

**FACTORS INFLUENCING RABBIT FARMING; A CASE OF RABBIT PRODUCTION  
PROJECT IN ABOTHUGUCHI WEST DIVISION, MERU COUNTY, KENYA**

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**DECLARATION**

This research report is my original work and has not been presented to any other institution of higher learning for award of certificate, diploma or degree.

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## **DEDICATION**

This report is dedicated to my husband, Peter I. Mwangi; whose words of encouragement has been great, also to my first born son Amos in his university second year who has been offering the competition spirit and my second son David who gained that education is for forever. To my mother Alice Mbutu for her words of wisdom.

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## **ABBREVIATIONS AND ACRONYMS**

ASDSP	-Agriculture Sector Development Support Program
FAO	-Food and Agriculture Organization
GDP	- Gross Domestic Product
GTZ	-German International Development Agency
HIV	- Human Immunodeficiency Virus
IFPRI	- International Food Policy Research Institute
KARI	- Kenya Agricultural Research Institute
KEMRI	- Kenya Medical Research Institute
KNH	- Kenyatta National Hospital
KPHC	- Kenya Population and Housing Census
MDG	- Millennium Development Goal
MOLD	- Ministry of Livestock Development
LEAD	- Livestock, Environment and Development initiative
NAEP	- National Agriculture Extension Policy
NALEP	- National Agriculture and Livestock Extension Program
RABAK	- Rabbit Breeders Association of Kenya
SMS	- Short Message Service
SR-CRSP	-The Small Ruminant Collaborative Research Support Program
USAID	-United State of Aid

## ABSTRACT

Food security and availability is a challenge globally; making individuals, governments and other stakeholders to seek for production alternatives. In the developing world; the poor are prone to both starvation and food insecurity. Increase in the human population indicates a need for increased production. Animal protein is scarce to the low income sections of the society due to its high prices, raising the need for diversifying the sources. Rabbit rearing is one of the options. The study dwelt with the demographic factors of the sample population, the attitude on rabbit farming, their incomes, and rabbit products and benefits attracting farmers to rabbit farming. The target population consisted of rabbit farmers in Abothuguchi West division of Meru County, Kenya. There were 78 rabbit farmers sampled in this study. Data were collected using structured questionnaires and observations. The response rate was 84.6%. Data was cleaned and edited in Excel computer package and descriptive statistics arrived at using statistical package for social sciences (SPSS). The findings were that contrary to expectations, 72.5% adult reared rabbits, with 39.4% of rabbit farmers owning 10 to 20 rabbits and that the negative attitude against rabbit keeping had reduced over time. It was established that rabbit farming keeping thrived mainly because of being a source of white meat-food, income and manure as a combination 78.8% of the farmers confirmed. It was recommended that information regarding rabbit products and benefits be passed to the potential keepers. The study has revealed several facts about rabbit farming in Abothuguchi West division so Livestock extension officers must bridge as they avail these information through trainings. The Government could also use media especially the local language stations since the study has indicated that some farmers got initial rabbit farming ideas from the media, however, there should be an initiative to invite extension officers to these stations so as to give appropriate message which when left to media people there are gaps or misinformation released to the multitude. The suggestions included are due to increasing pressure on land as a result of increased population, land is getting sub divided to very small units, a research to compare traditional enterprises to these areas (coffee, tea and dairy) and emerging enterprises (rabbit farming) need to be done to reveal how they could either complement each other or replace one another.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to the Study

According to Andersen *et, al.* (1999) seventy three million people will be added every year between 1995 and 2020 which is at thirty two percent to reach 7.5 billion world populations. Mirkin (2005) presented a report on world demographic trends to the UN which indicated that the world population stood at 6.5 billion and was expected to reach the 7 billion mark in 2013 due to dynamic population change as reflected in new and diverse patterns of family formation, childbearing, mortality, ageing, urbanization and migration. This population growth will mainly be in the cities and rural areas of developing world which will lead to an increase in world food demand for both the cereals and meat. The WorldWatch Institute (2004) concerned with Vision for Sustainable World noted that food productivity of farmland in the world is gradually lagging behind population growth.

International Food Policy Research Institute, Food Policy Report by Andersen (1999) also reported that the volume of meat consumed in the developing world grew three times faster than developed world, which according to FAO (2006) through LEAD initiative showed that more than two third of agriculture land has been allocated to livestock production while a third is left for crop production leading to decrease in forest and grassland sizes as more were opened to create more space for production. IFPRI (1999) state that there has been a success in improving agricultural productivity in the world, however in the Sub-Saharan African food situation is still extremely difficult as large-scale breakthroughs in agricultural productivity and improvements in food security are yet to occur in the region.

Chauvin *et, al.* (2012) reported to UNDP that African countries' agricultural sector provides a relatively large share of GDP but productivity in the sector has lagged behind that of other continents and the potential that Africa can reach in the sector. Agricultural productivity is below yield potentials, agricultural mechanization is weak and declining. The rural population has been unable to transform their basic agriculture, which is a major economic activity, which led to World Bank in its 2008 World Development Report, to devote to Agriculture and Rural Development as the center of the development agenda to achieve Millennium Development Goals of halving extreme poverty and hunger by 2015.

Kenya Vision 2030 (2007) has the details of how Kenya government consultatively developed a development strategy that was called Vision 2030. It aimed to move the country economy to middle income by 2030 through three pillars namely Social, Political and Economics. Through the Economic pillar, Agriculture's contribution shall be enhanced by promoting innovation, commercially oriented and modern farming techniques in order to improve on agricultural productivity.

FAO (2008) has stated that meat is part of a balanced diet that contributes valuable nutrients that are beneficial to health, since meat and meat products contain important levels of protein, vitamins, minerals and micronutrients which are essential for growth and development. In the developed and industrialized countries per capita consumption of meat is high as indicated in the FAO (2008), it is at 82.9 kg/year, while at 31.1 kg/year in developing countries. Average global per capita meat consumption is 42.1 kg/year against the recommended daily animal-sourced protein per capita of 50 kg per year. In the developing countries the level is insufficient and often leads to under-nourishment and malnutrition. FAO (2004) estimates that more than 2 billion

people in the world are deficient in key vitamins and minerals, particularly vitamin A, iodine, iron and zinc and more than half of this are in Africa. Deficiencies being inadequacy or low levels occur when people have limited access to micronutrient-rich foods such as meat, fish, fruit and vegetables. The report further state that most people with micronutrient deficiencies live in low income countries and are typically deficient in more than one micronutrient. FAO (2010) indicated that a rise in global population mirrors the growth of the meat industry and that generally, in developing countries when people have more money, they increase the meat and animal products in their diets which have promoted demand for cheap protein, and however, the space for expansion in livestock production is limited. According to FAO (1982) by the year 2000 the meat requirements of one-third of the human population was to be satisfied by the supply of pork, poultry and rabbit meat. The Organization has a program in meat and meat products which aims to assist the member countries in exploiting the opportunities for livestock development and poverty alleviation through the promotion of safe and efficient production, processing and marketing of meat and meat products.

According to Ministry of Agriculture program document, ASDSP (2011) Kenya land area is approximately five eighty seven thousand Kilometers squared (587,000km<sup>2</sup>) with estimated population of forty million, eight sixty three thousand (40,863,000) people and a growth rate of 2.7%. ASDSP (2011) explains that life expectancy is at 55years for women and 53 years for men having reduced from 69 and 67 respectively, which is mostly due to lifestyle changes in both behavior and diet. It also noted that nearly half of Kenyan population lives below poverty line which is 45.9% nationally and 49.1% in the rural areas. According to the report, the poorest 10% human population in Kenya consumption is 2.5% of national food consumption, yet they

contribute very little of what they consume. The economic review of agriculture 2007 indicates that 51% of the Kenyan population lack access to adequate food. This inaccessibility to food is closely linked to poverty which stands at 46% (National Economic Survey, 2008).

FAO (2008) estimate shows that the average global per capita meat consumption is 42.1 kg/year with 82.9 kg/year in developed and 31.1 kg/year in developing countries against the recommended daily animal-sourced protein per capita of 50 kg per year. FAOSTAT (2007) puts red meat supply including offal at 16.34 kg per capita in Kenya which is below level identified by FAO for the developing countries like Kenya as well as below the recommended FAO protein per capita. This identifies a gap that need to be addressed to improve on supply of animal source protein. In Meru Central district (2011), Annual Livestock Production report, the district population of 141,768 persons was estimated to have consumed red meat which amounted to 442,940 kilograms which shows that within that year each person consumed approximately 3 kg per year of meat. This is just the official figure that does not include the meat not inspected or the meat from neighbouring districts. This is below the FAO recommended figure of 50 kg per year.

Agriculture has been the mainstay of the Kenyan's economy, providing 26% of the GDP while 80% of the rural population derives their livelihood from agriculture and other related activities. Kenya Government has strived to achieve national, household and individual food security throughout the country through increased production of major food crops. The government has been having programs meant to assist in improved food production, for example, SR-CRSP by KARI supported by USAID for the last 10 years was initiated due to increasing demand for animal products. The government appreciated that a proportional share of small ruminant productivity is necessary to improve on food availability without environmental degradation. It

has successfully brought awareness of significance of small ruminant industry to policy makers. It has also successfully lobbied to have rabbits included in the list of small ruminants for their efficiency to convert fodder to food as the whole point of meat production is to convert plant proteins of little or no use to people as food into high-value animal protein. Cheeke (1980) noted that recently there has been increased awareness of the advantages of rabbit meat production in developing countries as a means to alleviate food shortages which is attributed to the rabbit having a 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. Lukefahr (1987) indicated that rabbit rearing should be strongly integrated into traditional farming practices to ensure the recycling of garden and/or kitchen refuse as rabbit feed and the conversion of rabbit manure into compost for enhancing farm soil. Such applied integration may give increased yields while requiring only marginal capital expenditure.

Lukefahr (1987) stated that correct care and management are necessary if rabbit production is to be successful. He noted that in many cultures, livestock have to scavenge for their own food, find shelter and water under open conditions which can only supports limited production. He indicates that for many farmers, rabbits are not easy to rear as they require meticulous care and labour. Confinement rearing and lack of technical knowledge have been identified as traditional hindrance to rabbit farming in many developing countries.

## **1.2. Statement of the Problem.**

In 1992 the Government of Federal Republic of Germany through its GTZ component, together with Government of Kenya (GOK) through its Ministry of Agriculture; Livestock Production



Department funded a project Integrated Small Livestock Project (ISLP - 1992) that had four components; dairy goat production, poultry, rabbit and beekeeping targeting small scale farmers. The objective was to improve production of the named enterprises, improve food security and incomes. While dairy goat and poultry production farmer groups were formed and still carrying out their activities as witnessed in the field, the beekeeping farmer groups declined and those for rabbit production collapsed leaving only a few individual farmers continuing with rabbit production. In 2000 Sweden Government through its SIDA component, together with GOK Ministry of Agriculture and Ministry of Livestock Development funded an extension program National Agriculture and Livestock Extension Program (NALEP 2000 -2012) that targeted farmer groups who had a common interest in farm production, farm produce marketing and value addition. Among the enterprises targeted was rabbit production. According NALEP Report (2012) Thika district which was among the pilot district had a target of 23 Focal Areas (FA), during which 20 Focal areas were successfully implemented, within those FA total of 5 rabbit production Common Interest Groups (CIG) were formed with 25 members (10 youths and 15 women). The following year Rabbit CIGs increased from 5 to 7 CIGs while membership increased from 25 to 35 members (10 youths 5 women and 18 men). In 2005 a self help group with 50 members (30 women 10 men and 10 youths was registered, in five years the growth of membership grew at fifty percent, that is, at ten percent each year. In 2010 the GOK through the Ministry of Livestock Development initiated a Rabbit Production Project; Rabbit Production (2011 – 2014) in twenty two districts spread across the country, following the Impact Assessment Report (2006) on NALEP which had identified rabbit production as a means to address food security as a source of animal protein and a source of income for small scale farmers as well as the poor farmers in both the urban and rural areas, however, the uptake and

adoption rates for the enterprise have remained low. Following these deliberate initiatives to increase rabbit population and adoption rates remaining low and slow there is need to establish how several factors influence rabbit production.

### **1.3 Purpose of the study**

The study assessed the factors influencing rabbit farming; a case of rabbit production project in Abothuguchi West Division, Meru Central district, Meru County. The GOK allocated resources towards promotion of rabbit production project in the district yet population figures and trends indicate that there are minimal changes in adoption rate and rabbit population.

### **1.4 Objective of the study**

After several initiatives contributing towards rabbit production promotion; Integrated Small Livestock Project (1992 – 1998), NALEP (2000 – 2012) and the Ministry of Livestock Development Rabbit production Project (2011- 2014) there was need to establish how various factors influence rabbit farming.

### **1.5. Specific Objectives**

1. To find out how demographic factors influence rabbit farming in Abothuguchi West division, Meru Central district.
2. To find out the relationship between rabbit farming and the farmers' attitude in Abothuguchi West division, Meru Central district.
3. To determine how the level of family incomes influence rabbit farming in Abothuguchi West division, Meru Central district.
4. To find out how rabbit products influence rabbit farming in Abothuguchi West division, Meru Central district.

### **1.6. Research Questions.**

1. How do demographic factors influence rabbit farming in Abothuguchi West division, Meru Central district?
2. What is the relationship between farmers' attitude and rabbit farming among rabbit farmers in Abothuguchi West division, Meru Central district?
3. How do family incomes influence rabbit farming in Abothuguchi West division, Meru Central district?
4. How do rabbit products influence rabbit farming in Abothuguchi West division, Meru Central district?

### **1.7. Justification of the Study.**

According to Micro-report No. 184, livestock sector employs close to 50 percent of Kenya's agricultural labor force and it is estimated that livestock sector contribution to Kenya GDP at 5.6 percent while its contribution to agricultural GDP is estimated at 30 percent. Expansion of the sector would contribute much more towards wealth and job creation, as well as improve food security and diet improvement. It was important to have the study so that as the government continue to fund for rabbit production project, then it would be possible for the government and other private investors to strategize on how to expand and sustain the rabbit production as source of income and its contribution towards food security especially among the 49.1% rural poor community. The entrepreneurs would make use of the value chain to ensure its enrichment, with some opting for production and breeding, others on support services e.g. (feeds and drugs manufacturers, equipment provision), and others on processing and value addition.

### **1.8. Delimitation of the study**

The research project was carried out in Abothuguchi West division; Meru Central district focusing on rabbit production farmers, with the sample size of 78 farmers. The study was on demographic factors, income, farmers' attitude and rabbit products and how they influenced rabbit farming in the area of study.

### **1.9. Assumption of the study**

The rabbit farmers would be ready to provide truthful responses since their confidentiality would be guaranteed. It was also necessary to assume that rabbit production project support in Abothuguchi West division would continue to the final phase. Expectations were that response

rate would be a hundred percent, it was not possible since it is a tea zone and it was during a tea picking season, which was at its highest since there were rains and cold season had not set in the area.

#### **1.10. Definition of significant terms.**

**Rabbit products-** These are what one get from rabbit farming that the farmer benefit from. In case of rabbit farming they include food (white meat), manure, income from products or rabbit sale, skin/fur.

**Rabbit productivity -** This is the level of production in various products from the rabbits, when good husbandry is practiced then the productivity goes up and benefits are more. Poor rabbit husbandry gives poor/low production level and subsequently low benefits.

**Total farm income-** this is the income that a farmer gets from the farming activities he undertakes in his farm.

**Livestock officer-** Personnel in Ministry of Livestock Development deployed in the field to disseminate information concerning livestock enterprises, rabbits included.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The chapter provides a solid background for the research study through review of the objectives which are demographic factors, level of attitudes, income levels and rabbit products and their influence on rabbit farming. Source of review included books, publications, journals, reports and other information from the internet.

#### **2.2 Demographic factors**

Demographic factors are characteristics assigned to age, sex, marital status, religion, birth rate, death rate, family size, and marriage age. Heller (2010) as he examined implications of demographic factors on infrastructure development in the developing world stated that demographic factors are key to development but are often ignored. He recommended to policy makers to consider population and its indicators as they make development choices since there is a connection between these factors and development. Duncan (2004) looked at age as aspect of demographic factors in relation to food consumption. He indicated that as a population age, that is having more elderly people than young ones, food consumption per capita decline as well as change in dietary patterns due to change in preference.

Sadik (1989) did a study and presented her findings to a UNFPA forum; she said that in developing world women are responsible for half of food produced, in time and energy spent on cultivation, harvesting, processing and preparation of food, however, most governments are yet to recognize this role. Women are pivotal in family planning services, improvement in nutrition, access to education and health. The governments need to make deliberate efforts to recognize

women roles which would ensure adequate food production. She also advised that special agricultural and environmental extension services should be made available to women since they carry out much of land and water management. The report concluded that better educated women are more effective as farmers and environmental managers.

Hadrich (2011) stated that human capital in terms of age, experience, education, and management capabilities of the farm operators can be considered important as they contributed to reduce the marginal factor cost. Sumner and Leiby (1987) indicated that when younger farmers have education and an initial finance they tend to adopt technology faster than older farmers. Moreover they are more flexible to changing prices and technology thereby achieves higher production and profits.

Quisumbing (1995) showed that in general, male and female farmers are equally efficient as farm managers. However, where women farmers' yields are lower it can be attributed to use of lower levels of inputs and human capital as compared to men. The author agrees further that level of education for both men and women are significant in dynamic agricultural settings where modern technologies have been introduced. The report concluded that farmers with more education were more likely to adopt new technologies.

### **2.3. Level of Attitude**

Attitudes being evaluations of associated beliefs and behaviors towards some object are subject to changes brought about by social influence and they are not stable. Increase in communication and different behaviour of other people influence attitude. Boninger *et, al.* (1995) noted that media may describe events where people engage in dramatic acts due to passionately held

attitudes while others are unmoved by the same issues. This variability in how much people invest in attitudes is called attitude strength whose indicators are the extremity, the accessibility and the certainty with which they are held and have been used to gauge attitude strength. They also stated that there is evidence that, attitudes people consider important are firm and exert great influence on social perception and behaviour. These important attitudes are beliefs having definitive characteristics which include resistant to change, are stable over time, they impact on cognition and behaviour. This is an indication of selective exposure to relevant information, better memory for that information and the way it is organized once in the memory. Ira (1988) noted that attaching importance to an attitude is making a commitment to think about an object, gather information on the object and use that information together with attitude to make relevant decisions.

Xu *et al.* (2005) noted there are positive and statistically significant correlations of producers' risk attitudes in various areas of the farm business just as there are also some differences in producers' willingness to risk, especially in the finance area. Lien (2008) stated that many farmers important decisions have an emotional impact and these decisions will affect both future lifestyle and one's identity as a farmer, possibly for several generations.

#### **2.4. Income level at household**

Income is a factor among the socioeconomic; Boskey (2009) defined socioeconomic as a combination of factors which include income, level of education and occupation, including a way of looking at how individuals or families fit into society as they use economic and social measures that impact on their health and well being. Business dictionary describe income as the flow of cash or cash-equivalents received from work as wage and salary, from capital as interest



and profit or land as rent. Ahearn *et, al.* (1985) indicated that there is a circular flow of income between different sectors. It revolves around businesses that produce goods and services to generate income that can then be used for factors of production in firms or households and other portions put aside for savings and taxation. Income is shared between personal income, whereby some is distributed among people or income groups and the other portion distributed to factors of production (labour, land and capital).

Okello (2004) report indicated that differences in income and social services have caused inequality in Kenya which is manifested in different forms. He gave an example of total income control in Kenyan households. Top 10% wealthy households control 42% of total income while the bottom 10% poor households control less than 1% of the income. Business dictionary state that as levels of income change in the households, then food consumption in those households also changes. Especially the income dependent goods sell more than non income dependent goods when income improves, for instance, demand for staple food does not increase while that restaurant foods increase with individual income.

Schnepf (2012) noted that within farming community there are two incomes, net cash income and net farm income, whereby net cash income is generally less variable than net farm income.

He defined net cash income as a flow of cash at farm level where farmers are able to meet family living expenses and make debt payments. This does not include crops that are produced, harvested and kept on-farm storage. They must be sold so as to be counted as part of the household's cash flow. To reduce variability in net cash income decisions on produce sales and input purchases are made at appropriate time. He described net farm income as farmers' net value added to the national economy within a calendar year as cash or noncash form. It includes

the value of home consumption, changes in inventories, capital replacement, and implicit rent and expenses related to the farmers' dwelling that are not reflected in cash transactions. A crop which is grown, harvested and it is on farm storage has to be included in the farm's net income calculation. However, off- farm income are not included in net farm income calculations.

Ahearn *et, al.* (1985) concluded that off-farm income reduces income inequality in the United States and higher incomes from farm production reduce the need to look for additional income from off-farm sources.

## **2.5. Rabbits Products**

According to United State Department of Agriculture, circular Number 549 results, extensive test had shown that domestic rabbit meat is the most nutritious meat known to man. It is all white meat that has cholesterol levels and fat percentage at a much lower level than chicken, turkey, beef, or pork meat. Compared cholesterol level showed that rabbit meat has 82mg, chicken has 110mg, beef has 115mg and mutton has 125mg per 8 ounces serving of all the mentioned meat.. Nutritional Value of Rabbit Meat, Issue Number 5 (2004) state that rabbit meat is fit to provide special diet for people having heart diseases and for the aged. Rabbit from farm to table can be as fresh or frozen rabbit meat which is sold all year round. Rabbit sold in United State of America as food are labeled as fryer they are young rabbit weighing between 1.5 to 3.5 pounds and at less than 12 weeks of age. The flesh is tender, fine grained and pearly pink color should be cooked as young poultry. Mature rabbits are labeled as roasters, they weigh over 4 pounds at over 8 months of age. The flesh is firm, coarse grained and is slightly darker in color and less tender, stewing would be better. The inner organs, the liver and the heart are called Giblets.

Cheeke (1980) stated that a doe rabbit that weighs 10 pounds can produce 320 pounds of meat per year, since it gives kids four times per year and during each time it produces a litter size of eight kids. Alternatively a cow produces 240 pounds of meat and it takes 2 acres of land to raise a cow. A kid rabbit feeding from its mother's milk can achieve double weight in 6 days as compared to a piglet that doubles weight at 14 days or calves at 47days and human at 160 days. Therefore rabbits are among the most productive animals among the domestic livestock. Rabbits rearing is done off the ground in raised cages and therefore give one of the cleanest meats.

Lukefahr (1985) noted that as the human population in the world increases, the land and water to produce food will decrease. Most of the countries in the tropics and sub tropics need to produce more meat in order to supply their increasing population with animal protein The rabbit will play a more increasing role to supply animal protein. The rabbit has several points in its favor as a meat producer which includes feeding rabbit on a great variety of locally available foods (weeds, and kitchen vegetables). Due to rabbit small size its handling is easy and therefore can be cared for by members of all genders. The carcass is small enough and a household would be able to utilize it without having to store for a later use. A female adult rabbit will produce average of 6 to 8 young ones every 2 months and they are ready for consumption after 5 to 6 months. Herd size (the number of rabbits in the herd) can easily be matched to the rabbit's keeper resources.

### **2.5.1. History about rabbits keeping**

National statistics do not include rabbit production and the few basic statistics from (FAO 2008) survey suggested a possible world output of roughly 1 million tonnes of carcasses which would mean a per capita consumption of approximately 200 g of rabbit meat per person. Alabama University (1989) documented a historical description of how rabbit keeping started in the world.

The document analyzes that the wild rabbit *Oryctolagus cuniculus* of southern Europe and North Africa was discovered by Phoenicians (Greeks) when they reached the shores of Spain about 1000 BC. The Romans contributed to spreading of the rabbit throughout the Roman Empire as a game animal which was a better alternative as it saved waste over bigger animals', because the hunted rabbit was all eaten since there was no refrigeration. In the sixteenth century there was a first indication of controlled breeding as domestication was started by the monks, since it provided them with a more delectable dish than the tougher wild rabbit which then spread across France, Italy, Flanders and England. Albama University records that an organisation (Agricola 1595) had mentioned the existence of grey-brown (wild), white, black, piebald (black and white) and ash-grey rabbits while (Olivier de Serres 1606) classified three types of rabbit: the wild rabbit, the semi-wild or "warren" rabbit raised inside walls or ditches, and the domesticated or hutch-bred rabbit. Rabbit rearing in hutches (domestication) sprang up all over rural Western Europe and also in city suburbs where they were kept in the back yard together with poultry. European colonial expansion saw the introduction of the rabbit in many countries where it was unknown, such as Australia and New Zealand. Sailing vessels distributed rabbits on islands in various sea lanes to be used as a source of food by sailors'.

Cheeke (1980) appreciated that due to rabbit domestication activities like hutch rearing system and selection of breeding materials rabbit population exploded. Backyard rabbit production had to shift to rational production that led to rationalized breeding techniques and hutch hygiene improvement through formation of breeders associations. The Second World War saw the extensive development of rabbit production throughout Europe and Japan to cope with meat shortages. Under these demanding conditions, rabbits demonstrated their highly efficient feed-

conversion capacity. Europe accounts for 85% of world rabbit meat output since there is Industrial rabbit production in units of 200 to 1 000 hybrid does reared in buildings with artificial light and controlled ventilation. The breeding females are exposed to artificial lighting for 15 to 16 hours a day and produce all through the year. They are reared in one- to four-storey mesh cages (flat-deck and battery).

In Africa, several countries have been promoting rabbit production. The Ghana government started the National Rabbit Project in 1971. By 1974 the rabbit breeding herd at Kwabenya, near Legon, had increased to approximately 698 and by 1975 to approximately 1,478 as stated by Mamattah (1978). The project was promoting rabbit production on a small backyard scale, using breeding rabbits (materials) from government Rabbits centre. In Malawi, rabbit production is on a small scale only and there are no development schemes in operation. Most of the rabbits are kept near the main urban areas of Lilongwe, Blantyre and Zomba whereby the herd size do not exceed 30 in number as McNitt (1980) observed. The two main African rabbit producers are Ghana and Egypt both with 7 000-8 000 tonnes of carcasses a year. Far behind come Algeria and the Sudan, with 1 000-2 000 tonnes a year.

Borter (2011) indicated that in Kenya rabbit production dates back to colonial times and there were efforts to promote it in 1980s through National Rabbit Development Program funded by Government of Kenya and German International Development Agency (GTZ). National Breeding Station in Ngong Veterinary Farm was set up with an objective of providing breeding materials to the farmers throughout the country. Breeding stock was imported from West Germany (now called Federal Republic of Germany). Despite efforts to promote, socio-cultural factors remained a hindrance to widespread adoption of rabbit. This was due to fact that rabbit

keeping was for young boys and other social groups gave it little attention. Due to poor response from farmers, multiplication centers were closed except Ngong Veterinary farm. Recently there has been renewed interest with numerous rabbit keeping groups with membership stretching through different gender groups have sprung up and have registered under an umbrella association called Rabbit Breeders Association of Kenya (RABAK) based in Thika. Rabbit production is one of the growing livestock enterprises in the country, though there has been no study yet to ascertain the reasons for this. It is speculated that reduction in land size holdings has pushed farmers to choose livestock enterprises such as rabbit which have low demand on land and resources. The rabbit population is 600,000 rabbits concentrated in Central, Western and Rift Valley provinces (MOLD, 2010). 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.

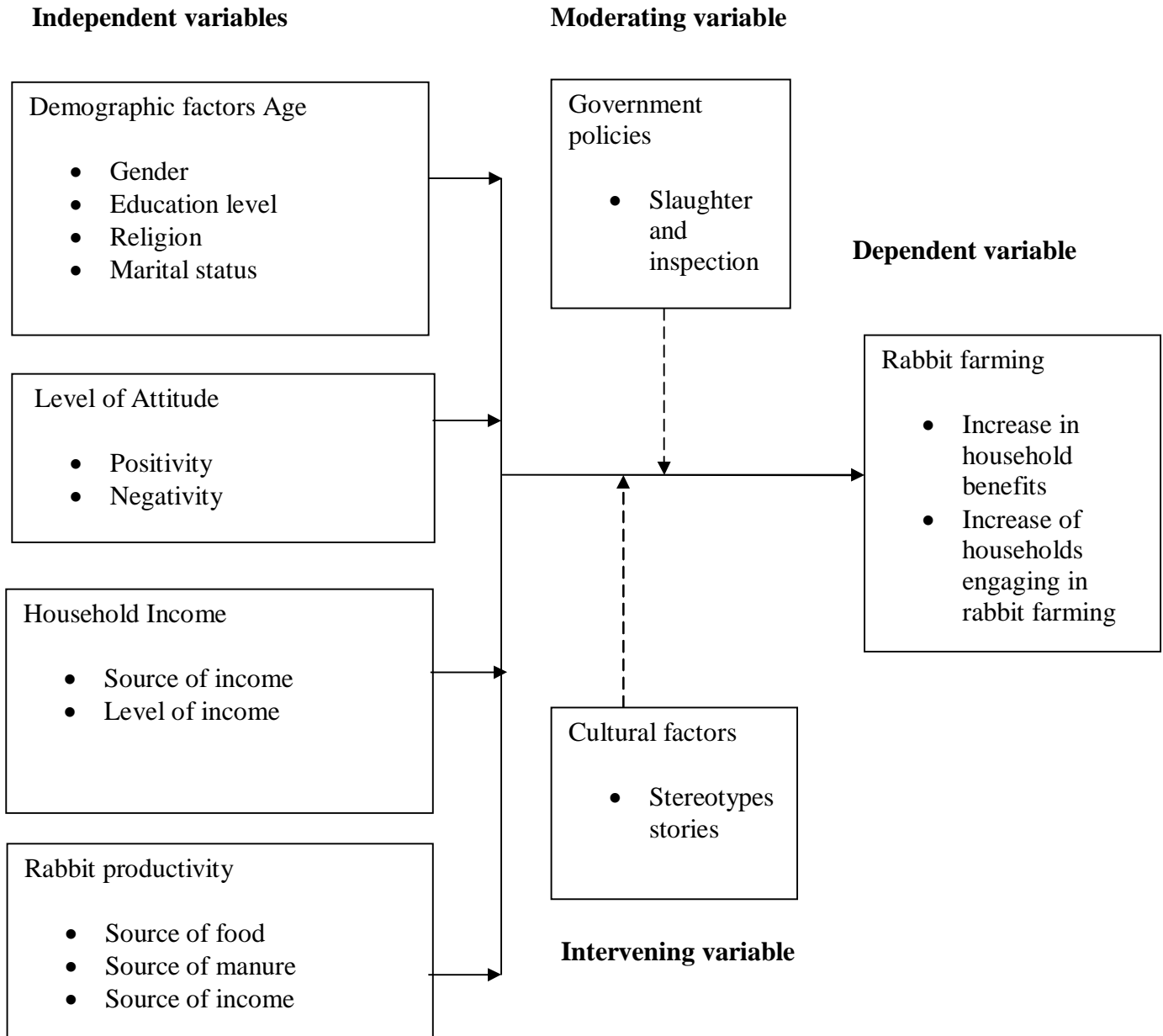
### **2.5.2 Rabbit- other benefits:**

Rabbits have been associated with several benefits, INFRA – FAO Survey (1981) reported that rabbits have other useful by products e.g. skin, wool and organic manure. The best quality skins are used after tanning for garments, linings and gloves. Russia and Poland make domestic use of all the skins they produce. The wool of the Angora rabbit forms a special sector of the international wool trade. Wool production is mainly concentrated in Czechoslovakia (80-120 tonnes a year), France (100 tonnes) and the Federal Republic of Germany (30-40 tonnes). Domestic Rabbit magazine (1990) stated that manure from rabbits has the following percentages of dry material; 2.20% Nitrogen, 87% Phosphorus, 2.30% Potassium, 36% Sulfur, 1.26% Calcium and 40% Magnesium.

Success of Rabbit production project would be ensured through a successful program, to train farmers and offer extension support. Developing countries experience technical problems, total failure attributed to inadequate education or lack of extension follow-up in methods of small-scale rabbit raising as (Borter and Mwanza 2011) noted.

## 2.6 Conceptual framework

Conceptual framework shows relationship existing between independent variables and the dependent variable. There also exist moderating variables in form of government policies that could affect the relationship, but not under study.



**Figure 2.1 Conceptual framework**



## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter reviewed the research methodology used to conduct this study; the research design, sample and sampling procedure, research instruments used, data collection tools and the data analysis method.

#### **3.2 Research Design**

The study carried out about an existing situation where environment was not manipulated which (Kombo et al 2006) describes as descriptive survey and stated it was appropriate for behavioural science as it sought to find out factors associated with certain occurrences, outcomes and condition of behaviour. It involved collection of information through use of interviews and questionnaire administration to assist in revealing the nature of existing situation as Orodho, (2003) prescribes.

#### **3.3 Target Population**

The target population was rabbit farming farmers who are in registered group within Abothuguchi West division of Meru Central district Meru County. There are five rabbit farmers registered group with a membership of 194 farmers (119 men and 75 women) who have 2681 rabbits. The division has an area of 61.4km<sup>2</sup> and estimated human population 38000 and Divisional Annual Livestock Production report (2012).

**Table 3.1. Target Population in Abothuguchi West Division**

Group Name	Membership		Number of rabbits farmers own
	Men	Women	
Kithirune Rabbit Keepers Self Help Group	19	18	531
Kinjo Rabbit Keepers Self Help Group	24	14	501
Muchierene Rabbit Keepers Self Help Group	24	15	548
Githongo Mwendantu Self Help Group	27	16	592
Mwiriene Munanda Rabbit Keepers Self Help Group	25	12	509
	• Source: Meru Central District Livestock Production April 2013 Report		
Total	119	75	2681

### 3.4 Sample and Sampling Procedure

The target population of rabbit farmers showed that the study area has 194 farmers engaging in rabbit farming and registered by the department of Social and Gender Development office in Meru Central. This being a social research 5% margin error was acceptable as Krejcie and Morgan (1970) stated. The target population was small and to achieve the appropriate sample size then Hypergeometric formula was used.

$$n = \frac{NZ^2pq}{\left( E^2 (N - 1) + Z^2pq \right)}$$

N – Target population

n – Desired sample

Z – Value corresponding to level of confidence required (level of confidence at 95%)

p – Proportion belonging to a specified category (50%)

q – Proportion not belonging to specified category (50%)

(When proportions are not known)

E – Margin of error (0.05)

$$n = \frac{194(1.96) (1.96) (0.5) (0.5)}{(0.05) (0.05) (194 - 1) + (1.96) (1.96) (0.5) (0.5)} = 128.907$$

Adjusted minimum sample size calculated using the formula below;

$$n^1 = \frac{n}{1 + n/N}$$

$n^1$  – Adjusted minimum sample size

n – Minimum sample size

N – Target population

$$n^1 = \frac{128.907}{1 + 128.907/194} = 77.44 \text{ (sample size of 78 farmers)}$$

### **3.5 Research Instruments**

The research instruments used to study the research objectives included questionnaire, interviews and observation for primary data collection to rabbit farmers in the study area. The questionnaires were designed having open ended and closed questions. As the data was being collected it was prudent to observe that only rabbit farmers were interviewed by observing presence of rabbits on the farm. The questionnaire had four sections where each section represented each objective to make it standard and objective.

### **3.6 Pilot Study**

Pilot testing was done in the neighbouring division; Abothuguchi Central Rabbit farmers registered in three groups having 40 members (19 men and 21 women). A questionnaire was administered to sampled 20 farmers, but the results are not included in the analysis. This assisted to ensure clarity of the questions as farmers responded.

### **3.7 Reliability**

Method of Test-retest enhanced reliability of the instrument, which was prepared and administered to the participants at two different times to reduce error registering the two results that were correlated. It was important for test-retest activity to reduce random errors that may result from inaccurate coding and ambiguous instructions during the study if not improved.

### **3.8 Validity**

The pilot study conducted enhanced the data collection, as the instruments were refined to improve validity and reliability. The study was done in a division neighbouring the area of study. Sampling validity employed measured the degree to which data collected using a particular

instrument represents a specific concept. Mugenda and Mugenda (2003) stated sampling validity is employed so as to circumvent the problem associated with content validity. Orodho (2005) stated that validity is the degree to which a test that measures how well the results obtained from analysis represents the study under research.

### **3.9. Methods of Data Collection**

The 78 questionnaires were taken to the respondents individually, some filled immediately while others requested to be given time and it was granted. The questionnaires had both open and close ended questions along the four variables contributing towards rabbit farming in the district. During presentation of the questionnaire it was important to observe that only those with rabbits on farm were included to avoid respondents give here say information, but to give real information on what they experience as they undertake rabbit farming. During the period of administering questionnaires the sampled rabbit farmers indicated that the minimum education level among them was primary level, therefore, could actively fill in the questionnaires, however, some felt that the interviewer would fill in the questionnaires. For those who were not ready to write interviewers used the local language to explain the questions, as the farmers responded answers were filled. The interviewers picked the rest of the questionnaires after one week. The response rate was 88.4 %.

### **3.10 Data Analysis**

Data analysis started with checking the questionnaires returned for completeness and consistency. During data cleaning process on 88.4% response rate declined to 84.6% because among the returned questionnaires, 3 were not possible to analyse since they lacked much of the information. Responses were organized and coded to enhance analysis and categorization. For

statistical analysis of this study, the statistical software package SPSS was utilized. The data collected was entered in the SPSS v16.0. The statistical analyses included descriptive statistics for the independent and dependent variables in this study. The independent variables descriptive statistics were presented using tables showing frequencies, percentages and number of participants in each category illustrating participants' distribution. Mean and standard deviation were used to analyse the spread of distribution. Correlations of different variables were done. Finally regression analysis of the independent variables was done to indicate the relationship between the variables. This relationship was described in the following formula.  $y=b_0+b_1X_1+b_2X_2+b_3X_3+b_4X_4$ ; Where y represent rabbit farming as indicated by number of rabbits owned,  $X_1$  represent rabbit farmers age,  $X_2$  represent household monthly income,  $X_3$  represent number of trainings and  $X_4$  represent who introduced the farmer to rabbit farming.

### **3.11. Ethical considerations**

The participants were requested for their participation and it was explained to them about the purpose of study and none was coerced to respond just as none was bribed to respond. The interviewer expressly assured them of confidentiality about their responses.

### 3.12 Operationalisation Table

**Table 3.2. Operationalisation table**

<b>Objectives</b>	<b>Variable type</b>	<b>Indicators</b>	<b>Measurement scale</b>	<b>Research instruments</b>	<b>Data collection</b>	<b>Methods of data analysis</b>
To find out how demographic factors influence rabbit farming in Meru Central district.	<b>Independent</b> Demographic factors	Registration in rabbit keeping self help groups  Their;- Age, Education, Religion, Household head, Occupation.	Nominal Ordinal	Questionnaire  Interview	Primary	Descriptive (frequencies and percentages)
To determine how the level of family incomes influence rabbit farming	<b>Independent</b> Family income	Indicating how each family gets its income and how much	Ordinal	Questionnaire  Interview	Primary	Descriptive (frequencies and percentages, correlations)
To establish the relationship between rabbit farming and the farmers attitude	Farmers attitude	Positive or Negative towards rabbit farming by level of engagement by family members  Number of	Ordinal Nominal	Questionnaire  Interview	Primary	Descriptive  Descriptive (frequencies and percentages, correlations)

		Household members involved in rabbit activities,  Trainings that assist to change attitude				
To find out how rabbit products influence rabbit farming	Rabbit products	Number of years they have reared rabbits  Source of food, manure and income  Programs that have influence rabbit farming	Ordinal	Questionnaire  Interview	Primary	Descriptive  Descriptive (frequencies and percentages, mean and standard deviation)
Rabbit farming	<b>Dependent</b>	The rabbit population changes	Ordinal	Questionnaire  Interview	Primary	Descriptive Regression analysis



## **CHAPTER FOUR**

### **DATA ANALYSIS, PRESENTATION AND INTERPRETATION**

#### **4.1 Introduction**

This chapter presents of the findings of four main factors influencing of rabbit farming in Abothuguchi West division in Meru Central district, Meru County, Kenya. The four factors include; demographic factors, Income, household members participation in rabbit farming activities and rabbit products. The chapter focuses on data analysis, interpretation and presentation.

#### **4.2 Response rates**

The targeted sample of the study was 78 farmers but only 69 questionnaires were returned. During data cleaning 3 more questionnaires were found incomplete making the response rate 84.6% which was well above the acceptable level of 75%.

#### **4.3 General characteristics**

The first specific objective of the study focused on the general characteristics (age, level of education, marital status, family size and region) of rabbit farmers and their likely influence on rabbit production

##### **4.3.1 Distribution of number of rabbits owned and the rabbit farmers Age**

General interacting with the rabbit farmers in Abothuguchi West division revealed that traditionally, the Ameru adult men and women did not engage in rabbit farming. Only young boys reared rabbits as pets, or for slaughter for home cooked meat with no supervision from the parents. The study found that the trend is changing as both adult and young farmers are keeping

rabbits. Table 4.1 shows that the rabbit farmers above 35 years are more than the young and the mean indicate that the same age has more rabbits.

**Table 4.2: Distribution of Number of rabbits owned and the rabbit farmers Age**

	Distribution of farmers		Number of rabbits	
	Number of farmers	Percentage %	Average	Std dev
<b>Farmers' age</b>				
18 – 35 years	16	24.2	1.69	.704
Above 35 years	50	75.8	1.78	.745

#### 4.3.2 Distribution of rabbits farmers and their education level

The study also found that level of education of rabbit farmers is relatively high since 56.1% of them had achieved up to secondary level education (Table 4.2). The possible explanation is that since it is a tea growing area household incomes are high and regular enough to meet school expenses, which in turn means that most household have close proximity to educational facilities. However, the level of education does not appear to influence the number of rabbits kept because there is hardly any difference among the three groups.

**Table 4.2 Distribution of rabbits farmers and their education level**

	Distribution of farmers		Number of rabbits	
	Number of farmers	Percentage %	Average	Std dev
<b>Education level</b>				
Primary level	21	31.8	1.67	.658
Secondary level	37	56.1	1.78	.750
Tertiary level	8	12.1	1.88	.991

### 4.3.3 Number of rabbits owned and gender of household

In the study 92.4% of the households were headed by men, since the choice of household activities is mainly determined by men, their view on rabbit farming is likely to be an important determinant of whether or not the household engage in rabbit farming.

**Table 4.3 Distribution of number of rabbits owned and gender of household head**

	Distribution of farmers		Number of rabbits	
	Number of farmers	Percentage %	Average	Std dev
<b>Household head</b>				
Men headed	61	92.4	1.75	.745
Women headed	5	7.6	1.80	.837

### 4.3.4 Number of rabbits owned and the size of family

The study showed that majority of families had 2 -5 members so the number getting benefit from rabbit farming was more than those targeted, since other family members benefitted.

**Table 4.4 Distribution of number of rabbits owned and the size of the family**

	Distribution of farmers		Number of rabbits	
	Number of farmers	Percentage %	Average	Std dev
<b>Family size</b>				
2 members	2	3.1	2.00	1.414
2 – 5 members	39	60.0	1.72	.724
More than 5 members	25	36.9	1.83	.761

#### 4.3.5 Number of rabbits owned and the size of the farm

As shown in Table 4.5 those farmers who have 1 to 3 acres of land (53.8%) had the highest mean of 1.80. This is likely to indicate that they have space that is not enough for other enterprises expansion, therefore decided to engage in rabbit farming that requires less space.

**Table 4.5 Distribution of number of rabbits owned and the size of the farm**

	Distribution of farmers		Number of rabbits	
	Number of farmers	Percentage %	Average	Std dev
<b>Farm size</b>				
Less than 1Acre	23	35.4	1.70	.765
1 – 3 Acres	35	53.8	1.80	.719
More than 3 Acres	8	10.8	1.57	.787

#### 4.4 Households income

One the specific objectives focused on the relationship between household income and rabbit farming.

##### 4.4.1 Number of rabbits owned and the source of household income

The study found out that those who get income from farming activities alone were more at 75.4% (Table 4.6) and they also have a high mean. The farmers earn income from business have a higher mean and a high standard deviation because they are few. They are able to purchase more rabbits and those born on their farms may be having a high survival rate since these farmers are able to afford more and better rabbits inputs unlike the other farmers.

**Table 4.6 Distribution of number of rabbits owned and the source of household income**

	Distribution of farmers		Number of rabbits	
	Number of farmers	Percentage %	Average	Std dev
<b>Household monthly Income</b>				
Farming activities alone	49	75.4	1.78	.743
Employment alone	5	6.2	1.75	.500
Business alone	2	3.1	2.00	1.414
From more than one source mentioned above	10	15.4	1.50	.707

**4.4.2 Number of rabbits owned and the level of household income**

The analysis gives the distribution of number of rabbits and the level of household income. Those who get less than ksh 10000 were more at 56.9% and they also have a high mean. Those who get between ksh 10000 and 20000 had a higher mean.

**Table 4.7 Distribution of number of rabbits owned and the Level of household income**

	Distribution of farmers		Number of rabbits	
	Number of farmers	Percentage %	Average	Std dev
<b>Level of income</b>				
≤ Ksh 10000	37	56.9	1.76	.723
Ksh 10000 – 20000	25	36.9	1.83	.761
≥ Ksh 20000	4	6.2	1.00	.735

#### 4.5 Household members involvement in rabbit farming activities

The extent to which household members are engaged in rabbit farming activities, readiness to look for rabbit farming information from various sources as well as attendance of rabbit farming training sessions are all signs that views and perception of rabbit farming are changing.

##### 4.5.1 Level of involvement towards rabbit farming activities

Rabbit farming activities such as - feeding, cleaning and general management are no longer relegated to children but, increasingly to adult members of the households (Table 4.8) it is only in about 11% of all the households that these activities were carried out exclusively by children. Where rabbit husbandry in a household was done by both the parents and children the mean of rabbits they own is high indicating that more rabbits survived increasing the numbers when everybody in the family actively participate in taking care of the rabbits.

**Table 4.8 Distribution of number of rabbits owned and family members involved in rabbit husbandry**

	Distribution of farmers		Number of rabbits	
	Number of farmers	Percentage %	Average	Std dev
<b>Household members engaged in rabbit farming</b>				
Parents only	23	34.8	1.52	.790
Both parents and				
Children in the family	35	53.0	2.00	.686
Children in the family only	7	10.6	1.43	.535
Farm workers	1	1.5	1.00	-

#### 4.5.2 Readiness to source for rabbit farming information

Generally in the Ameru community, traditionally adults did not discuss rabbits issues and during the interviews rabbit farmers stated that not many adults would discuss rabbit farming, rabbit benefits or how to access information on rabbit farming. The study showed that this had changed since more rabbit farmers were influenced by their neighbours as they searched for information on rabbit farming from them as well as from livestock officer. They also obtained information from media.

**Table 4.9 Distribution of number of rabbits owned and source of initial rabbit keeping idea to the farmer**

	Distribution of farmers		Number of rabbits	
	Number of farmers	Percentage %	Average	Std dev
<b>Source of initial rabbit keeping idea</b>				
Neighbours	38	57.6	1.74	.760
Livestock Officer	22	33.3	1.77	.752
Media	2	3.0	2.00	1.414
Other sources *	3	4.5	1.67	.577
* churches, group gathering				

#### 4.5.3 Rabbit farming training and frequency of training

Willingness to attend training was another indicator that attitude towards rabbit farming was changing, but rabbit farmers stated in the past they attended training for other farm enterprises

trainings but never on rabbit enterprise. However, this changed as indicated by Table 4.10 below. Those trained have a higher mean indicating that they were able to manage the rabbits better which improved the number of rabbits in their farms. The more the training sessions they attended the more the rabbit numbers improved as table below indicated.

**Table 4.10 Relationship of rabbit farming training attendance and the number of rabbits they own**

	Distribution of farmers		Number of rabbits	
	Number of farmers	Percentage %	Average	Std dev
<b>Have been trained</b>				
Yes	55	81.8	1.81	.702
No	11	18.2	1.50	.905
<b>Number of training</b>				
Never	11	18.2	1.36	.809
Once	8	10.6	1.71	.756
2- 5 times	24	36.4	1.79	.779
More than 5 times	23	34.8	1.92	.654

- Each training took about an hour, since this is a tea zone where tea picking is an 8 hours daily activity. So trainings take place during mid day break or when they demand for one.

#### **4.6 Rabbit products and their influence to rabbit farming**

In the literature review rabbits were discussed and conclusion was that they have a product and several by products that have various benefits. In Abothuguchi West division several products had contributed towards influencing rabbit farming. The product mentioned was food (white



meat) and by products were manure for use in vegetable plots and income from sale of rabbits to others who wished to start breeding or for those who wanted to eat white meat. 75.4% of rabbit farmers in this division got their income from farming activity and it would have been easy to imagine that rabbit farming was being adopted to add on to farm income. Table 4.11 below showed that income was not as attractive as white meat. The combination of benefits attracted more farmers.

**Table 4.11 Distribution of responses on the number of rabbits they own and rabbit benefits and products**

	Distribution of farmers		Number of rabbits	
	Number of farmers	Percentage %	Average	Std dev
Rabbit benefits and products				
White meat (food) alone	4	6.1	1.00	.000
Manure alone	1	1.5	2.00	-
Income alone	2	3.0	3.00	.000
All of above	52	78.8	1.82	.713
Other benefits (hobby, pets)	7	10.6	1.43	.787

The study of the rabbit products and benefits variable was intended to show the extent to which each benefit was influencing rabbit farming. The rabbit products and benefits education had been taking place from 1992 when Integrated Small Livestock Project was launched having a rabbit production component, through to 2000- 2010 when National Agriculture and Livestock Extension Program was in effect and rabbit farming was promoted through CIGs (Common

Interest Group) and the 2011- 2014 Rabbit Production Project that currently is promoting rabbit production through registered groups. Table 4.12 below illustrated this. NALEP program period 2000 to 2010 had contributed more towards enlightening farmers on rabbit products and benefits.

#### **4.7 Number of rabbits farmers own and the period they started to rear rabbits**

Adoption of rabbit farming had been slow during the period before the year 2000 (Table 4.12). Introduction of rabbit production program after the year 2000 contributed to an increase in rabbit farmers as well as the number of rabbits they own.

**Table 4.12 Distribution of number of rabbits owned and when they started rabbit farming**

	<b>Distribution of farmers</b>		<b>Number of rabbits</b>	
	<b>Number of farmers</b>	<b>Percentage %</b>	<b>Average</b>	<b>Std dev</b>
Period started to rear rabbits				
Before year 2000	3	4.5	2.00	1.00
Between 2000 – 2010	35	53.0	1.94	.639
After 2010	28	42.4	1.50	.793

## **CHAPTER FIVE**

### **SUMMARY, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

The chapter summarizes the findings and makes conclusions as per the four research objectives of the study. The collected data was analyzed and interpreted according to these research objectives; to find out how demographic factors influence rabbit farming, to determine how the farmers' attitude influence rabbit to determine how the level of family incomes influence rabbit farming and to find out how rabbit products influence rabbit farming in Abothuguchi West division, Meru Central district.

#### **5.2 The Summary and discussion of the findings of the research**

These were the findings of each objective as given by the rabbit farmers who participated on the research.

##### **5.2.1 Influence of demographic factors on rabbit farming.**

Among the rabbit farmers in Abothuguchi West division; 23.2% were youth who are engage in rabbit farming while 72.5% are beyond youth age bracket which is contrary to belief that rabbit farming was a small boys activity, this gender category once convinced that rabbit farming is a worth enterprise, has resources to expand it further which would increase rabbit population as well as the number of farmers engaging in rabbit farming. Also the study showed that 92.4% of the households were headed by men. Much of the decisions in a farming community are made by men since they own land which is a factor of production. Once convinced about productivity of a new technology or a new enterprise, they make decisions for the household to adopt, so once this gender category adopt rabbit farming there would be an increase in rabbit population and number

of households keeping rabbits. The study indicated that education level is high since 56.1% had up to secondary level education; this has led to rabbit farmers being able to source for rabbit information and implement. In the process of sourcing for rabbit information they are likely to discover other rabbit benefits that would be exploited to make rabbit farming to be more worth an enterprise to engage in. All the rabbit farmers interviewed belonged to either Protestant or Roman Catholic faith which indicated that these two sects had no religious instructions forbidding the farmers from keeping rabbits. Generally the community in the Meru Central district is a rural community likely to have a similar sect composition as the sample since there were no mosques or temples in the area, which would make it easier to adopt rabbit farming if trained to realize other rabbit benefits and value addition that would contribute more income to the farming community.

### **5.2.2 Influence of income on rabbit farming.**

The responses indicated that 75.4% of respondents get their family income from farming activities only; they had reasons to explore more farm enterprises in order to improve on their incomes levels, however, in Table 4.12 income as benefit was shown to have attracted 3.0% of rabbit farmers. So the study showed that income as a factor contributed minimally, it could be that since the study area was a tea zone the rabbit farmers received a higher income from other enterprises, for instance tea and dairy. The sizes of families and farm size in the study area indicate that the land is under pressure and further land sub division would reduce economic land unit for dairy and tea production to uneconomical units. The farmers in these areas would have to explore other enterprises to engage in order to sustain their income levels. Rabbit farming requires less space than the other enterprises mentioned.

The change agents; extension officers need to avail more information about rabbit farming to the community in Meru County in order to enhance sources of income to the majority of the farming families.

### **5.2.3 Influence of attitude rabbit farming.**

Attitude which is a belief is not measurable but other responses and actions give guidance on whether one has a positive or negative attitude. Having high population of rabbits, seeking to source for more information about rabbits and a deviation from what tradition indicate that rabbit farming was a young boys activity to that other gender in the society were now ready to engage in the enterprise. Among the farmers who responded 42.4% owned 1- 10 rabbits, 39.4% owned 10 – 20 rabbits and 17.4% owned more than 20 rabbits average number of rabbits per farmer were 14 rabbits. Most of the rabbit farmers were having rabbits above the economic unit of four does and one buck, which showed that the enterprise was gaining on population. To sustain the growth the income aspect would have to be enhanced by improving on networking and linkage to other rabbit farmers in other regions to expand the market. In the research 93.9% of the respondents were ready to source for more information about rabbit farming and only 6.1% that would not really bother to seek for more information. Youth engaged in rabbit farming were 23.2% while 72.5% are beyond youth age bracket. The youth complain that their parents have not provided them with land portions that they could develop or use as collateral to source for funds. The study indicated that rabbit farming is mostly done by the family members as only 1.4% workers are instructed to rear on family behalf. In 34.8% rabbit farming was done by only the parents, while 53% of families involved both the parents and the children. This indicate a positive change of attitude since in Ameru community rabbit farming and its consumption has

never been an adult activity and it was always associated with small boys, however, findings on Table 4.1 showed that 72.5% of the rabbit farmers were male adults which was a shift from traditional beliefs. Trainings and being able to discuss rabbit farming with even neighbours has led to a shift in belief which was previously negative to being positive increasing rabbit keeping in the years after 2000. NALEP program contributed greatly towards attitude change as more farmers joined rabbit farming Common Interest Groups, the follow up Rabbit Production Project has enhanced rabbit farming. Among the rabbit farmers 56.1% had secondary level and 12.1% had achieved tertiary level, it was easy train them on new production systems and enterprises, just as it was easy to source for information increasing the chances of people changing their attitude.

#### **5.2.4 Influence of rabbit products towards rabbit farming.**

The respondents agreed that there are several benefits to be achieved from rabbit farming; the 78.8% of rabbit farmers were convinced that a combination of benefits (white meat, manure, income) attracted them. The white meat benefit attracted more farmers than income contrary to belief that farmers in Abothuguchi West division would start rabbit farming for income. Farmers in these area have other enterprises like tea, coffee, dairy for income, food crops (potatoes, maize, beans and vegetables) for home consumption and the excess sold for income. Manure from dairy was used to support those crops grown purely for income, while the interviewed rabbit farmers said that the rabbit manure was used for the other food crops. An increase in rabbit population would cause an increase in the amount of manure thus an increase in food crops to get enough for home consumption and much more for sale which would improve the farm income. The linear regression model showed that a unit increase in rabbit products would

lead to a 2.993 increase in rabbit farming. Rabbits have more products than farmers are aware of as indicated by Cheeke (1980) and Lukefahr (1985), which would attract increased rabbit farming as the benefits attract more farm income.

### **5.3 Conclusions**

The study has revealed several facts about rabbit farming in Abothuguchi West division;

1. Accessibility to information has improved as Table 4.8 showed that neighbours sensitized more farmers to start rabbit farming unlike before when extension officers (Livestock and Agriculture) were believed to be change agents. However, rabbit farmers still did not have full information about rabbit products/benefits which was a knowledge gap existing that Livestock extension officers must bridge as they avail these information through trainings. It would attract more farmers to rabbit farming if they realized that there are other products that could fetch better prices both in local and foreign markets. For instance Countries that experience severe winter season require a lot of white rabbit skin which is easy to dye for manufacturing slippers and caps for their citizens and winter tourists. Government sponsored programs like NALEP (National Agriculture and Livestock Extension Program) have improved on levels of rabbit farming.
2. Rabbit farming need to be encouraged for its product and benefits that farmers could benefit from, especially those with limiting space to invest in other heavy capital enterprises. In the literature review analysis on nutritive value of rabbit product (white meat) was immense and society that wanted to be healthy could benefit from this product.

3. Animal protein is scarce to the low income sections of our society due to high prices. So to improve their diet other animal protein sources need to be expanded, so that they can be able to access their food and eventually sell the excess for an income. Animal protein consumed in the country and in the Meru Central district is below the FAO recommended quantity, and then rabbit farming would assist in bridging the gap if more farmers started rearing rabbits to supplement the shortage, especially the resource poor who are not likely to be able to purchase other animal proteins due to high prices.
4. Environmentally rabbit farming is friendly since rabbits are known for being prolific, rabbits are also herbivores which efficiently convert fodder to food. Rabbit rearing does not require forest and grassland clearing of the magnitude required for cattle production, they do not require a whole crop field feed to convert it to meat, they do not trample on soils loosening them and they release dung in form of small and dry pellets which retain their nitrogen and efficiently fertilize the soil, so would be appropriate for urban farming since it would be easy to control the pollution encountered from other livestock enterprises.
5. Rabbit rearing would also help address some of the MDG goals; MDG goal number one is Eradicating extreme poverty and hunger, number six is Combating HIV /AIDS, malaria and other diseases and number seven is Ensuring environmental sustainability. Also the country's development plan Vision 2030 through its economic pillar, has targeted agriculture and livestock production improvement to ensure food security and value addition on farm produce to increase wealth and job creation, rabbit farming could contribute to that vision.



## 5.4 Recommendations

The findings and conclusion of this study indicate that due to governments programs in the Abothuguchuci West promoting rabbit farming more farmers are accepting rabbit as a source of food, manure and income. However, more information about other rabbit benefits have not been availed to farmers which would encourage many more as they explore and engage other lucrative markets to increase their income.

1. The Government could use media especially the local language stations since the study has indicated that some farmers got initial rabbit farming ideas from the media, however, there should be an initiative to invite extension officers to these stations so as to give appropriate message which when left to media people there are gaps or misinformation released to the multitude.
2. The rabbit farming inputs like breeding materials should be made available to avoid inbreeding that would otherwise affect rabbit farming if not controlled as their multiplication is very high. Also the rabbit supplement feeds were not available in the local markets, once the rabbit population increases agro vet traders need to avail the feeds and other requirements.
3. The youth should be empowered to participate in farming activities especially rabbit farming by availing funds since their borrowing power is limited by lack of collateral. The older generation should be encouraged to support the youth by sharing out some land that they would utilize for farming activities.

### **5.5 Suggestions on other issues requiring research**

Due to increasing pressure on land as a result of increased population, land is getting sub divided to very small units, a research to compare traditional enterprises to these areas (coffee, tea and dairy) and emerging enterprises (rabbit farming) need to be done to reveal how they could either complement each other or replace one another.

Since 1992 when government started to support projects promoting rabbit farming, there are farmers who persisted while other stopped along the way, it would be important to understand the reasons why some continued and others stopped for future planning.

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## **APPENDICES**

### **Appendix 1: Letter of Transmittal of data collection**

**EMMA MARY NJERI MBUTU**

**P.O. BOX 672 – 60200**

**EMBU**

**CELLPHONE 0721361815**

**DATE.....**

**TO WHOM IT MAY CONCERN**

**RE: DATA COLLECTION REQUEST**

I am a University of Nairobi post graduate student pursuing a Master of Arts Degree in Project Planning and Management. My Research proposal is on Factors influencing rabbit farming; case of rabbit production project in Abothuguchi West division, Meru Central district, Kenya

I am requesting to undertake the study in your locality and in collaboration with your institution. The information and data gathered will be for my M.A. project, it will also help me and your institution understands more about the various factors that are influencing rabbit farming. The respondents of this study will be the rabbit farmers registered in Abothuguchi West division. The data will be collected using questionnaire to obtain information in relation to rabbit farming. All responses will be treated confidentially.

Thank you.

## Appendix 2: Questionnaire for the study

### Questionnaire

Code No.....

The questionnaire is close ended and respondents have choices that they could choose from. The responses will be confidential and are meant for the purpose of the study only. It comprises of four parts. Put a tick next to your choice.

### PART I

#### A: DEMOGRAPHIC

1. **NAME (OPTIONAL)**.....
2. **AGE:**
  - (a) Below 18 years ( ),
  - (b) (b) 18 -35 years ( ),
  - (c) (c) above 35 years ( )
3. **FAMILY SIZE (Both parents and siblings);**
  - (a) 2 members ( ),
  - (b) (b) 2 -5 members ( ),
  - (c) More than 5 members ( )
4. **FAMILY HEAD:**
  - (a) Male headed ( ),
  - (b) Female headed ( ),
  - (c) Youth Headed ( ),
  - (d) Child headed- head less than 18 years( )
5. **EDUCATION LEVEL:**
  - (a) Primary level ( ),
  - (b) Secondary level ( ),
  - (c) Tertiary level ( ),
  - (d) None ( )

**6. RELIGION/SECT:**

- (a) Catholic ( ),
- (b) Protestant ( ),
- (c) Islam ( ),
- (d) Others (Buddhist) ( )

**B: SOCIAL ECONOMICS**

**7. FARM SIZE:**

- (a) Less than 1 Acre ( ),
- (b) 1 – 3 Acres ( ),
- (c) More than 3 Acres ( )

**8. SOURCE OF INCOME\**

- (a) From the farm ( ),
- (b) From employment ( ),
- (c) From business ( ),
- (d) A combination of those above( )

**9. TOTAL MONTHLY INCOME**

- (a) Below Kshs.10, 000 ( ),
- (b) Between Kshs. 10,000 – 20, 000 ( ),
- (c) Above Kshs. 20,000 ( )

**10. TOTAL COST OF FAMILY FOOD PER MONTH:**

- (a) Below Kshs. 5,000 ( ),
- (b) Between Kshs. 5,000 – 10,000 ( ),
- (c) Above Kshs. 10,000 ( )

**11. FARM ENTERPRISES:**

- (a) Cash crops; Tea ( ), Coffee ( ),
- (b) Food crops; Cereals – maize, beans ( ),
- (c) Traditional foods sweet potatoes, yams ( ),
- (d) Livestock; Cattle ( ), Shoats ( ), Poultry ( ), Rabbits ( )

**12. AMOUNT OF TIME SPENT IN FARMING ACTIVITIES:**

- (a) Less than 3 hrs ( ),
- (b) 3 to 5 hrs ( ),
- (c) More than 5 hrs ( )

**13. THOSE INVOLVED IN FARMING ACTIVITIES**

- (a) Parents only ( ),
- (b) Both parents and children ( ),
- (c) Children ( ),
- (d) Workers ( )

**PART II: CHANGE OF ATTITUDE**

**TRAININGS AND INFORMATION SOURCING**

**14. HAVE YOU EVER BEEN TRAINED ON RABBIT PRODUCTION?;**

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

**15. NUMBER OF TRAININGS ATTENDED.**

Rabbit production trainings;

- (a) Trained once ( ),
- (b) Trained between 2 – 5 ( ),
- (c) Trained more than 5 times ( ),
- (d) No training( )

**16. WHO REQUESTED AND ORGANISED FOR THE TRAINING;**

- (a) Group leaders ( ),
- (b) Group Trainer ( ),
- (c) Group Members ( ),
- (d) Others – stakeholders like other trainers not group trainer( )

**17. WERE THE TRAININGS OF ANY HELP TOWARDS RABBIT FARMING?**

- (a) Yes ( ),
- (b) No ( ),
- (c) Not sure ( )

**18. WERE YOU CONVINCED THAT RABBIT FARMING IS GOOD?**

- (a) Yes
- (b) No
- (c) Not sure

**19. DO YOU SOURCE FOR INFORMATION WHENEVER YOU REQUIRE IT?**

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

**20. IF YES FROM WHERE?**

- (a) Group trainer ( ),
- (b) Other farmers ( ),
- (c) Other trainers and not group trainer( ),
- (d) Internet – computer/ mobiles ( )

**PART IV: RABBIT PRODUCTIVITY**

**21. HOW MANY RABBITS DO YOU HAVE?**

- (a) Less than 10( ),
- (b) 10-20( ),
- (c) More than 20( )

**22. WHEN DID YOU START RABBIT REARING?**

- (a) Before year 2000( ),
- (b) 2000-2010( )
- (c) After 2010 ( )

**23. WHO INTRODUCED THE ENTERPRISE TO YOU?**

- (a) Neighbour ( ),
- (b) Livestock officer ( ),
- (c) From the media ( ),
- (d) Other sources (churches, group gatherings).....

**24. HAVE YOU EVER SOLD RABBIT TO OTHER FARMERS?**

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

**25. FOR WHAT PURPOSE DID THEY BUY RABBITS?**

- (a) Slaughter ( ),
- (b) Breeding ( )

**26. WHICH PRODUCTS DO YOU BENEFIT FROM RABBIT FARMING?**

- (a) White meat – food
- (b) Manure
- (c) Income
- (d) All of above
- (e) Others (hobby, pets, aesthetic)