dairy farming were found to realize higher milk production.
- iii) It emerged from the study that the breeds of cattle kept by the smallholder dairy farmers in the study area could be attributed to the amount of MFI's credit accessed. The most common dairy breed in the study area was indigenous cattle as represented by 32.5% of all the cattle. This was followed by Fresian/Zebu and Ayrshire/Zebu as represented by 23.1% and 20.6% respectively.
- iv) The amount of credit accessed in dairy farming was found to have an influence on animal husbandry practices in dairy farming among the smallholder farmers in the study area. Better animal husbandry was attributed to farming that employed more microfinance credit. However, majority of the households were still using the tethering

mode of feeding as represented by 72.4% of the total respondents with only a few households practicing semi zero grazing and zero grazing as represented by 5.3% and 0.7% respectively. In addition, majority (52.6%) of the smallholder farmers in the study area did not supplement feeds for their dairy cattle. Similarly, majority of the smallholder dairy farmers had no structures where they kept their animals as represented by 96.1% of the respondents (only 3.3% and 0.7% of the smallholder dairy farmers had semi-permanent and permanent structures, respectively).

- v) Majority of the households had been receiving trainings on dairy farming from microfinance institutions as represented by 86.8% of the total households. The most significant knowledge and skills gained by the dairy farmers from the training received involve spraying of dairy animals against external parasites as represented by 35.4% of the total responses. Most of the trainings by the microfinance institutions took one day. Training on animal health, animal housing and how to finance dairy farming (product loan) was found to influence the amount of milk produced. Training on animal health, animal housing, farm business plan (FBP), record keeping and veterinary services was observed to have an influence on the breeds kept. In addition, trainings on animal health, animal housing, record keeping, veterinary services, financial management and selection of good dairy breeds were found to improve the animal husbandry practices by smallholder farmers in the study area.

5.3 Conclusions

Majority of the households borrow loan from microfinance institutions for use in dairy farming. However, much of the loan is diverted to other uses. The amount of microfinance credit accessed by smallholder in dairy farming significantly influence the amount of milk produced per cow per lactation in the study area. The amount of microfinance credit accessed by smallholder farmers in dairy farming significantly influence the breeds of cattle kept in the study area. The amount of credit accessed significantly influence the animal husbandry practices in dairy farming among the smallholder farmers in the study area. The practice of zero and semi-zero grazing was more popular with households that had accessed more microfinance credit. Similarly, households that had accessed more microfinance credit in dairy farming were supplementing feeds for their dairy cattle and had structures where they kept their animals as compared to their counterparts who were not accessing (or using less) microfinance credit. Microfinance institutions have been providing trainings on dairy farming. Training on

animal health, animal housing and how to finance dairy farming (product loan), farm business plan (FBP), record keeping and veterinary services, financial management and selection of good dairy breeds were noted to influence dairy farming among smallholder farmers in the study area.

5.4 Recommendations

In view of the findings and the conclusion drawn above, this study makes the following recommendations:

- i) In their efforts to realize higher milk yields, smallholder dairy farmers in the study area should embrace microfinance credit in financing their dairy farming. Microfinance is a useful tool for achieving credit for use in dairy farming.
- ii) Dairy breed improvement requires substantial amount of capital. In this regard, dairy farmers in the study area should take advantage of the available and upcoming microfinance institutions in their efforts to obtain the necessary finances for breed improvement. Good dairy breeds result to higher milk yield.
- iii) In order to improve animal husbandry practices (feeding, animal health, veterinary services and housing) on dairy farming, access to microfinance credit should be embraced in the study area.
- iv) Microfinance institutions should endeavor to increase their trainings to smallholder dairy farmers on various important topics in dairy production and using experts in the field. Strategic partnerships with other key stakeholders (governments, NGOs, farmers' organizations and academic institutions) can be very helpful in conducting of high quality trainings at a cost effective manner.

5.5 Suggestions for Further Research

The findings of this study act as a base for more research on the impact of smallholder dairy farmers' participation in microfinance on dairy farming in the study area. This study was not exhaustive and suggests further research on:

- i) The effect of diversion of microfinance credit meant for use in dairy farming on microfinance institutions loan recovery abilities and dairy farming activities in the study area.

- ii) The impact of microfinance institutions' advisory services on the influence of the amount of credit accessed on dairy farming in the study area.
- iii) The influence of sources of credit on dairy farming among smallholder farmers in the study area.

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APPENDIX A: QUESTIONNAIRE FOR SMALLHOLDER DAIRY FARMERS

Questionnaire Code Number _____

Dear Sir / Madam

I am a Master's student from Egerton University carrying out a study on influence of smallholder dairy farmers' participation in microfinance on dairy farming in Longisa sub-county, Bomet County. Your responses to the questions will be confidential and will only be used for the purpose of this study. Please provide us with the most accurate information to the best of your knowledge. Your cooperation will be highly appreciated.

Name of the respondent: _____ Phone Number: _____

Sub-County _____ Location _____ Sub-location _____

Instructions

Tick [✓] or write your response in the spaces provided

SECTION A: DEMOGRAPHIC INFORMATION

- 1) Gender
 - a) Male []
 - b) Female []
- 2) Relationship with the household head
 - c) Household head []
 - d) Spouse []
 - e) Son/Daughter []
 - f) Sister/Brother []
 - g) Grandson/Granddaughter []
 - h) Uncle/Aunt []
 - i) Farm worker []
 - j) Other Relatives (Specify) _____
- 3) Marital status:
 - a) Single []
 - b) Married []
 - c) Widow []
 - d) Widower []
 - e) Others (specify)

4) What is your age? _____

- a) <20 years []
- b) 21- 30years []
- c) 31- 40years []
- d) 41 – 50 years []
- e) 51 – 60 years []
- f) 61 years and above []

5) What is your level of education?

- a) No formal Education []
- b) Primary (Std 1 – 4) []
- c) Primary (Std 5 – 8) []
- d) Secondary (Form 1 – 2) []
- e) Secondary (Form 3 – 4) []
- f) Tertiary (College) []
- g) Tertiary (University) []

6) What are some of the major enterprises that you engage on:

Enterprise	Specify	Area under the enterprise
i) Crop Production	i) .....	.....acres
	ii) .....	.....acres
	iii) .....	.....acres
	iv) .....	.....acres
	v) .....	.....acres
ii) Livestock production	[] Dairy farming	.....acres
	[] Beef production	.....acres
	[] Sheep/goats	.....acres
	[] Poultry keeping	
	[] Other livestock _____	.....acres
iii) Non-farm	i) .....	.....
	ii) .....	.....
	iii) .....	.....

7) a) Do you receive extension (training and advisory) services on dairying?

i) Yes []

ii) No []

b) If yes, where do you get information on dairy farming practices?

i) Extension workers []

ii) Cooperative []

iii) Research Institutions []

iv) Radio []

v) Mobile phone internet []

vi) Other farmers []

vii) Agricultural shows []

viii) Private companies []

ix) Demonstration/Field days []

x) Others (Specify).....[]

c) Are you satisfied with the extension services provided? Yes [] No []

If No Explain

8) Indicate the different farm machineries and implement that you own in your farming enterprise.

Farm machineries:

i) Tractor []

ii) Wheelbarrow []

iii) Shuffcutter []

iv) Others (Specify).....

Farm Implements:

i) Sprayer []

ii) Spades []

iii) Hammer []

iv) Sickle []

v) Jembe []

vi) Panga []

vii) Chain strainer []

viii) Others (Specify).....

9) How adequate are all the farm machinery and implements in your farm?

- i) Very adequate []
- ii) Adequate []
- iii) Moderate []
- iv) Inadequate []
- v) Very inadequate []

SECTION B: CREDIT INFORMATION

10) Within the past four years, have you ever borrowed loan from microfinance institution for use in dairy farming? Yes [] No []

Where did you borrow credit for use in dairy farming in the past four years (2011 - 2014) for dairy farming from MFI?

- a) Equity Bank: []
- b) Family Bank []
- c) Trans-National Bank []
- d) SACCO (i)..... []
(ii)..... []
- e) Farmer groups (i)..... []
(ii)..... []
- f) Informal Groups (Merry-Go-Round)
(i)..... []
(ii)..... []

11) How much money did you (cumulatively) borrow from the above sources? _____Kshs.

12) Are there microfinance institutions operating in Longisa Sub-County that you are aware?

Yes [] No []

If yes, name these institutions

- i)
- ii)
- iii)
- iv)
- v)

13) Indicate other possible purpose of the credit that you accessed from microfinance institutions.

- a)
- b)
- c)
- d)
- e)

14) Was the loan accessed applied in dairy farming? Yes [] No []

15) If yes, indicate for what purpose was the loan acquired.

- a) Buying of a dairy cow []
- b) Improvement of animal husbandry practices
 - i) Purchase of feeds []
 - ii) Improvement of breeds through AI services []
 - iii) Acquisition of machinery/equipments (sprayers, milking machines) []
 - iv) Purchase of veterinary drugs/acaricides (health care management) []
 - v) Hiring labour []

c) Others (Specify).....

16) Indicate proportion of the amount of credit utilized with respect to the total amount of loan accessed.

- i) Did not use the amount for dairy farming []
- ii) Less than 25% []
- iii) Between 25% and 50% []
- iv) Between 50% and 75% []
- v) Above 75% []

17) Do you have other sources of income apart from dairy farming? Yes [] No []

18) Name other income generating activities apart from dairy farming that you engage on

- a)
- b)
- c)
- d)
- e)

19) If yes, how much do you earn from these activities per month?

- a) 1000-5000 []
- b) 5001-10000 []
- c) 10001-15000 []
- d) Above 15000 []

SECTION C: AMOUNT OF MILK PRODUCED

20) How much milk did you get per cow per day in 2014?

Breeds	During the wet season	During the dry season
Indigenous		
Exotic		
Cross		

SECTION D: BREEDS OF DAIRY CATTLE KEPT

21) Which breeds of dairy cattle are you rearing in your farm?

- a)
- b)
- c)
- d)
- e)

22) How many dairy cows do you have in each of the below categories?

Breeds	Number
Indigenous	
Exotic	
Cross	
Totals	

23) To what extent have you adopted exotic breeds in your dairy farming?

- i) Very high []
- ii) High []
- iii) Moderate []
- iv) Low []
- v) Very low []

SECTION E: ANIMAL HUSBANDRY PRACTICES

24) What mode of feeding do you practice for your dairy farming?

- a) Zero grazing []
- b) Semi zero grazing []
- c) Tethering []
- d) Free/Open grazing []

25) Do you supplement feeds? Yes [] No []

If yes, Specify

Dairy meal [] Molasses []

Cotton seed cake [] Wheat bran []

Others.....

26) How much do you spend on the following activities?

- i) Dairy supplement feeds Kshs.....per month
- ii) Pest control Kshs.....per month
- iii) AI services Kshs.....per year
- iv) Others (specify)..... Kshs.....

27) What type of housing structure do you rear your dairy cattle in?

- i) Permanent concrete structure []
- ii) Semi permanent structure []
- iii) No structure []

SECTION F: TRAINING RECEIVED FROM MICROFINANCE

28) Have you received any training from Microfinance institutions in the last four years (2011 – 2014)? Yes [] No []

29) If yes, what were the key contents of the training offered by the microfinance institution related to dairy cattle farming?

- i) Feeds []
- ii) Animal health []
- iii) Housing []
- iv) Farm Business Plan (FBP) []
- v) Insurance []
- vi) Record keeping []
- vii) Veterinary services []
- viii) How to finance dairy farming/loan products []

- ix) Financial management []
- x) How to improve milk yields []
- xi) Selection of good dairy breeds []

30) What are some of the most significant knowledge and skills that you have so far gained from the trainings?

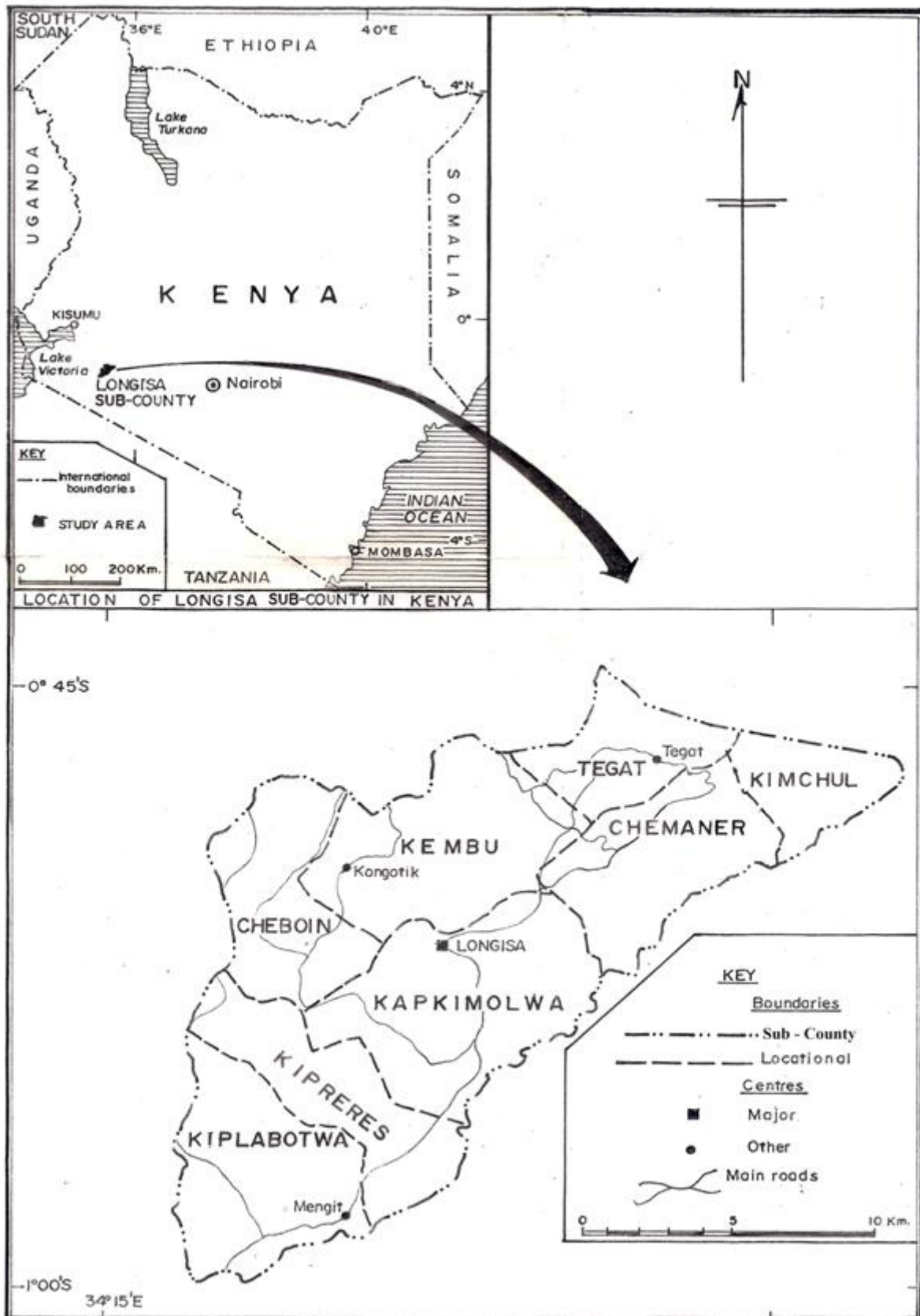
- i)
- ii)
- iii)
- iv)
- v)

31) How much time (duration) did the training take?

- i) One day []
- ii) One week []
- iii) Two weeks []
- iv) One month []
- v) Three months []
- vi) Others, (specify).....

Thank you for your cooperation

APPENDIX B: MAP OF LONGISA SUB-COUNTY, BOMET COUNTY



Source: Ministry of Lands, Bomet County (2013). Page 2

APPENDIX C: RESEARCH AUTHORIZATION



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349, 310571, 2219420
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Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:

11th August, 2015

NACOSTI/P/15/1331/6814

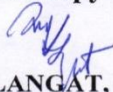
Angela Anyango Kenduiwa
Egerton University
P.O Box 536-20115
EGERTON.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *“Influence of smallholder dairy farmers’ participation in microfinance on dairy farming in Longisa Sub-County, Bomet County, Kenya,”* I am pleased to inform you that you have been authorized to undertake research in **Bomet County** for a period ending **4th December, 2015**.

You are advised to report to **the County Commissioner and the County Director of Education, Bomet County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.


DR. S. K. LANGAT, OGW *
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Bomet County.

The County Director of Education
Bomet County.

National Commission for Science, Technology and Innovation is ISO 9001: 2008 Certified

APPENDIX D: RESEARCH PERMIT

THIS IS TO CERTIFY THAT:
MS. ANGELA ANYANGO KENDUIWA
of EGERTON UNIVERSITY, 15999-20100
nakuru, has been permitted to conduct
research in Bomet County

on the topic: INFLUENCE OF
SMALLHOLDER DAIRY FARMERS'
PARTICIPATION IN MICROFINANCE ON
DAIRY FARMING IN LONGISA
SUB-COUNTY, BOMET COUNTY, KENYA

for the period ending:
4th December, 2015

Applicant's
Signature

Permit No. : NACOSTI/P/15/1331/6814
Date Of Issue : 11th August, 2015
Fee Received :Ksh 1,000



Director General
National Commission for Science,
Technology & Innovation

CONDITIONS

- 1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit**
- 2. Government Officers will not be interviewed without prior appointment.**
- 3. No questionnaire will be used unless it has been approved.**
- 4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.**
- 5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.**
- 6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.**

REPUBLIC OF KENYA

NACOSTI

National Commission for Science,
Technology and Innovation

RESEARCH CLEARANCE
PERMIT

Serial No. A 6137

CONDITIONS: see back page