

**FACTORS INFLUENCING ADOPTION OF COMMERCIAL
RABBIT PRODUCTION AMONG FARMERS IN NAKURU
DISTRICT, KENYA**

BY

BENSON MWANGANGI MUTISYA

**A RESEARCH PROJECT REPORT SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF THE
MASTER OF ART DEGREE IN PROJECT PLANNING AND
MANAGEMENT OF THE UNIVERSITY OF NAIROBI**

2014

DECLARATION

This research project report is my original work and has not been presented to any other institution of learning for the award of academic certificate.

.....

BENSON MWANGANGI MUTISYA

L50/63042/2013

.....

DATE

This research project report has been submitted for examination with my approval as the University Supervisor.

.....

DR.LYDIAH N. WAMBUGU

LECTURER,

DEPARTMENT OF EXTRA MURAL STUDIES,

UNIVERSITY OF NAIROBI.

.....

DATE

DEDICATION

This research is dedicated to my beloved parents, to my wife Dorothy for her moral and financial support, self-sacrifice and determination to ensure my success. Also to my children Jonathan and David Mwendwa.

ACKNOWLEDGEMENT

I am greatly indebted to my supervisor Dr. Lydiah Wambugu for her guidance, encouragement and concern. She paid attention to details and was available to patiently read and offer her constructive criticism. I acknowledge the support offered by group members and fellow classmates towards the completion of this proposal. I thank my family members for granting me the atmosphere to work on the project.

Special thanks to the Nakuru extramural centre staff members for the cooperation and support they accorded me. My attributes goes to the late Mr.Mungai for his fatherly council and guidance, may God rest his soul in eternal peace, and to all of you I say may God bless you abundantly.

TABLE OF CONTENTS

	Page
DECLARATION.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT.....	iv
TABLE OF CONTENT.....	v
LIST OF FIGURES.....	x
LIST OF TABLES.....	xi
ABBREVIATION AND ACRONYMS.....	xiii
ABSTRACT.....	xiv
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background to the Study.....	1
1.2 Statement of the Problem.....	5
1.3 Purpose of the Study.....	6
1.4 Objective of the Study.....	6
1.5 Research Questions.....	6
1.6 Significance of the Study.....	7

1.7 Delimitation of the Study.....	8
1.8 Limitation of the Study.....	8
1.9 Basic assumptions of the Study.....	8
1.10 Definition of Significant terms.....	9
CHAPTER TWO: LITERATURE REVIEW.....	11
2.1 Introduction.....	11
2.2 World rabbit production.....	11
2.3 Rabbit production in Africa.....	12
2.4 Rabbit production in Kenya.....	13
2.5 Factors influencing adoption rate of commercial rabbit production	17
2.5.1 Technical knowledge and adoption of commercial rabbit production.....	17
2.5.2 Marketing strategy and adoption of commercial rabbit production.....	19
2.5.3 Social cultural factors and adoption rate of commercial rabbit production.....	22
2.5.3.1 Land tenure and commercial rabbit production.....	23
2.5.3.2 Capital and adoption of commercial rabbit production.....	23
2.5.3.3 Human labor and adoption of commercial rabbit production.....	24
2.5.3.4 Acceptability and rejection of commercial rabbit production.....	25

2.5.3.5 Demographic characteristics and adoption of commercial rabbit production.....	26
2.5.4 Training and extension services in relation to adoption of commercial rabbit production.....	27
2.6 Theoretical frame work.....	29
2.7 Conceptual frame work.....	31
2.8 Summary of literature review.....	32
CHAPTER THREE: RESEARCH METHODOLOGY.....	34
3.1 Introduction.....	34
3.2 Research design.....	34
3.3 Target population.....	34
3.4 Sample size and Sampling procedures.....	35
3.5 Data Collection Instruments.....	35
3.5.1 Pilot testing of the Instruments.....	35
3.5.2 Validity of the Instruments.....	36
3.5.3Reliability of the Instruments	36
3.6 Data Collection Procedures.....	37
3.7 Data Analysis Techniques.....	37
3.8 Ethical consideration.....	38
3.9 Operational Definition of Variables.....	38

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION OF

FINDINGS.....	39
4.1 Introduction.....	39
4.2 Questionnaire return rate.....	39
4.3 Demographic characteristics of the respondent.....	39
4.3.1 Gender of the Respondents	39
4.3.2 Age of Respondents.....	40
4.3.3 Marital status of the Respondent.....	41
4.4. Influence of technical knowledge on adoption of commercial rabbit production.....	42
4.4.1 Experience in commercial rabbit production.....	42
4.4.2 Farmers keeping Rabbit production Records.....	43
4.4.3 Record keeping influence Adoption	44
4.4.4 Type of records kept.....	45
4.5 Influence of marketing factors on adoption of commercial rabbit production	46
4.5.1 Rabbit selling Price.....	46
4.5.2 Price influence adoption of Commercial Rabbit production.....	47
4.5.3 Availability of Rabbit Market.....	47
4.5.4 Market availability influence adoption.....	48

4.6 Influence of Social cultural factors on commercial rabbit production.....	48
4.6.1 Involvement in Rabbit keeping.....	48
4.6.2 Eating of Rabbits.....	49
4.7 Influence of Training and Extension services on adoption of commercial rabbit production.....	50
4.7.1 Attended training organized by ministry of agriculture livestock and fisheries.....	50
4.7.2 Methods of training used.....	50
4.7.3 Training influenced adoption of commercial rabbits Production.....	51
4.7.4 What motivates Farmers to adopt Commercial Rabbit production.....	52
CHAPTER FIVE: SUMMARY OF FINDINGS, DISCUSSION, CONCLUSION AND RECOMMEDATIONS OF THE STUDY.....	54
5.1. Introduction.....	54
5.2 Summary of Findings.....	57
5.3 Discussion of Findings.....	57
5.3.1 Technical knowledge on adoption of commercial rabbit production.....	56
5.3.2 Marketing factors on adoption of commercial rabbit production.....	57
5.3.3 Social cultural factors on adoption of commercial rabbit production.....	57
5.3.4 Influence of training and extension on commercial rabbit production.....	59
5.4 Conclusions of the study.....	59

5.5 Recommendations of the Study.....	60
5.6 suggested areas for further research.....	61
REFERENCES.....	62
APPENDICES.....	66
APPENDIX I: Letter of transmittal of data collection instrument.....	66
APPENDIX II: Research Questionnaires for Rabbit farmer.....	67
APPENDIX III: Extension Service providers and Informant Research questionnaire.....	73
APPENDIX IV: Krejcie and Morgan Sampling Table (Krejcie R. V et al. 1970).....	77

LIST OF FIGURES

Figure 1. Conceptual framework.....	27
-------------------------------------	----

LIST OF TABLES

	Page
Table 1.1 Population by administration for Nakuru district.....	2
Table 1.2 Kenya’s export of Rabbit, meat or Hare meat fresh, chilled or frozen.....	4
Table 1.3. Rabbit production trends for Nakuru district for the last seven years (2006-2012)..	4
Table 3.1 Operationalization of variables.....	34
Table 4.1 Gender of the respondent.....	38
Table 4.2 Age of the respondent.....	42
Table 4.3 Marital status of the respondent.....	43
Table 4.4 Respondent level of education.....	44
Table 4.5 Experience in commercial rabbit production.....	45
Table 4.6 Number of farmers who have attended training.....	45
Table 4.7 Number of farmers keeping records	46
Table 4.8 Record keeping influence commercial rabbit production.....	47
Table 4.9 Type of records kept.....	47
Table 4.10 Rabbit selling price.....	48
Table 4.11 Price of Rabbit influence adoption	49

Table 4.12 Availability of market.....	49
Table 4.13 How does market availability influence adoption	50
Table 4.14 Involvement in rabbit keeping.....	51
Table 4.15 Eating of rabbits.....	51
Table 4.16 Attended training organized by ministry of agriculture, livestock and fisheries.....	52
Table 4.17 Methods of training used.....	53
Table 4.18 Training influence rabbit adoption.....	53
Table 4.19 How training influence rabbit adoption	54
Table 4.20 what motivates farmers to adopt commercial rabbit production.....	54

ABBREVIATIONS AND ACRONYMS

EPC'S	Export Promotion Council
FAO	Food and Agricultural Organization
FCR	Feed Conversion Ratio
GOK	Government of Kenya
GDP	Gross Domestic Product
ITC	International Trade Conference.
KARI	Kenya Agricultural Research Institute
MOLD	Ministry of Livestock Development
MDG'S	Millennium Development Goals
MOA	Ministry of Agriculture

ABSTRACT

In recent years there has been increased awareness of the advantages of rabbit meat production in developing countries as a means to alleviate world food shortages. This is largely attributable to the rabbit's high rate of reproduction; early maturity; rapid growth rate; high genetic selection potential; efficient feed and land space utilization; limited competition with humans for similar foods; and high-quality nutritious meat. Globally rabbit production is estimated at more than 1.5 million tons per year, according to (FAO). It is noted that rabbit production in developing countries is low and only few countries export rabbit meat and other rabbit products. In Nakuru district rabbit production is quite erratic and this is the reason for carrying out this study. The purpose of study was to investigate the factors that influence adoption of commercial rabbit production among farmers in Nakuru district Kenya. The study focused on Lanet, Barut, and Municipality divisions of Nakuru District. The population under study comprised of 1830 households, 750 households from Lanet Division, 600 households from Barut Division, and 480 households from Municipality Division who rear rabbits. The study adopted a descriptive survey design which investigated factors that influence commercial rabbit production in Nakuru district Kenya. The primary data was collected using questionnaires. The collected data were summarized, coded and tabulated. Descriptive statistics such as means, frequency, and frequency were used in this study. The followings conclusions were made from the study, that technical knowledge influenced adoption of commercial rabbit production. Trainings on keeping records, rabbit feeding, hatchet construction and breed selection should be attended by those keeping or willing to start rabbit business. Keeping of records is very important in commercial rabbit production. It was also concluded that marketing factors influence commercial rabbit production. From the research finding the study recommended that commercial rabbit farmers should be trained on keeping records, rabbit feeding, hatchet construction and breed selection. Commercial rabbit keepers should be encouraged to keep records of their enterprises. Viable and well established markets are always a real economic incentive towards farmers embarking upon any alternative agricultural enterprise. The farmers should be trained on the available marketing channels, consumer demand and supply, promotion.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

The rabbit when raised with appropriate technologies can contribute virtually to improve the diet of large numbers of both rural and urban families, particularly landless and low-income ones, eventually providing such families with employment and a source of regular income (Onuekwus and Okezie, 2007). According to (Roe 2008), the rabbit has come under focus as an animal with enormous potential because of its attributes such as small body size, short generation interval, high reproductive potential, rapid growth rate, genetic diversity and ability to utilize forage. The feeding habits of rabbit offer no appreciable competition with humans. This is because it can subsist on vegetative basal diets. The rabbit industry is growing in many countries in Africa today. Rabbit production is still a new enterprise and is mainly a small-holder system that has advantages over the other livestock systems; because of the small rabbit's body size, high rate of reproduction, adaptability to inexpensive housing and useful by-products (Hungu et al; 2013). Inadequate food production is a critical problem throughout Africa and rabbit farming could make a significant contribution to human welfare in an area with inadequate food production and income generating (Karikari and Asare, 2009)

According to Ministry of livestock development report(MOLD,2005), rabbit production industry has recorded growth in Kenya over the last couple of years and farmers have earned good profit as well as formed self help groups through which commercial rabbit production can be achieved. This is an important sub- system in regions where there is scarcity of land, and in areas where a large proportion of low income earning communities may lack adequate resources to start other income generating and nutrition supporting enterprises (Hungu et al; 2013). The characteristics of rabbit production in most parts of Africa are comparable; the producers experience almost the same climatic conditions as well as challenges.

At a workshop convened for stakeholders in May 2011, the Government of Kenya launched an initiative to promote rabbit rearing as a suitable industry that can contribute towards food security, wealth and employment creation. A forum comprising of experts was formed to spearhead the initiative and formulate strategies to promote rabbit keeping and consumption.

This study sought to establish the factors that influence adoption of commercial rabbit production among farmers in Nakuru district.

Table 1.1 Population by administrative units.

DIVISION	HOUSEHOLD	HOUSEHOLD REARING RABBIT
LANET	19097	750
BARUT	3457	600
MUNICIPALITY	5629	480
TOTAL	28183	1830

Source: Nakuru District achievement and progress review report of 2011.

The study focused on municipality division with 480 households, Barut division with 600 households and Lanet division with 750 households rearing rabbits (MOLD, 2012).The study examined the factors influencing the adoption of commercial rabbit production in Nakuru District.

Rabbit production can be integrated into small farming systems, with the rabbits being fed crop residues, weeds, waste fruits and vegetables, whereas the manure can be used as a fertilizer for crops and gardens. Rabbit manure does not have strong smell, and rabbits do not make much noise therefore the neighbors will not complain (Moreki and Seabo, 2012).According to (Lukefahr 2007), a sustainable system of rabbit production involves the use of renewable on-farm resources, such as local breeds, feedstuffs from forage or garden plots, local materials for hutches and other equipment, and family labor. Efficiency of meat production can be improved by taking advantage of the diversity of rabbit breeds through crossbreeding.

Genetic parameters such as additive genetic effects and direct or maternal heterosis are generally important for maternal performance but they are not well known for post weaning performance of growing rabbits, especially for traits related to feed efficiency and carcass merit. In meat rabbit production, posts weaning daily weight gain or weight at the end of the fattening period are used as selection criteria of sire lines in most breeding programs (Piles et al, 2010). He further stated that feed efficiency is one of the most commercially important traits because post-weaning feeding accounts for around 40 % of total cost .This trait is improved through the negative genetic correlation with growth rate because direct selection is difficult and costly. Carcass yield is also an important trait because carcasses are generally graded and the price is established according to this value in commercial slaughter-houses. The aim of this study was to ascertain the extent to which breeding selection influence the adoption rate of commercial rabbit production in Nakuru district. Over the last 50 years, rabbit meat production has increased 2.5 fold with China being the world's largest producer producing 700,000t/year (Dalle-Zotte and Szendrő, 2011). Even in countries of Latin origin (Italy, France, Spain), who practice traditional cuisine, rabbit meat production represents only about 3.7% in France and Spain and slightly larger (11.4%) in (Italy) of total meat production (Mailu et al; 2012).

With an estimated population of about 600,000 rabbits, Kenya just like many developing countries which account for only 18% of the world rabbit population is still in the initial stages of developing a vibrant rabbit sector. Rabbitry dates back to the colonial period and in 1980, a bilateral agreement between the Government of Kenya and German International Development revamp of the National Rabbit Breeding Centre at Ngong Veterinary Farm with an objective of providing breeding material for farmers throughout the country. This did not catch the attention of many farmers since rabbit keeping was traditionally a 'thing' for young boys. The industry still lagged for several reasons which might include the lack of viable and well-established markets, insufficient promotion, erratic product supply, unreasonable prices, and competition from other meats (Mailu et al:2012).The study sought to establish the extent to which these factors influence adoption of commercial rabbit production among farmers in Nakuru district. Ultimately, a more sophisticated market infrastructure may involve product diversification such as breeding

stock, tanned skins and processed meat forms, as well as entrepreneurial training, mass media promotion, competitive pricing and/or overcoming market fragmentation. By adopting such a logistic approach to market development, greater assurance of successful marketing may often be realized. In fact, out of a list of 18 counties, Kenyan farmers were seen to be marketing their rabbits at 7 months against an average of 3.7 months (Karumbi 2009) possibly an indication of a paucity of markets for rabbits in Kenya. Rabbit's potential remains unrealized in many developing regions which contribute substantially less than 20% of total world rabbit meat production (Hoffman and Cawthorn, 2012).

Table 1.2 Kenya's Exports of Rabbit or Hare meat fresh, chilled or frozen (Values in Kshs.) to Sudan

YEAR	COMMODY	QUANTITY (Kgs)	VALUE (KShs.)
2007	Rabbit or Hare meat	251	61,644
	Chilled or frozen		
2008	Rabbit or Hare meat	1,722	49,4 48
	Chilled or frozen		
Total		1,973	111,092

Source for all statistics: ITC calculations based on comrade statistics.

As indicated in Table, Kenya has only recorded exports of rabbit meat to Sudan over the period 2000 – 2010 with highest export value being Kshs 0.49 million in 2008. This implies that the commercial rearing of rabbit may be confined to the local market and the development of the export of this commodity may be in the infant stages and may develop over time with the necessary interest and acceptable returns on investment in the industry. Rabbit production in Nakuru district has had an erratic trend that mainly depends on availability of forage. The production trends for the last eight years shows that the production is erratic, despite it being a major component of livestock production and a source of quality meat and good source of income in a household(MOLD,2012) annual report.

Table 1.3 Rabbit production trends for Nakuru District for the last seven years (2006-2012)

YEAR	BUCKS	DOES	WEANERS/FRYERS	KIDS	TOTAL
2006	850	950	1700	1900	5400
2007	900	1057	1923	1990	5870
2008	300	697	991	1002	2990
2009	104	240	341	345	1030
2010	132	420	341	345	1238
2011	148	510	652	530	1840
2012	154	511	677	623	1965
Total	2588	4385	6625	6735	20333

Source: Nakuru district livestock quarterly report of 2012.

1.2 Statement of the Problem

Apparently, despite the growing interest in rabbit rearing, rabbit production in Kenya is still dominated by ultra small and small scale producers with minimal investment in housing, feeding and other management practices(AP, 2010).Despite these efforts to promote the rabbit industry, economic and socio-cultural factors remained a hindrance to widespread adoption of rabbit keeping(MOLD, 2011). Unfortunately, for Kenya, very few studies have been conducted in this seemingly attractive sector. Rabbit meat has been found to be nutritious and of high quality (Petracci et al; 2009) yet it has not been adopted commercially in Kenya. This research study therefore explored the factors influencing the adoption of commercial rabbit production among farmers in Nakuru District.

In recent years there has been increased awareness of the advantages of rabbit meat production in developing countries as a means to alleviate world food shortages and hence to do commercial rabbit production. This is largely attributable to the rabbit's high rate of reproduction; early maturity; rapid growth rate; high genetic selection potential; efficient feed and land space utilization; limited competition with humans for similar foods and high-quality nutritious meat (Kuria, 2013).A study carried out found that market availability remained the major challenge.

Secondly, very little research has been done in this sector therefore; research should be undertaken by players both in the academia and industry, hence the reason for carrying out this study. The study recommended that government should spearhead promotion campaign to create market, encourage research and extension services. Despite so much effort to promote the rabbit industry, economic and socio-cultural factors remains a hindrance to widespread adoption of rabbit keeping. (Karanja ,2013).Rabbit production value chains gives a greater chance of increasing house-hold income and generating rural growth through increased agro-factories and offers an alternative livelihood to urban and rural farmers in addressing poverty level and increasing economic development food security in line with the vision 2030.

Rabbit production in Nakuru district has had an erratic trend that mainly depends on availability of forage. The production trends for the last eight years shows that the production is erratic despite it being a major component of livestock production and a source of quality meat and good source of income in a household (MOLD,2012) annual report. Trading in the lucrative by-product of fur skins has not been developed in Kenya due to the small size of the rabbit meat industry, the reason why this study was done is to find out those influencing factors on the adoption of commercial rabbit production

Several studies have been done on rabbits such as housing systems for breed groups (Trocino and Xiccato, 2012), effects of environment enrichment on rabbit performance (Hamming, 2013) feeds and feeding among others. This study ascertained the factors that influence adoption of commercial rabbit production.

1.3 Purpose of the study

The purpose of study was to investigate the factors that influence adoption of commercial rabbit production among farmers in Nakuru district.

1.4. Objectives of the study

This study was guided by the following objectives:

1. To establish the extent to which Technical knowledge on rabbit production influence adoption of commercial rabbit production among farmers in Nakuru District.

2. To ascertain the extent to which marketing factors influence adoption of commercial rabbit production among farmers in Nakuru District.
3. To assess the extent to which social cultural factors influence adoption of commercial rabbit production among farmers in Nakuru District.
4. To establish the extent to which training and extension services influence adoption of commercial rabbit production among farmers in Nakuru District.

1.5. Research Questions

This study was guided by the following research questions:

1. To what extent does Technical knowledge influence adoption of commercial rabbit production among farmers in Nakuru District?
2. To what extent does marketing factors influence adoption of commercial rabbit production among farmers in Nakuru District?
3. To what extent does a social cultural factor influence adoption of commercial rabbit production among farmers in Nakuru District?
4. To what extent does training and extension services influence adoption of commercial rabbit production among farmers in Nakuru District?

1.6. Significance of the Study

The study showed factors influencing the adoption of commercial rabbit production among farmers in Nakuru district. It is expected that the research findings will generate new information which will help farmers, government departments in the ministry of agriculture, and other stakeholders to be able to understand influencing factors on the adoption rate of commercial rabbit production.

The extension agents will be empowered to train and educate the farmers to understand how to go about handling these factors on the adoption of commercial rabbit production leading to improved economy and attainment of vision 2030.

It was important to this study because according to(Owen ,1981) emphasized that, in developing countries where critical national meat shortages exist, the potential for rabbit production is greatest meaning that African countries need to take up the challenge and produce rabbit meat commercially.

At present, production and survey data are urgently needed from developing countries as well as extension methodologies relevant to rabbit project development.

1.7 Delimitations of the study

The study covered three Divisions that constitute Nakuru District and these are namely, Municipality Division, Lanet Division and Barut Divisions since this is the District of the researcher's choice and Nakuru town is a good market for rabbit meat. The study focused on individual farmers practicing rabbit production and farmers' groups keeping rabbits.

The study focused on factors influencing adoption of commercial rabbit production by farmers in Nakuru district. All other factors were held constant and only knowledge on rabbit production, marketing strategies, social cultural factors, and training and extension services was studied as influencing factors on adoption of commercial rabbit production, this is because these factors forms the internal and external rabbit production factors that are documented as major constraint in rabbit production enterprise (Kyson, 2007).

1.8 Limitations of the study

Most of my respondents were the heads of households who mostly are men and their views may not fully represent those held by the women, youths or the minority groups. The researcher tried to balance this by having an equal representation of views from all gender and groups. Some of the respondents were not available the first day of the interviews, and this caused the researcher to make repeat visits in order to complete the interviews.

Literacy level of some respondent hindered articulation of questions which were written in English such that use of an interpreter was engaged. The researcher used an interpreter to assist during the interviews schedules.

1.9 Basic Assumptions of the study

The study assumed that the respondents will be very cooperative and give or provided accurate and reliable information which led to developing realistic and applicable

recommendations on the factors that influence adoption of commercial rabbit production in Nakuru district.

1.10. Definition of significant terms

- Adoption** - Adoption refers to taking up of a technology and implementing it.
- Breeds selection** - Breeds selection refers to choosing the best breed of rabbits among other breeds, depending on desired characteristics such as Carcass weight, litter size per doe etc. for purpose of improving productivity and performance.
- Commercial Rabbit Production** - Commercial Rabbit Production refers to keeping rabbits for income generating purposes, thus doing rabbit farming purely for business
- Extension services** - Extension services refers to dissemination of innovations and production technologies to farmers by extension agents or experts
- Generation interval** - Generation interval refers to the period between one kindling of a doe to the next one.
- Household** - Household refers to members of a family who live and eat together in the same homestead.
- Income generating-** Income generating refers to earning some money from the sales of rabbits, rabbit
- Marketing factors** - Marketing factors refers to factors that determine the marketing functions for rabbit enterprises.
- Marketing channels** - Marketing channels refers to structures used in selling of rabbit products or ways through which rabbits are sold

- Management skill** - Management skill refers to being able to take care of the rabbits properly so as to get maximum productivity and benefits.
- Rabbits are prolific** - Rabbits are prolific refers to the high rate at which rabbits are able to kindle in a given period
- Rabbit production** - Rabbit production refers to rearing of rabbits or keeping rabbits.

- Socio-Cultural Factors** - Socio-Cultural Factors refers to factors which influence the social status and cultural aspects of the household.

- Technical knowledge** - Technical knowledge refers to skills on various aspects of rabbit production.

.

.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter covered literature review that was relevant to the study. This included global rabbit production, rabbit production in the developing countries, and commercial rabbit production in Kenya. Also included was the factors that influence adoption of commercial rabbit production among farmers in Nakuru District. Among the factors discussed are marketing strategies, social cultural factors and training and extension services. This chapter also included theoretical framework and conceptual framework.

2. 2. Global rabbit production

Rabbits are best known for being prolific, herbivores which efficiently convert fodder to food. In efficient production systems, rabbits can turn 20 percent of the proteins they eat into edible meat. Comparable figures for other species are 22 to 23 percent for broiler chickens, 16 to 18 percent for pigs and 8 to 12 percent for beef (Mailafia et al, 2010). Rabbits have high reproductive potentials and fast growth rate, utilize low grain and high roughage diets and breed all year-round, as well as short gestation period, early sexual maturity, ability to rebreed shortly after kindling and short generation interval. These qualities confer on rabbits a potential to bridge the shortage of animal protein and a source of income generating (Hassan et al, 2012). According to (Cheeke, 2007) Small livestock such as rabbits have a number of characteristics that might be advantageous in the smallholder, subsistence-type integrated farming and gardening food production systems in developing countries. The advantages of keeping rabbits over other livestock are manifold. According to (Gono et al; 2013), starting a rabbit project requires minimal initial capital outlay. Additionally, a rabbit can be easily sold when a small amount of money is needed to meet immediate family needs. Rabbits are characterized by small body size, short gestation period, high reproductive potential, rapid growth rate, genetic diversity, their ability to utilize forages (Mailafia et al, 2010), and also require small amounts of feed likewise using inexpensive, easily constructed housing. Furthermore, rabbits do not compete with humans for grains as strongly as chickens (Gono et al; 2013).

Rabbits compliment well with vegetable production as garden wastes are fed to rabbits, whereas the manure is used to fertilize the soil (Moreki et al; 2012).

Unlike poultry manure, rabbit manure will not burn the plants and can be applied directly to the plant or its roots. In the opinion of (Murphree, 2013) rabbit farming exposes children to learning to tend for and appreciate animals. Additionally, rabbits can relieve stress and tension when they are watched jumping and vibrating noses or by touching their smooth furs according to (Ramodisa, 2007).

Domestication of rabbit date back no further than present millennium (Amin, 2011). Commercial rabbit breeders who specialize in the production of meat and fur primarily breeds Newzealand white and California white breeds. These breeds are selected due to their fast growth, rate and their white pelts which can be dyed in many colors. They are the most dominant of all breeds in the world now (Ekarius and Robson, 2012).

Over the last 50 years, rabbit meat production has increased 2.5 fold with China being the world's largest producer producing 700,000t/year according to (Dalle-Zotte, 2011). Even in countries of Latin origin (Italy, France, Spain), who practice traditional cuisine, rabbit meat production represents only about 3.7% in France and Spain and slightly larger (11.4%) in (Italy) of total meat production (Mailu, 2012).In 2000, Europe produced 570,051 tons of rabbit, Africa 85,782 tons (76,600 tons came from North African countries). South America produced 16,317 tons and Central America, 4,364 tons. In North America very little rabbit is consumed. Production was estimated at just 35,000 tons.

2.3. Rabbit production in Africa

North African countries produce 90 percent of Africa's rabbit meat. Morocco tops production at 0.78 kg per person a year. Though there are some commercial rabbit farms, most rabbit farming in North Africa is essentially artisanal. Commercial rabbit production is a worldwide enterprise that benefit both the rural and the urban people due to it nature of production.

2.4 Rabbit production in Kenya

According to the American Rabbit Breeders Association (ARBA), there are over 47 distinct rabbit breeds (ARBA, 2011). Only a handful of these are reared in Kenya, the most common being New Zealand White, Californian white, Chinchilla, French lop, Dutch, Checkered Giant, Giant Flemish, Angora and Rex.

A survey conducted by Animal Production Division in November 2010 indicated that New Zealand White and Californian White breeds of rabbits are the most popular in Kenya. These two medium sized rabbit breeds (3.6 – 5.9kg) are also rated the most popular for meat elsewhere in the world because of their good growth characteristics (Oseni, 2008). Other breeds that are popular in Kenya include the Giant Flemish, the French Lop and Checkered Giant.

In 1982 GTZ and the government initiated a national program on rabbit production where the National Rabbit Centre at Gong FTC and other multiplication centers at Machakos, Embu, Wambugu FTC and Kilifi were established to supply the breeding stock to rabbit farmers (MOLD, 2010). The initial breeding stocks were imported from Germany. A few farmers from Central Kenya and Rift Valley and other institutions like Egerton University, Kijabe Mission Center and ILRI also supplied rabbit breeding stock. The support by government for rabbit production in eradicating malnutrition and poverty is also to address the challenges in the diminishing land sizes and reduction in area for crop production. In setting up the multiplication centers, the objective of government was to supply 3 million rabbits by the year 2000. But this did not happen due to insufficient supply of breeding stock and a waning government extension service(MOLD, 2010).

The Kenya Vision 2030 is a long term development blue print for the country motivated by a collective aspiration for a better society by the year 2030 and aims to create a globally competitive and prosperous country with a high quality of life for its citizens, making Kenya to be a middle income country by 2030. Agriculture is among the key sectors identified to deliver this economic growth rate. This aims to promote innovative, commercially oriented productions, promote value chains in production such as value chain in commercial rabbit production. By the year 2010, the world population will have risen from the present 5.4 billion to 7.2 billion, moving past nine billion by 2025. This

increase will be felt mainly in the developing countries, where the corollary will be sizeable growth of the peripheries of urban conurbations, increased pressure on available land and major changes in the composition of animal populations. There will also be substantial impact on available natural resources and on the future demand for livestock products. This will have a profound effect on the choice of feed resources and livestock systems.

More land will have to be allocated for food production, reducing the feed resources (natural rangeland, pastures, and forage) available to feed this growing population, as can already be seen in Asia. Even so, appropriate technology can release additional harvest residues and agro-industrial by-products which can be used for livestock feed. Clearly, enhanced food production requires more efficient utilization of natural resources and the development of alternatives such as rabbit husbandry. Rabbit production is one of the livestock enterprises with the greatest potential and room for expansion in Kenya. This is because of their minimal investment requirements and ability to reproduce fast. Their feed requirement is low, especially with regard to demand for grain. Their housing and disease control management requirements are also low yet their meat is highly nutritious and healthier source of protein when compared with other sources of meat. According to ministry of livestock development report (MOLD,2005)report, rabbit production industry has recorded growth in Kenya over the last couple of years and farmers have earned good profit as well as formed self help groups through which commercial rabbit production can be achieved. This is an important sub- system in regions where there is scarcity of land, and in areas where a large proportion of low income earning communities may lack adequate resources to start other income generating and nutrition supporting enterprises (Hungu et al; 2013).

The commercial rearing of rabbits is a relatively new industry in Kenya but various institutions such as Ministry of livestock development and Nongovernmental organization (NGOS) are working hard to develop the Sector. With an estimated population of about 600,000 rabbits, Kenya just like many developing countries which account for only 18% of the world rabbit population is still in the initial stages of developing a vibrant rabbit sector.

Rabbit keeping dates back to the colonial period and in 1980 a bilateral agreement between the Government of Kenya and German International Development revamp of the National Rabbit Breeding Centre at Ngong Veterinary Farm with an objective of providing breeding material for farmers throughout the country. This did not catch the attention of many farmers since rabbit keeping was traditionally a ‘thing’ for young boys and other multiplication farms in Machakos, Imbue, Wambugu F.T.C., and Qualify were later closed down according to(Borter and Mwanza, 2011).

The industry still lagged for several reasons which include the lack of viable and well-established markets, insufficient promotion, erratic product supply, unreasonable prices, and competition from other meats (Mailu et al; 2012).

Kenya has only recorded exports of rabbit meat to Sudan over the period 2000 – 2010 with highest export value being Kshs 0.49 million in 2008(EPC, website). This implies that the commercial rearing of rabbit may be confined to the local market and the development of the export of this commodity may be in the infant stages and may develop over time with the necessary interest and acceptable returns on investment in the industry (NALEP, 2010). Presently, the lack of statistical data concerning the feasibility or the marketability of rabbit meat plagues the backyard and commercial rabbit entrepreneur. Hopefully, in the future, with the involvement of national government agencies and private organizations in rabbit production as an alternative protein source, there will be studies conducted on the various potentials and/or detriments of this field for the entrepreneur to utilize as guidelines (NALEP, 2010). Hence the reason why for this study was conducted on factors influencing the adoption of commercial rabbit production by farmers in Nakuru district.

Kenya Government unveiled Vision 2030 with a focus on transforming national development. It is an ambitious long term strategy that will supersede the Economic Recovery Strategy for Wealth and Employment Creation which expired in December 2007.

Vision 2030 aims to turn Kenya into an economic powerhouse by increasing income per head fivefold to \$3,000 by achieving and sustaining 10% GDP growth per annum and transforming the country into an efficient modern democracy (GOK, 2009). In order to achieve this, among many other initiatives, the ministry of livestock production encourages and trains farmers to take farming as a business such as promotions of commercial rabbit production for income generation in a household. Rabbit production in Kenya stands at 600,000 nationally (MOLD, 2012). The export potential council (EPC's newsletter) further revealed that Kenya has only recorded export of rabbit meat to Sudan over the period 2000-2010, with the highest export value being Kshs 0.49 million or US \$ 5975 in 2008.

This implies that commercial rearing of rabbit meat is confined to the local market and the development of the export of this commodity is in the infancy stages. It could therefore be developed over time with the necessary interest and acceptable returns on investment in the industry. Trading in the lucrative by-product of fur skins has not been developed in Kenya due to the small size of the rabbit meat industry. In the light of this commercial rabbit production has a bright future and this is the reason for having done this study to establish factors influencing adoption of commercial rabbit production by farmers in Nakuru district.

Kenya has the potential to emerge as a major producer of rabbit meat both for the domestic and export market within the next 5 years. Among the recommendations proffered by our Export Promotion Council (EPC) in their newsletter dated May 2011 on the way forward for the rabbit meat industry in Kenya, is the establishment of a Rabbit Breeders Association in line with the associations established in Ghana which led to the successful establishment of a rabbit meat industry in that country. (EPC newsletter, 2011). Rabbit production in Nakuru district has had an erratic trend that mainly depends on availability of forage. The production trends for the last eight years shows that the production is erratic despite it being a major component of livestock production and a source of quality meat and good source of income in a household (MOLD, 2012) annual report. Trading in the lucrative by-product of fur skins has not been developed in Kenya due to the small size of the rabbit meat industry, the reason why this study is being

done to find out those influencing factors on the adoption of commercial rabbit production. According to (MOA, 2012), Nakuru District is one of the districts that forms Nakuru county. It has an area of 297.2sq.km, with a population of 308,783 persons. The district covers three divisions, namely Municipality division, Barut Division, and Lanet division. The study covered the three divisions which used to be only one division before the larger Nakuru district was sub divided into the current eleven districts that constitute Nakuru County.

2.5. Factors influencing adoption of commercial rabbit production

This study focused on the independent variables of the study as the factors influencing the adoption of commercial rabbit production in Nakuru district. These variables are; Technical Knowledge on rabbit production; Marketing strategies; Social cultural factors; Training and extension services.

2.5.1 Technical knowledge and adoption of commercial rabbit production

According to(Appiah et al,2011), adoption of rabbit technologies is dependent of age, marital status, type of farming and main purpose of entering the rabbit business.(Appiah et al; 2011) further observed that young people are often more prepared to take risk of adopting innovation than the older ones. Older people are most of the time adherents to old techniques of farming, hence lower adoption. Similarly (Nwakor, F 2011) found out that the age of respondents had a positive influence on their adoption of rabbit technologies. This study went further to establish the influence technical knowledge has on the adoption of commercial rabbit production.

The adoption of available technologies has been a problem although they have been introduced to farmers (Gilert, 2013). They are faced with lots of problems hindering their desire to adopt these technologies. It is established that many farmers are still exposed to the traditional ways of raising rabbits resulting in low performance and profitability (Frimpong, 2009).This study will seek to establish the influence of the technical skills on the adoption rate of commercial rabbit production. Good housing systems for rabbits are important to protect them from adverse weather conditions, predators and maintain good and sanitized environment (DEPI, 2014). Disease management was partially adopted by

rabbit farmers. Although rabbits are often observed to be healthy and productive, there are exceptions: in LDC countries, rabbits are particularly vulnerable (Lukefahr, 2008).

Strategies for long-term training are particularly justified where rabbit production expertise is lacking in major governmental program. In many cases, project managers have been trained abroad, obtaining specialized degrees at universities with active rabbit research program. Part of their training should also encourage them to work for the benefit of the small-scale producer (Galante, 2012). Through proper training, whereby the nutritional value of rabbit meat is recognized, farmers can be taught to regard rabbits as a beneficially prolific meat animal species. This attitude can be supported by preparing rabbit meat dishes using local recipes and by serving rabbit meat on festive community o

According to the FAO (2004), the design of rabbit housing is governed by the behavioral characteristics of the animals and their reactions to environmental temperature and humidity and this is why domestic rabbits should have durable living quarters, providing either a refuge from disturbances or a peaceful environment that makes a refuge unnecessary. Any new and sudden change (noise, presence, smell) will make the first rabbit in the group to notice the disquieting novelty thump his hind foot to warn his fellows of danger.

According to (Ramodisa 2007), Lack of technical knowledge in rabbit production by farmers and advisors is a challenge in many countries and this study will go further to establish the influence of technical skills on adoption rate of commercial rabbit production. According to (Oseni et al, 2008) lack of access to information on rabbit management under smallholder units is one of the major challenges in rabbit production. It is established that technical knowledge on rabbit production lack in many countries but this study established the influence it has on adoption of rabbit production among the farmers.

According to (Moreki et al; 2012), extensions methodologies relevant to rabbit project development are generally paramount to rabbit projects' success and the same lack in many developing countries of Africa.

In spite of the extension methodologies being important it is not stated the influence it has on the adoption of commercial rabbit production, hence this study investigated the influence this has on the adoption of commercial rabbit production. Training of farmers on basic husbandry technique contribute to the sustainability of the production systems and formal farmers training may be more appropriate when held on demonstration farms in the region systems (Lukefahr,2007) . This study answered the question does training of farmers on rabbit production influence the adoption of commercial rabbit production.

The success of training programs can be further enhanced by a training need assessment especially on commercial rabbit production systems (lukefahr,2007).Farmers be trained on self-sufficiency rather than depend on off-farm inputs such as imported breeding stocks, commercial diet and wires for cages.

Strategies for long-term training are Well-informed and enthusiastic extension agents can complement this training process by organizing farmer training and supervision activities and providing technical information, program promotion services and equipment (EAAP,2008).However, agents have sometimes convinced farmers to modernize their operations with inappropriate imported technology. These farmers then become gradually dependent on expensive, and often unnecessary, cage wire, concentrate feed and medicines. Training of farmers on basic husbandry technique contributes to the sustainability of the production systems. (Lukefahr, 2007), reported that formal farmers training may be more appropriate when held on demonstration farms in the region. This study established training of farmers on rabbit production influence the adoption of commercial rabbit production.

2.5.2 Marketing factors and adoption of commercial rabbit production.

The market dynamics' factors of demand and supply really have an implication on production. The demand for live rabbits is necessitated by the requirement for breeding, especially by startup and expanding farmers. The main consumers of the rabbit products are majorly local households, local hotels and restaurants, and about 5 per cent are exported.

This provides an opportunity to expand the market for rabbit products which was noted to be really under developed (Karanja, 2013).Also (Karanja, 2013) further reported that market availability remained the major challenge. Secondly, very little research has been done in this sector therefore; research should be undertaken by players both in the academia and industry, hence the reason for carrying out this study to establish the influence of market and the rate of adoption of commercial rabbit production.

The industry still lagged for several reasons which might include the lack of viable and well established markets, insufficient promotion, erratic product supply, unreasonable prices, and competition from other meats (Mailu, 2012). Commercial rabbit operations may be encouraged. Ultimately, a more sophisticated market infrastructure may involve product diversification such as breeding stock, tanned skins and processed meat forms, as well as entrepreneurial training, mass media promotion, competitive pricing and/or overcoming market fragmentation. By adopting such a logistic approach to market development, greater assurance of successful marketing may often be realized.

Rabbit's potential remains unrealized in many developing regions which contribute substantially less than 20% of total world rabbit meat production (Hoffman, 2012). In Kenya for instance, export of rabbit meat in the period 2000-2010 was paltry with the highest stated exports worth 0.49 million to Sudan in 2008 (EPC website). Many factors constrain the industry in Kenya, an industry which in the past was seen as a pas-time for young boys. However, it appears that the most important constraint in the region is that rabbit meat consumption is very common as a traditional dish.

According to (Moreki, 2012) rabbits reach market at about 8 weeks of age or less and they may be sold live or dressed. Usually, they are sold to individuals who keep them as pets or those starting backyard rabbitries. There are various marketing channels but it is not stated whether this channel influence the adoption rate, hence this study will seek to establish the influence of marketing strategies on the adoption rate of commercial rabbit production by farmers. In addition, rabbits are sold to institutions such as schools for educational purposes .(USDA APHIS, 2012).The study investigated the extent to which marketing strategies influence the adoption of commercial rabbit production among farmers.

The cost of production will depend on the system of production selected as the major cost will be that of feed. The rabbits will consume about 25 g of pellets per day which will translate to 2.25 Kg in 90 days. At 90 days the dressed weight will be between 1-1.2kg. Therefore the feed/pellets will cost Ksh.51 and you will be able to sell the meat at between Kshs. 500 and 1000 per kilogram dressed weight (KARI, 2006).The finding from KARI has not indicated the influence of the selling price and the adoption hence this study will go further to establish the influence of the price and the adoption rate of commercial rabbit production.

Kenya has only recorded exports of rabbit meat to Sudan over the period 2000 – 2010 with highest export value being Kshs 0.49 million in 2008(EPC website). This implies that the commercial rearing of rabbit may be confined to the local market and the development of the export of this commodity may be in the infant stages and may develop over time with the necessary interest and acceptable returns on investment in the industry. A kilo of rabbit meat ranges between Kshs.500.00 and 1000.00 in the local market. A weaned rabbit, one Month is fetching between Kshs.500.00 to 1000.00.

Every extra month increases the value with Kshs.1000.00,with a mature 4 Months rabbit going for between Kshs.3500.00 to 5000.00 depending on the breed, health and the region according to (KARI,2006).It is the aim of this study to look into the influence of the price of rabbit and rabbit products on the adoption rate of commercial rabbit production. According to (Petracci and Cavani 2012), the higher the production cost of rabbit meat in developed countries compared to other meat the higher the cost of rabbit meat. The study established the influence of the price to the adoption of commercial rabbit production.

A rabbit breeder who has a medium level of involvement pays a fee to have the animals processed and then markets the rabbit meat themselves. This type of business is not as intensive as the all-inclusive, but it still allows the breeder to be more involved in the final product and has the potential of finding a better selling price than the processor.

A good program makes efforts to ensure that demand exceeds the current supply, and that rabbit meat is sold at a competitive price compared to popular meats (Hoffman et al;

2012).According to (Lukefahr, 2007) he emphasized that opportunities for expansion should be carefully consider the market demand. Also farmers should certainly avoid flooding the market with rabbits. In addition rabbit meat should be competitive with other meat by setting the price lower than that of broiler chickens.

According to (Mailler ,2014), the existence of viable and well established markets is always a real economic incentive towards farmers embarking upon any alternative agricultural enterprise. Far too many otherwise sound rabbit projects have failed due to inadequate marketing opportunities for rabbit meat. This can largely be prevented through prior marketing research and evaluation conducted in the feasibility and/or design stage of the project. Report by (Olguin, 2012) showed that factors such as low consumer demand, insufficient promotion, unsteady product supply, unreasonable prices, competition between other meats, lack of product diversification and poorly developed marketing channels, may explain reasons of limited market success.

2.5.3 Social cultural factors and adoption of commercial rabbit production

Social economic and cultural factors are elements that are related to or pertaining to the interactions of social, economic and cultural aspects.

According to(Lukefahr and Cheeke 2013), Socio cultural factors are the larger scale forces within societies and cultures that affect the thoughts, behaviors and feelings of individual members of those societies and cultures. Socio cultural factors include aesthetics (appearance), language, law, politics, religion, values, attitudes, social organizations, reference groups, family, person's role and status in their chosen society, technology and material culture. These issues can become very important for small business owners, because they need to target their promotions based on the socio cultural factors that are at play. (Gadhi, 2011) reported that socioeconomics is the study of the relationship between economic activity and social life. It emerged as a separate field of studies in the late 20th century.

He further said that it the income and social position that is used to measure the status of a family or an individual in a community. Socioeconomic factors are such as income, education, occupation, and involvement in the community.

2.5.3.1 Land tenure and commercial rabbit farming

According to (Singoei and Hussein 2007), where there is no formal land registration and boundaries are imprecisely defined by traditional methods there are land tenure litigations. As a result ethnic conflicts over land boundaries in these areas are reported. Where matrilineal inheritance is practiced, women's tenure can be insecure if the husband dies intestate. In areas where patrilineal system dominates, land ownership is less available to women (Bhaumik, 2014). Problems with land tenure have affected agricultural development projects and can similarly affect Rabbits and culture-based rabbits. Land ownership in Kenya is very important for households. This is because it has the tendency to appreciate quickly over time. Households can be able to sell their lands in times of financial difficulties as a coping mechanism. However, the net acquisition of land is not very high. This means that in as much as a lot of people are acquiring lands; a large majority of owners are also selling their lands in order to cope with the economic situation. It is only in the rural areas where there were some improvements in the land ownership. The rural poor do not have any improvement in the net land ownership. This means that the increase in the land ownership in the rural areas is due to the well to do people in the villages. Therefore when land ownership is not defined, construction of rabbit hutches and hence rabbit production is affected.

2.5.3.2 Capital and adoption of commercial rabbit production

According to (Adu 2005), banks are willing to lend money for the construction of rabbit hatchets but the conditions for the loans are strict and make them suitable mostly for those who are already well established economically. Generally, the estimated market value of the collateral has to be at least equivalent to the amount of funds loaned. For example, the practical experience of bank officers in commercial aquaculture is weak and most bank managers refer any loan request by a rabbit farmer to the headquarters in Accra, before deciding on whether or not to give credit.

This difficulty in assessing formal credit, a lot of farmers resort to informal credit. Most informal credits do not carry interest except for specialized money lenders. Money lenders charge very high interest rates of between 50-100 % and are for short periods. This does

not indicate the influence on the adoption rate of commercial rabbit production, hence the reason this study went further to establish the influence capital has on rabbit production.

2.5.3.3 Human Labor and adoption of commercial rabbit production

Various factors influence rabbit productivity. This includes high labor intensity, disease problems and nutritional problems. In order for rabbit production to be competitive with other types of animal production, production systems that increase the efficiency of labor utilization are needed. According to (Baumans and Loo (2012) in Europe, harem breeding systems have been used. Does are kept individually in cages. A long narrow buck cage is constructed ' behind a bank of doe cages. The bucks may enter the doe cages through an opening whereas each doe wears a collar to prevent her from leaving her cage. In this way, the does can be bred without any human labor required. Artificial insemination may be another way of increasing breeding efficiency, especially in large rabbitries. Automated feeding and cleaning systems could reduce labor costs as well. It is possible that new methods of production need to be developed to make this a viable industry. According to (Wenger and Coughler 2011), it is possible to raise weanling rabbits to market weight in feedlot cages on wheels with automatic feeders and waterers. When the fryers reach market weight, the cage could be wheeled onto a truck, and taken to the processing plant, with very little labor in-put.

The rabbit is a uniquely versatile livestock species in terms of production, patterns of reproduction, behavioral instincts, neonatal development, feeding habits and nutrient requirements. In other words, proper care and management are necessary in order for the benefits of rabbit rising to be well realized. In many cultures, livestock have to scavenge for their own food, shelter and water under open range conditions. This seemingly laissez-faire management system usually supports only limited production. To many farmers, rabbits are not easy to rise; they require meticulous care and labor.

Not every farmer possesses the human talents required, or "knack", for successful production. Confinement rearing has been identified as one common traditional hindrance to rabbit farming in many countries. This constraint, however, can usually be eliminated

through proper approaches in screening farmers and in training, largely through effective farmer demonstration.

According to (Hungu et al. 2013), the time or labor required to raise rabbits can be minimally figured to 10 hours per breeding doe in a year. For the backyard operation with four breeding does, this labor input relates to a single work-week (40 hours) per year equivalent, or less than 10 minutes per day. However, many families enjoy spending more time than this with their rabbits. (Hungu et al; 2013) further said that rabbit farming compliments the efforts of the serious gardener and flowering plan enthusiast. The manure from rabbits makes excellent compost, rich in organic matter and nutrients that can produce remarkable garden and flowering results. Commercial red worms or African nit crawlers grown in rabbit manure produce a superb and fairly odorless organic material that resembles peat moss. Many commercial rabbit producers market both the organic material in bags and bait worms in cartons as a supplemental source of income. For the family that enjoys fishing, one also has a regular supply of bait worms. This study will establish the influence of availability of labor on the adoption rate of commercial rabbit production among farmers.

2.5.3.4 Acceptability and rejection of commercial rabbit production

According to (Wenger and Coughler 2011), rabbit raising in Ghana has been socially accepted on the combined basis of the low space requirement, high reproductive rate, no apparent competition with humans for the same foods, minimal zoonotic health hazard and minor capital investment, as well as no social taboos affecting the consumption of rabbit meat. However there are three major constraints which include, association of rabbits as pets, not food producing animals and the fear of escaped stock becoming a widespread agricultural and ecological pest, such as was formerly the case in Australia; and limited marketing opportunities (Sodhi,2010)

.The researchers further reported on a rabbit program in Cameroon, where in certain rural family-based projects, women and children assumed most of the rabbit feeding and management responsibilities.

According to (Mailu,et al,2012), only 38 percent of non-rabbit farmers consumed rabbit meat compared to 82 percent for those who kept rabbits. (FAO, (1983) stated out that in order to overcome rejection of rabbit meat, nutritional value of rabbit meat is extolled through training. These trainings will enable farmers to recognize rabbits as a beneficially prolific meat animal species instead of as pet animals. This can be further reinforced by preparing rabbit meat dishes using local recipes. Serving rabbit meat on festive community occasions, perhaps even disguising the meat for other more popular meats, is another proven means of gaining local acceptance. Besides such short-term approaches, providing rabbit meat in the school cafeterias and breeding stock for youth club rabbit projects are long term measures which have been successfully implemented, as observed in Africa and in Latin America. Moreover, since in many cultures major agricultural farming activities are predominately performed by women, the small and manageable size of the rabbit is ideal. (Osbahr 2007), reported that during rabbit programs in Cameroon, women and children assumed most of the rabbit feeding and management responsibilities.

2.5.3.5 Demographic characteristics and adoption of commercial rabbit production

According to (Hungu et al,2013), the most common breeds of rabbits kept were New Zealand white (73%), Californian (60%) and their cross breeds (51%) which were all suitable for meat production.

He further pointed out that most rabbit farmers buy their breeding stock from other farmers, with only a small proportion buy from breeding centres. The major constraints of rabbit farming are those dealing with production are diseases predators, death of rabbits, unavailability of rabbit feed, poor access to technology and poor marketing strategies.(Hungu et al,2013) further stated that the ages of the rabbit farmers cuts across all age groups with 44% of them being above 50 years of age.

The report showed that the interest in rabbit farming among adults has risen in recent years due to the Government efforts in encouraging rabbit farming by establishing a rabbit breeding program in the country. According to (Mailu et al , 2012), rabbit production has experienced a steady growth in the past few years, with gender biases associated with its production fading away. This is a significant change considering that for many years,

rabbit production in Kenya was confined to the youth, mainly 4-K club members and young farmers. Though rabbit meat marketing is yet to gain, in this study the researcher further ascertained the influence of age of farmers on adoption of commercial rabbit production.

2.5.4 Training and extension services in relation to adoption of commercial rabbit production

According to (MOA ,2011), agricultural extension provides the bridge between the research stations and the farmers, carrying and bringing back knowledge based upon local experience for further investigation. Rabbit extension services may be defined as the dissemination of the educational advances to persons unable to take advantage of such in knowledge in a normal manner. Rabbit extension brings to the rabbit farmers and other stakeholder's educational assistance which is best suited to their needs as far as rabbit production is entailed. The inability of the farmers in developing countries, including Kenya, to produce at a rate that can meet the need of the population has been linked to lack of access to crucial information on improved agricultural practices, among other factors. This results from the limited resources available to the public extension agencies which reach free of charge in developing countries (Budak, et al. 2010). Therefore, in a bid to promote farmers' access to extension services, various forms of agricultural extension finance payments have been instituted in some parts of the world, like in the United Kingdom, Netherlands, Sweden, Germany, Chile and Portugal (Budak et al; 2010).

This trend would reduce the economic burden on government and increase the efficiency and effectiveness of extension (Staley, 2012). The trend would also enhance sustainability in rabbit production. A positive attitude of rabbit farmers towards financing extensions services can enhance both social and economic concepts of sustainability.

It can make rabbit production levels relatively adequate for the present and future generations without reducing the ecosystem potentials.

Agricultural extension department is the most important public service institution with the widest range of responsibilities for agricultural and rural development (Ogunremi and Faturoti, 2011). In this regard, agricultural extension provides a vehicle of technology

transfer by initiating the development, transfer and diffusion process of innovation (Thai, 2011). According to (Ogunremi and Faturoti 2011), agricultural development is a rural development approach through which the right technology, effective extension services, access to inputs, adequate market and complementary infrastructural facilities essential to improve productivity and boost the standard of living of rural dwellers are provided.

One approach to determining desirable extension agent behavior and performance is to begin with the farmers' point of view (Barnhardt, 2013). Some useful indications of farmers expectation of extension agents behavior was confirmed by (Ogunremi and Faturoti 2011), who found widespread resentment towards extension agents among farmers because they resent advise from agents who adopt superior attitudes. Many scientists are now convinced that it is no longer desirable to use a transfer of technology approach in which the extension administrators decide on the targets to be realized by the field-level extension agents. (Ogunremi and Faturoti 2011) further reported that a more participatory approach is instead preferred, in which farmers decide which changes are desirable and what kinds of support are needed from extension to realize changes. A participatory approach requires that the extension organization becomes a learning organization with the ability to discover which changes are desirable in each specific situation.

It is easier to adopt a participatory approach or a farmer-led extension system or a farmers' association than in a government environment extension organization (World Bank Group, 2013). According to (Adu 2005), the first stage towards the adoption of an innovation is to become aware that it exists. Awareness does not just mean that an innovation exists but that it is potentially of practical relevance to the farmers (Adu, 2007).

The major role of agricultural extension is to help farmers to make decisions through which they can realize their own goals and to learn from their own experience (Barnhardt, 2013). The commonly used extension methods in Kenya are individual farm visit, group visits, demonstrations, field days, barazas, on-farm trials and mass media (MOA, 2011). The study will establish the influence extension services have on the adoption rate of commercial rabbit production among farmers in Nakuru district.

2.6 Theoretical Framework

This study was based on diffusion of innovation' model or theory suggested by (Rogers, 1962). This theory is the process by which innovation is communicated over a period of time to members of social society. Diffusion is the process by which an innovation is communicated through certain channels over a period of time among the members of a social system. Innovation is an idea thought to be new to an individual such as production technologies. Communication is a process in which participants create and share information with one another to reach a mutual understanding (Rogers, 1995)

It is widely recognized that innovation comes from multiple sources, including farmers and how the agenda of different stakeholders are represented affects the appropriateness of new technology developed (Suleiman et al, 2006).According to (Rogers ,2003) the determinants of adoption are ; perceived attributes of technology ,comparative advantage ,the degree to which an innovations perceived better than the idea it supersedes complexity-the degree to which a a practice is perceived as relatively difficulty to understand and to adopt negatively related to its rate of adoption ,trial ability-degree to which an innovation may be practiced at a limited bases.This model helps extension workers to communicate new technologies or innovations to farmers which in return helps promotion of production technologies according to(Zhou,2012).If an innovation or production technology is adopted by farmers, farm productivity is improved and hence income increased with creation of more employment opportunities.

2.7. Conceptual framework

The Conceptual framework is an illustration of the relationships between the variables identified for the study. It shows the relationship between the independent and the dependent variables. For this particular study, the adoption rate of commercial rabbit production among farmers was the dependent variable. The independent variables were the factors influencing adoption of commercial rabbit production. These factors are technical knowledge on rabbit production, marketing, social economic factors and training and extension services. These factors, either in isolation or a combination will influence

the rate of adoption of commercial rabbit production among farmers. The moderating variable for this study were government policy issues on livestock production. Other extraneous variable were culture and believes.

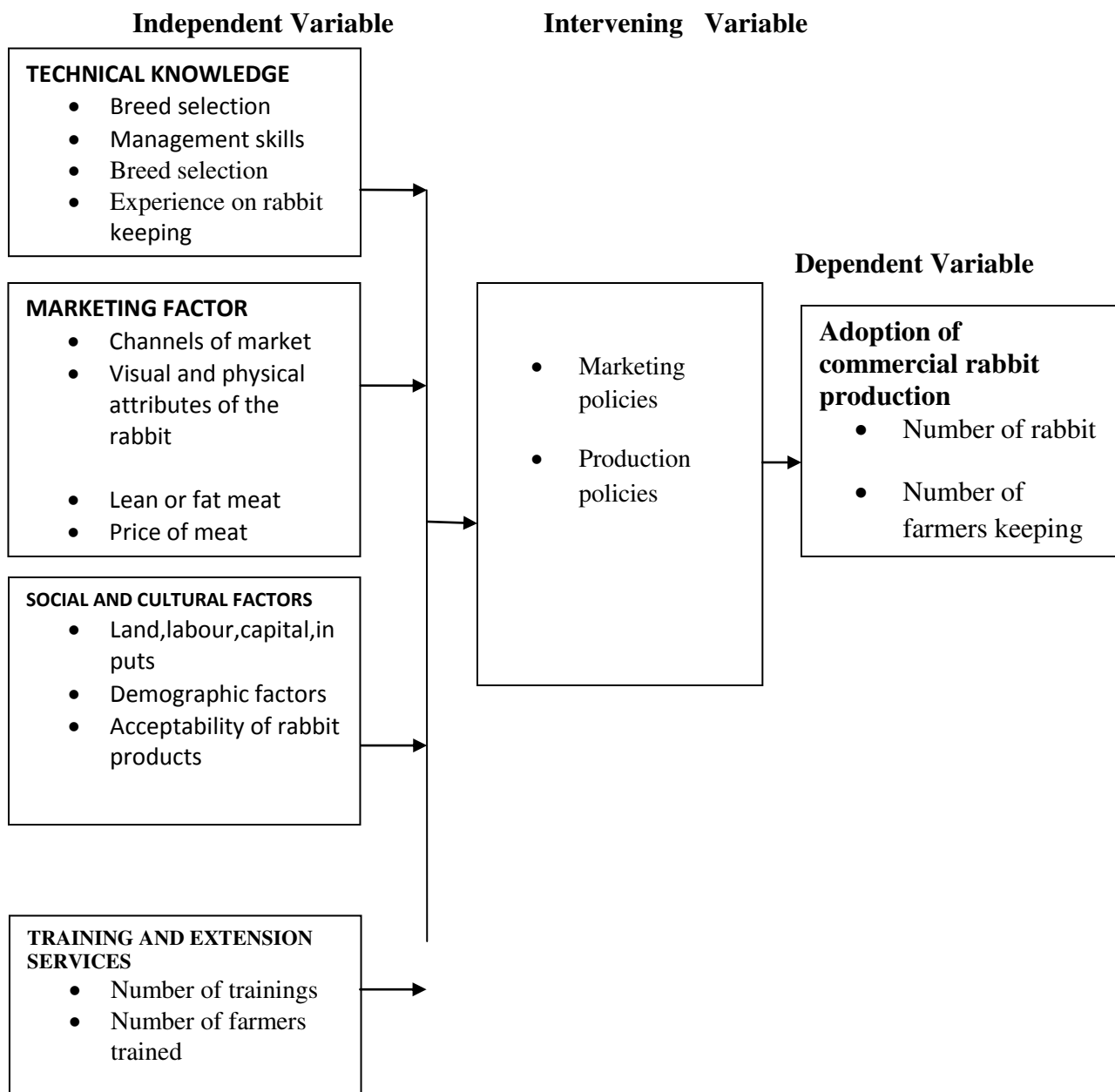


Figure 2.1 Conceptual Framework of the study.

2.7. Conceptual framework

The Conceptual framework is an illustration of the relationships between the variables identified for the study. It shows the relationship between the independent and the dependent variables. For this particular study, the adoption rate of commercial rabbit

production among farmers was the dependent variable. The independent variables were the factors influencing adoption of commercial rabbit production.

These factors are technical knowledge on rabbit production, marketing, social economic factors and training and extension services. These factors, either in isolation or a combination will influence the rate of adoption of commercial rabbit production among farmers. The moderating variable for this study were government policy issues on livestock production. Other extraneous variable were culture and believes.

2.8. Summary of literature review/knowledge gap

The chapter gives a brief background of commercial rabbit production globally, regionally Kenya, and Nakuru district. The production trends, and importation and exportation of the same have been highlighted. Factors influencing the adoption were discussed. Theoretical and the conceptual framework have been outlined. Rabbit production value chains gives a greater chance of increasing house-hold income and generating rural growth through increased agro-factories and offers an alternative livelihood to urban and rural farmers in addressing poverty level and increasing economic development food security in line with the vision 2030.

Rabbit production in Nakuru district has had an erratic trend that mainly depends on availability of forage. The production trends for the last eight years shows that the production is erratic despite it being a major component of livestock production and a source of quality meat and good source of income in a household (MOLD,2012) annual report. Trading in the lucrative by-product of fur skins has not been developed in Kenya due to the small size of the rabbit meat industry, the reason why this study is being done to find out those influencing factors on the adoption rate of commercial rabbit production among farmers in Nakuru district.

Despite the efforts to promote the rabbit industry, economic and socio-cultural factors remained a hindrance to widespread adoption rate of rabbit keeping (MOLD, 2004). Unfortunately, for Kenya, very few studies have been conducted in this seemingly attractive sector. Rabbit meat has been found to be nutritious and of high quality (Petracci, Bianchi and Cavani, 2009) yet it has not been adopted commercially in Kenya. This

research study therefore explored the strategic factors causing the sluggish growth of rabbit farming in Nakuru district, Kenya.

The findings are expected to be invaluable to the rabbit farming stakeholders including the farmers, government policy makers as well as other researchers.

As a fast developing enterprise in the Kenyan economy, very few researches have been conducted in the field of rabbit farming. Whereas from (MOLD, 2010), the sector is appraised to be vibrant, no literature suggests that it is in fact growing. This is because no thorough review the performance of rabbit farming has been conducted. The statistics provided by (ADP, 2010) seem to look only at the positive elements in the sector, and sidelining the challenges which are in fact real, and a major obstacle to the growth of this sector. The dynamic nature of the agribusiness sector provides significant future business challenges and opportunities. The expected growing demand for food by itself presents potential sales and revenue growth. In addition, the expected future development of the expanding bio-economy with biological based raw materials being used in the energy, industrial and health/pharmaceutical industries adds further potential. The integration of the agricultural sector into the broader overall global industrial economy creates opportunities for innovative new product and service offerings as well as new value chains to deliver those new products and services. It adds further complexity to an already complex value chain. But that future also is highly uncertain. No study has explored the reasons for the sluggish growth in this sector, and more so in the Kenyan setup where the contribution of agriculture to the GDP is great. This study therefore explored the factors influencing the adoption of commercial rabbit production. The production trends for the last eight years shows that the production was erratic, despite it being a major component of livestock production and a source of quality meat and good source of income in a household annual report (MOLD, 2012).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter research methodologies that were used in the study are discussed. This chapter also discusses the type of data collected, source of the data, the data collection procedures, as well as the data analysis procedures. The sample size and the sampling frame will be outlined along with ethical considerations arising in the course of the research.

3.2 Research design

The study adopted a descriptive survey design which aimed at investigating factors that influence commercial rabbit production in Nakuru district Kenya. The research design constitutes the blue print for the collection, measurement and analysis of data (Kothari, 2003). A descriptive survey was used in the description of the state of affairs or the current status of the variables in the study. The study used a descriptive survey design since it mainly looks at the phenomena, events, and issues the way they are according to (Mugenda and Mugenda, 2003). This research design involved gathering data that describe events and then organize, tabulate depict and describe the data.

3.3 Target population

The study focused on Leant, Barut, and Municipality divisions of Nakuru District. The population under study comprised of 1830 households, 750 households from Lanet Division, 600 households from Barut Division, and 480 households from Municipality Division who rear rabbits (Table 1.1). According to (Mugenda and Mugenda 2003), a study population is a complete set of individuals, cases or objects with some common observable characteristics. The target populations for the study were households and group of farmers in Nakuru District.

3.4. Sample Size and Sampling Procedures

According to (Cooper and Schinder ,2003), sampling is selection of a few items(sample)from a bigger group(population) to become the bases for estimating or

predicting the prevalence of an unknown piece of information, situation or outcome regarding the bigger group. According to (Krejcie and Morgan 1970), a total of 1830 households require a sample of 317 respondents. Stratified random sampling, together with proportionate sampling will be used in this study. Thus 130 households will be from Lanet division, 83 household from municipality and 104 households from Barut Division. In each division one opinion leader and one extension officer will fill the questionnaires. This study will use stratified sampling since three divisions will be covered and proportionate sampling because proportional sampling enables the researcher to achieve greater representativeness in the sample of the population. This is accomplished by selecting individuals at random from subgroup in proportion to the actual size of the group in the total population (Van Dalen, 1979)

3.5 Data collection Instrument

The study used questionnaires to collect data. The questionnaires sought information on respondents profile and the questions from the four objectives. The questionnaires obtained data from 317 households. The study used questionnaires because a large population was considered and also because of the simplicity of administration of the questionnaires on a large population sample according to (Babbie, 2001).

3.5.1 Pilot testing of the Instruments

The researchers tested the questionnaires in Nakuru North district which neighbors Nakuru district and have the same climatic condition and farming activities. Ten questionnaires were administered .The respondent were selected randomly, at least a week before the main study. They were asked to respond to the questions as the researcher observes whether each question measures what is supposed to measure, how long it takes to interview one respondent, whether response choices are appropriate, whether the tools collect the information needed among other things.

Necessary adjustment was made to the tools. The researcher sought permission from local leaders to facilitate this.

3.5.2 Validity of the Instrument

Validity refers to the accuracy and meaningfulness of inferences which are based on the research results or in other words validity is the degree to which results obtained from the analysis of the data actually represent the phenomenon under study. The researcher concerned himself with the how accurately the data obtained in the study represents the variables of the study that is the factors influencing the adoption rate of commercial rabbit production among farmers in Nakuru district. The data should be a true reflection of the variables hence the inferences will be accurate and meaningful. In this study the instruments were first discussed between the researcher and the supervisor(s) who provided (her) expertise and ensure that the instruments measures what they intend to measure as recommended according to (Kumar, 2005).

In this study the researcher concerned himself with the internal validity because the changes on the dependent variable can accurately be attributed to the independent variable of the study. The assumption is that the extraneous variables were under control. This validity was ensured by ensuring that the extraneous variables of the study were not included in the data collected hence assuming that they were in control.

3.5.3 Reliability of the Instrument

Reliability is synonymous with repeatability or stability and a measurement that yields consistent results over time is said to be reliable (Kothari, 2008) This study used the equivalent-form technique. The researcher used parallel forms or equivalent forms methods where by two Questionnaires are used. The two instrument were designed as equivalent to each other as possible. Responses from the instruments administered to the same group at different times were compared to establish if the instruments yields the same or similar results consistently. The results obtained from the two forms were correlated and the correlation coefficient was high, the instrument yielded reliable data that have high equivalent -form reliability.

The questionnaire used was reliable since the coefficient gotten using Cranach's alpha formula was closer 0.8 which is acceptable according to (Mugenda,1999).

3.6. Data Collection Procedures

This exercise was done in three parts .First part was to acquire research permit from the county administration office in Nakuru District. Second part was making a familiarization visit to the study area in order to meet the local leaders, among them the chief and the village elders .The extension officers working with the Ministries of agriculture and livestock were briefed on the importance of the research so that they can assist in availing the data as required.

The actual field work entailed collecting primary data from the respondent. Primary data were collected using semi-structured questionnaires. Data were collected using drop and pick method where questionnaires were collected after two days .Response was recorded objectively and accurately. The collected data were examined and checked for completeness and comprehensibility. The data was then summarized, coded and tabulated.

3.7 Data Analysis Techniques

Once the questionnaires or other measuring instruments have been administered the raw data obtained were organized systematically in a manner that facilitated analysis. The questionnaires were categorized, numbered and the data coded. Descriptive statistic such as the specific means, standard deviations and frequency distributions were used to analyze the data. Computer software such as the statistical package for social sciences (SPSS) and Ms Excel based on study objectives and research questions were used to assist in analyzing the data.The study finding is presented using frequencies, percentages distributions and tables to make interpretations

3.8 Ethical Consideration

The respondent was assured of ethical standards that were observed such as, confidentiality of the information provided. The principle of voluntary participation requires that people not be coerced into participating in research and these was observed. There was free will in the participation .Initial approval was secured from the University of Nairobi. A researcher permit was sought from the NCST.

The respondents were assured that the information given will be for the purpose of the research and will be treated with uttermost confidentiality. The researcher ensured that participants are not put in a situation where they might be at risk of harm as a result of their participation. Harm can be defined as both physical and psychological.

3.9. Operationalization of variables

Operationalization of variables means manipulation both independent and dependent variables in such a way that they end up having few level that are measurable. Table 3.2 shows the operational definition of variables.

Table 3.1 Operational Definition of Variables

Objectives	Variables	indicators	Measure	Instrument Tools used	Scale used	Data analysis Techniques used
To establish the extent to which technical knowledge influence adoption rate of commercial rabbit production in Nakuru district	Independent Technical knowledge on commercial rabbit production.	-Rabbit production	-Number of years formally trained	Questionnaires	Ratio	Frequency Mean and percentages
		Management skills	-Number of production systems used.	Questionnaires	Ratio	Frequencies mean and percentages
		-breed selection	-Number of breeds kept	Questionnaires	Ratio	Frequencies ,mean and percentages
		Experience in rabbit keeping	-Number of	Questionnaires	Ratio	Frequencies

			years in rabbit keeping			,means and percentages
To assess the extent to which marketing factors influences the adoption of commercial rabbit production among farmers in nakurudistrict.		Price of rabbit meat -Price of rabbit records	-Value in ksh. -Amount in KShs. -Number of kilo of rabbit meat sold in a given period.	Questionnaires Questionnaires	Ratio Ratio	Frequency Mean and percentages
To assess the extent to which social cultural factors influence adoption of commercial rabbit production by farmers in Nakuru District.		-Land -Labour -Employment -Age -Gender	-Cost per Ha -Number of years -Male and Female	Questionnaires	Ratio Ratio Ratio Ratio	Frequency Mean and percentages
To establish the extent to which training and extension services influence adoption rate of commercial rabbit production among farmers in Nakuru district.		- Trainings -Farmers trained -Other Service providers	-Number of trainings conducted -Number of farmers trained -Number of training -Number of other service providers	Questionnaires Questionnaires Questionnaires	Ratio Ratio Ratio	Frequency Mean and percentages
	Dependent Variable	-Presence of rabbit in the	-Number of rabbit kept. -Number of	Questionnaires	Ratio	Frequency Mean and percentages

	Commercial rabbit production.	hutches. -Type of labor used.	employed person in charge of the rabbitry.	Questionnaires Questionnaires	Ratio Ratio	
--	-------------------------------------	-------------------------------------	--	--------------------------------------	--------------------	--

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION OF FINDINGS

4.1 Introduction

This chapter contains data analysis, presentation and interpretation of findings. The study investigated the factors that influence adoption of commercial rabbit production among farmers in Nakuru district. The chapter discusses results of the study under the following headings: questionnaire return rate, technical knowledge, marketing factors, social cultural factors and training and extension services these being the independent variables of the study.

4.2 Questionnaire Response Return Rate

The study population was 317 where 311 questionnaires were returned resulting to questionnaire return rate of (98%), as 317 questionnaires were used. This was possible since the questionnaires were administered by trained research assistants who administered questionnaires, waited for the respondent to complete and collect immediately and others were collected the following day. (Mugenda and Mugenda, 1999) indicated a response of above 50% to be sufficient for a study and therefore a response of 98% for this study was very good.

4.3 Demographic Characteristics of the respondents

This section discusses the respondent's demographic characteristics which include gender, age, level of education and marital status. These social attributes influence adoption of technologies by farmers and were relevant to the study since they enabled the respondent to provide information that is valid, reliable and relevant to the study.

4.3.1 Gender of the respondents

The study sought to establish the gender of the farmers adopting commercial rabbit production. During the data collection exercise the farmers were asked to state their gender and the responses were recorded as indicated in the table below. From the study

findings 218 respondents (70.1%) were males and 93 respondents (29.9%) were females. The findings from the study showed that males are more involved in the commercial rabbit production than females. This means that male play a key role in the adoption of commercial rabbit production. The responses are shown in Table 4.1.

Table .4.1 Gender of the respondents

Gender of respondent	Frequency	Percentage
Male	218	70.1
Female	93	29.9
Total	311	100.0

From the study findings it is indicated that there are more males than female adopting commercial rabbit production in Nakuru district. This study does support the proposition by (Mailu et al,2012) who stated that rabbit production has experienced a steady growth in the past few years, with gender biases associated with its production fading away. This is a significant change considering that for many years, rabbit production in Kenya was confined to the youth, mainly 4-K club members and young farmers.

4.3.2 Age of the Respondents

The study sought to establish the age of rabbit farmers in Nakuru district .The respondents were asked to indicate their ages from among choices of age classes given. The respondents responses are shown in Table 4.2

Age of respondent in years	Frequency	Percentage
16-25 years	51	16.4
26-35 years	137	44.1
36-45years	66	21.2
over 45 years	57	18.3
Total	311	100.0

The findings from this study showed that 137 respondents (44.1%) are in age bracket of 26-35 years, 66 respondents (21.2%) are in age bracket of 36-45 years and 57 respondents (18.3%) are in over 40 years. Therefore, the study findings showed that 203 respondents (65.3%) are in age bracket of 26-45 years. This indicates that majority of the respondents are in their middle age and therefore suitable in undertaking commercial rabbit production which require commitment and effective decision making. The study agrees with (Onuekwus and Okezie'2007) who stated that the age of respondents had a positive influence on their adoption of commercial rabbit production technologies. From this study it showed that the youth age between 16-25year is not actively involved in commercial rabbit production and they should be targeted for adoption of commercial rabbit production.

4.3.3 Marital status of the Respondents

In the study the respondents were asked to state their marital status. During the exercise of primary data collection the respondents were asked to indicate their marital status. 250 respondents (80.4%) were married, 60 respondents (19.3%) were singles. Marital status could contribute to the adoption of rabbit production since family labor is cheap and readily available hence cutting down the cost of rabbit production. The results of the respondent are shown in Table 4.3

Table 4.3 Marital status of the respondents

Marital status	Frequency	Percentage
Single	60	19.3
Married	250	80.4
Others	1	0.3
Total	311	100.0

The findings of the study indicated that majority of the respondents 250 respondents (80.4%) were married, 60 respondents (19.3%) were singles and 1 respondent (0.3%) were among others (widow, widower, divorced or separated). Marriage ascribes familial responsibilities to farmers and therefore farmers become more serious in terms of their

participation in agricultural technologies that would give them access to more food and income to meet their responsibilities. The study findings agrees with (Appiah et al, 2011) who stated that adoption of rabbit technologies is dependent of age, marital status, type of farming and main purpose of entering the rabbit business.

4.3.4 Education level of the respondents

The respondents were asked to indicate their highest level of education .The results are as Shown in the table 4.4 which indicated that 117 respondents (56.9%) had secondary education, 121 respondents (38.9%) had primary education while only 3 respondents (1.0%) had university education. This shows that majority of rabbit farmers in Nakuru district have secondary level of education. Education is important when it comes to implementation of production technologies. People who are learned are more innovative and able to implement rabbit production technologies.

Table 4.4 Respondent level of education

Level of education	Frequency	Percentage
Primary	121	38.9
Secondary	177	56.9
Tertiary	10	3.2
University	3	1.0
Total	311	100.0

The findings of the study showed that 117 respondents (56.9%) had secondary education, 121 respondents (38.9%) had primary education while only 3 respondents (1.0%) had university education.

4.4 Influence of technical knowledge in adoption of commercial rabbit production

The study sought to establish the extent to which technical knowledge influence adoption of commercial rabbit production among farmers in Nakuru district.

4.4.1 Experience in commercial rabbit production

The respondents were asked to indicate the experience they have on commercial rabbit production and the results indicated in table 4.5. From the study findings it showed that of 160 respondents (51.4 %) had an experience of 1-2 years while 79 respondents (25.4%) had an experience of 3-5 years and 64 respondents (20.6%) had experience of less than 1 year.

Table 4.5 Experience in commercial rabbit production

Experience	Frequency	Percentage
Less than 1 year	64	20.6
1-2 years	160	51.4
3-5 years	79	25.4
6-10 years	1	0.3
not applicable	7	2.3
Total	311	100.0

From the study findings, experience in commercial rabbit production does influence adoption of commercial rabbit production. This is in agreement to the study findings by (Frimpong, 2009), who stated that many farmers are still exposed to the traditional ways of raising rabbits resulting in low performance and profitability. The study showed that with time many farmers abandon the enterprise and this agrees with (MOLD, 2012) annual report which indicated that the rabbit production trends for the last eight years shows that the production is erratic since only 0.3% had an experience of over 6-10 years. Experience in any undertaking is very important and cannot be over emphasized, in commercial rabbit production, experience is important for improving the productivity and efficiency. With experience farmers are able to overcome farming challenges which are inevitable.

Table 4.6 Number of farmers who have attended training

Whether attended training	Frequency	Percentage
Yes	249	80.1
No	62	19.9
Total	311	100.0

The study showed that of 249 respondents (80.1 %) had attended trainings on commercial rabbit production. From the study findings it is indicated that training of farmers influence adoption of commercial rabbit production .This agrees with the study findings by (Lukefahr 2007), who stated that training of farmers on basic husbandry technique contributes to the sustainability of the production systems. According to the finding of the study, training of farmers on commercial rabbit production influence adoption.

4.4.2 Farmers keeping Rabbit production Records

The study sought to establish the extent to which technical knowledge influence adoption of commercial rabbit production of which record keeping is a production technology. The respondents were asked to indicate whether they kept rabbit production records. Table 4.7 shows the farmer's responses.

Table 4.7 Number of farmers keeping records

Keeping records	Frequency	Percentage
Yes	141	45.3
No	170	54.7
Total	311	100.0

The study findings indicated that 141 respondents (45.3%) kept rabbit production records while 170 respondents (54.7%) did not keep rabbit production records. The study findings indicated that more farmers do not keep rabbit production records. From this study findings it is concluded that keeping of commercial rabbit production records does not influence commercial rabbit adoption.

4.4.3 Record keeping influence adoption

The respondents were asked to indicate whether record keeping influence adoption of commercial rabbit production. Table 4.7 shows the responses

Table 4.8 Record keeping influence adoption of commercial rabbit production

Record keeping influence adoption	Frequency	Percentage
Yes	135	43.4
No	162	52.1
Not applicable	14	4.5
Total	311	100.0

From the study findings 135 respondents (43.4%) indicated that keeping records influence adoption of commercial rabbit production while 162 respondents (52.1%) indicated that keeping records does not influence adoption of commercial rabbit production. This study concluded that the keeping of rabbit production records does not influence adoption of commercial rabbit production since more farmers do not keep records.

4.4.4 Type of records kept

The respondent were asked to indicate the type of rabbit production record they kept. Table 4.8 shows the responses

Table 4.9 Type of records kept

Type of records kept	Frequency	Percentage
Breeding	59	19.0
Feeding	69	22.2
Input purchases	37	11.9
Others	2	0.6
Not applicable	144	46.3
Total	311	100.0

The study showed that 69 respondents (22.2%) keep feeding records, 59 respondents (19.0%) breeding records while 37 respondents (11.9%) keep input purchases records. From the study's findings it is indicated that feeding and breeding record are more kept by the farmers. More rabbit farmers did not keep any record and this according to this study implies that record keeping does not play a key role on the adoption of commercial rabbit production.

4.5. Influence of marketing factors on adoption of commercial rabbit production

The study sought to find out the extent to which marketing factors which included selling prices and marketing channels, influence adoption of commercial rabbit production among farmers in Nakuru district.

4.5.1 Rabbit selling Price

The respondents were asked to indicate the selling price of their rabbits. Their responses are shown in table 4.9

Table 4.10 Rabbit selling price

Rabbit selling price	Frequency	Percentage
Not applicable	92	29.6
100-500	114	36.7
500-1000	85	27.3
1500-2000	7	2.3
Over 2000	13	4.2
Total	311	100.0

The study has shown that 114 respondents (36.7%) sold their rabbits at 100-500 Kenya shillings while 85 respondents (27.3%) sold their rabbits at 500-1000 Kenya shillings. From the study findings more farmers sell their rabbits ksh100-500, which does not agree with (KARI, 2006) report which stated that the rabbit selling price ranges between Kshs.3500.00 - 5000.00 depending on the breed, health and the region. From the findings of the study selling price of rabbit influences adoption of commercial rabbit production among farmers in Nakuru district. The study finding indicated that the selling price of

rabbit is low which is in agreement with (Lukefahr, 2007) who stated that rabbit meat should be competitive with other meat by setting the price lower.

4.5.2 Price influence adoption of commercial rabbit production

The respondents were asked whether the selling price of rabbit influence the adoption of commercial rabbit production. Their responses are indicated in table 4.10

Table 4.11 Price of rabbits influence adoption of commercial rabbit production

Influence	Frequency	Percentage
Yes	131	42.1
No	137	44.1
Not applicable	43	13.8
Total	311	100.0

The study showed that 131 respondents (42.1%) indicated that price influenced the adoption of commercial rabbit production while 137(44.1%) respondents indicated that market price did not influence the adoption of commercial rabbit production. From the study findings, selling price does not influence adoption of commercial rabbit production

4.5. 3 Availability of Rabbit Market

The respondents were asked about the availability of rabbit market. Their responses are in table 4.11

Table 4.12 Availability of rabbit market

Availability of rabbit market	Frequency	Percentage
Readily available	95	30.5
available	152	48.9
not available	34	10.9
other	30	9.6
Total	311	100.0

From the study, 152 respondents (48.9%) indicated that the rabbit market is available while 95respondents (30.5%) were readily available. From these study findings it is

indicated that the market for rabbit is not readily available. This is in agreement with (Karanja, 2013) who stated that the market for rabbit products was really under developed .His study further reported that market availability remained the major challenge .From this study findings availability of market influences adoption of commercial rabbit production among farmers in Nakuru district.

4.5.4 Market availability influence adoption

The respondents were asked to indicate how market availability influence adoption. Their responses are in table 4.30

Table 4.13 How does market availability influence adoption

Influence of market availability	Frequency	Percentage
Not interested in rabbit commercial production	121	38.9
Rabbit can be sold immediately after reaching maturity	148	47.6
Market availability acts as an enticement	42	13.5
Total	311	100.0

The study has shown that 148 respondents (47.6%) indicated that market availability influence adoption in that rabbit can be sold immediately after reaching maturity while 42 respondents (13.5%) indicated that market availability acts as an enticement. The market availability for rabbit is very important when it comes to the adoption of commercial rabbit production.

4.6 Influence of Social Cultural factors on adoption of Commercial Rabbit production

The study sought out to establish the extent to which social cultural factors which included, involvement in rabbit production, eating of rabbit meat and Religious influence adoption of commercial rabbit production among farmers in Nakuru district.

4.6.1 Involvement in rabbit keeping

The respondents were asked to indicate their involvement in rabbit keeping. Their responses are in table 4.34

Table 4.14 involvement in rabbit keeping

Involvement	Frequency	Percentage
Run the operation myself	60	19.3
My family assist me	149	47.9
Have employed attendant	58	18.6
Not applicable	44	14.1
Total	311	100.0

The study findings showed that 149 respondents (47.9%) indicated that they are assisted by family members to run rabbit keeping venture, 60 respondents (19.3%) indicated that they run the business by themselves and 58 respondents (18.6%) indicated that they employed an attendant. As shown in the table above, majority of rabbit farmers are assisted by family members to learn the business.

4.6.2 Eating of Rabbits

The respondents were asked to indicate whether they eat rabbits. Their responses are in table below Table 4.3.5

Table 4.15 Eating of rabbits

Eating of rabbits	Frequency	Percentage
Yes	207	66.6
No	101	32.5
Not applicable	3	1.0
Total	311	100.0

The study has shown that 207 respondents (66.6%) eat rabbits while 101 respondents (32.5%) do not eat rabbits. From the findings of the study, majority of farmers who keep rabbit eat rabbit meat. This agrees with (Mailu, et al, 2012) who stated that only 38 percent of non-rabbit farmers consumed rabbit meat compared to 82 percent for those who kept rabbits. This implies that majority of farmers who keep rabbit eat rabbit meat the findings concurred with (Karanja, G. (2013), who stated that the main consumers of the

rabbit products are majorly local households, local hotels and restaurants, and about 5 per cent are exported.

4.7 Influence of training and Extension services in adoption of commercial rabbit Production

The study sought to ascertain the extent to which training and extension services influence commercial rabbit production among farmers in Nakuru district. The respondents were asked to respond on various aspects of training and the results indicated as shown in the tables below.

4.7.1 Attended training organized by Ministry of Agriculture Livestock and Fisheries.

The respondents were asked to indicate whether they attended trainings organized by the ministry of agriculture livestock and fisheries. The findings are shown in the table 4.19.

Table 4.16 Attended training organized by Ministry of Agriculture Livestock and Fisheries

Attended training	Frequency	Percentage
Yes	183	58.8
No	128	41.2
Total	311	100.0

The study showed that 183 respondents (58.8%) attended training organized by Ministry of Agriculture Livestock and Fisheries while 128 respondents (41.2%) have not attended training organized by Ministry of Agriculture Livestock and Fisheries .From the study findings ,ministry of agriculture livestock and fisheries contributes greatly in the training of commercial rabbit farmers. This concurs with study finding by (Thai, 2011) who stated that agricultural extension provides a vehicle of technology transfer by initiating the development, transfer and diffusion process of innovation

4.7.2 Method of training used

The respondents were asked to indicate the methods used on training. Responses are indicated in table 4.17

Table 4.17 Method of trainings used

Method of trainings used	Frequency	Percentage
Demonstration	9	2.9
Workshop and seminar	115	37.0
Other	59	19.0
not applicable	128	41.2
Total	311	100.0

From the study findings it showed that 115 respondents (37.0%) received training through workshop and seminar and those 9 respondents (2.9%) received training through demonstrations. This implies that the method of training used is workshop and seminars This does not agrees with report by(MOA 2011) who reported that the commonly used extension methods in Kenya are individual farm visit, group visits, demonstrations, field days, barazas, on-farm trials and mass media. From the study findings workshops and seminars are preferred methods for commercial rabbit trainings.

4.7.3 Training influence adoption of commercial Rabbit Production

The respondents were asked whether trainings influenced adoption. Responses are indicated in table 4.41

Table 4.18 Training influence rabbit adoption

Training influence rabbit adoption	Frequency	Percentage
Yes	193	62
No	118	38
Total	311	100.0

The study showed that 193 respondents (62%) indicated that they influenced adoption of rabbits.

4.7.3 How training influence adoption of commercial rabbit production

The respondents were asked to indicate how training influenced adoption of commercial rabbit production. The results were indicated in table 4.21

Table 4.19 How training influence adoption

Influence of training	Frequency	Percentage
It gives the farmers skills on commercial rabbit production	68	21.9
Training enlighten farmers on the breeds and markets	71	22.8
It enables farmers to make informed decisions	46	14.8
not applicable	126	40.5
Total	311	100.0

The study showed that 71 respondents (22.8%) indicated that training enlighten farmers on the breeds and markets, 68 respondents (21.9%) indicated that training gives the farmers skills on commercial rabbit production while 46 respondents (14.8%) indicated that It enables farmers to make informed decisions. According to the findings the training of farmers influences adoption of rabbit production among farmers

4.7.4 What motivates farmers to adopt Commercial Rabbit Production

The respondents were asked to indicate what motivates farmers to adopt commercial rabbit production. Responses in table 4.23

Table 4.20 what motivates farmers to adopt commercial rabbit production

Sources of motivation	Frequency	Percentage
Better breeds readily available	112	36.0
Markets available	107	34.4
Change of consumption tastes	63	20.3
Rabbits are not land intensive	29	9.3
Total	311	100.0

The study has shown that 112 respondents (36.03%) indicated that farmers are motivated if better breeds readily while 107 respondents (34.4%) indicated that farmers are

motivated if market is available. The study findings indicated that better breeds and market availability are crucial in adoption of commercial rabbit production.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS, AND RECOMMENDATIONS OF THE STUDY

5.1 Introduction

This chapter focuses on the summary of findings of the study which formed the foundation for discussions. The discussions provided a firm basis upon which conclusions and recommendations were advanced to address factors influencing adoption of commercial rabbit production among farmers in Nakuru district. It also includes suggested areas for further research and contributions made to the body of knowledge.

5.2 Summary of Findings

The first objective of the study was to establish how technical knowledge influence adoption of commercial rabbit production among farmers in Nakuru district. From the findings technical knowledge influenced commercial rabbit production. The study showed that 71 respondents (22.8%) indicated that training enlighten farmers on the breeds and markets, 68 respondents (21.9%) indicated that training gives the farmers skills on commercial rabbit production while 46 respondents (14.8%) indicated that It enables farmers to make informed decisions. According to the findings the training of farmers influences adoption of rabbit production. Training of rabbit farmers improves on their technical knowledge which is important in technology adoption .This concurs with study finding by (Thai, 2011) who stated that agricultural extension provides a vehicle of technology transfer by initiating the development.

The second objective was to ascertain the extent to which marketing factors influence adoption of commercial rabbit production. The study showed that 98 respondents (31.5%) indicated that they sold 1-10 rabbits per year, 72 respondents (23.2%) sold 11-20 rabbits per year. From the study, 109 respondents (35.0%) indicated that they sold their rabbits to butcheries, 85 respondents (27.3%) sold to middlemen while 64 respondents (20.5%) sold their rabbits to supermarkets. From the study, 142 respondents (45.7%) indicated that

rabbit market availability did not influence adoption while 166 respondents (53.4%) indicated that market availability did influence adoption. In any production market availability is very important and from the findings of this study it is concluded that market availability influence adoption of commercial rabbit production. The findings of this study are in agreement with (Mailler, 2014) who stated that the existence of viable and well established markets is always a real economic incentive towards farmers embarking upon any alternative agricultural enterprise.

The third objective of the study was to assess the extent to which social cultural factors influence adoption of commercial rabbit production among farmers in Nakuru district. The study showed that 149 respondents (47.9%) indicated that they are assisted by family members to run rabbit keeping venture. Also the study showed that 207 respondents (66.6%) eat rabbits while 101 respondents (32.5%) do not eat rabbits. From the findings of the study, majority of farmers who keep rabbit eat rabbit meat. This agrees with (Mailu, et al, 2012) who stated that only 38 percent of non-rabbit farmers consumed rabbit meat compared to 82 percent for those who kept rabbits. This implies that majority of farmers who keep rabbit eat rabbit meat .The findings concurred with (Karanja, G. (2013), who stated that the main consumers of the rabbit products are majorly local households, local hotels and restaurants, and about 5 per cent are exported.

The fourth objective of the study was to establish the extent to which training and extension services influence adoption of commercial rabbit production among farmers in Nakuru district. Training and extension services influence adoption of commercial rabbit production. The study showed that 183 respondents (58.8%) attended training organized by Ministry of Agriculture Livestock and Fisheries while 128 respondents (41.2%) have not attended training organized by Ministry of Agriculture Livestock and Fisheries .This findings agrees with study findings by (Thai, 2011) who stated that agricultural extension provides a vehicle of technology transfer by initiating the development, transfer and diffusion process of innovation.

5.3 Discussion of Findings

Discussion of findings of the study was presented based on the four objectives of the study which are to establish the extent to which Technical knowledge on rabbit production influence adoption of commercial rabbit production among farmers in Nakuru district, to ascertain the extent to which marketing factors influence adoption of commercial rabbit production among farmers in Nakuru district, to assess the extent to which social cultural factors influence adoption of commercial rabbit production among farmers in Nakuru district and to establish the extent to which training and extension services influence adoption of commercial rabbit production among farmers in Nakuru District.

5.3.1 Technical knowledge on adoption of commercial rabbit production

The study has shown that 141 respondents (45.3%) keep records. The study also showed that 69 respondents (22.2%) keep feeding records, 59 respondents (19.0%) keep breeding records while 37 respondents (11.9%) keep input purchases records. The study has also shown that 135 respondents (43.4%) indicated that keeping records influence adoption of commercial rabbit production. From the study, 264 respondents (84.9%) attended rabbit feeding training, 154 respondents (49.5%) attended record keeping while 149 respondents (47.9%) had attended hatchet construction training. From the study's findings training influenced adoption of commercial rabbit production.. The study agrees with (Lukefahr ,2007) who stated that training of farmers on basic husbandry technique contribute to the sustainability of the production systems. From the study, 179 respondents (57.2%) indicated that the trainings on rabbit feeding, record keeping and hatchet construction had influence on adoption of commercial rabbit production. This collaborates study by Galante (2012) who stated that strategies for long-term training are particularly justified where rabbit production expertise is lacking in major governmental program .From this study findings ,technical knowledge which farmers acquire through training influence commercial rabbit production

5.3.2 Marketing factors on adoption of commercial rabbit production.

The study findings showed that 98 respondents (31.5%) indicated that they sold 1-10 rabbits per year, 72 respondents (23.2%) sold 11-20 rabbits per year. From the study, 109 respondents (35.0%) indicated that they sold their rabbits to local places and butcheries. This agrees with (Karanja 2013) who reported that the main consumers of the rabbit products are majorly local households, local hotels and restaurants, and about 5 per cent are exported. This provides an opportunity to expand the market for rabbit products which was noted to be really under developed. The study has shown that 114 respondents (36.7%) sold their rabbits at 100-500 Kenya shillings while 85 respondents (27.3%) sold their rabbits at 500-1000 Kenya shillings. This implies that the selling price of rabbit influence adoption of commercial rabbit production. From the study, 152 respondents (48.9%) indicated that the rabbit market is available while 95 respondents (30.5%) were readily available. The study has shown that 142 respondents (45.7%) indicated that rabbit market availability influence adoption. This collaborates study by (Mailler, 2014), who reported that the existence of viable and well established markets is always a real economic incentive towards farmers embarking upon any alternative agricultural enterprise. The study has shown that 148 respondents (47.6%) indicated that market availability influence adoption in that rabbit can be sold immediately after reaching maturity. This agrees with (Karanja, 2013) who reported that market availability remained the major challenge. From the study's findings it is concluded that marketing channels are very important and it influences the adoption of commercial rabbit production. From this finding it is recommended that the marketing issues be given priority in adoption of production technologies.

5.3.3 Social cultural factors on adoption of commercial rabbit production.

The study has shown that 105 respondents (33.8 %) carried out their commercial rabbit production in their family land while 92 respondents (29.2 %) carried out their commercial rabbit production in their own land. This findings of the study agrees with (Bhaumik ,2014) pointed out that when land ownership is not defined, construction of rabbit hutches and hence rabbit production is affected. The study showed that 149

respondents (47.9%) indicated that they are assisted by family members to run rabbit keeping venture, 60 respondents (19.3%) indicated that they run the business by themselves and 58 respondents (18.6%) indicated that they employed an attendant. The study showed that 207 respondents (66.6%) eat rabbits while 101 respondents (32.5%) do not eat rabbits. This collaborates study by (Mailu,et al,2012), who in his study reported that only 38 percent of non-rabbit farmers consumed rabbit meat compared to 82 percent for those who kept rabbits. The study also showed that 93 respondents (29.9%) felt that the rabbits are for small boys while 63 respondents (20.3%) indicated that their religion does not allow them to eat rabbits. Therefore trainings need to be carried out to enhance eating of rabbits. This agrees with FAO (1983) report which stated that in order to overcome rejection of rabbit meat, nutritional value of rabbit meat is extolled through training. These trainings will enable farmers to recognize rabbits as a beneficially prolific meat animal species instead of as pet animals. From the study findings social cultural factors influence commercial rabbit production.

5.3.4 Training and extension on adoption of commercial rabbit production.

The study has shown that 183 respondents (58.8%) attended training organised by Ministry of Agriculture Livestock and Fisheries. From the study, 71 respondents (22.8%) indicated that training enlighten farmers on the breeds and markets,68 respondents (21.9%) indicated that training gives the farmers skills on commercial rabbit production while 46 respondents (14.8%) indicated that it enables farmers to make informed decisions. This finding are in agreement with study by Thai (2011) who stated that agricultural extension provides a vehicle of technology transfer by initiating the development, transfer and diffusion process of innovation. The study has also showed that 115 respondents (37.0%) received training through workshop and seminar and indicated that 9 respondents (2.9%) received training through demonstrations. This agrees with (Ogunremi and Faturoti 2011) who reported that agricultural extension department is the most important public service institution with the widest range of responsibilities for agricultural and rural development From the study, 154 respondents (49.5 %) stated that training of farmer groups will promote commercial rabbit production and enable them to make informed decisions. This agrees with (Barnhardt ,2013) who reported that the major

role of agricultural extension is to help farmers to make decisions through which they can realize their own goals and to learn from their own experience. From this study findings ,it is indicated that training and extension services influence the adoption of commercial rabbit production.

5.4 Conclusions of the study

From the research findings, it was concluded that technical knowledge influenced adoption of commercial rabbit production. Males are more involved in commercial rabbit keeping than females.

The age of respondents influenced commercial rabbit production. Age is therefore suitable in undertaking commercial rabbit production which require commitment and effective decision making. Marriage ascribes familial responsibilities to farmers and therefore farmers become more serious in terms of their participation in agricultural technologies that would give them access to more food and income to meet their responsibilities. Trainings on keeping records, rabbit feeding, hatchet construction and breed selection should be attended by those keeping or willing to start rabbit business. Keeping of records is very important in commercial rabbit production. It can be concluded that marketing factors influence commercial rabbit production. The main consumers of the rabbit products are majorly local households, local hotels and restaurant The rabbit market should be readily available since existence of viable and well established markets is always a real economic incentive towards farmers embarking upon any alternative agricultural enterprise. The reasons of limited market success are low consumer demand, insufficient promotion, unsteady product supply, unreasonable prices, competition between other meats and lack of product diversification and poorly developed marketing channels.

From the study findings was concluded that social cultural factors influence commercial rabbit production. Land tenure has affected agricultural development projects and can similarly affect Rabbits and culture-based rabbits. If land ownership is not defined, construction of rabbit hutches and hence rabbit production is affected. Those who keep rabbits eat more rabbits than those who do not keep rabbits. Therefore trainings need to be carried out to enhance eating of rabbits. That is in order to overcome rejection of rabbit

meat, nutritional value of rabbit meat is extolled through training. According to the study findings It was concluded that training and extension influence commercial rabbit production. Agricultural extension provides the bridge between the research stations and the farmers, carrying and bringing back knowledge based upon local experience for further investigation. The commonly used extension methods are individual farm visit, group visits, demonstrations, field days, barazas, on-farm trials and mass media. Ministry of Agriculture, Livestock production and Fisheries is leading in provision of trainings on commercial rabbit production. Commercial rabbit production is very effective if the right technology, effective extension services, access to inputs, adequate market and complementary infrastructural facilities are provided.

5.5 Recommendations of the study

The following policy recommendations were made from the findings of this study

1. The commercial rabbit farmers should be trained on keeping records, rabbit feeding, hatchet construction and breed selection. Commercial rabbit keepers should be encouraged to keep records of their enterprises.
2. Viable and well established markets are always a real economic incentive towards farmers embarking upon any alternative agricultural enterprise. The farmers should be trained on the available marketing channels, consumer demand and supply, promotion.
3. Land ownership must be defined otherwise construction of rabbit hutches and rabbit production is affected. Those who keep rabbits eat more rabbits than those who do not keep rabbits. In order to overcome rejection of rabbit meat, nutritional value of rabbit meat should be extolled through training.
4. Commercial rabbit production is very effective if the right technology, effective extension services, access to inputs, adequate market and complementary infrastructural facilities are provided.

5.6 Suggested areas for further Research

The following areas are suggested for further studies from the results of this study

1. A study to establish the factors that influence the eating habits of rabbits in the country.
2. A study to find out social economic factors influencing implementation of rabbit programmes in the country.
3. A study to establish the effect of rabbit production on the rural food security in the country.

REFERENCES

- Adu A. (2007). Utilization of Forestry, Related Technologies Among catchments Areas of forestry Research Institute (South West Nigeria). Department of Agricultural extension and Rural Development, University of Ibadan, Nigeria.
- Adu A. (2005). Socio-Economic Impact of Forestry-Related Technologies Utilization among Farmers in South West Nigeria. Published Seminar Paper in the Department of Agricultural Extension and Rural Development. University of Ibadan, Nigeria.
- Akinfala O. Matanmi O. & Aderibigbe O. (2003).Preliminary studies on the response of weaner rabbits to whole cassava plant meal basal diets in the humid tropics.Dept. Of Animal Science, Obafemi Awolowo University, Ile-Ife, Nigeria.
- Amin R. (2011).Rabbit Farming, A Potential Approach towards Rural Poverty Alleviation. Department of Public Administration, Comilla University. Cornilla, Bangladesh.
- Ashoka C. (2013). A Local Solution to Malnutrition Ashoka Changemakers. Nairobi, Kenya.
- Barnhardt R. (2013). Culture, Community and the Curriculum Culture, Community and the Curriculum. Center for Cross Cultural Studies. University of Alaska, Alaska,United States of America.
- Baumans V. & Loo V. (2012).How to improve housing conditions of laboratory animals, The possibilities of environmental refinement. Dept. Animals, Science and Society, Div. Laboratory Animal Science, Utrecht University Utrecht, the Netherlands.
- Bhaumik S. (2014).Is Women's Ownership of Land a Panacea in Developing Countries? Evidence from Land-Owning Farm Households in Malawi. ABS, Aston University, Birmingham, United Kingdom.
- Dalle Zette A.& Szendra (2011). The role of rabbit as a functional food. National Center for Biotechnology Information, U.S. National Library of Medicine, Bethesda Maryland, USA.
- Depi (2014). Guidelines on Keeping Pet Rabbits. Department of Environment and Primary Industries, East Melbourne, Australia.

- EAAP (2008).59th Annual Meeting of the European Association for Animal Production. European Association for Animal Production, Copenhagen, Denmark
- Ekarius C. & Robson D. (2012).The Fleece & Fiber Sourcebook; More Than 200 Fibers, from Animal to Spun Yarn. Workman Publishing, New York United States. For Chicago. Morgan Kaufmann Publishers, Chicago, Illinois.
- Gadhi D. (2011). Socioeconomic Study of Grasses and Legumes in Baria and Godhra, Forest Division, Gujarat. The Maharaja Sayajirao University of Baroda, Faculty of Science, Department of Botany, Gujarat, India.
- Galante J. (2012). Agricultural Marketing, Department of Housing and Urban Development Act, Washington, DC, USA.
- Gómez A. (2010).Crossbreeding parameters of some productive traits in meat rabbits. World Rabbit Science, Barcelona, Spain.
- Hamming D. (2013). Effects of environment enrichment on rabbit performance. Commonwealth Agricultural Bureau International, Oxfordshire, United Kingdom.
- Hoffman L. & Cawthorn D. (2012). What is the role and contribution of meat from wildlife in providing high quality protein for consumption? American Society of Animal Science, Champaign, Illinois, United States.
- Kalio A. Etela & Ginilla V. (2008).Rabbit meat, preferred animal protein. Department of Agriculture, Rivers State College of Education, Ndele, Nigeria
- Karumbi P. (2009).Investigation of challenges facing accessibility of credit from commercial banks for financing agricultural sectors in Kenya: Kenyatta University, Nairobi, Kenya.
- Kuria D. (2013).A Local Solution to Malnutrition Ashoka Change makers. Nairobi, Kenya
- Muzondiwa V. (2013).Constraints and Opportunities to Rabbit Production in Zimbabwe. Midlands State University, Department of Livestock and Wildlife, Midlands, Zimbabwe.

- Maingi N. & Ng'ang'a J. (2013). Production characteristics and constraints of rabbit farming in Central, Nairobi and Rift-valley provinces in Kenya. Department of Veterinary Pathology, Microbiology and Parasitological, University of Nairobi, Nairobi, Kenya.
- Mailler P. (2014). Enhancing agriculture's contribution to regional communities. Australian Rural Leadership Foundation, Deakin West, Australia.
- Maingi N. & Nganga J. (2013). Production characteristics and constraints of rabbit farming in Central, Nairobi and Rift valley provinces. Nairobi, Kenya.
- MOA(2011). A guide to effective extension methods for different situations. National Agriculture and Livestock Extension Program, Nairobi, Kenya
- MOA (2011). Nakuru district achievement and progress review report. Ministry of agriculture, Nakuru, Kenya.
- MOA(2012). Rabbit Farming. National Agricultural Farmers information systems. Nairobi, Kenya.
- MOLD (2012). Nakuru district quarterly report .Ministry of livestock development Nakuru district, Nakuru, Kenya.
- Moreki, C (2007). Commercial Rabbit Production. Poultry and Rabbits Section, Non-Ruminants Division, Department of Animal, Production, Gaborone, Botswana.
- Moreki,C.&Seabo,D.(2012).Current status, challenges and opportunities of rabbit production in Botswana .Department of Animal, Production, Gaborone, Botswana.
- Murphree J. (2011). Ask a Farmer: How Do We Get Kids Interested in Farming?
- Nwakor F. (2011). Cassava varieties among farmers in abia state .National Root Crops Research Institute Umudike. Michael Okpara University of Agriculture Umudike, Abia, Nigeria.
- Ogunremi B & Faturoti O (2011).Rural Fish Farmers' Awareness and Participation in Agricultural Extension Agents' Activities In Oyo State. Department of Wildlife and Fisheries Management, University of Ibadan, Ibadan, Oyo State, Nigeria.

- Olguin A .(2012). Natoural Resource Management for Sustainable Development in the Caribberan. Library of Congress, USA.
- Osbah H .(2007).Building resilience: Adaptation mechanisms and mainstreaming for the poor. Centre for the Environment, University of Oxford, Oxford.
- Petracci M. & Cavani C. (2012).Rabbit Meat Processing: Historical Perspective To Future Directions. Department of Agricultural and Food Sciences, Alma Mater Studiorum - University of Bologna, Cesena, Italy
- Roe E. & Higgin M .(2009).Current strategies for animals welfare in the food service¹ sector in Norway. Wageningen Academic Publishers,Wageningen, the Netherlands.
- Rogers M .(2003). Diffusion of innovation. New York Free Press,New York, USA.
- Thai,M.(2011).Agricultural Knowledge Transfer and Innovation Processes in Vietnam's Northwestern Uplands:State-governed or Mobility
- Staley S. (2012).Practical Strategies for ReducingCongestion and Increasing Mobility for Chicago,Demand-driven? Institute of Food and Resource Economics, Faculty of Life Sciences, University of Copenhagen, Rolighedsvej, Denmark.
- Trocino & Xiccatto (2012).Animal Welfare in Reared Rabbits: A Review with Emphasis on Housing Systems. Department of Animal Science, University of Padova, Agripolis, Legnaro, Italy.
- Wanyoike &Mwanza R. (2012).Rabbit meat consumption in Kenya. International, Kumasi, Ghana.
- Wenger C.&Coughler P. (2011).Starting a farm in Ontario. Ministry of Agriculture, Ontario,California,USA.
- Wilson T. (2011). Small animals for small farms. Rural Infrastructure and agro industries Division.FAO, Rome, Italy.

APPENDIX 1: LETTER OF INTRODUCTION

Benson M. Mutisya
P.O.BOX 44,
NAKURU.
TEL: 0722261614.

TO WHOM IT MAY CONCERN

Dear Sir/Madam

RE: Factors influencing adoption rate of commercial rabbit production among farmers in Nakuru District.

I am a postgraduate student in the University of Nairobi, pursuing a Masters degree in Project Planning and Management. I am conducting a research study entitled Factors influencing adoption of commercial rabbit production in Nakuru district.

The purpose of this letter is to request for permission to interview farmers using the attached questionnaire copies. The information obtained is strictly for academic purposes and shall be treated with uttermost confidentiality.

Thank you.

Yours Faithfully.

Benson .M. Mutisya

L50/63042/2013

APPENDIX II: RESEARCH QUESTIONNAIRES FOR RABBIT FARMERS

Introduction

This questionnaire is on factors influencing adoption of commercial rabbit production in Nakuru District. The exercise is in line with research study requirement in partial fulfillment of a master degree in Project Planning and Management at the University of Nairobi. The data collected will be used for the said purpose only. The identity will be held with strictest confidence. The questionnaires contain five sections. Kindly tick clearly the correct response for YES/NO” questions and write legibly on the spaces provided for open ended questions. Kindly respond to all the sections by filling or by ticking the space provided or explaining your opinion briefly.

SECTION ONE: DEMOGRAPHIC CHARACTERISTICS.

1. Kindly indicate your gender.

(a) Male ()

(b) Female ()

2. Please indicate your age from the choices given below;

(a) 16-25years ()

(b) 26-35years ()

(c) 36-45years ()

(d) Over 45years ()

3. What is the level of your education?

(a) None ()

(b) Primary ()

(c) Secondary ()

(d) Tertiary ()

(e) University ()

4. Kindly indicate your marital status.

(a) Single ()

(b) Married ()

(c) Others (specify) ()

SECTION B: INFLUENCE OF TECHNICAL KNOWLEDGE ON COMMERCIAL RABBIT PRODUCTION.

5. Kindly indicate your experience in commercial rabbit production

- (a) 0 years () (b) 1- 2 years () (c) 3-5 years () (d) 6-10 years() (e) Over 10 years()

6. Have you ever attended any training on rabbit production in an academic institution?

- (a) Yes () (b) No ()

7. If your answer to question 2 above is yes, please indicate type of institution attended.

- (a). Agricultural training centre (ATC) ()
- (b). Agricultural training colleges (eg. Bukura, DTI etc) ()
- (c). Universities ()
- (d).Others (specify) ()

8. Do you keep any records for your farm on commercial rabbit production?

- (a) Yes () (b) No ()

9. If yes which records on rabbit production do you keep?

- (a).Breeding ()
- (b).Feeding ()
- (c).Input purchases ()
- (d).Others(specify).....
.....
.....
.....

10. Does your answer above influence your adoption of commercial rabbit production?

- (a) Yes () (b) No ()

11. Kindly indicate the source of feed for your rabbits

- (a). Not applicable
- (b).Kitchen waste ()
- (c).Forage from the garden ()
- (d).Rabbit pellets ()

(e)Others(specify).....

12. Please indicate feeding schedules of your rabbits per day

- (a). Once in the morning only ()
- (b). Twice per day ()
- (c).More than twice per day ()
- (d) Not applicable

13. Please indicate the litter/doe per year in your farm

- (a). 2-4 litter/doe/year () (b). 4-6 litter/doe/year () (c).8-10 litter/doe/year ()
- (d).Over 12 litter/doe/year () (e). Not applicable ()

14. Please indicate the mortality rate of young rabbits on your farm.

- (a).0-5% () (b).6-10% () (c).11-15% () (d).Over 16% () (e) Not applicable()

15. Have you attended any training on?

- (a). Rabbit feeding? Yes () No ()
- (b). Rabbits' record keeping? Yes () No ()
- (c).Rabbit hatcher construction? Yes () No ()

16. Does the answer to question 10 above influence the adoption of commercial rabbit production?

- (a) Yes () (b) No ()

17. Kindly indicate your routine rabbit feeding.

- (a).Once every day () (b). Twice a day () (c).More than twice a day ()
- (d).Not applicable

18. What are the main two (2) challenges in adoption of commercial rabbit production by farmers?

i.....

ii.....

19. Do you keep rabbit breeding records?

- (a) Yes () (b) No ()

20. What are the sources of your rabbit replacement breeding stock?

(a).Not applicable (b).Selection from your farm () (c).Purchases from outside() (d).Other (specify).....

21. What do you consider when selecting the replacement stock?

(a).Records of parents () (b).Records of the animal () (c).Physical appearance of animal only ()

(d).Other (specify)..... (e).Not applicable

22. Please indicate the type of rabbit breeds kept on your farm.

(a).Chinchilla () (b).California white () (c). Crosses () (d). All types () (e)

Do not keep any rabbit

23. Does the breed type influence your adoption of commercial rabbit rearing?

(a) Yes () (b) No ()

Give reason for your answer.....
.....

24. How do you rate the availability of rabbit breeding stock?

(a). Not readily available () (b).Readily available ()

25. Please indicate how your answer in 3 above influences your adoption of commercial rabbit

keeping.....
.....
.....
.....

SECTION C: INFLUENCE OF MARKETING STRUCTURES ON COMMERCIAL RABBIT PRODUCTION.

26. How many rabbit did you sell in the last 12 months?

.....

27. Where do you sell your rabbits?

Super markets ()

Butcheries ()

Middle men ()

Local market centre ()

Other

(Specify).....

.....

28. At what price do you sell your rabbits.....?

29. Does the price influence you to adopt commercial rabbit production?

(a) Yes () (b) No ()

Give reason for your answer Question 23.....

30. Kindly indicate the availability of market for rabbits.

(a). Readily available () (b). Available () (c). Not available () (d). Others (specify) ()

31. Does your answer to question 24 above influence your adoption of commercial rabbit production

(a) Yes () (b) No ()

Kindly give an explanation for your answer in question 25

.....

32. In your own opinion, Comment on adoption of commercial rabbit production by farmers in your area.....

.....

33. How do you get market information for your rabbits e.g. on selling price and where to sell?

(a). Word of mouth from friends and relatives () (b). Local market () (c). Newspaper ()

(d). Radio () (e). Mobile phone () (f). Internet () (g). Other (specify).....

SECTION D: INFLUENCE OF SOCIAL, CULTURAL AND ECONOMIC FACTORS ON ADOPTION RATE OF COMMERCIAL RABBIT PRODUCTION.

34. What is the ownership of the land tenure on which you do the rabbit farming?

(a) Freehold [] (b) Family land [] (c) leasehold [] (d) Own land []

35. What is your involvement in the rabbit farming?

(a) Run the operation by myself [] (b) my family assist me []
(c) I have employed rabbit farm attendants []

36. How did you raise money to start your rabbit farming?

(a) Own money [] (b) Bank loan [] (c) Co-operative society loan []
(d) Government Support [] (e) others (please specify).....

37. (a) Is rabbit farming your main source of income?

(a) Yes [] (b) No []
(b) If not please state if you have other sources of income apart from fish farming.....
.....

38. Do you eat rabbit meat?

(a) Yes [] (b) No []

If the answer is No in Question number 32, please state two reasons

i.....
ii.....

SECTION E: INFLUENCE OF TRAINING AND EXTENSION SERVICES ON ADOPTION RATE OF COMMERCIAL RABBIT PRODUCTION

39. Have you attended any training organised by Ministry of Agriculture, Livestock and Fisheries or any other service providers?

(a) Yes [] (b) No []

If yes please explain the following information about the trainings and extension services conducted

Name of training institution.....
Method of training used 1. Demonstration [] 2. Workshop/seminar [] 3. Other []
Number of trainings received last year (2012).....

40. Do you think the training and extension services influence rabbit farming in this area?

(a) Yes [] (b) No []

If yes, explain

.....

41. Please indicate two rabbit service providers in your area.

i.....

ii.....

APPENDIX III: EXTENSION SERVICE PROVIDERS AND INFORMANT RESEARCH QUESTIONNAIRE.

INTRODUCTION.

I am a student at Nairobi University undertaking a Masters degree in Project Planning and Management. In the fulfillment of my dissertation I am researching on factors influencing adoption of commercial rabbit production by farmers in Nakuru district in Nakuru County. The purpose of this questionnaire is to obtain information on factors influencing the adoption of commercial rabbit production in Nakuru district. The information will be treated confidential and will only be used for the purpose of this study only .Please tick the appropriate answer and write legibly on the spaces provided for any details explanation of your answers to the questions.

1. Please indicate whether you are an extension service provider or a group leader.

A group leader ()

An extension officer ()

2. In your own opinion what are the factors influencing the adoption of commercial rabbit production by farmers

.....

.....

.....

.....

3. Please indicate the challenges rabbit farmers face in adoption of commercial rabbit rearing.....

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

4. What do you think motivates farmers to adopting commercial rabbit production?

.....

5. Please comment on the adoption of commercial rabbit production by farmers in your area.

Low ()

Average ()

High ()

Give reason for your answer to question 4

above.....

6. What is the most popular breed of rabbits kept by farmers in this area.....?

7. What is your view on the market structures of rabbit in this area.....

.....

8. In your opinion, what do you constitutes best commercial rabbit production.....

.....

9. What is your organization doing to promote adoption of commercial rabbit production by farmers in this area.....

10. In your opinion, do the rabbit farmers have adequate knowledge on commercial rabbit production?

Yes ()

No ()

11. Comment, in your own opinion, on how to enhance commercial rabbit production by farmers in your area.....

12. Kindly comment on the availability of rabbit feeds by the farmers in this area.....

APPENDIX IV: Table 4: Krejcie and Morgan Krejcie (1970) Sampling Table

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Where: “N” is population size, S” is sample size.
