

**FACTORS INFLUENCING QUAIL FARMING IN NYERI CENTRAL  
CONSTITUENCY, NYERI COUNTY, KENYA**

**BY**

**CHEGE LUCY MUTHONI**

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**DECLARATION**

This research project report is my original work and has not been presented for the award of a degree in any other University or institution of higher learning.

**Signature.....**

**Date .....**

**Chege Lucy Muthoni**

**Reg. No: L50/60193/2013**

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

**Signature.....**

**Date .....**

**Professor Timothy Maitho**

**Department of Public Health, Pharmacology and Toxicology**

**University of Nairobi**

## **DEDICATION**

This research report is dedicated to my husband Amos Chege for his prayers, moral and financial support, understanding and perseverance during my study period. Further dedication goes to my dear sons Eric Theuri and Lawrence Wakibia for their invaluable love and encouragement.

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## ABBREVIATIONS AND ACRONYMS

<b>ARDS</b>	Agriculture and Rural Development Sector
<b>ASDS</b>	Agriculture Sector Development Strategy
<b>ASDSP</b>	Agriculture Sector Development Support Programme
<b>ASIP</b>	Agriculture Sector Investment Programme
<b>ATC</b>	Agriculture Training Centre
<b>EU</b>	European Union
<b>FEO</b>	Frontline Extension Officer
<b>CP</b>	Crude Protein
<b>DVS</b>	Director of Veterinary Services
<b>FAO</b>	Food Agriculture Organization
<b>GoK</b>	Government of Kenya
<b>IFAD</b>	International Fund for Agriculture Development
<b>ILRI</b>	International Livestock Research Institute
<b>KWS</b>	Kenya Wildlife Services
<b>LDCs</b>	Less Developed Countries
<b>MARD</b>	Ministry Agriculture and Rural Development
<b>MDG</b>	Millennium Development Goals
<b>MLCSL</b>	Market Livestock Consulting Services Limited
<b>MOLP</b>	Ministry of Livestock Production
<b>NGO</b>	Non-Governmental Organization
<b>NRC</b>	National Research Council
<b>PEM</b>	Protein Energy Malnutrition
<b>IFAD</b>	International Fund for Agricultural Development
<b>KBS</b>	Kenya Bureau of Standards
<b>UN</b>	United Nations
<b>USA</b>	United States of America
<b>USDA</b>	United State Department of Agriculture
<b>WHO</b>	World Health Organization

## ABSTRACT

Protein deficiency has remained a major challenge in the world. In Kenya, the recommended animal protein requirements by the Food and Agriculture Organization have not been met for most citizens. Quail farming is a cheap source of animal protein. Despite the introduction of the quail farming to cross the nutrition gap, the number of households keeping quails in Nyeri Central Constituency still remains low. Quail farming is faced by challenges such as overall sector disorganization, a weak feed industry, lack of ready market access and information for smallholder producers, lack of access to inputs and stock procurement and prevalence of avian diseases among other challenges. Therefore, the research sought to find out the factors influencing quail farming in the area of study. The objective of the study was to find out the influence of social factors, management practices, perceived nutritional and medicinal value and access to market on quail farming. Descriptive survey was used to gather information from a target population of the 300 quail farmers in Nyeri Central Constituency, four livestock government officers and one feed supplier. A sample of 169 quail farmers was selected from the five wards through stratified random sampling in order to ensure that they are evenly spread within the 5 wards. From each ward, snow ball sampling technique was used until the defined sample size was reached. A ward different from the study population was used for pilot testing. Questions were asked as research tool for data collection from quail farmers and interview schedules were used to collect data from the Government Officers and input supplier. The raw data was organized systematically, coded and analyzed through descriptive statistics with aid of computer software Statistical Package for the Social Sciences. The data was then presented using percentages and tables. The findings of the study revealed that 57.9 % of quail farmers were males who were middle aged, well educated and had practiced quail farming for less than 12 months. This affects quail farming because it is usually a women domain. Majority (97%) of quail farmers used chicken feed and 62.8% of the farmers did not use feed supplements. Most (89.6%) of the quail farmers kept quails for income generation rather than for their nutritive or medicinal value and 77.4% of the quail farmers did not eat quails eggs. According to the study, 66.5% of the quail farmers cited unreliable market as the major market challenge followed by lack of market information with 58.5%. Majority (95.1%) of quail farmers had no organizations to assist in marketing of their quails. It was concluded that in order to promote the development of quail farming, there is a need to factor in the special needs of women when government policies on social activities are being crafted in order to realize the full potential of women contribution in the quail farming. Secondly, unavailability of quail feeds slows down production and productivity of quails and so there is a need to have feeds specifically formulated for quails. Despite the quail farmers being aware of the nutritive and medicinal value of quails eggs, there is low consumption of quail eggs due to traditional belief that quails are pets for children and only children especially boys should eat them and in order to enhance local consumption of quails eggs, information on nutritive and medicinal values of quails should be provided in order to change attitude of people. The existence of unreliable quail market, lack of market information and lack of organized marketing associations is also a great hindrance to the development of quail farming and government should enhance the formation of quails marketing associations. The findings of the study will be useful to the staff in the Ministry of Agriculture, Livestock and Fisheries, Non-Governmental Organizations staff and other related organizations who promote quail farming. The result from this research will also provide a base for further research on the projects encompassing production and marketing of quail issues

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to the Study

Poultry industry is one of the growing industries globally; many people have developed interest and realized the benefits of investing in this area of production (FAO, 2007). Globally, due to the continued preference of white meat to red meat, consumption of poultry has increased from 68.5 million tons in 2000 to 103.5 million tons in 2012 which is a 51 per cent increase. On a per-person basis, the increase in animal protein consumption has been from 11.1g per day to 13.6g per day. In Africa, per person average animal protein consumption is lower at 6g per day. This is far below the Food and Agriculture Organization (FAO) recommended of 26 g per person per day (Global Poultry Trend, 2012). According to FAO (2010), the number of undernourished people in developing countries has increased from the estimated 824 million in 1990-92 to 870 million people in 2010-2012. One out of every three people in developing countries is affected by protein deficiencies. The findings by WHO Global Database on children Growth confirm that more than a third of the world's children have Protein Energy Malnutrition (PEM) (WHO Working Group, 2006). Quail farming is seen as one of the most promising means to bridge the animal protein gap. Quails are small, sedentary game or hunting birds which are raised for eggs and meat production (DAFF, 2013). Quails belong to the same family as the domestic fowl, the pheasant and the peacock (Wilkinson, 1999). However, there is not much diversification within the poultry sector. The potential of poultry production have not been fully exploited because most farmers have restricted themselves to chicken production as compared to other birds as quails which are equally of economic, social and nutritional benefits. In spite of intensive research, however, much still remains to be discovered and verified with regard to why there is slow uptake of quail farming by farmers.

The World's egg production is dominated by domestic chickens. The FAO estimated that in 2010 chickens, turkeys and ducks produced 87% and 6.7% and 4% of total poultry eggs worldwide respectively. The others, that is, geese, pigeons, quails, pheasants, ostriches and emus all combined produce about 2.3% of total egg production (Arthur, 2013). Official statistics for the quail egg industry in the world are not available due to the small size of the industry. Quails are therefore considered as one of the minor species of poultry. Farmers have somehow restricted

themselves to chicken production due to lack of necessary information on how other types of birds such as quails can be raised.

The increasing demand for animal protein calls for diversification and venturing into production of affordable and fast growing birds. As a way of trying to meet the increasing demand for sources of animal protein, quail production was recently introduced in Kenya. Quails have several advantages which includes: they mature early, are excellent layers, low feed consumption, require small floor space, have high immunity against diseases, meat low in fat and their eggs are claimed to have high nutritive and medicinal value (Shanaway, 2008).

In Kenya, although the country is currently self-sufficient in production of most of the livestock products, the recommended animal protein requirements by the Food and Agriculture Organization (FAO) of 26g per person per day have not been met for most citizens. A study done by Kang'ethe (2004) showed that more than 14.5 million people in Kenya (52.3% of the population) are hungry and malnourished. Kenya has an estimated 28 million birds out of which 76 per cent consist of free-range indigenous chicken, while 22 per cent are commercial layers and broilers. The mean annual poultry meat production is about 20,000 metric tons, while egg production is 1,255 million eggs. Apart from chicken, other poultry species like ducks, turkeys, pigeons, ostriches, guinea fowls and quails constitutes 2 per cent. The figure of quail eggs produced in the country is not available due to the small number of quails reared and limited information. The potential of quail production has not been fully exploited and hence the current promotion of commercially quail farming.

Quail production is gaining popularity in Kenya due to its role in bridging the protein malnutrition, economic empowerment of the poor people of the society and also fits well in the farming systems commonly practiced. Quail production is practiced at various levels ranging from subsistence to large scale commercial operations (Kingori, 2011). Its success depends on uptake of quail farming by the farmers. Most of the research literature reviewed on the quail farming, have identified common factors influencing quail farming. Among the factors featured are social factors, management practices, perceived nutritive and medicinal value and access to market. The study will be carried out in Nyeri Central Constituency in Nyeri County and it has the following five wards: Muruguru/Gatitu, Ruringu, Majengo/Rware, Kamakwa and Kiganjo. The area under study was chosen due to the reasonable number of farmers abandoning chicken

farming for quail farming. The researcher would wish to investigate the factors that influence quail farming in Nyeri Central Constituency

## **1.2 Problem Statement**

Quail farming remains an elusive goal in many parts of the world despite the concerted efforts of Governments and Non-Governmental Organization to introduce quails in order to fill the animal protein deficiency and also to generate supplementary income for improvement of socioeconomic status of farmers. Official statistics for the quail meat and egg industry in the world are not available due to the small size of the industry. In Nyeri Central Constituency the adoption of quail farming remains low in comparison with the high numbers of farmers keeping chicken. According to the MOLP Nyeri Central Annual Report (2013) the numbers of poultry farmers in Nyeri Central Constituency rearing chickens (indigenous, broilers and layers) are 39,250 farmers while only 300 farmers are keeping quails

Quail production in Nyeri County constituency is still in its infancy stage, having picked up in July 2013 and after slowly gaining popularity among the farmers. Quail farming is faced with certain challenges such as the lack of adequate information on quail husbandry under local conditions. The success rate of quail farming remains questionable especially going by the low number of quail farmers.

Although the demand for quail birds and its products has been increasing rapidly due to the perceived medicinal, nutritional and economic benefit, limited research has been done on quail farming. Most of the research done on quail farming is outside Africa and focused on quail nutritive value and quails feeds. There is limited information on quail farming in Kenya. This study provides useful information on factors influencing quail farming in Nyeri Central Constituency in order to improve production and income of farmers

## **1.3 Purpose of the Study**

The purpose of this study is to examine factors influencing quails farming in Nyeri Central Constituency.



#### **1.4 Objectives of the Study**

This study will be guided by the following objectives:

1. To assess how social factors influencing quails farming in Nyeri Central Constituency.
2. To establish how management practices influence quail farming in Nyeri Central Constituency.
3. To evaluate how the perceived nutritive and medicinal value of quail influence quail farming in Nyeri Central Constituency.
4. To establish how access to market influence quail farming in Nyeri Central Constituency.

#### **1.5 Research Questions**

The research questions of this study will be:

1. To what extent do social factors influence quails farming in Nyeri Central Constituency?
2. To what extent does management practice influence quail farming in Nyeri Central Constituency?
3. To what extent does the perceived nutritive and medicinal value of quail influence quail farming in Nyeri Central Constituency?
4. To what extent does access to market influence quails farming in Nyeri Central Constituency?

#### **1.6 Significance of the Study**

This study will generate useful information which can be used by the Government and Non-Governmental Organizations (NGOs) to implement policies which will promote quail farming as a viable source of protein and income. The study will endeavour to provide information to personnel of the Department of Livestock Development in order to identify the strengths and weaknesses of quail farming and hence indicate corrective measures which can be undertaken by quail farmers. Programmes related to quail farming within and outside the county will also benefit from information obtained from the study. The research will also provide important practical information which will assist other project designers when designing quail projects in future. The study will also provide a base for further research on quails farming.

### **1.7 Basic Assumptions of the Study**

It is assumed that the respondents will be co-operative and provide accurate information when responding to the research questions. It is also assumed that the sample size chosen will be representative of the population and will enable the researcher to draw valid conclusions about the population.

### **1.8 Limitations of the Study**

One of the limiting factors of the study will be the language barrier where respondents will be issued with written questionnaire and some may be illiterate. Use of a trained research assistant, conversant with the local language will help in mitigating such challenges. Availability of funds will be a limiting factor to the study since the researcher is self-sponsored. There is no assurance that the respondents will return all the questionnaires duly completed, neither is there a guarantee that the interviewers will respond to all the questions put forward to them comprehensively. Time constraint will be a limiting factor because the study will be undertaken within a short time. Uncooperative informants are likely to be encountered due to suspicion on the real motives of the researcher.

### **1.9 Delimitation of the Study**

The study will be restricted to Nyeri Central Constituency and will focus on small scale farmers keeping quails within the constituency. Farmers keeping quails are limited to 300 and are spread widely within the constituency and therefore reaching each individual farmer will be a challenge due to scarcity of information.

## 1.10 Definitions of Significant Terms

<b>Bio security</b>	They are the measures that prevent the entry and survival of viruses, bacteria, parasites, fungi, insects and rodents into a game bird flock
<b>Brooding</b>	It involves providing warmth, high quality feed, clean water and protection during the first six weeks of a quail chick's life.
<b>Candling</b>	It is a process done on the seventh day of incubation to identify fertilized quail eggs.
<b>Culling</b>	It is the removal of sick, injured, unproductive and poor producing birds from the flock.
<b>Hatchery</b>	This is a building that houses equipment used to artificially incubate hatching eggs
<b>Incubation</b>	It is the management of fertile egg in order to ensure satisfactory development of the embryo in the egg to a normal chick
<b>Market</b>	It is a specific location where trading takes place on certain occasions
<b>Poultry</b>	It is defined as any of the domesticated and commercialized types of birds used for eggs or meat production
<b>Poultry Production</b>	It is the raising of domesticated birds such as chickens, turkeys, ducks, geese and quails, for the purpose of farming meat or eggs for food.
<b>Quails</b>	These are small game or hunting birds that are used for eggs and meat production
<b>Quail Management</b>	It is the process of taking care of the quails
<b>Quail farming</b>	It involves raising quails commercially for the purpose of profitable eggs and meat production.

### **1.11 Organization of the Study**

Chapter one provides background information on of quail farming, statement of the problem, research objectives of the study, purpose of the study, significance of the study, limitations and delimitations of the study. Chapter two outlines the various schools of thought on what constitutes quail farming and challenges facing it. Chapter three outlines the research design and methodology which were used to carry out the study. It also describes in details the target population, sample size and sampling procedures, data collection methods, validity and reliability of the instruments, data analysis, ethical issues and operationalization of variables. Chapter four contains data analysis, presentation and interpretation while chapter five provides a summary of findings, discussion, conclusions and recommendations. This is followed by references and appendices sections.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter reviews the literature on quail farming. It highlights the literature related to factors influencing quail farming such as social factors, management practice, perceived nutritive and medicinal value and access to market. The chapter also analyses literature related to other aspects influencing quail farming. The conceptual framework explains the relationship between the independent, dependent, moderating and intervening variables. The chapter ends with a summary of the research gap identified from the literature review which if bridged can contribute to successful quail farming.

#### 2.2 Overview of Quail Farming

Quail is one of the poultry birds and Chibe (2009) defined poultry as any of the domesticated and commercialized types of birds used for production of eggs and (or) meat for human food. According to the same author, poultry includes birds like chickens, turkeys, pigeons, doves, ducks, geese, upland game birds (quail, pheasant, partridges) and ratites (ostriches, emu and rhea). Poultry are widely acknowledged as the livestock of the poor, providing a source of income and a tool for poverty alleviation. According to FAO (2010), 85 per cent of rural households in sub-Saharan Africa keep chickens or other types of poultry.

Poultry form the most important sector of livestock worldwide and the production of poultry meat and eggs is a major contribution to human nutrition. A report by FAO (2010), stated that in 2007, some 269 million tons of meat were produced globally, of which 88 million tons were poultry meat and represented about 33% of global meat production. According to the same report, globally, chickens and turkeys and ducks are the most common sources of poultry eggs producing 87% and 6.7% and 4% of total poultry production, respectively. The others like geese, pigeons, quails, pheasants, ostriches and emus all combined produce about 2.3% of total egg production. These alternative bird eggs may represent a smaller proportion of total worldwide egg production, yet they continue to have importance in many countries with worldwide production increasing to 29.9% from 2000 to 2010, which is more than the 24.7% growth in egg production over the same time period (Arthur, 2013)

Quails are small game or hunting birds which are used for eggs and meat production (DAFF, 2013). MOLD (2012) states that in the wild, quails are migratory birds living in grassland and cultivated fields. The quail is the smallest and least sedentary of the game bird (Appendix 7). It belongs to the same family as the domestic fowl, the pheasant and the peacock (Wilkinson, 1999). At first quails became popular as game birds but at later stage in 1910 the commercial keeping of quail kicked off because of their tasty meat, low feed consumption and excellent layering (Shanaway, 2008). Quail is an ideal food as authenticated in the Holy Bible and the Holy Koran and has no religious taboos. Quail farming involves raising quails commercially for the purpose of profitable eggs and meat production. There are 18 species of quails suitable for profitable quail farming business. Quail breeds are of two types; broilers (meat production) and layers (egg production). Popular layer quail breeds include; Tuxedo, Pharaoh, British Range, English White and Manchurian Golden. Popular broiler quail breeds include; Bobwhite (American) and White Breasted (Indian) (McNaughton and Haymes, 1978). In Kenya the most common species of quails are; common quail, African Blue quail, Japanese quail, rain quail, and harlequin quail (MOLD, 2012).

Globally, due to the continued preference of white meat to red meat, consumption of poultry has also increased from 68.5 million tons in 2000 to 103.5 million tons in 2012 which is a 51 per cent increase. On a per-person basis, the increase in animal protein consumption has been from 11.1g per day to 13.6g per day. In Africa, per person average animal protein consumption is lower at 6g per day. This is far below the FAO recommendation of 26 g per person per day (Global Poultry Trend, 2012). The finding by WHO Global Database on children Growth confirms that more than a third of world's children have Protein Energy Malnutrition (PEM) (WHO Working Group, 2006). According to FAO (2010), the number of undernourished people in developing countries has increased from the estimated 824 million in 1990-92 to 870 million people in 2010-2012 and one out of every three people in developing countries are affected by protein deficiencies.

The potential of poultry production have not been fully exploited because most farmers have restricted themselves to chicken production as compared to other birds which are equally of economic, social and nutritional benefits. Quail farming is seen as one of the most promising means to bridge the animal protein gap. In spite of intensive research, however, much still

remains to be discovered and verified with regard to why there is slow uptake of quail farming by farmers.

According to Onyewuchi, Offor, and Okoli (2013), quail farming is more profitable than other poultry. Quails has various benefits such as: quail birds mature earlier; they start laying eggs after 5-6 weeks; they lay a greater number of eggs 280-300 in a year; their eggs takes about 16 to 18 days to hatch; they have high immunity against diseases; they are poor feeders and they require small floor space. Their meat is low in fat and the eggs are perceived to have nutritional and medicinal value (MOLD, 2012). Quails produce 220 to 250 grams of meat from 7 to 7 ½ weeks and they are also used in animal research and hunting in many countries (View West Marketing; Zeetnoff Agro-Environmental Consulting, 2002). Meat and eggs of quail are very tasty, delicious and nutritious and are source of high quality protein (Bakoji, Aliyu, Haruna, Jibril, Sani, and Danwnka, 2013). Quails are very hardy and almost all types of weather conditions are suitable for starting quail farming business (NRC, 1991).

Quail farming has been widely acknowledged as a great agro-business (Heft, Puppharessa, Otte, Roland, Sudsawasd and Zilberman, 2008). In the USA, commercial quail production is concentrated on a few large farms and the game bird industry in the USA raises 37 million quails. (USDA, 2011). In Europe, common quail is very abundant and widespread (Rodriquez, Sarda, and Puigcerver, 2012) and the estimated population is 300,000,000 birds. According to a report by Arthur (2013), in North America, duck and quail eggs and egg products are not traditional nor common foods and typically they are found only in metropolitan areas like British Columbia which boast ethnic and immigrant populations from areas of the world that have traditionally used these eggs in their cuisines who represent a strong market opportunity. The same report indicates that there is little production of fresh quail eggs and duck eggs in British Columbia but on commercial basis, the market for salted and preserved duck eggs as well as processed quail eggs (typically pickled, canned, or smoked) is served by and dominated by imported products from Asia. The report concludes that very little is known about the market for these products. Scanty scholarly or agricultural extension research has been conducted on the consumer market for salted and preserved duck eggs and fresh or processed quail eggs in British Columbia.

Dozier, Bramwell, Hatkin and Claudia (2010) reported that in Georgia, approximately 5 million Bobwhite quail are produced and marketed each year for use at hunting preserves and plantations. According to the same report, the total number of hunting preserves and plantations in the southern region provides an excellent market for Bobwhite quail producers. With recent droughts, volatile market prices and other problems associated with agronomic crops in Georgia, Bobwhite quail production has received attention as an alternative enterprise for many farming operations.

In Japan, the poultry meats and eggs available in pockets in the market are not adequate to meet the increasing demand of the people and poultry eggs are imported from the neighbouring states. Commercial quail farming in Japan has spread tremendously. In a study done in Japan on quail meat and eggs availability by Singh (2005), the study indicated that the present scale of quail industry is far below the potential. According to the same report though quail farming has reached the international markets, the awareness of it is yet to be spread to some states in Japan and the report recommends that there is a need to promote quail production programmes in these regions. The report concludes that promotion of quail farming in the rural area will not only supplement the shortages of animal proteins but will also generate supplemental income for improvement of the rural people socio-economic status.

According to prefeasibility study on quail farming in Pakistan, quails have been introduced to the Pakistan in the last ten years as an alternative of chicken to mitigate chronic protein deficiency among the Pakistani population (Government of Pakistan, 2009). According to the Agriculture Statistics of Pakistan the per capita consumption of quail meat is increasing at a rate of 4% per annum. The existing daily availability of protein quantity per capita in Pakistan deriving from animal source including beef, mutton, poultry and fish combined amounts to 11 grams per person per day. This is far less than the recommended daily dietary protein allowance from animal source of 26 grams per person per day according to the Food and agriculture Organization standards. The same report states that in Pakistan quail meat is the cheapest source of animal protein available in the country. There are about 3,000 quail farms in Pakistan and a total of 50,000 to 100,000 birds are consumed daily in Pakistan as cutlets, fingers, noodles, soup powder and egg puff.



Quail production is gaining popularity in the developing countries due to its role in bridging the protein malnutrition, economic empowerment of the resource poor segment of the society and also fits well in the farming systems commonly practiced. Quail production is practiced at levels ranging from subsistence to large scale commercial operations (Kingori, 2011). In Nigeria, more emphasis is laid on domestic fowl to the neglect of other types of poultry. Of the 150 million poultry population, domestic fowl constituted 91 % while guinea fowl, duck, turkey and others were 4 %, 3 % and 2 % respectively. The most commonly used bird eggs are those from chickens. Duck and goose eggs, and smaller eggs such as quail eggs are occasionally used as gourmet ingredients (Adeyeye, 2012). Bakoji, et al. (2013), a large number of poultry farmers in Kaduna, Zaria, Bauchi and Kano states in North Nigeria have embraced quail farming, which is gradually taking over chicken poultry business in most parts of the north. Quails high return rate, low cost of investment, high nutritional value and market value are some of the reasons many poultry farmers are resorting to quail farming (Obiona, 1992) . A study done in Nigeria by Onyewuchi, Ofor, and Okoli (2013) with the objective to determining the profitability of quail bird and egg production in Imo State found out that quail meat and egg production is a profitable business. However, due to the lack of awareness amongst farmers in the study area, its production is still very low. It is therefore recommended that extension agents should reach out to farmers in Imo State and enlighten them on quail bird production to help alleviate poverty amongst farmers in Imo State and enable them to enjoy the health benefits associated with its consumption.

In Zambia, the poultry industry is one of the fast growing industries and many people have developed interest and realized the benefits of investing in this area of production. Despite the introduction of quail farming as source of high quality animal protein of great benefit to humans, the farmers have restricted themselves to chicken production due to lack of necessary information on how other types of birds such as quails can be raised. A study done to assess nutritional requirements of quails found out that quails are often raised on broiler feed ration as there is no standard feed ration and farmers are unable to get optimum performance from them. The report concluded that the amount of protein and energy in quail diets need a particular attention because of the major roles they play in influencing the growth performance of birds (NRC, 1991).

In South Africa, eggs are the 4th largest animal product with a total of 24.5 poultry producing 127.9 million eggs per week. 97.3% of these eggs are from chicken while 2.7% are from duck and quails (Ministry of Agriculture, fisheries and forestry, 2011). Quails are normally reared by small scale farmers due to the little attention they require.

Kenya is a signatory to the Millennium Development Goals (MDGs) Programme, whose goal number one is halve the number of undernourished people by the year 2015. (GoK, 2008). A study done by Kang'ethe (2004) showed that, more than 14.5 million people or 52.3% of the population of Kenya are hungry and malnourished. Livestock farming, being the mainstay of most rural households is key to the achievement of this important MDG and vision 2030 through increased productivity (ARDS, 2012). In Kenya, the development of the Livestock industry has in the past aimed at increasing production of livestock products. As a result of this, the country is currently self-sufficient in production of most of the livestock products. However, the recommended protein requirements by FAO of 26 g per day have not been met for most citizens (Olielo, 2013). Majority of the livestock farmers have continued being poor and food insecure mainly due to low productivity, high cost of farm inputs, local market inefficiencies and stringent quality requirements in international markets (GoK, 2008).

Kenya has an estimated 28 million birds out of which 76 per cent consist of free-range indigenous chickens, while 22 per cent are commercial layers and broilers. The mean annual poultry meat production is about 20,000 metric tons, while egg production is 1,255 million eggs per year. Apart from chicken, other poultry species like ducks, turkeys, pigeons, ostriches, guinea fowls and quails constitutes 2 per cent of poultry. The figure of quail eggs produced in the country is not available due to the small number and scanty information. The potential of quail production is not fully exploited and hence the current promotion of commercially quail farming. Due to the population explosion and rampant malnutrition, the quail can be a cheap source of animal protein. This is because quails require low capital investment, minimum floor space, are prolific- mature at six weeks and lay 280-300 eggs per year, are early maturing- marketed at 5 weeks, eggs have health benefits and medicinal value and compared with other animals quails are less destructive to the environment. (MOLD, 2012). As a result, commercial quail farming business can be a great source of food, income and employment for the all types of people (Olielo, 2013).

According to MOLD (2012) quails have traditionally been trapped in Western Kenya from the wild. Domesticated quails differ from wild quails which are protected under the Wild Life Protection Act, The introduction of the quail farming has opened a new path and an alternative for poultry farmers. Quail domestication has begun with an increasing number of farmers taking up quail farming as business (MOLD, 2012). Commercial quail farming in Kenya started in 2003 by individual farmers. In 2012 the government and NGOs supported the initiative as a poverty eradication tool. (Kago, 2014). Documented record by Global Quails and Agribusiness Farmers Cooperative Society from their headquarters in Nakuru indicates that quail farming is being practiced in Kiambu, Nairobi, Nakuru, Laikipia, Nyandarua and Nyeri Counties. Quail farming has attracted the interest of investors due to its low cost of production perceived nutritive and medicinal value (MOLD, 2012). Quail is considered a wild bird and quail farmers have to apply for a permit from the Kenya Wildlife Service (KWS). An annual fee for maintaining a licence cost 1,500 shillings and can be renewed annually subject to meeting certain conditions, including hygiene. The KWS conducts periodic monitoring and inspections of farms, and will withdraw licenses from farmers who violate the conditions (MOLD, 2012). Data from Kenya Wildlife Services office in Nyeri Indicate that 987 farmers in Nyeri County have been licensed to keep quails out of which 300 are from Nyeri Central Constituency.

Once considered as pets for children, quails referred in the local language as *umakia arume* are slowly becoming the poultry of choice for rearing in Nyeri County. Quail farming in Nyeri Central Constituency is still in its infancy stage, having started in July, 2013 and it is slowly gaining popularity among the farmers. In the recent past, demand for quail meat and eggs perceived to have high nutritive and medicinal value has gone up and so have the number of farmers raising quails. According to the MOLP annual report (2013) the numbers of poultry farmers in Nyeri Central Constituency are: 28,700 farmers rearing indigenous chicken, 8500 layers, 2050 broilers, 140 ducks, 121 geese and 200 turkey and 300 farmers are keeping quails. The quail farmers have an estimated 63,000 quails. According to documented report by Ministry of Livestock Production Nyeri Central (2013), there was no recorded farmer keeping quails by March 2013 but the number rose to 300 farmers in December. According to MOLP Nyeri Central Annual Report (2013), the 'wild bird craze' started mid-2013 and Kenyans put a lot of money into the venture. The venture came with hype and unfounded claim especially in the internet of perceived nutritive and medicinal value of the quail egg and the high unmet demand

of the eggs. According to the same report by December, 2013 the market was saturated with quail eggs and the price of an egg had fallen from Kshs. 100 to Kshs. 10 resulting to some farmers abandoning the business.

Most farmers are keeping an average of 100-500 quails mostly for egg production. The breeds being kept in Nyeri Central constituency are rain quail, common quail and button white. There is no hatchery within the constituency but 50 of the farmers have individual incubators. The incubators are either from òjua kaliö or fabricated and they use chicken or quail trays. The cost of commonly used incubator ranges from Kshs. 12,000 for 60egg chicken/150egg quail incubator to Kshs. 70,000 for 264 eggs chicken/663 eggs quail. According to document report from Wambugu ATC (2013), the number of birds that a farmer should keep so as to break even is 500 birds. According to the same report, the cost of producing day old quail chick is Kshs. 53 and it's currently being sold at Kshs. 70 but in October- November 2013, it was being sold at Kshs. 200. For laying birds the gross margin for 500 birds is Kshs. 441,850. Its calculated taking into consideration income from eggs, culls and manure and expenditure on day old chick, cost of feed and labour. Despite the many benefits of quail farming it has some constraints which include: inappropriate production systems, poor nutrition and poor market among others (Darwish, 2003).

### **2.3 Factors influencing quail farming**

There are several factors which influence quail farming such as social factors, management practices, perceived nutritive and medicinal value of quail and access to market. These factors are discussed below.

#### **2.3.1 Influence of social factors on quail farming**

Quail farming is affected by a combination of factors amongst which gender issues may play a larger role. The Agriculture Sector Development Strategy (ASDS) 2009-2020, recognizes the fact that women carry out 70% of agricultural related activities (GoK, 2010). A study carried out for Agricultural Sectors Investment Programme (ASIP) 2004 established that women are the core of the small hold agricultural in Kenya. They manage at least two fifth of the small holding and produce about 75% of the labour used in the small holding. They are largely responsible for attaining food security at the household level as they are responsible for a large part of cultivation as well as for marketing (GoK, 2010) Rural women traditionally play an important role in poultry farming and are often in control of the whole process from feeding to marketing,

which is not the case in production systems for other livestock species (IFAD, 2000). According to Njuki and Waithanji (2012), the traditionally domain of women in poultry keeping is undergoing a shift in roles and attitudes as men become aware of its economic value. Research finding by FAO found out that increasing access to productive resources by women to be at par with those of men would increase farm yields by 20-30%. This in turn would raise agricultural output in developing countries by 2.5-4%, reducing the number of hungry people by 12-17% (FAO, 2012). FAO conclusion was that a focus on gender can increase the productivity of agriculture and livestock systems, and improve food security and nutrition. But According to FAO (2011), despite the significant roles women play in agriculture and Livestock production they continue to have a poor command over a range of productive resources and services. The report concluded that ignoring gender issues can result in projects that are technically successful but negatively affect men, women and children.

According to a report by IFAD (2000) distribution of ownership of livestock between men and women is strongly related to social, cultural and economic factors. In many societies, cattle and larger animals are owned by men, while smaller animals such as goats, sheep, pigs and poultry are women domain. But when the rearing of small animals becomes a more important source of family income, ownership, management and control are often turned over to the man. The report suggests that identifying and supporting women's roles as livestock owners, processors and users of livestock products while strengthening their decision-making power and capabilities, are key aspects in promoting women's economic and social empowerment and consequently provides a way to enable rural women to break the cycle of poverty.

Despite their considerable involvement and contribution, women's role in livestock production has often been underestimated and as a result, it is difficult to obtain information on the role of women in livestock production from existing research and project reports. In addition, women's work is rarely reflected in national statistics (IFAD, World Bank and FAO, 2007).

A report by GIZ (2013) indicates that men and women have different needs, interests and constraints with regards to development and delivery of new livestock technology. As services and access to information are increasingly privatized, women face severe challenges as their access to markets, services, technologies, information and credit schemes is lowered even further, thereby decreasing their ability to improve productivity and benefit from a growing

livestock sector. Livestock production scale-up to meet the increasing demand from growing population is not an easy task for women: decisions, income and sometimes the entire enterprise shifts to men, and women tend to go from an employer to employee role. The report concludes that consideration of the needs of women and men when developing livestock technologies will reduce their workload, increase productivity and improve food security and the overall income generation will be improved (GIZ, 2013).

A research done in Ethiopia indicates that women are typically engaged with activities related to the safety and wellbeing of livestock which are performed around the homestead, such as collecting dung and hygiene. They are also involved with activities closely related to their household activities and are often responsible for storing, processing and adding value to the livestock products. The tasks of feeding and watering livestock are often shared and other household members may also participate (Aregu, Sambrook, Puskur and Tesema, 2010). The same research states that even though women play a considerable role in livestock production and management, they rarely participate in marketing and controlling the benefits from the sales of large livestock and their produce. Women control only processed products such as milk and butter and smaller items, such as poultry and eggs, while men control income from the sale of cattle, sheep, goats and honey.

Many countries still face challenges in translating legislation related to women's access to and control of resources into action at the community and household levels (IFAD, 2004). Namibia has implemented legislation to prevent property and asset confiscation, yet it is still common practice for a husband's family to take livestock and other assets from a widow and her children upon the husband's death. This has immediate impacts on a woman and her children in terms of loss of food security insurance and potential income. This impacts women's capacity to control and benefit from livestock. Poultry is an exception; the Namibian women have more control over the poultry they produce and market.

In general, women, men, boys, and girls provide labour for different livestock-related tasks. But gendered roles are open to change for different social, economic, environmental, and health-related reasons. Tanzania pastoralist groups of Morogoro and Tanga showed a clear division in gender roles. Yet in times of labour shortages, women could and did perform 'men's' tasks, such as herding and watering animals. On the other hand, men seldom performed 'women's' tasks,

except in cases where there was potential to gain control over assets (Hill, 2003). Although differences exist within and between different livestock production systems and across regions, women are almost universally recognized for their role as the main actors in poultry, small ruminant, and micro livestock production. This result to women's labour and responsibilities in animal production remaining under recognized and underappreciated by those designing and implementing livestock policies and plans (IFAD, 2004). In the agro pastoral systems of Iringa, Mara, and Mwanza in Tanzania, women cannot sell or slaughter their animals without consulting their husbands, but they can decide to use their money from the sale of surplus food crops to buy livestock. They could also sell or exchange their poultry without seeking their husband's permission. In the intensive systems of Kilimanjaro, milk, which was once under women's control, came under men's control when it became a key source of household income (Hill, 2003).

As keepers of local knowledge, women and men contribute to the enhancement of gene flow and domestic animal diversity (FAO, 2002). They also hold knowledge useful in the prevention and treatment of livestock illness. Men, women, boys, and girls will often have differing livestock knowledge and skills depending on their roles and responsibilities in animal husbandry. Women who process wool may have far different criteria for breed selection than men. Men herding cattle may have different knowledge of fodder and disease prevention than others in their household. Men's and women's reasons for keeping livestock differ. In Kenya women reason for keeping of livestock as primarily contributing to food security, whereas men keep livestock as a way to meet needs such as school fees, food, and a way to invest (IFAD, 2004).

Gendered asymmetries in access to and delivery of livestock and veterinary services not only do a great disservice to women and men livestock producers and processors, but they also stifle the potential for more sustainable and effective actions along a given livestock value chain. In most cases those working formally on livestock disease prevention and control perceive adult men to be the ones raising livestock. Yet adult women, girls and boys, and often elder men and women, may be responsible for diverse production and health activities (FAO, MARD and ACI, 2007). As services are increasingly privatized, women face disproportionate challenges compared to men in accessing livestock services and information. Women's poor access to markets, services, technologies, information, and credit decreases their ability to improve productivity and benefit

from a growing livestock (FAO, 2006a). The researcher would wish to investigate the extent to which empowering both gender across age and marital status would affect quail farming.

Education is the most important means to the development of human resources, appropriate skills, knowledge and attitudes. It forms the basis for developing innovation science and technology which are useful in implementing both development and food security programs. Lack of education and low levels of literacy make access to information difficult and commonly undermine the confidence and skills needed to enter public life whether at village, community, local or national level. As regard to education of women involvement in Livestock production, studies have shown that there is a strong association between education, economic development and proper livestock husbandry (Bwiki, 1990). Provision of adequate education will enhance active participation in Livestock production and lack of education deprives one knowledge and means of producing more on the farm.

A study carried out in Senegal by Michelle (2006) found out the farmers with formal education were more likely to than those without education at all to belong to community organization, hold leadership position with the local institution, attend local organizational meetings at least occasionally, speak out in meetings and get together with others to raise an issue.

Macharia (2007) conducted study in Kiambu, Kirinyaga and Maragwa districts and established that the education level of households' head was an important factor influencing what development projects people initiates collectively, which new farming technologies would be adopted and what farming enterprises would be undertaken. Illiteracy level in the rural area of Vihiga district leads to poor implementation of the agricultural programmes by the donors and also by the government (Mwaura, 2008).

### **2.3.2 Influence of management practice to quail farming**

In quail farming, management abilities and practices determine the difference between success and failure. Management problems are far easier and cheaper to prevent than to solve, and the limited availability of effective disease treatments makes proper management an absolute necessity.



Quails housing can either be dip litter (floor pens), colony cages, or individual cages (battery cages) (Skewis and Wilson, 2003). (Appendix 5) and they should be designed to ensure comfort for the birds, make food and water readily accessible and to permit easy and effective sanitation (Randall and Gerry, 2008). Quail houses should have proper ventilation system so as to allow proper flow of air and light inside the cage and it should be out of the reach of wild animals and other predators. One of the advantages of raising quail is the relatively small space that is required. According to MOLD (2012) the required floor space for adult quail is 145 cm<sup>2</sup> per bird on floor pens and 125 cm<sup>2</sup> per bird on cages. If kept outside, the quail will stop laying eggs during the colder period but if kept inside under good conditions like enough space, food, temperature above 16°C (61° F) and enough light, the quail would normally lay around 280-300 eggs in a year. In the wild, all quail devote much of their time to scratching and foraging for seeds and invertebrates on the ground. According to Walker and Smith (2013), behaviour tests have shown that domesticated quail do not change that behaviour and strongly prefer a solid floor with litter to a wire floor so that they can use the litter for scratching, pecking and dust bathing. According to MOLP (2012), in Kenya, the common type of quail housing is colony cage system in which birds are kept in cages and provided with beddings which is mostly wood shavings which are important for moisture absorption. The beddings should be turned over regularly to avoid wet spots which can be sources of diseases.

Availability of high quality feed is a pre-requisite for improved quail production and productivity. To ensure the quails are healthy, growing proper and are highly productive, they should be provided with balanced feed regularly. According to MOLD (2012), the basic factors affecting the supply of quality feed are its price, availability, the quality of raw material used, processing methods, handling and storage of mixed feeds, among other factor. An adult quail consumes about 20 to 25 grams of feed daily. Adult quail requires 7 cm of feeder space per bird (Randall and Gerry, 2008). Feed in quail farming is the single item that represents the highest cost of production (Chibe, 2009). In Pakistan more than 70 per cent production cost for poultry is incurred in feed prices (Government of Pakistan, 2009). In Pakistan quail feed has a specific formula feed mix which consists of rich protein elements like grains, gluten, blood meal, fishmeal and soybean meal. According to Darwish (2003) in Lebanon, the cost of feed represents between 65 and 70% of the production cost. In Kenya, quail feeds account for between 60-80 per cent of the production costs in quail farming (GoK, 2008).

The Kenya Bureau of Standards (KEBS) has set standards on feeds for most livestock species. However, the standardization of feeds for some categories of animals as quails is not set. In addition, feed ingredients themselves are not fully standardized. As a result, feed manufacturers face great difficulties in meeting acceptable standards of feeds using such feed ingredients (GoK, 2008). A report from Wambugu ATC (2013) indicate that farmers in Nyeri County feed their quails with commercial chicken feeds mostly from Unga Company since there is no quail formulated feed in the market. The Chicken feed contains less CP than the recommended quail feed. According to NRC (1994), quail chick feed and adult feed should contain 28% CP and 24% CP respectively while chicken chick and adult feed contain 21% CP and 15 % CP respectively. According to Walker and Smith (2013), due to the different CP requirements, feeding quails with chicken feeds results to high mortality rate at times reaching 70% from day old days; uneven growth of birds; inefficient laying with production period not going beyond six months and molting which severely affects the egg production. The low CP in Chicken feed results to quails not achieving their optimum growth and production. A report by Wambugu ATC indicates that most farmers in Nyeri County achieve egg production of 200 eggs per year instead of the expected 280-300 eggs per year. For Wambugu ATC, they supplement their chicken feed with rapeseed, cotton seed cake, sunflower and fishmeal to enhance the CP but most farmers don't supplement. Darwish (2003) state that very little research has been done on quail feeds and quails farmers have to rely mainly on manufacturers' advice regarding feeds. Quails should be provided with fresh, clean and readily accessible drinking water at all times with a minimum of 0.6 cm of trough space per quail. The watering system should be cleaned and disinfected frequently (Ecochicks Poultry limited, 2013).

Proper selection of breeding stock is important because starting with undesirable breeders end up with undesirable offspring. According to Walker and Smith(2013), the best breeding stock can be selected by buying only from reputable breeder dealers; purchasing chick quails for future breeding stock that conforms to size, shape, and color according to the species; purchasing eggs with uniformity in size and shape and selecting birds that show best growth, stamina, and feathering. The type of breeder to rear is determined by the market. Larger birds are desired for table meat while smaller birds lay better than larger birds. Using the same breeders for more than one laying season can lower egg production, fertility, and hatchability with weaker offspring, and less disease-resistant birds. Culling should be carried out throughout the laying season. In order

to prevent inbreeding, unrelated breeder stock should be introduced at least every third year and this can be achieved by exchange males with another breeder who has an unrelated strain, purchase new birds, or buy eggs and raise new blood line. (Walker & Smith, 2013).

The Quail can be bred upon attaining maturity at the age of 6-8 weeks. For successful breeding and hatching of eggs, one male should be kept with three female quails (Sogunle, 2012). According to Wilson and Douglas (1983), presence of adequate light is highly recommended for desired egg production from quails. By providing artificial light for 14-18 hours breeders can be brought into egg production at any time and maintain production throughout the year. Males not required for breeding, or any quail being grown for meat production, can be given only about 8 hours of low-intensity light per day. This is not enough to initiate sexual maturity; therefore, the birds do not expend energy on fighting and mating and will tend to fatten more quickly (Randall and Gerry, 2008). Egg production also depends on breed, house hygiene, temperature, feeding, water, care and management. The small breeds of quails are used for egg production. The larger varieties usually lay fewer eggs than the small varieties and are used for meat. With proper care, hens lay 280-300 eggs in a year. Their productive life is one year two months but their life expectancy is 2 to 2½ years (Wilson and Douglas, 1983).

According to Akpan and Nsa (2009), domesticated quails loss their instinct of nesting and therefore never incubate their eggs. Quail chicks can be produce by hatching their eggs using broody hen or artificially through using incubators. Sogunle (2012) defined incubation as the management of fertile egg in order to ensure satisfactory development of the embryo in the egg to a normal chick. According to Ecochicks Poultry (2013) an incubator enable the farmers to control as to when to incubate the eggs unlike the natural way of incubating through the mature quails in which one have to wait for the birds to start brooding. According to Dozier et al. (2010) the most desirable eggs for hatching are those that are clean, free of shell defects, fairly large and with good shell quality. Egg hatchability is reduced by storage beyond seven days, using eggs from young breeders or eggs of near the end of the laying cycle. For successful incubation, several factors such as temperature, humidity, ventilation, turning, egg position and sanitation should be carefully controlled. The incubation period for quail is 14-18 days (Randall and Gerry, 2008). The humidity of the incubator should be 55-60 per cent and this should be increased to 80-85 per cent on the 14<sup>th</sup> day during hatching. The temperature of the incubator should be

maintained at 37.5-38 degrees centigrade throughout the incubation period. According to MOLD (2012), candling is done on the 7<sup>th</sup> day to identify the fertilized eggs and died eggs should be discarded. The eggs are turned at an angle of 45<sup>0</sup> either manually or automatically from day one to the fourteenth day. This is done so that the eggs get even heat, to prevent the yolk from sticking on the shell and to keep the embryo in the middle of the egg. After hatching, the chicks are left for 1-2 days in the incubator to dry before transferring to the brooder.

According to Darwish (2003) in Lebanon, day-old quail chicks costs are second highest cost of production after feeds ranging from 15-25% of the total cost. According to the same report, parent stocks should be disease free and raised under optimum conditions. But in many cases, these requirements are not fulfilled resulting in low quality of quail chicks with a high mortality and/or a low productivity. Quail chicks should be sorted in the hatchery to remove any weak or abnormal ones. In few cases, especially when chick prices rise, chicks are not sorted at the hatchery resulting to low productivity.

Newly hatched quail chicks should be brooded. Sogunle (2012) defined brooding as the provision of warmth to the newly hatched chicks in order to ensure satisfactory growth (Randall and Gerry, 2008). According to Skewis and Wilson (2003), brooding involves providing warmth, high quality feed, clean water and protection during the first 2-3 weeks of a quail chick's life. Heat is confined to a particular area for the chicks using hovers or brooder boxes which keeps the chicks in the vicinity of the heat, water and feed. Brooding can be carried out in floor pens with either litter or raised wire floors. Stocking density in the brooder is 10 birds per square foot. Several days before the chicks arrival, the quail brooder house should be prepared by cleaning and disinfecting. Regardless of the season, the brooders should run for at least 24 hours before chicks arrive, and the litter temperature should be approximately 95 degrees Fahrenheit. Brooder temperatures should be reduced by about 5 degrees per week until 70 degrees F (Dozier, Bramwell, Hatkin and Claudia, 2010).

Breeders should be maintained in a comfortable, well-ventilated environment. Temperatures should be kept between 65 and 85 degrees F to achieve acceptable feed conversion and production levels. Research indicates that temperatures lower than 65 degrees F will increase the birds energy requirement, which will lower feed efficiency and reduce egg production. At temperatures greater than 85 degrees F, feed intake is often reduced, which may also lead to

reduced egg production (Dozier, Bramwell, Hatkin and Claudia, 2010). According to Bakoji, et al., (2013), the life cycle of quail generally take two to two and a half years. Culling should be done regularly to the breeders. Skewis and Wilson (2003) refers to culling as the removal of sick, injured, unproductive and poor producing birds from the flock. The advantages derivable from culling of birds are: prevention of spread of diseases, increase in the quality of the stock, more space is allowed for the remaining birds, increase in profits principally by reducing feed required to produce a dozen eggs. According to MOLP (2012), a survey carried out by the Department of Livestock revealed that although poultry farmers have diversified to quail farming both farmers and staffs are not equipped with necessary knowledge and husbandry techniques to handle them. To pace with this increasing demand, effort must be intensified towards increasing the level of production and marketing of quails

Diseases are less in quails than in to other poultry birds. Most of the common quail diseases are caused by organisms which the birds pick up from the ground or from contaminated droppings. While quails have a certain degree of resistance to some diseases, they are prone to some poultry diseases and pests. According to MOLD (2012), quails are prone to the following diseases and pests as shown in Table 2.1

**Table 2.1: Quail Diseases, Pests, Signs and Control**

<b>Disease/pests</b>	<b>Cause</b>	<b>Signs</b>	<b>Control</b>
Quail bronchitis	Virus	Respiratory distress, coughing, sneezing and loose watery droppings	Vaccination
Coccidiosis	Parasite	Birds go off feed, weak legged, pale and die if not treated	Coccidiostat
<i>Haemoproto</i> infection	Protozoa	Anaemia, lameness, poor growth and general weakness	Antimicrobial drugs
Ulcerative <i>enteritis</i>	Bacteria	Restlessness, retracted neck, drooping wings, partially closed eyes, ruffled feathers diarrhoea, anaemia and watery white faeces	Antimicrobial drugs
Internal parasites	Round worm and tape worms	Drop in egg production, an increase in hunger and diarrhoea	Anthelmintic
External parasites	Lice, mites and fleas	Loose of feathers, lose weight, drop in egg production and scaly legs	Keep premises clean

Quail are more sensitive to mismanagement than chicken therefore good management practices are vitally important in preventing and controlling disease. (Ferket, 2007). According to a report on quail production and management in Georgia by Dozier, et al., (2010), no medications are approved for quail and there are no disease preventive vaccines. The report recommends that farmers should implement sanitation and bio security procedures which are inexpensive way to reduce the possibility of a disease outbreak. Bio security includes measures that prevent the entry and survival of viruses, bacteria, parasites, fungi, insects, rodents, etc., into a bird flock. Any of these agents may endanger the health of a flock, regardless of age.

According to a document report by Wambugu ATC (2013), there are no quails vaccine and medication in the market. So far no quail disease has been noted in the Nyeri County. External pests like lice, flea and mites have been noticed and they are controlled by use of sevins dust. According to GoK (2008) the Director of Veterinary Services (DVS) in Kenya is empowered to

control animal diseases and pests by various legal statutes but there is inadequate capacity to handle emerging animal diseases and outbreaks for emerging livestock like quail. Disease prevention, control and sanitary management practices are the best guarantee against disease and pests and this can be achieved by keeping their house dry and clean; ensuring proper movement of light and air inside their house; keeping different aged quails separated from each other; separating the disease affected quails from the healthy one; burning the dead bird or burning them; not allowing other birds, animals or unknown persons enter inside quail house; ensuring hygienic and balanced feed supply and providing adequate fresh and clean water according to their demand. To avoid spread of diseases care for the youngest birds should be before the oldest birds and care for healthy birds should be before the sick birds (GoK, 2008). According to Walker and Smith (2013) little research specific to quail disease problems has been done and so treatment of specific diseases have been experimental.

### **2.3.3 Influence of perceived nutritive and medicinal value of quail on quail farming**

Good nutrition affects growth and development of human body. Nutritional composition research has shown that eating well-balanced food can improve human health. A report by Wahab (2002) indicated that quail meat is an ideal food as authenticated in the Holy Bible and the Holy Koran and has no religious taboos. Quails have existed for a long time and used as food in the bible, there are two specific occasions on which quails featured in the history of the Israel according to the Old Testament record and these are described in Exodus 16.13 and in Numbers 11.31-34, quails are also mentioned in Psalms 78.26-30 and Psalms 105.39-42.

According to a report by Applegate (2000) on nutrition and functional role of quail in a diet, quail meat is all white and it's very low in fat and high in protein forming an ideal food for health conscious consumers. Quail eggs and meat are renowned for being rich in vitamins, essential amino acids, unsaturated fatty acids and phospholipids, which are vital for human physical and mental development. The same report recommends that quail meat and eggs can be included in the diets of children, pregnant mothers, geriatric and convalescent patients. The report concluded that quails eggs and meat are an essential part of the diet of socially and economically weaker sections of the society. A report by Kamba (2012), on benefits of quail eggs indicate that even though quail eggs are 5 to 6 times smaller than chicken eggs, their nutritional value is four to five times greater than chicken eggs. It contains 2.47 % less fat than

chicken egg. Quail eggs contain 13 per cent proteins compared to 11 per cent in chicken eggs. Quail Eggs contain 140 per cent of vitamin B<sub>1</sub> compared to only 50 per cent in chicken eggs. In addition, quail eggs provide five times as much iron and potassium. Unlike chicken eggs, quail eggs do not cause allergies or diathesis (Troutman, 2012). The same reported observed that quails are quickly replacing the chicken broiler due to high nutritive value and medicinal properties.

Quail eggs are inexpensive forms of animal protein, contain all amino acids needed for human health, provide many vital vitamins and minerals, and compare favourably to chicken eggs in some nutrient values (Table 2.2).

**Table 2.2: Comparison of Whole, Fresh, Raw Duck, Quail, and Chicken Egg Nutrients**

Nutrient	Unit	Duck egg value per 100g	Quail egg value per 100g	Chicken egg value per 100g
Energy	Kcal	185	158	143
Protein	g	12.81	13.05	12.56
Total lipid (fat)	g	13.77	11.09	9.51
Carbohydrate, by difference	g	1.45	0.41	0.72
Sugars, total	g	0.93	0.40	0.37
Calcium	mg	64	64	56
Iron	mg	3.85	3.65	1.75
Magnesium	mg	17	13	12
Phosphorus	mg	220	226	198
Potassium	mg	222	132	138
Sodium	mg	146	141	142
Zinc	mg	1.41	1.47	1.29
Thiamine	mg	0.156	0.130	0.04
Riboflavin	mg	0.404	0.790	0.457
Niacin	mg	0.200	0.150	0.075
Vitamin	mg	0.250	0.150	0.170
Folate	mcg	80	66	47
Vitamin B	g	5.40	1.58	0.89
Vitamin A	IU	674	543	540
Vitamin E	mg	1.34	1.08	1.05
Vitamin D	IU	69	55	82
Vitamin K	g	0.4	0.3	0.3

A study carried out in Thailand by Tunsaringkan, Tungjaroenchai and Siriwong (2013) to evaluate nutritional compositions of carbohydrate, fat, protein, calories, vitamin, mineral and sex



hormone contents of quail eggs found out that they are good sources of protein, fat, vitamin E, minerals (nitrogen, iron and zinc) and sex hormone and so quail eggs are a good source of nutrients for human health. The study found out that regular consumption of quail eggs helps fight against diseases such as digestive tract disorders such as stomach ulcers; quail eggs strengthen the immune system, promote memory health, increase brain activity and stabilize the nervous system. They help with anemia by increasing the level of hemoglobin in the body while removing toxins and heavy metals. The study concluded that quail eggs are good nutritional foods and may be the alternative source of nutrients necessary for human health in developing countries and may be a good potential to resolve the World Food Problem.

The British medical researchers for Health found out that quails eggs are much higher in vitamins and minerals than hen's eggs; they are especially rich in the essential amino acids and have no complex carbohydrates or dietary fibre (Williams, 2013). According to the same research the Chinese, Japanese and Russian scientists have discovered that, in addition to the nutritional value of the eggs and meat of the Japanese quail, they have medicinal value as well. Quail egg revitalizes the body regardless of age: regulates and improves the functioning of the heart and circulatory activity; regulates gastric acidity; improves breathing and reproductive function; has beneficial effects in treating kidney and liver diseases; will positively affect the brain, the lymphatic system and the immunologic system. According to the same researchers, quail egg would reduce the amount of antibodies in the body responsible for allergic reactions. Because of their extraordinary nutritional and medicinal properties, they are being used with more and more success in Europe, America as well as in the Far East. The researchers conclude that quail eggs are considered to be one of the best known natural treatment products.

According to Kamba (2012), Chinese medical practitioners have been using quail eggs as a treatment for hundreds of years with brilliant results. Chinese use quail eggs to help treat tuberculosis, rhinitis, asthma, diabetes, hay fever and skin conditions; prevent sufferer of kidney, liver, or gallbladder stones and remove these types of stones. As quail eggs are slowly becoming an easy to get product on the market more and more people are beginning to show interest in their use as an active natural medicine instead of the chemical products with so many side effects. It is recorded that a Japanese Emperor was healed from tuberculosis after eating quail meat, and this led to selection of domestic quail for meat and egg production in Japan in the latter part of the nineteenth century. The eggs are since considered a natural remedy, exceptional

source of minerals and vitamins. Later observation and medical researchers did validate this concept (Judith, 2010). A study done in Thailand by scientist who analyzed quail eggs indicate that the health benefits of quail eggs include anti-cancer effects, with compounds that inhibit cancerous growth, boost the immune system by stunning aging in organs, and prevent anaemia by promoting haemoglobin (Williams, 2013).

Quails could reduce protein deficiency in developing countries because quail products have proven to be relatively cheap providers of proteins. In India, in the last two decades, quail has been introduced to the Indian sub-continent as an alternative avian species in the progressing poultry industry to mitigate chronic protein deficiency among the Indian population (Wahab, 2002). As a result, quail rearing has resulted to the alleviation of protein deficiency among the Indian population due to the per annum availability of 33 eggs and 770 grams of poultry meat per person. (Chibe, 2009).

Nigeria is among the least consumer of animal protein in the world (Ikheloa and Inedia, 2005). The problem of malnutrition in Nigeria is attributable to low consumption of meat. According to Bakoji, et al.(2013) a study conducted in Bauchi Local Government Area, Bauchi state, Nigeria to analyze the economics of quail birds in the study area found out that quails farming is an uncommon farming business in Nigeria but few people that have embraced it are enjoying both nutritional and health benefit derived from consuming it (FAO, 2009). The birds' high nutritional and market value is encouraging many chicken poultry farmers to abandon the business for quail farming. As a result there is increased consumption of animal protein and a reduction of malnutrition cases in Bauchi state.

In Thailand, a report by Tunsaringkan, Tungjaroenchai, and Siriwong (2013) state that experts in natural treatment methods claim the health benefit of quails egg are: regulate and improve heart function; strengthen the cardiovascular system; lower cholesterol; help in the treatment of tuberculosis, bronchitis, asthma, and diabetes; have strong anticancer effects and may help inhibit cancerous growth; help eliminate and remove stones from liver, kidney, and gall bladder; regulates gastric acidity and digestion; help in treating kidney and liver diseases; greatly help in cases of allergic rhinitis, allergies and eczema; regulate blood sugar level of diabetes cases; can

help cure anaemia; accelerate recuperation after blood stroke and help strengthen heart muscles; powerful stimulant of sexual potency; promote good memory, enhance brain activity and regulate the nervous system; strengthen the immune system and slow down aging of organs and increase life span. These claims are similar to those of quail farmers in Kenya as reported by Kamba (2012) and in Nigeria as stated by (Dobras Quail Farm, 2014). Natural treatment practitioners recommend that drinking quail egg raw is the best way to derive maximum health benefit from it but, if one cannot take it raw it can be added a little milk, honey or orange juice or cook it for 30 seconds. According (Dobras Quail Farm, 2014) the natural treatment practitioners recommend administration of quailsøeggs as shown in Table 2.3.

**Table 2.3: Quail Eggs per Day**

<b>Age Group</b>	<b>Total No. of Quails eggs</b>	<b>Total No of days</b>	<b>1<sup>st</sup> day</b>	<b>2<sup>nd</sup> day</b>	<b>3<sup>rd</sup> day</b>	<b>From the 4<sup>th</sup> day on</b>
Adult	240	49	3	3	4	5
Adult	120	25	3	3	4	5
16-18 yrs	120	25	3	3	4	5
11-15 yrs	120	31	3	3	3	4
8-10 yrs	90	30	3	3	3	3
4-7 yrs	69	20	3	3	3	3
1-3 yrs	60	30	2	2	2	2
3 months-1yr	30	30	1	1	1	1

In Kenya, no scientific research on quail nutritive and medicinal value and has been carried out. According to a reported by Kamba (2012), claims on medical benefits of quails are not backed by local studies and scientific data and the report recommended that in order to protect the

public, the government need to be involved in the studies in order to ensure that the medical claims and allegation are proven scientifically. The same reports indicate that quails eggs are not medicinal but nutritional just like chicken eggs. The report recommends that quails products should be used to aid quick recovery of people already on medication

#### **2.3.4 Influence of access to market on quail farming**

According to MLCSL (2010), market means a specific location where trading takes place on certain occasions. In economics, the term is much wider and can refer to all the people and institutions concerned in the exchange of any commodity. Eggs are the main products of quails. The average feed conversion ratio for quails is 3:1 this poor feed conversion efficiency makes broiler production uneconomical and broiler production is secondary in quail farming. Quail farming can play an important role for fulfilling the daily family nutrition demands and earning a living. Commercial quail farming can be a great source of employment.

According to Skewis and Wilson, (2003), Marketing possibilities, probabilities and plans should be determined before starting any new business venture. Many producers contract their production of birds and/or eggs for 1 to 2 years in advance. A study done by Arthur (2013), on the consumer market for duck and quails egg product in Vancouver British Columbia found out that the structure of the duck and quail egg industry can be described as comparatively loose with respect to marketing the products because of lack of organized system. The weaknesses of the industry is that there is little known about the markets for quail and quail eggs as the information is proprietary. Individual producers and processors have to find their own markets and producers have the option to sell their eggs through multiple channels which are: farmers, farm gate, farmers market, processors, wholesalers/distributors, restaurants / retailers, importers and consumers. The core market for duck and quail egg products currently rests in the stable, frequent purchaser who purchases primarily for regular meal planning reasons and this retailer controls access to shelf space. These limited options mean that producers and processors do not have market power and essentially must take the price offered by distributors.

A report by Ministry of Agriculture and Food (2008) indicates that competitive forces in the duck and quail industry are strong. There are no regulatory barriers to entry such as in supply managed sectors, and imports of processed duck and quail egg products are not currently restricted nor subject to tariffs. The Canadian and British Columbia markets for processed duck

and quail egg products are dominated by imports from Asia that hold economy of scale production advantages and a low cost labour advantage. Despite the relatively weak position of the duck and quail egg industry in British Columbia, the report have noted its potential due to the growing population (View West Marketing; Zeetnoff Agro-Environmental Consulting, 2002). This potential is aided by a growing overall demand for local food products. There is a limited but expanding market for specialist products such as fresh or pickled quail eggs and fresh or frozen quail carcasses. However, commercial success requires thorough market research and the ability to maintain supplies of top quality produce (Randall and Gerry, 2008).

In India, according to Wahab (2002), an exclusive quail market segment has lately been growing within the poultry meat sector to cater to the quality conscious meat consumers. Quail meat is not only regarded as a restaurant delicacy but is also consumed in quantity by the public due to its affordable prices. Approximately, one out of every ten broiler consumers opts for quail.

In Pakistan the consumption of white meat is increasing due to growing health consciousness in the masses. Quail meat regarded as a restaurant delicacy and it is also consumed in quantity by the public due to its affordable prices (Government of Pakistan, 2009). In Pakistan the shelf life of quail eggs and meat are enhanced by preserving the products as egg and meat packed in plastic pouches. The methods employed include deprivation of water and sometimes oxygen, excess of salt, increased acidity or extreme cold or heat this ensure the products stay longer in the market. In Pakistan, broilers are distributed in the market through middlemen and wholesalers. In some cases, the middleman provides Day Old Chicks and other farm inputs (feed, etc.) to the broiler farmers and then agrees to buy back the mature birds from them. Birds are transported to the urban market and are sold to retailers or market-street poultry shops on live-weight basis. Although collection and handling of birds has improved with the use of loader vehicles, the greater the distance between the poultry producer and consumer, the more complicated is the marketing system including their collection, handling and transportation to the consumer or processing plants. The processing plant produces dressed quail (slaughtered and cleaned). However, a very small amount of dressed quail is available in the local retail market. The integrated processing units distribute frozen and dressed quail packed in whole or cut-ups to the consumer through retail shops.

In Egypt, the primary interest of quail breeders is marketing of 6 week birds in which the main concern is the weight of the bird. No attention is paid to the quality of the marketed birds (Shahin, Shemeis, and Abdalla, 2000). According to a report by Darwish (2003), the quality and hygiene of poultry products is an internally regulated practice, which is implemented mainly by large-scale producers who have their own bio-safety and sanitation control procedures. The same report indicates that quality of the marketed birds can be negatively affected at the farm level due to low hygiene and poor production procedures; during transportation, the products are often subject to the prevailing environmental conditions such as high temperature, wind, dust and fumes and by poor storage facilities provided by retailers. Lebanon is known for the abundance of small snack restaurants, which offer poultry products such as shawarma, taouk and the various sandwiches. These outlets in turn are subject to minimal control procedures that target their products storage and handling conditions. The impacts of these conditions are also minimally documented (Darwish, 2003).

According to a report by Government of Kenya (2008), poultry marketing in Kenya is largely in the hands of the private sector, the Government only offers regulatory and facilitation services. The key marketing agents include farmers, marketing organizations, private live animal traders, butchers, and middlemen. The distribution system of poultry products and by-products is poorly developed in the country. The apparent distribution vacuum has enticed the establishment of many middlemen and middlemen organizations that skew the market against the interests of producers and farmers are being controlled by middlemen or the large producers. A report by MOLP (2012) recognizes that the poultry farming in Kenya has potential for earning substantial foreign exchange and transforming the living standards of communities. Full access to external markets, is essential to the exploitation of such potential, but this is curtailed by animal health standards and quality parameters that are currently not being achieved by some of the local producers. This is further compounded by the trans-boundary nature of some livestock diseases, which require regional approach to animal health surveillance and monitoring. The same report noted that good infrastructure directly facilitates efficient market and trade performance and by extension, affects producer prices but at the moment Kenya's infrastructure (roads, holding grounds, and stock routes for livestock) is in poor state, and hence not conducive to efficient poultry marketing.

In Kenya, poultry meat/ eggs is traditionally marketed fresh, mainly through small retail shops which slaughter birds upon request and choice of the customer. During the last decade, and with the increased involvement of day-old chicks, producers in meat production and the establishment of closed chains, the sales of slaughtered birds as whole or cut-up parts has increased significantly. Despite the market tendency, live animals are still being marketed by small-scale outlets especially in suburbs and rural areas. This trend still has preference by many families due to the 'freshness' factor and the religious aspect during slaughtering. In this operation, middlemen play a crucial role in price regulation and determination of farmer profit and it is well proven that middlemen make the major profit of this business. On the other hand, Eggs are marketed by middlemen that play a decisive role in price regulation as in the broiler sector. Hence, small-scale farmers are practically dependent on them. Grading and labelling of eggs is nearly not existent especially when it comes to the traditional marketing in 30 eggs trays. But, this is also witnessing some changes as the demand by supermarkets and chain stores is moving towards graded and labelled eggs in smaller packages of 6, 10 and 12 eggs

According to a report by Kamba (2012), the 'wild bird craze' started mid-2013 and Kenyans put a lot of money into the quail farming. The venture came with hype and unfounded claim especially in the internet of nutritive and medicinal value of the quail egg and the high unmet demand of the eggs. According to the same report by December, 2013 the market was saturated with quail eggs and the price of an egg had fallen from Kshs. 100 to Kshs. 10 resulting to some farmers abandoning the business. According to the same report, the fast saturation of the market of quail was because it has been a market of farmers selling to other farmers but not to consumers. The same report refers the situation to the cobweb theory of agriculture which states that when a product is low, price is high. Based on high prices, many farmers venture into business which leads to over supply causing price to fall resulting to some people giving up and prices go up again. The report recommends that farmers should first establish if there is market for the product before committing themselves into the business and they should also take calculated risk.

Quail farmers have established a national cooperative society Global Quails Agribusiness Farmers' Cooperative Society to harmonize the marketing of eggs in the country by ensuring that the farmers speak with one voice. The cooperative is registered as a company, has the Kenya

Bureau of Standards mark of approval and bar code for selling in supermarkets. Documented report of the society noted that so far concentration by quail farmers has been on income generation which has led to saturation of the market. The report recommended farmers should be trained on health and nutritive value of quails to enhance local consumption, formation of marketing groups within counties so as to have volumes for ease of marketing and the cooperative is in the process of looking for international market for quails.

In Kenya most of the quail farmers are small-scale farmers and they sell the quail products locally by carrying out direct marketing to the consumers through farm gate, stall in the local village market, street vendors and also door-to-door sales. The organized marketing of quail is in the formative stage and currently, farmers are selling their products directly to the consumers by carrying their product to the market or from the farm gate. According to Hilmi, Dolberg and Alders (2011), in direct marketing farmers need to be advised about quality and health factors and avert breakages and excessive exposure to heat, water and other factors that can reduce the quality and safety level of eggs. For the live birds and the necessity to carry out slaughter operations, farmers must be knowledgeable not only of how to slaughter birds appropriately, but be aware of safety risks in terms of meat contamination. Transporting live birds to market is a common practice, but more than often transport conditions of birds are not ideal and arrival at markets sometimes reduces the quality of the bird as it has broken feathers, bruises or has fought with other birds while in transit. Appropriate transport methods are fundamental to uphold quality of birds for sale in local markets. Few farmers sell quails through indirect marketing that is when small-scale farmers sell their poultry products to marketing organizations found within the poultry supply chain. Commonly this is because markets that are being served are at a distance from the location of the producing farm. Marketing intermediaries are commonly rural traders, assembly merchants, wholesalers and retailers (butchers and street food vendors)

Currently, Kenya's poultry farming is based on primary production. There is very little on-farm and off-farm processing of poultry produce, and this translates to low income for farmers and loss of employment opportunities. Value addition initiatives in the poultry farming are mainly constrained by lack of supportive infrastructure such as roads, electricity, cold storage structure and water, in addition to investment disincentives arising from high taxes and un-conducive regulatory frameworks (GoK, 2008).



A report by ARDS (2012), state that an efficient market information system is an essential element for enhancing market competitiveness. In a system where market information flow is efficient, the ability of producers, traders and consumers to make the right choices is vastly enhanced. The same report state that inefficient market information system creates market distortions that eventually tend to make business expensive to both the producers and consumers. The report concludes that poor market pricing are mainly a result of poor market information systems that act as a key limiting factor to good market access. Low producer prices affect earnings for the poultry farmers, their livelihood and food security situation.

### **2.3.5 Government Policies and Regulations**

It is recognized that the poultry sub-sector has potential for earning substantial foreign exchange and transforming the living standards of communities dependent on the subsector. Full access to external markets, is essential to the exploitation of such potential, but this is curtailed by animal health standards and quality parameters that are currently not being achieved by some of the local producers. This is further compounded by the trans-boundary nature of some livestock diseases, which require regional approach to animal health surveillance and monitoring (GoK, 2008).

Poultry Welfare is given more legislative attention in the EU than many other regions in the world. This is due to specific futures for production environment and the consumers' preference for welfare for production of poultry. The developing countries that comply with the EU standards are allowed to export their products to the EU (Van Horne and Achterbosch, 2008).

In Uganda, although poultry is implicitly referred to in the definitions of 'animal' and 'livestock', there is a lack of specific reference to poultry as a form of livestock. Livestock policies and laws do not make specific reference to poultry issues, and poultry farmers' needs are not disaggregated from those of farmers in other subsectors. For example, the meat policy does not differentiate poultry meat from beef, the local government meat ordinance elaborates slaughter and meat conveyance processes for cattle but not for poultry, and there are no specifications for the slaughter of poultry. Neither the national breeding policy nor the breeding act provides strategies for the conservation of poultry genetics. This reduces the visibility of the subsector, especially during planning and prioritization for resource allocation. At present there is no clear poultry policy or strategy in Uganda and so poultry is often neglected (Azuba and

Byarogaba, 2009). The report concludes that enhancing the visibility of poultry through a strategy or policy could help ensure that national plans for the agriculture sector include budget allocations for poultry, which would lead to improved poultry production in the country.

Kenya has a National Poultry Policy whose overall objective is to enhance the contribution of the poultry industry towards food security and employment creation. The Poultry Policy addresses issues that enhance production of quality feeds, housing, poultry diseases and improving management and breeding of poultry (MOLD, 2008). According to the National Livestock Policy Government of Kenya (2008), the market liberalization initiatives of the mid-1980s affected marketing of most livestock products. The government role was reduced to offering regulatory and facilitation services while marketing was largely in the hands of the private sector. This led to the collapse of livestock marketing institutions and the private livestock dealers were not adequately prepared to undertake the challenges of marketing making the farmers return from livestock low.

Currently, there are numerous pieces of legislation in the poultry sector, which have not been reviewed and some are redundant. This coupled with a lengthy process of review have resulted in laws and policies that lag behind the current development. (ARDS, 2012). According to MOLD (2008), The Veterinary Department is mandated to carry out disease control under Cap 364 but, the existing legal and regulatory framework does not adequately address challenges in notifiable poultry diseases, also there is inadequate enforcement of existing rules and regulations on movement of poultry and poultry products both within the country and internationally due to some of the Acts not responding to emerging challenges. These policies need to be reviewed. The National Livestock Development Policy was formulated in 1980. The policy recommended, among others, the provision of a poultry credit scheme, and the establishment of a national poultry advisory body. However, this policy lacked an implementation framework to implement the interventions and thus have been redundant.

According to the livestock policy MOLD (2008), enforcement of animal health and product quality standards in Kenya has been mandated to the Department Public Health and the Department of Veterinary Services through various acts of parliament. Public Health is vital in the prevention and control of Zoonosis diseases, ensuring food safety and fair trade in foods of livestock origin through inspection of meat and eating premises in order to prevent spread of

diseases such as tuberculosis to human. The Department of Veterinary Services is responsible for issuing licenses for transportation of livestock, inspection and certification of foods of animal origin for local and international trade. The bodies responsible for control of veterinary drugs and pesticides are variously placed in the Ministries of Health and Agriculture making it hard to safeguard animal health. There has been poor coordination between the two departments which is coupled with inadequate capacity. The report recommends that to address the above challenges, it is necessary that a thorough review of both policy and institutional framework of the livestock sector be undertaken to allow for the development of a competitive poultry industry.

#### **2.4 Theoretical framework**

This section gives the underlying theories supporting farmers in undertaking the farming activities. Farming activities can be based on theories such as the theory of contracting farming, cobweb theory of agriculture and entrepreneurial theory (Klerks, 2013).

Contract farming has existed for many years in both developed and developing countries. FAO (2010), defines contract farming as an agreement between farmers and processors and/or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices. Contract farming is a tool to better control the compliance of farmers with production techniques and food safety standards. As agribusiness firms becomes involved in global trade of agricultural products such as fruits, vegetables, flowers and livestock products, the importers and the final buyers such as supermarkets in Europe, the Middle East or other important trading partners often require exporters from developing countries to comply with certain standards (Wainaina, Okello and Nzuma, 2012). The intensity of the different contractual arrangements varies; some are rather informal and based mainly on mutual trust and verbal agreements, while others have developed contracts as documents to formalize the cooperation.

A lot of information from this theory has been borrowed by the Kenyan government with an aim of linking farmers to market. On one hand, buyers and producers might cooperate irregularly by relying on verbal agreements with no further assistance concerning input supply and extension. A more formalized system specifies the transactions and responsibilities of both parties in a contract document. The farmer normally provides land, labour and tools while the buyer often

supplies inputs, credit, extension services including trainings on grading and is responsible for marketing and transportation of the produce. In addition to these, the contract also mentions the quantity and quality requirements for the cultivated crop or livestock products, prices and technology application. So, contract farming can be regarded as a partnership between agribusiness companies and farmers.

According to Wainaina, Okello and Nzuma (2012), though contract farming is widespread in Africa and many other developing countries, there are conflicting views on its impact on the welfare of smallholder farmers. Some authors argue that contract farming is beneficial to the small holder farmers since it enables farmers to access ready markets and also to access global markets. On the other hand other authors argue that contract farming is a means of exploiting farmers by the large agribusiness firms due to the unequal bargaining power. But a fundamental feature of contract farming is the shifting of risk from producers to processors since it is a form of futures market. Production and price risks are important features of poultry farming. Much of the price risk is reduced, in contract farming, by the use of a predetermined price rather than the market price.

According to Dieci (2011), the cobweb model was identified by the Hungarian economist, Nicholas Kaldor in 1934. The same author states that Cobweb models describe the price dynamics in a market of a non storable good that takes one time unit to produce. Due to the production lag, producers form price expectations and undertake production decisions one time period ahead, based on current and past experience. This model provides explanation of the cyclical supply and demand in which there is a lag between response of producers to a change of price.

Kaldor explained Cobweb model using agricultural markets by observing that when weather conditions are not optimal, quantity supplied of crops or livestock products is quite small resulting to excessive demand or shortage which in turn causes prices to be unusually high. When farmers realise high prices, they plant more or keep more livestock in order to supply more the following year. However, supply is so high the following year that prices decrease to meet consumers demand and farmers decide to lower their supply the following year, resulting in high prices again. This process will go on until equilibrium is reached after a few fluctuations. The Cobweb theory has remained substantially in the form first stated by its originators (Ezekiel, 2012).

The price on current agriculture market can also be explained by the cobweb theory. Prices of agriculture products under conditions of pure competition, over a given limited period of time tend to be determined by the interaction of the supply and demand on that market (Ezekiel, 2012). The law of demand states that, people will buy more of a product at a lower price than at a higher price, if nothing changes. The law of supply states that at higher prices, producers are willing to offer more products for sale than at lower prices. The law of supply and demand results to a competitive market in which there are many buyers and sellers of the same good or service (FAO, 2010). In marketing of agriculture products, the law applies such that when production of a product is low, price is high and based on high prices, many farmers venture into business which leads to over supply causing price to fall resulting to some people giving up and prices go up again and this continues until equilibrium is reached. The report recommends that farmers should take calculated risk by first establish if there is market for the product before committing themselves into the business.

Throughout the theoretical history of entrepreneurship, scholars from multiple disciplines have grappled with a diverse set of interpretations and definitions. Different theories results to a conflicting array of definitions describing entrepreneurship in terms of dynamic change, new combination, exploiting opportunity, innovation, risk, uncertainty, ownership, new venture formation, monopoly formation and superior decision making. Even though certain themes continually resurface throughout the history of entrepreneurship theory, presently there is no single definition of entrepreneurship that is accepted by all economists or that is applicable in every economy (Klerks, 2013).

According to Bwiki (1990), although many economists accept the idea that entrepreneurs are innovators, it is difficult to apply the theory of entrepreneurship to Less Developed Countries (LDCs). This is due to the fact that entrepreneurs in LDCs are not truly innovators but rather, they imitate the products and production processes that have been invented elsewhere in the world.

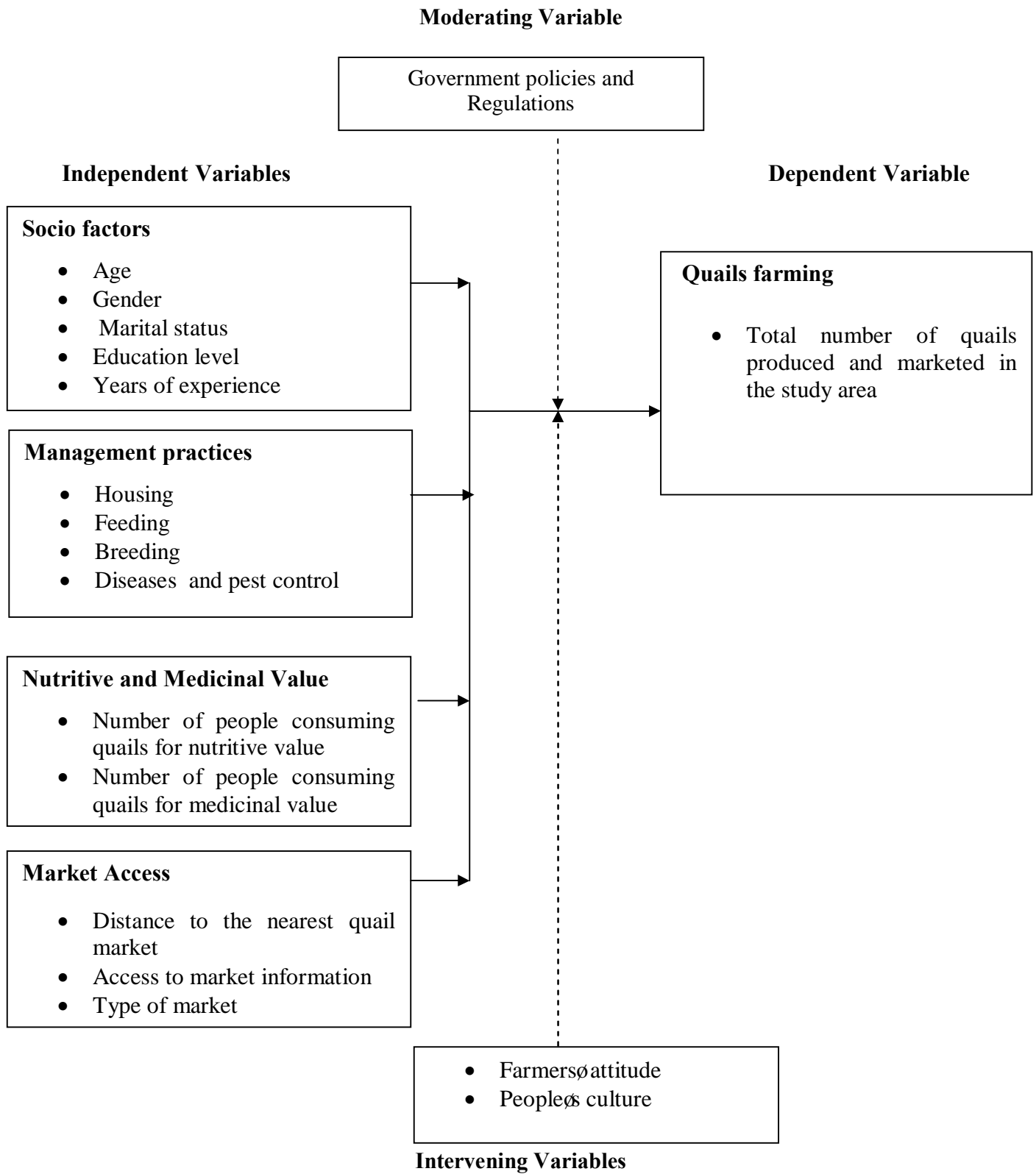
Historically, the agricultural work setting did not include entrepreneurial behaviour. Over the last 50 years, in many western countries, agriculture has become a highly specialized domain focused on efficiency and productivity (Klerks, 2013). In Europe, post-war agricultural modernization was very successful for its original aims, to provide food security. However, this system did not

stimulate diversification and innovative entrepreneurship. Farmers were trained to be craftsmen, producing food and fibres by focusing on doing things better rather than doing new things. Over the last decade, this situation has changed dramatically due to economic liberalization, a reduced protection of agricultural markets, and a fast changing, more critical, society. Agricultural companies increasingly have to adapt changing consumer habits, enhanced environmental regulations, new requirements for product quality, chain management and food safety sustainability. These changes have cleared the way for new entrants of innovation entrepreneurial in farming. It has been recognized that farmers and growers increasingly require entrepreneurship, besides sound management and craftsmanship, to be sustainable in the future. Recent studies show that agricultural entrepreneurship has a profound impact on business growth and survival (Klerks, 2013).

In Kenya, agriculture is dominated by small family farms (GoK, 2010). The family farming culture and associated logic influences agricultural entrepreneurship. Unlike general entrepreneurs, farming families are less driven by ideas of growth and profit maximization. Higher priority is given to survival, preserving family heritage, autonomy, rural lifestyle, and passing through a healthy farm on to the next generation. The presence of other generations in the farm, in combination with a conservative mentality, does not stimulate change and innovative thinking and this hinders agricultural entrepreneurial (Bwiki, 1990).

## **2.5 Conceptual Framework**

The conceptual framework is given in Figure 1



**Figure 1: Conceptual Framework**

## **2.6 Knowledge Gap**

Quail farming involves raising quails commercially for the purpose of profitable egg and meat production. The four factors which are discussed in the literature review and influence quail farming include social factors, management practices, perceived nutritive and medicinal value of quail and access to market. These practices provide multiple benefits to quail farmers as a source of food, income and employment. Therefore quail farming if carried out well provide a solution to various challenges facing the community such as animal protein deficiency and unemployment.

However, there is limited information from the literature reviewed on quail farming since there is lack of proper policies which can encourage and motivate farmers to practice quail farming, there is also inadequate knowledge by both farmers and staff on quail farming. There was no local research which has been done on quail feeds and perceived nutritional and medicinal value of quail eggs. Lastly, there is lack of organised market for those undertaking quail farming.



## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter outlines the research methodology used in the study. The sections included in the chapter are; research design, target population, sampling procedure, data collection method and instruments.

#### **3.2 Research Design**

A descriptive survey was used in this cross sectional study. According to Mugenda and Mugenda (2003), a survey involves collecting data from members of a population with respect to one or more variables. The survey design is well suited to studies in which individuals are used as a unit of analysis in order to measure generalizations (Gall, Gall and Borg, 1999; Bartlett, Kotrlik and Higgins, 2001). The survey design was best suited for this study because the data required for analysis was collected from a large population, in which it was hard to observe the features of each individual. According to Gall (1993), descriptive research involves collecting data in order to answer questions concerning the current status of the subject in the study. The descriptive design was selected in this study because it allowed the researcher to gather numerical and descriptive data to assess the relationship between the variables. This enabled the researcher to produce statistical information on factors influencing quail farming.

#### **3.3 Target Population**

The target population of interest in this research consisted of 300 small scale quail farmers from five wards of Nyeri Central constituency of Nyeri County, who have been licensed by Kenya Wild life Service to engage in quail farming as indicated in the Nyeri County Livestock Production, 2013 Annual Report (Table 3.1). The target population provided information on factors influencing quail farming in the area of study.

**Table 3.1: Quail Farmers in the Five Wards**

<b>Name of the Ward</b>	<b>Number of Quail Farmers</b>
Ruringu	117
Murunguru/Gatitu	93
Kamakwa	52
Majengo/ Rware	20
Kiganjo	18
<b>Total</b>	<b>300</b>

**Note:** This information was obtained in December, 2013

### **3.4 Sample Size and Sampling Procedure**

This section presents the method which was used to determine the study sample size from which data was collected. It also describes the sampling techniques which were used in selecting respondents who were included in the study.

#### **3.4.1 Sample Size**

Kothari (2004) defined a sample size as a sub-set of the total population which is used to give the general view of the target population. The sample size must be a representative of the population on which the researcher wishes to generalize the research findings. According to the Krejcie and Morgan sample size Table (1970), the sample size of this study was 169 members based on the target population of 300 farmers, (Appendix 4). One officer from Wambugu Agriculture Training Centre, one from the Sub county Livestock office, two Frontline Extension Officers and one feed supplier were also included in the study total sample of 174 respondents. Krejcie and Morgan sample size Table is universally accredited and provides a reasonable sample size depending on the size of the population on the study.

### 3.4.2 Sampling Procedure

Sampling is the process of selecting a number of individuals for a study in such a way that the individuals selected represent the large group from which they were selected (Mugenda and Mugenda, 2003). The target population of 300 quail farmers was stratified into 5 wards. A sample size of 169 quail farmers was selected from the target population using stratified proportional random sampling technique in order to ensure that they were evenly spread within the 5 wards (Table 3.2). From each ward, snow ball sampling technique was used till the defined sample size was reached. Snowball sampling technique is where the researcher identifies a small number of individuals who have the required characteristics. These individuals are then used as informants in order to identify others who qualify for inclusion in the sample. Purposive sampling was used to select the following respondents who were included in the study, one Officer from Wambugu Agriculture Training Centre, one Officer from Sub County Livestock office, two Frontline Extension Officers and one feed supplier. The sample was calculated proportionally using a total of 300 quail farmers and quail farmers from each ward as shown in Table 3.2.

**Table 3.2: Sample Size Distribution Table**

<b>Name of the Ward</b>	<b>Number of Quail Farmers</b>	<b>Sample size per ward</b>
Ruringu	117	66
Murunguru/Gatitu	93	52
Kamakwa	52	30
Majengo/ Rware	20	11
Kiganjo	18	10
<b>Total</b>	<b>300</b>	<b>169</b>

### 3.5 Methods of Data Collection

Data collection was done using questionnaire as a research instrument. Creswell (2003) indicated that research instruments are tools which are used in the collection of data on the phenomenon of the study. The questionnaires had structured open ended and closed ended questions. The open ended questions were used to collect qualitative data while the close ended questions were used

to get quantitative data and the respondents were restricted to direct answers without further explanations. The questionnaires were used to get important information about the population. According to Mugenda and Mugenda (2003), each item in the questionnaire should address a specific objective or hypothesis of the study. The questionnaire consisted of four sections each addressing the four study variables. To obtain data from the quail farmers, the researcher distributed questionnaires in different wards at different times and collected them after they had responded. Interview schedule was used to obtain information from the four government officers and the feed supplier. Interview schedule is a set of questions which are asked by the interviewer and filled on the spot in a face to face interaction. This allowed the respondents to freely give their opinions. Data collection was carried out for a period of two weeks and was administered through the help of research assistants who were trained well on the questionnaire in order to ensure familiarity.

### **3.6 Validity of Research Instruments**

Validity is the extent to which an instrument measures what it purports to measure (Kimberlin and Winterstein, 2008). Validity, therefore, has to do with how accurately the data obtained in the study represents the variables of the study. A content validity test was used to measure instrument validity. Content validity according to Kothari (2004) is the extent to which a measuring instrument provides adequate coverage of the topic under study. Content validity ensures that the instruments will cover the subject matter of the study as intended by the researcher. Prior to using the research instrument, the content validity of the instruments was determined by the researcher by discussing the items in the instrument with the supervisor and also with the peer members undertaking the same programme.

### **3.7 Reliability of Research Instruments**

Reliability refers to a measure of the degree to which a research instrument yields consistent results or data after repeated trials (Mugenda and Mugenda, 2003). The researcher used two methods to test reliability.

#### **3.7.1. Pilot study**

A pilot study is a mini-version of a full-scale study or a trial run done in preparation of the complete study (Orodho, 2004). The pilot study involved pre-testing of the instruments in order to determine their reliability. The aim of the pilot study was to test whether the design of

questions was logical and if questions were clear and easily understood. The study also indicated if the stated responses were exhaustive and how long it would take to complete the questionnaire. The pre-test also allowed the researcher to check on whether the collected variables would be processed and analyzed easily. The researcher pilot-tested the instruments by using a different group of quail farmers from the neighbouring ward of Tetu constituency. Using simple random sampling, the researcher selected a sample of 17 farmers who were equivalent to 10% of the study sample size of 169 subjects. According to Mugenda and Mugenda (2003), a sample size of 10% of the study sample is enough for piloting the study Instruments. Necessary corrections and adjustments were made on any questions found to be interpreted differently so that they could have the same meaning to all respondents. Views given by the respondents during pre-testing were analyzed and used to improve the questionnaires before actual data collection in order to increase their reliability.

### **3.7.2 Test retest**

The other method used by the researcher for assessing reliability was test retest. It was done by administering the questionnaires twice to the same group of individuals with similar characteristics as the actual sample size. The test was repeated after two weeks. Scores obtained from both tests were correlated to get the coefficient of reliability. A Spearman's correlation coefficient of 0.7 was found acceptable.

### **3.8 Data Analysis**

Data analysis involved pre-processing of collected data and a careful analysis of the completed questionnaires in order to ensure that collected data was accurate and consistent with other information gathered. The questionnaires were then coded accurately. Coding refers to the process of assigning numbers to subjects' responses (Mugenda and Mugenda, 2003). After the coding, the completed data was classified on the basis of common characteristics and attributes. The organized and well coded data was then analyzed through descriptive statistics which according to Frankel and Wallen (2004) is a technique that enables researchers to meaningfully describe data with numerical indices or in graphical form. . This entailed use of measures of central tendency such as the mean, mode, median and measures of normal distribution. The Statistical Package for Social Sciences was used to aid the statistical analysis of the data. Content

analysis was applied for the qualitative data in order to identify patterns, themes and biases. The data was then presented using percentages, frequency distribution tables and thematically.

### **3.9 Ethical Issues**

The researcher exercised caution while administering the data collection instruments to the respondents in order to ensure that the rights and privacy of the respondent were respected. The researcher obtained consent from the respondents before undertaking data collection from the field. The researcher informed and explained the objectives of the research in order to solicit informed consent from the respondents. To ensure confidentiality, the questionnaires were given numerical codes instead of names and no respondent was forced into the exercise. The study findings were presented without any manipulation of data in favour of the researcher's expectations.

### **3.10 Operationalization of Variables**

The measurement of various variables in the study were undertaken as shown in Table 3.3

**Table 3.3: Operationalization of Variables**

<b>Objective</b>	<b>Variables</b>	<b>Indicators</b>	<b>Measurement scale</b>	<b>Tools of analysis</b>	<b>Type of data analysis</b>
<b>Independent</b>					
To assess how social factors influence quails farming in Nyeri Central Constituency	Social factors	Age	Ratio	Percentage, mean and frequency	Descriptive
		Gender	Nominal		
		Marital status	Nominal		
		Educational Level	Ordinal		
		Years of experience	Ordinal		
To establish how management practices influence quail farming in Nyeri Central Constituency.	Management practices	Housing	Ratio	Percentage, mean and frequency	Descriptive
		Feeding			
		Breeding			
		Diseases/ pests Control			
To evaluate how the perceived nutritive and medicinal value influence quail farming in Nyeri Central Constituency	Nutritive and medicinal Value	Number of people consuming quails for nutritive value	Ratio	Percentage, mean and frequency	Descriptive
		Number of people consuming quails for medicinal Value			

To establish how access to market influence quails farming in Nyeri Central Constituency	Market access	Distance to the nearest quail market Access to market information Type of market	Ratio	Percentage and mean	Descriptive
<b>Dependent</b>					
	Quail farming	Total number of quails produced and marketed in the study area	Ratio	Percentage and mean	Descriptive

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## CHAPTER FOUR DATA ANALYSIS, PRESENTATION AND INTERPRETATION

### 4.1 Introduction

This chapter presents data analysis, presentation and interpretation of findings on the data collected from quail farmers in Nyeri Central Constituency, in Nyeri County, based on factors influencing quail farming in the area.

### 4.2 Questionnaires Return Rate

Out of the 169 questionnaires issued to the quail farmers who are licensed by the Kenya Wildlife Services to undertake quail farming in the study area, 164 were returned giving a 97% response rate which was considered acceptable for the study.

### 4.3 Social factors of respondents

One of the study objectives was to examine how social factors influence quail farming, in order to establish influence of respondents' social factors, the study obtained the respondents' responses on gender, age, marital status, family type, level of education and period one has kept quails.

#### 4.3.1 Composition of respondents by Gender

One of the social factors examined in the study was gender distribution among the quail farmers. The researcher asked the respondents to indicate their gender and the results are presented in Table 4.1.

**Table 4.1: Gender Distribution of the Respondents**

<b>Gender</b>	<b>Frequency</b>	<b>Percentage</b>
Male	95	57.9
Female	69	42.1
<b>TOTAL</b>	<b>164</b>	<b>100</b>

Table 4.1 shows that 57.9% of the 164 respondents were males while only 42.1% were females. This shows that a large number of study respondents who had taken up quail farming were males.

### 4.3.2 Composition of respondents by age

Table 4.2 displays the farmers' participation in quail farming according to their age.

**Table 4.2: Composition of respondents by age**

<b>Age</b>	<b>Frequency</b>	<b>Percentage</b>
20 years and below	2	1.2
21 to 30 years	23	14.1
31 to 40 years	55	33.5
41 to 50 years	43	26.2
51 years and above	41	25.0
<b>TOTAL</b>	<b>164</b>	<b>100</b>

The data in the Table 4.2 shows that majority (33.5%) of quail farmers were of the age bracket of 31 to 40 years followed by those at the age bracket of 41 to 50 years (26.2%). The middle aged were more likely to participate in quail farming. The lowest percentage of respondents were those less than 20 years of age (1.2%) followed by those between 21 to 30 years (14.1). This is an indication that the youth does not engage in quail farming.

### 4.3.3 Distribution of respondents by marital status

Table 4.3 shows the marital status of the respondents who were interviewed in the study.

**Table 4.3: Distribution of respondents by marital status**

<b>Marital Status</b>	<b>Frequency</b>	<b>Percentage</b>
Married	110	67.1
Single	41	25.0
Widowed	8	4.9
Divorced	5	3.0
<b>TOTAL</b>	<b>164</b>	<b>100</b>

Table 4.3 shows that 67.1% of the respondents were married, 25% were single, 4.9 % were widowed while 3.0 % were divorced.

### 4.3.4 Composition of respondents by family type

Table 4.4 shows the family type of the respondents that were interviewed.

**Table 4.4: Distribution of Respondents by family type**

<b>Family Type</b>	<b>Frequency</b>	<b>Percentage</b>
Male headed family	123	75.0
Female headed family	41	25.0
<b>TOTAL</b>	<b>164</b>	<b>100</b>

The findings indicate that the majority (75%) of the respondents were male headed households while 25% were female headed households. This shows that a large number of study respondents who had taken up quail farming were male headed.

#### 4.3.5 Composition of respondents by level of education

Table 4.5 shows the education levels of the respondents interviewed.

**Table 4.5: Composition of respondents by level of education**

Level of Education	Frequency	Percentage
Primary level	17	10.4
Secondary level	78	47.6
Tertiary level	68	41.5
Never attended	1	0.5
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.5 shows the levels of education that quail farmers had attained. The majority of the respondents are literate because those who had attained education up to tertiary level were 41.5%, secondary level were 47.6% while primary level were 10.4%

#### 4.3.6 Composition of respondents by period they had kept quail

Table 4.6 shows the period of which the respondents have kept quails.

**Table 4.6: Composition of respondents by period they had kept quail**

Quail keeping period	Frequency	Percentage
Less than 6 months	55	33.5
6 to 12 months	80	48.8
More than 12 months	29	17.7
<b>Total</b>	<b>164</b>	<b>100</b>

The majority (48.8%) of the respondents have practiced quail farming for 6 to 12 months while 33.5% of the respondent has practiced quail farming for less than 6 months. Only 17.7 % have kept quails for more than 12 months. This could perhaps be due to quails being a new enterprise within the study area.

#### 4.4 Influence of management practices

Management practice is critical in quail farming as it determines its success or failure. The researcher wanted to find out the extent to which management practice influence quail farming. In order to establish influence of management practices to quail farming, the study obtained the respondents responses on housing, feeding, breeding and diseases/ pests control.

##### 4.4.1 Distribution of respondents by the type of housing

Table 4.7 shows the type of quail housing used by the respondents that were interviewed.

**Table 4.7: Type of quail housing**

Type of Housing	Frequency	Percentage
Colony cages	84	51.2
Deep litter	45	27.4
Individual cages	35	21.4
<b>Total</b>	<b>164</b>	<b>100</b>

The major type of quail housing were colony cages (51.2%) followed by deep litter (27.4%) while 21.4% were individual cages. This is an indication that quails are housed well.

##### 4.4.2 Distribution of respondents by the types of feed used

Table 4.8 shows the type of feed used to feed quail by the respondents that were interviewed.

**Table 4.8: Type of feed used**

Type of feed	Frequency	Percentage
Chicken feed	159	97.0
Quail feed	5	3.0
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.8 reveals that 97% of the respondents fed their quails with chicken feed while only 3% use quails feed. This could be due to unavailability of quail feed.

#### 4.4.3 Source of feed

Table 4.9 shows the source of feed used to feed quail by the respondents who were interviewed.

**Table 4.9: Source of feed**

<b>Source of feed</b>	<b>Frequency</b>	<b>Percentage</b>
Animal feeds shop	162	98.8
Home made	2	1.2
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.9 reveals that 98.8% of the respondents source quails feeds from animal feeds shop.

#### 4.4.4 Feed supplement

Table 4.10 shows how the respondents interviewed supplements quail feeding.

**Table 4.10: Feed Supplement**

<b>Supplement</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	61	37.2
No	103	62.8
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.10 shows that majority of the respondents 62.8 % of the quail farmers did not use feed supplements while 37.2 % used feed supplement. The common supplements used were green vegetable, rapeseed, sorghum and millet.

#### 4.4.5 Feed rate

Table 4.11 shows the amount of feed per quail per month respondents interviewed give to their quail.

**Table 4.11: Feed rate**

<b>Feed rate per quail per month</b>	<b>Frequency</b>	<b>Percentage</b>
Below 750 grams	39	23.8
750 grams	80	48.8
Above 750 grams	45	27.4
<b>Total</b>	<b>164</b>	<b>100</b>

From the study finding, 80 (48.8%) of the respondents fed their quails with 750 grams per quail per month while 45 (27.4%) fed their quails with more than 750 grams per quail per month. 39 (23.8%) of the respondent fed their quails with less than 750g per quail per month.

#### 4.4.6 Watering of quails

Table 4.12 shows the how respondents interviewed gave water to their quail.

**Table 4.12: Watering of quails**

<b>Quail Watering</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	164	100.0
<b>Total</b>	<b>164</b>	<b>100</b>

From the study finding, 100% of the respondents gave water to quails.

Further investigation was carried out on the frequency of giving water and the results were presented in Table 4.13.

**Table 4.13: Frequency of watering quails**

	<b>Frequency</b>	<b>Percentage</b>
Continuous	90	54.9
Twice a day	51	31.1
Once a day	23	14.0
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.13 reveals that 54.9 % of the respondents give quails water continuously, 31.1 % give quails water twice per day while 14% gave once per day

#### **4.4.7 Distribution by the source of breeding stock**

Table 4.14 shows the source of breeding stock of quails kept by the respondents that were interviewed.

**Table 4.14: Source of breeding stock**

<b>Source of breeding stock</b>	<b>Frequency</b>	<b>Percentage</b>
Purchase 2 week old chick	121	73.8
Use incubator	40	24.4
Purchase day old chick	2	1.2
Use brooding hen	1	0.6
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.14 shows that majority of the respondents 73.8 % of the quail farmers purchase 2 weeks old chicks while 24.4 % used incubators. Only 0.6 % used brooding hen.



#### 4.4.8 Distribution by the type of quails kept

Table 4.15 shows the type of quails kept by the respondents that were interviewed.

**Table 4.15: Type of quails kept**

Type of quails kept	Frequency	Percentage
Layers	162	98.8
Broilers	2	1.2
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.15 shows that majority of the respondents (98.8 %) kept layers while only 1.2 % kept broilers

#### 4.4.9 Distribution by the type of eggs produced

Table 4.16 shows the type of eggs produced by quails kept by the respondents who were interviewed.

**Table 4.16: Type of eggs produced**

Type of eggs produced	Frequency	Percentage
Fertilized	150	91.5
Unfertilized	9	5.5
Both	5	3.0
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.16 shows that majority of the respondents 91.5 % produced fertilized eggs. This could have been due to production of eggs for breeding purposes in the study area.

#### 4.4.10 Distribution by the type of heating used for brooding

Table 4.17 shows the type of heating used for brooding by the respondents that were interviewed.

**Table 4.17: Type of heating used for brooding**

Type of heating used	Frequency	Percentage
Electricity	117	71.4
Charcoal	44	26.8
No heating (none)	3	1.8
<b>Total</b>	<b>164</b>	<b>100</b>

The percentage of respondents who used electricity for heating was 71.4 % while 26.8 % of the respondents used charcoal.

#### 4.4.11 Distribution by the number of quails kept

Table 4.18 shows the number of quails kept by the respondents that were interviewed.

**Table 4.18: Number of quails kept**

Number of quails kept	Frequency	Percentage
Below 100 quails	40	24.4
100 to 200 quails	74	45.1
200 to 400 quails	34	20.7
Above 400 quails	16	9.8
<b>Total</b>	<b>164</b>	<b>100</b>

The data in the Table 4.18 shows that most respondents (45.1%) kept between 100 and 200 quails. The second highest percentage of respondents (24.4%) kept below 100 quails while the lowest percentage (9.8%) kept more than 400 quails.

#### 4.4.12 Distribution by the current price of eggs

Table 4.19 shows current price of eggs given by the respondents who were interviewed.

**Table 4.19: Current price of eggs**

<b>Price of egg</b>	<b>Frequency</b>	<b>Percentage</b>
Less than shillings 5	34	20.7
shillings 5 to 15	122	74.4
More than shillings 15	8	4.9
<b>Total</b>	<b>164</b>	<b>100</b>

The data in Table 4.19 shows that the highest percentage of respondents 74.4% sold their quails eggs for between shillings 5 and 15 while only 4.9% sold quails eggs for more than shillings 15. This is an indication that the price of quail eggs is low

#### 4.4.13 Distribution by the price two weeks old chick

Table 4.20 shows the price of two weeks old chicks given by the respondents who were interviewed.

**Table 4.20: Price of two weeks old chicks**

<b>Price of 2 weeks old chicks</b>	<b>Frequency</b>	<b>Percentage</b>
Less than shillings 50	113	68.9
shillings 50 to 100	33	20.1
More than shillings 100	18	11.0
<b>Total</b>	<b>164</b>	<b>100</b>

The data in the Table 4.20 shows that the highest percentage of respondents 68.9 % sold or purchased two weeks old chicks for less than shillings 50 while 11% are sold or purchased two weeks old chicks for more than shillings 100 and this is an indication that the price of two weeks old chicks is low.

#### 4.4.14 Distribution by the price of adult quail

Table 4.21 shows the price of adult quail given by the respondents who were interviewed.

**Table 4.21: Price of adult quail**

<b>Price of adult quail</b>	<b>Frequency</b>	<b>Percentage</b>
Less than shillings 200	134	81.7
shillings 200 to 400	28	17.1
More than shillings 400	2	1.2
<b>Total</b>	<b>164</b>	<b>100</b>

The data in the Table 4.21 shows that the highest percentage (81.7 %) of respondents sold adult quails for less than shillings 200 while 1.2 % of the respondents sold adult quails for more than shillings 400 and this is an indication that the price of mature quails is low

#### 4.4.15 Diseases affecting quails

Table 4.22 shows the diseases affecting quails which were given by the respondents.

**Table 4.22: Diseases affecting quails**

<b>Diseases affecting quails</b>	<b>Frequency</b>	<b>Percentage</b>
None	114	69.6
Coccidiosis	34	20.7
Ulcerative enteritis	6	3.7
Quail bronchitis	4	2.4
Eye swelling/infection	3	1.8
Ulcerative	2	1.2
Haemoprotus infection	1	0.6
<b>Total</b>	<b>164</b>	<b>100</b>

Majority (69.6 %) of respondents indicated that there were no diseases affecting quails in their farms. However, 20.7% of the respondents indicated that quails were affected by coccidiosis. This is an indication that there are diseases which affects quails in the area of study.

#### **4.4.16 Parasites affecting quails**

Table 4.23 shows the parasites affecting quails which were given by the respondents.

**Table 4.23: Parasites affecting quails**

<b>Parasites affecting quails</b>	<b>Frequency</b>	<b>Percentage</b>
None	108	64.8
Mites	28	17.1
Worms	10	6.1
Lice	9	5.4
Worms	6	3.6
Fleas	5	3.0
<b>Total</b>	<b>164</b>	<b>100</b>

Majority (64.8 %) of respondents indicated that there were no parasites affecting quails. However, 17.1% of the respondents indicated that quails are affected by mites. This is an indication that there are parasites which affect quails in the area of study.

#### **4.4.17 Personal used for Disease and pest control**

Table 4.24 shows the personnel used by respondents for disease and pest control on quails.

**Table 4.24: Personal used for Disease and pest control**

<b>Disease and pest control</b>	<b>Frequency</b>	<b>Percentage</b>
Self	132	80.5
Veterinary	25	15.2
Animal health assistants	7	4.3
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.24 shows that 80.5% of the respondents control diseases and pests themselves, 15.2% use veterinary officers while only 4.3% uses Animal Health Assistants. Further analysis on methods used for diseases and pest control was undertaken and the findings are as shown in Table 4.25.

**Table 4.25: Disease and pest control methods**

<b>Methods of diseases and pest control</b>	<b>Frequency</b>	<b>Percentage</b>
Cleaning the house	148	90.2
Treatment with drugs	14	8.5
Vaccination	2	1.3
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.25 shows that 148 (90.2%) of the respondents cleaned the quails house in order to control diseases and pests, 14 (8.5%) treat diseases with drugs while only 2 (1.3%) used vaccination. This is an indication that the major method of disease and pest control is hygiene.

#### **4.4.18 Stage in which there is mortality**

Table 4.26 shows the different stages in which the respondent experience mortality of quails.

**Table 4.26: Stages of mortality**

<b>Stage of mortality</b>	<b>Frequency</b>	<b>Percentage</b>
Chick	149	90.9
Growers	12	7.3
Layers	2	1.2
None	1	0.6
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.26 shows that 90.9% of the respondents indicated that the highest mortality is for chicks while 1.2% of respondents indicated that the layers had the lowest mortality rate. Further analysis of the extent of death of quails was undertaken and the findings are given in Table 4.27.

**Table 4.27: Extent of death**

<b>Extent of death</b>	<b>Frequency</b>	<b>Percentage</b>
Less than 25%	150	91.5
25% to 50%	12	7.3
50% to 75%	1	0.6
None	1	0.6
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.27 shows that 91.5 % of quail deaths experienced by the respondents were less than 25% while death rate between 50% and 75% was 0.6%. This indicates that the mortality rate of quails is low in the area of study.

#### **4.4.19 Sources of information on quail farming**

Table 4.28 shows the sources of information on quail farming by the respondents.



**Table 4.28: Sources of information on quail farming**

	<b>Frequency</b>	<b>Percentage</b>
Extension services	12	7.3
Radio	18	11.0
Newspaper	7	4.3
Local meetings	7	4.3
Neighbours	56	34.1
Internet	35	21.3
Phone	29	17.7
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.28 shows that 34.1 % of the quail farmers sourced information on quail farming from neighbours while 21.3 % sourced through internet. From the results of Table 4.28 it is evident that a majority of the quail farmers sourced information either through neighbours or through internet. It is only 4.3% of the quail farmers who sourced information from newspapers or local meeting. The Percentage of quail farmers who sourced information through phone was 17.7%.

#### **4.5 Influence of Perceived Nutritive and Medicinal Value**

Perceived nutritive and medicinal value of quails is the third variable the study examined in attempt to answer the study question on the influence of perceived nutritive and medicinal value on quail farming. The study investigated people consuming quails for their nutritive and medicinal values.

##### **4.5.1 Purpose of quail farming**

Table 4.29 shows the purpose of quail farming given by respondents who were interviewed.

**Table 4.29: Purpose of quail farming**

<b>Purpose for quail farming</b>	<b>Frequency</b>	<b>Percentage</b>
Income generation	147	89.6
Nutritive value	7	4.3
Medicinal value	10	6.1
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.29 shows that majority (89.6%) of the respondents kept quails for income generation while only 4.3 % kept quails for their nutritive value and 6.1 % kept quails for their medicinal values.

#### **4.5.2 Nutritive value of quail eggs**

Table 4.30 shows the distribution of respondent according to what they think about the nutritive value of quail eggs.

**Table 4.30: Nutritive value of quail eggs**

<b>Nutritive value of quails eggs</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	150	91.5
No	14	8.5
<b>Total</b>	<b>164</b>	<b>100</b>

Majority (91.5%) of respondents admitted that quails eggs have nutritive value. It was only 8.5% who indicated that quail eggs have no nutritive value.

#### **4.5.3 Consumption of quail eggs**

Table 4.31 shows the distribution of respondent according to how they consume quail eggs.

**Table 4.31: Consumption of quail eggs**

<b>Consumption</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	37	22.6
No	127	77.4
<b>Total</b>	<b>164</b>	<b>100</b>

Majority (77.4%) of respondents admitted that they did not eat quails eggs while only 22.6 % ate quail eggs.

#### **4.5.4 Diseases cured by quail eggs.**

Table 4.32 shows the distribution of respondents according to diseases the quail eggs are claimed to cure by customers.

**Table 4.32: Diseases cured by quail eggs**

<b>Diseases cured</b>	<b>Frequency</b>	<b>Percentage</b>
Diabetes	30	18.3
Skin conditions	26	15.9
Asthma	23	14.0
Ulcers	20	12.2
Sexual impotence	19	11.6
Anaemia	13	7.9
Heart condition	11	6.7
Cancer	6	3.7
Kidney stone	5	3.0
Others	11	6.7

Table 4.31 shows that 18.3% of the quail farmers heard that the quail eggs could cure diabetes, 15.9 % heard that quails eggs could cure skin condition while 14.0 % said quails eggs could cure asthma. A total of 6.7% said that quails could cure other diseases like arthritis, HIV/AIDS, loss of memory, low immunity and fatigue. It was only 3.0 % of the quail farmers who indicated that they could cure kidney stones. From the results of Table 4.32 it is evident that quails eggs are believed to cure several diseases.

#### 4.5.5 Effectiveness of quail eggs in curing diseases.

Table 4.33 shows the distribution of respondents according to effectiveness of curing diseases they have heard quail eggs cure.

**Table 4.33: Effectiveness of quail eggs in curing diseases**

<b>Effectiveness of curing of quail eggs</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	115	70.1
No	11	6.7
Don't know	38	23.2
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.33 shows that majority (70.1%) of the respondents believed that quail eggs are effective in curing diseases while only 6.7 % did not believe that they cure diseases. Another 23.2 % did not know if quail eggs cure diseases.

#### 4.6 Influence of access to market

The accessibility of markets by quail farmers is critical to ensure the sustainability of this enterprise. The study investigated on marketing challenges, types of market and market organization.

#### 4.6.1 Marketing challenges

Table 4.34 shows how the respondents ranked different marketing challenges

**Table 4.34: Ranking of marketing challenges**

Marketing Challenges	Ranking					
	Very serious	%	Serious	%	Not serious	%
Long distance to the market	51	<b>31.1</b>	28	<b>17.1</b>	85	<b>51.8</b>
Unreliability of the market	109	<b>66.5</b>	37	<b>22.5</b>	18	<b>11</b>
Lack of market information	96	<b>58.5</b>	36	<b>22</b>	32	<b>19.5</b>
Low Prices	83	<b>50.6</b>	65	<b>39.6</b>	16	<b>9.8</b>
Presence of brokers	68	<b>41.5</b>	15	<b>9.1</b>	81	<b>49.4</b>
Low volume	18	<b>11</b>	39	<b>23.8</b>	107	<b>65.2</b>

According to the data analyzed in Table 4.34 reliability of market was ranked as the most serious challenge to marketing of quails with 66.5 % while lack of market information was ranked second with 58.5%. Low volume was ranked as the least serious challenge with 65.2% and long distance to market with 51.8 %.

#### 4.6.2 Duration of keeping eggs

Table 4.35 shows the period which the respondents kept eggs before selling.

**Table 4.35: Duration of keeping eggs**

<b>Duration of keeping eggs</b>	<b>Frequency</b>	<b>Percentage</b>
Less than 7 days	61	37.2
7 to 14 days	85	51.8
More than 14 days	18	11.0
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.35 shows that 51.8 % of the respondents kept eggs for 7 to 14 days, 37.2 % for less than 7 days while 11% kept quail eggs for more than 14 days.

#### **4.6.3 Types of marketing organization**

Table 4.36 shows the types of marketing organization assisting the respondents in marketing of quails eggs.

**Table 4.36: Marketing organization**

<b>Marketing organization</b>	<b>Frequency</b>	<b>Percentage</b>
Marketing associations	7	4.3
None	156	95.1
Self-help group	1	0.6
<b>Total</b>	<b>164</b>	<b>100</b>

From the study finding, 95.1 % of the respondents interviewed were not assisted by any organization in marketing quails and their products while only 4.3 % were assisted by marketing associations. Further investigation was carried out on the kind of assistance offered and the results are presented in Table 4.37.

**Table 4.37: Kind of assistance offered**

<b>Kind of assistance offered</b>	<b>Frequency</b>	<b>Percentage</b>
None	159	97.0
Marketing services	5	3.0
<b>Total</b>	<b>164</b>	<b>100</b>

From the study finding, 97% of the respondents interviewed were not offered any assistance by any organization in marketing quails and their products while only 3 % were offered marketing services.

#### **4.6.4 Marketing of eggs**

Table 4.38 shows where the respondents sold their eggs.

**Table 4.38: Marketing of eggs**

<b>Where eggs were sold</b>	<b>Frequency</b>	<b>Percentage</b>
Brooders	109	66.6
Brokers	35	21.3
Individual customers	13	7.9
Supermarkets	4	2.4
Hotels	3	1.8
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.38 shows that majority (66.6 %) of the respondents sold their eggs to brooders followed by brokers at 21.3 %. The least place where respondents sold their eggs was hotels at 1.8% and supermarket at 2.4 %. The respondents gave the two main ways of improving market access as formation of marketing groups and increasing awareness of health benefits of quails

#### 4.6.5 Importance of Sustainability of quail farming

Table 4.39 shows the respondents' opinion on sustainability of quail farming

**Table 4.39: Sustainability of quail farming**

Sustainability of quail farming	Frequency	Percentage
Yes	139	84.8
No	25	15.2
<b>Total</b>	<b>164</b>	<b>100</b>

From the study findings, 84.8 % of the respondents interviewed were for the opinion that sustainability of quail farming was important while only 15.2% were for the opinion sustainability of quails farming is not important. The respondents gave the main reasons for sustainable quail farming as because it is a source of income and for its medicinal and nutritive value.

#### 4.6.6 Profit from quail farming

Table 4.40 shows the respondents' profit made from quail farming

**Table 4.40: Profit making from quail farming**

	Frequency	Percentage
Yes	118	72.0
No	46	28.0
<b>Total</b>	<b>164</b>	<b>100</b>

From the study finding, 72% of the respondents interviewed made profit from quail farming while 28% did not make profit. Further investigation was carried out to rate the profit made and the results are presented in Table 4.41.



**Table 4.41: Profit rating**

<b>Profit rating</b>	<b>Frequency</b>	<b>Percentage</b>
Very good	28	17.1
Good	58	35.4
Medium	69	42.1
Poor	9	5.4
<b>Total</b>	<b>164</b>	<b>100</b>

Table 4.41 shows that majority (42.1%) of the respondents made medium profit followed by good at 35.4 %. Those who made poor profit were 5.4%.

## CHAPTER FIVE

### SUMMARY OF FINDINGS, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents summary of the findings, discussion, conclusions and recommendations following the objectives of the study. The study examined the effect of social factors, management practices, perceived nutritive and medicinal value and access to market factors which influence quail farming.

#### 5.2 Summary of the findings

The main findings are based on the results of data analysis following objectives of the study. The findings on how social factors influencing quail farming in Nyeri Central Constituency include: The majority (57.9%) of the respondents were males. The majority (33.5 %) of the respondents' ages lie in the age bracket of 31 to 40 years and this show that the majority of the respondents are middle aged. The study shows a total of 15.3% of those who engaged in quail farming were below 30 years old and this is an indication that very few youth engage themselves with quail farming. Majority (67.1%) of the respondents were married and 75 % of the respondents were male headed households. The education level of the respondents was found to be high because those with secondary and tertiary education comprised 96.4% of the total population interviewed. Majority of the respondents practiced quail farming for a very short time because those who kept quails for less than 12 months comprised of 82.3% of the 164 population interviewed.

The findings on how management practices influence quail farming showed that majority (51.2%) of quail housing are colony cages followed by deep litter. Majority (97%) of the respondents feed their quails with chicken feed which is sourced mostly from animal feed shops. Majority (48.8%) of the respondents fed their quails with 750 grams per quail per month and 100% of the respondents provided water to quails. Majority (73.8 %) of the respondents purchased 2 weeks old chicks and majority (98.8 %) of the respondents kept quails for their fertilized eggs. Majority (77.1 %) of the respondents used electricity for brooding their quails. Majority (45.1%) of the respondents kept between 100 and 200 quails. Majority (74.4%) of respondents sold or bought eggs between shillings 5 and 15. Majority (68.9 %) of the

respondents sold or purchased two weeks old chicks for less than shillings 50, while majority (81.7%) of the respondents gave the price of adult quails to be less than shillings 200.

The majority (69.6 %) of respondents indicated they had not experienced quail diseases in their farms while 64.8% of the respondents indicated that they had not experienced quail pests. Most (80.5%) of the respondents control quails diseases and pests themselves and majority (90.2%) of the respondents cleaned the quail houses to control diseases and pests. Majority (90.9 %) of the respondents indicated that the highest mortality is for chicks and most (91.5 %) of the respondents have experienced quail deaths of less than 25%.The most common source of information on quail farming was from neighbours (34.1%) followed by internet (21.3%).

The findings on how the perceived nutritive and medicinal value influence quail farming showed that majority (89.6%) of the respondents kept quails for income generation. Majority (77.4%) of the respondents did not eat quail eggs. Majority of the respondents have heard the quail could cure various diseases and most of them (70.1%) believed that quail eggs are effective in curing those diseases.

The finding on how access to market influence quail farming include: Unreliability of market was ranked as the most serious challenge to marketing of quails with 66.5 % while lack of market information was ranked second with 58.5%. Majority (89%) of the respondents of the total population interviewed kept eggs for less than 14 days before selling. Majority (95.1 %) of the respondents interviewed were not assisted by any organization in marketing quails and their products. Majority (66.6%) of the respondents sold their eggs to brooders. Majority (84.8%) of the respondents interviewed were for the opinion that sustainability of quail farming is important. Majority (77.5%) of the respondents interviewed made good to medium profit from quail farming and those who made poor profit were 5.4%

### **5.3 Discussion of findings**

This section gives a detailed discussion of findings from the study.

#### **5.3.1 The influence of Social factors on quail farming in Nyeri Central constituency**

The male respondents practicing quail farming were 57.9 % and this shows that most of the respondents who practiced quail farming are males. Majority of the respondents were middle aged and were 31 and 50 years and they were well educated and majority had attained secondary and tertiary education. Most respondents had practiced quail farming for less than 12 months.

The study agrees with Njuki and Waithanji (2012), who reported that though women traditionally play an important role in poultry farming and are often in control of the whole process from feeding to marketing, the tradition domain of women in poultry keeping is undergoing a shift in roles and attitudes as men become aware of its economic value. When the rearing of small animals becomes a more important source of family income, ownership, management and control are often turned over to the man. The low participation of women in quail farming could also be due to women poor access to markets, services, technologies, information, and credit resulting to their inability to improve productivity and benefit from a growing quail sector

### **5.3.2 The Influence of management practices to quail farming in Nyeri Central Constituency**

Quails are well housed either in colony cages or deep litter system. Majority (97%) of the respondents feed their quails with chicken feed which is sourced mostly from animal feed shops. This could be attributed to unavailability of quail feeds in the animal feed shops. Majority (62.8%) of the respondents did not use feed supplements. This could be attributed to lack of knowledge of availability and use of supplements. The respondents gave the recommended amount of feed or more and they all gave water to the quails. Majority of the respondents indicated that there were no major diseases and pests affecting quails and mostly, the respondents dealt with diseases and pests by disease prevention, control and sanitary management practices.

According to MOLD (2012), availability of high quality quail feeds is a pre-requisite for improved quail production and productivity of quails. A report by GoK (2008) revealed that though Kenya Bureau of Standards (KEBS) has set standards on feeds for most livestock species, the standardization of feeds for some categories of animals as quails is not set. Chibe (2009) maintained that the commercial chicken feed have lower Crude protein than quails feed thus the importance for supplementing. A report from Wambugu ATC indicates that most farmers do not supplement the quail feed to enhance the crude protein. Lack of appropriate quails feed can affect the growth and production of quails. Wambugu ATC annual report (2013) indicates that most farmers in Nyeri County achieve egg production of 200 eggs per year instead of the

expected 280-300 eggs per year. Darwish (2003) stated that very little research has been done on quail feeds and quails farmers have to rely mainly on manufacturers' advice on quail feeding.

The study findings agree with MOLD (2012) report that diseases affecting quails are fewer than those affecting other poultry birds and the common quail diseases are caused by organisms which the birds pick from the ground, contaminated feeds or water. Dozier, et al (2010) reported that no medications are approved for quail and there are no disease preventive vaccines. According to a document report by Wambugu ATC (2013), there are no quail vaccines and medication in the market and therefore, good management practices are vitally important in preventing and controlling quail diseases and pests. Walker and Smith (2013) stated that there is limited research specific to quail disease problems which have been done and so treatment of specific diseases has been experimental.

### **5.3.3 Influence of perceived nutritive and medicinal value on quail farming in Nyeri Central constituency**

Majority (89.6 %) of the respondents kept quails for income generation rather than for their nutritive or medicinal values though they were aware of their nutritive and medicinal values. This can perhaps be due to the fact that most quail farmers took quail farming as a form of business. Only a small percentage (22.6 %) ate quail eggs. This could be due to negative attitude towards consumption of quail since traditionally, quails are perceived as children's pet and as such only children especially boys could eat them.

Williams (2013) revealed that the demand for quail eggs was high in leading restaurants and supermarket which is a very limited market. Though most respondents had access to quail eggs, there was a problem in consumption of quail eggs. Majority (89.6 %) of the respondents kept quails for income generation and sold their eggs mostly to brooders but not to consumers. Kamba (2012), observed that in Kenya, no scientific research on quail nutritive and medicinal value has been carried out and claims on medical benefits of quails are not backed by local studies and scientific data.

### **5.3.4 Influence of market accessibility to quail farming in Nyeri Central constituency**

According to this study the quail farmers experienced different types of challenges when marketing their quails and quail eggs with unreliable market taking 66.5%. This is attributed to lack of feasibility study on quail market and also lack of local consumption. Lack of market

information was the second serious challenge. This is likely due to the fact that the respondents got information of quail farming from neighbours and internet and 95.1% of the respondents had no organization to assist them in marketing their eggs and majority sold their eggs to brooders. The respondents gave the two main ways to improve market access as formation of marketing groups and increasing awareness of health benefits of quails.

The study agrees with Arthur (2013) who reported that Individual producers have to find their own market. The core market for quail and egg products currently rests in the stable, frequent purchaser who purchases primarily for regular meals and controls access to market. These limited options mean that producers do not have market power and essentially must take the price offered by the consumers. A report by ARDS (2012) state that inefficient market information system creates market distortions which eventually tend to make business expensive to both the producers and consumers. The structure of the quail egg industry can be described as comparatively loose with respect to marketing the products because of lack of organized systems. The weaknesses of the industry is that there is little known about the markets for quail. The distribution system of quails products and by-products is poorly developed in the country.

#### **5.4 Conclusions**

The following conclusions were made from the findings of this study.

The study shows that there is a need to promote development of quail farming and to factor in the special needs of women when government policies on social activities are being crafted in order to realize the full potential of women contribution in the quail farming. Women poor access to markets, services, technologies, information, and credit are likely to slow down quail farming.

The study also shows that the use of chicken feeds due to lack of quail feeds results in low production and productivity of quails. There is a need to have feeds specifically formulated for quails with the right crude protein requirements for quails. The fact that most of the quail farmers sources information of quail farming from neighbours indicates that though poultry farmers have diversified to quail farming, both farmers and Department of Livestock staff are not equipped with necessary knowledge and husbandry techniques to handle quails.

The study indicates that although most quail farmers are aware of the perceived nutritive and medicinal value of quail eggs, few quail farmer consumed the quail eggs for nutritive and medicinal value. This could be attributed to the fact that traditionally, quails were considered as pets for children and only children especially boys ate quails and the farmers still maintain that attitude. Low consumption of quail eggs reduces the sustainability of quail farming since most farmers practicing quail farming are mostly for income generation not for consumption.

Lastly, the development of quail farming can be affected by poor market accessibility of quail and its products. The existence of unreliable quail market, lack of market information and lack of organized marketing associations is also a great hindrance to the development quail farming. Quail farming is based on primary production. Value addition of quails and their products could enhance marketing for quails.

### **5.5 Recommendations**

Based on the findings of the study, the following recommendations were made in order to promote quail farming:

It's recommended that more government policies on poultry farming should be developed in order to overcome the numerous challenges faced by women such as poor access to services and information and lack of collateral security.

Secondly, the Kenya Bureau of Standards should ensure standardization of quail feeds so that feed manufacturers can have formula for quail feeds and enhance availability of quail feeds. The Department of Livestock production should ensure that their staffs are well trained on quail farming so that they can be in a position to offer technical advice to quail farmers

The Directorate of Livestock Production should provide more information on the nutritive and medicinal value of quail eggs in order to promote local consumption of quail eggs in the community so as to have an attitude change from the traditional belief that quails should be consumed by children.

Lastly, the government should promote the formation of marketing associations in order to assist quail farmers to get market for their products

## **5.6 Suggestions for Further Research**

The following areas are suggested for further studies:

- i. Appropriate quail feeds should be formulated.
- ii. An investigation into perceived nutritive and medicinal value of quail eggs in the country should be conducted.
- iii. A research on factors which influence sustainable quail farming in the county should be conducted.



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## APPENDICES

### Appendix 1: Letter of transmittal

Lucy Muthoni Chege,  
P.O Box 2316-10100,  
Nyeri

Phone: 0723317435

Email: lucchege@yahoo.com

Dear Respondent,

I am a student in the Nairobi University and I am undertaking a research project entitled: "Factors Influencing Quail Farming in Nyeri Central constituency, Nyeri County, Kenya" in fulfilment of the requirements of the award of a Masters of Arts degree in Project Planning and Management.

This is a request for your participation in the study by responding to the attached questionnaire. I wish to assure you that any personal information given will be treated with utmost confidentiality and will be used only for the purpose of this study.

Your willingness to answer all the questions comprehensively and to the best of your knowledge will be highly appreciated.

Thank you for your co-operation.

Yours faithfully,

Lucy Muthoni Chege  
L50/60193/2013

## Appendix 2: Questionnaires for quail farmers

### Instructions

Please tick in the appropriate box and also fill in the blank spaces provided for those questions where elaborate answers are required. You are requested to complete this questionnaire as honestly and objectively as possible. Use the space at the back of this questionnaire if you need more space for your responses.

### Section (A): Social Factors

Please put a tick where appropriate.

1. What is your gender? (i) Male [ ] (ii) Female [ ]
2. What is your age bracket in years? (i) 20 and below [ ] (ii) 21 -30 [ ]  
(iii) 31 -40 [ ] (iv) 41 -50 [ ]  
(v) 51 and above [ ]
3. What is your marital status? (i) Single [ ] (ii) Married [ ]  
(iii) Widower [ ] (iv) Divorced [ ]
4. What is the type of your family? (i) Female headed [ ] (ii) Male headed [ ]  
(iii) Child-headed [ ]
5. What is the level of your education? (i) Primary level [ ] (ii) Secondary level [ ]  
(iii) Tertiary [ ] (iv) Non Formal [ ]  
(v) Have never attended any school [ ]
6. What period have you been keeping quails in months? (i) Less than 6 [ ]  
(ii) 6-12 [ ] (iii) More than 12 [ ]

### Section (B): Management Practices

7. What type of quail house do you have? (i) Deep litter [ ]  
(ii) Colony cages [ ] (iii) Individual cages [ ]
8. What type of feed do you give to your quails? (i) Chicken feed [ ] (ii) quail feed [ ]  
(iii) Others Specifyí ..í í í í í í í .
9. Where do you get your feeds? (i) Animal feed shop [ ] (ii) Homemade [ ]  
(iii) Others Specifyí í í í í í í ..
10. Do you supplement your feed? (i) Yes [ ] (ii) No [ ]
11. If yes in 10 above, with what? .....

12. How much feed do you give to each quail per months?  
 (i) Below 750gms [ ]      (ii) 750gms [ ]      (iii) Above 750gms [ ]
13. Do you give water to your quails?      (i) Yes [ ]      (ii) No [ ]
14. How often do you give water? (i) Once a day      (ii) Twice a day  
 (iii) Continuously
15. What type of heating do you use for chicks?  
 (i) Electricity [ ]      (ii) Charcoal [ ]      (iii) Others, specifyí í í
16. How many quails do you normally keep? (i) Below 100 [ ]      (ii) 100-200 [ ]  
 (iii) 200-400 [ ]      (iv) Above 400[ ]
17. What is the current price in shillings of?  
 (i) Egg- less than 5 [ ]    5-15 [ ]    more than 15 [ ]  
 (ii) 2 weeks old chick - less than 50 [ ]    50-100 [ ]    more than 100 [ ]  
 (iii)Adult Quail - less than 200 [ ]    200-400[ ]    more than 500 [ ]
18. How do you get your breeding stock? (i) Using brooding hen [ ]  
 (ii)Purchase day old chicks [ ]    (iii) using incubator [ ]    (iv) Purchase 2 week old[ ]
19. Which type of quail do you keep? (i) Layers [ ]      (ii) Broiler [ ]
20. If layers in 19 above, for what type of eggs do you keep your quails?  
 (i) Fertilized [ ]      (ii) Unfertilized [ ]
21. Which of the following diseases affects your quails?      (i)Quail bronchitis [ ]  
 (ii) Haemoprotus infection [ ]      (iii) Ulcerative enteritis [ ]  
 (iv) Coccisidiosis [ ]      (iv) Others, specifyí í í í .    (vi) None [ ]
22. Which of the following parasites affects your quails?      (i) Worms [ ]  
 (ii) Lice [ ]    (iii) Mite [ ]    (iv) fleas [ ]    (v) Others, specifyí í    (vi)None [ ]
23. Who treat the diseases and pests?    (i)Veterinary [ ]  
 (ii) Animal health assistance [ ]      (iii) Self [ ]
24. At which stage do you observe mortality or death of quails?  
 (i) Chicks [ ]      (ii)Growers [ ]      (iii) Layers [ ]
25. How many quails died? (i) less than 25% [ ]      (ii)25-50% [ ]  
 (iii)51-75% [ ]      (iv) more than 75% [ ]

26. Which disease control method do you use?

- (i) Vaccination [ ]      (ii) Treatment with drugs [ ]      (iii) Cleaning the house [ ]

27. How do you get information on quail farming?

- (i) Extension services [ ]      (ii) Radio [ ]      (iii) Newspaper [ ]  
 (iv) Local meetings [ ]      (v) Neighbours [ ]  
 (vi) Internet [ ]      (vii) Phone [ ]

**Section (C): Perceived Nutritive and Medicinal Value**

28. Which is your purpose of quail farming?

- (i) Income generation [ ]      (ii) Nutritive value [ ]      (iii) Medicinal value [ ]  
 (iv) Others (specify) í í í í í í í í í í í í í í í í í í .

29. a) According to you, do quails eggs have nutritive value? (i) Yes [ ]      (ii) No [ ]

29 b) Do you eat quails eggs? (i) Yes [ ]      (ii) No [ ]

30. According to you, which of the following diseases have you heard that quail eggs cure?

Disease	Tick appropriately
Ulcers	
Asthma	
Kidney stones	
Skin condition	
Anaemia	
Sexual impotency	
Cancer	
Heart condition	
Diabetes	
Others, specify	

31. According to you, are quail eggs effective in curing these diseases?

- (i) Yes [ ]      (ii) No [ ]      (iii) Don't know [ ]

**Section (D): Market Access**

32. How would you rate the challenges you experienced when marketing your quails?

Please indicate with a tick the scale of those challenges as very serious, serious and not serious according to the Table below.

Challenge	Very Serious	Serious	Not serious
Long distance to the market			
Reliability of the market			
Lack of market information			
Low Prices			
Presence of brokers			
Low volume			
Others			

33. How long do you keep quails eggs before selling?

(i) Less than 7 days [ ] (ii) 7-14 days [ ] (iii) more than 14 days [ ]

34. What types of organizations have been assisting you to market quails and their product? (i)Government[ ] (ii) Marketing Association [ ]

(iii) NGO [ ] (iv) None [ ] (v) Others specifyí í í .

35. What kinds of assistance do organizations in 34 above offers? (i) Extension services [ ]

(ii) Marketing Services [ ] (iii) None [ ] (iv) Others specifyí í í

36. Where do you sell your eggs? (allow multiple)

(i) Individuals consumers [ ] (ii) Hotels [ ] (ii) Supermarkets [ ]

(iii) Brokers [ ] (iv) Brooders [ ]

37. According to you which two ways can market access for quails be improved?

.....í í í í í í í í í í í .

í .

38. Do you think sustainability of quail farming is important? Yes [ ] No [ ]

39. If yes why? í í í í í í í í í í í í í í

40. Do you make profit from your quail farming? Yes [ ] No [ ]

41. If yes how do you rate your profit margin?

(i) Very Good [ ] (ii) Good [ ]

(iii)Medium [ ] (iv) Poor [ ]

### **Appendix 3: In depth interview guide for the Livestock Government officers and feed supplier**

Please tell me your name, designation and the organization you work for.

#### **Social factors**

1. How many quail farmers do you have in your area?
2. According to you, what are the main benefits of quail farming?
3. Have your ministry trained farmers on quail farming?
4. In your own opinion is it economic to undertake quail farming?

#### **Management Practices**

5. In your own opinion do farmers have the appropriate housing for quails?
6. Which types of feeds do the farmers use to feed quails?
7. In your own opinion do farmers have access to the appropriate feeds for quails?
8. According to you, are farmers using the appropriate breeds for quails?
9. Which are the common diseases and pests affecting quails?
10. What measures do you think should be taken to ensure proper management of quails and disease control?

#### **Nutritive and medicinal value**

11. According to you why have farmers taken up quail farming?
12. Do you think that quails have nutritive and medicinal value?

#### **Market access**

13. According to you is there a ready market for quails?
14. In your own opinion do farmers have access to quail market information?
15. What measure do you think should be taken to ensure sustainability in quail farming?

**Appendix 4: Krejcie and Morgan sample size Table**

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

**Source:** Krejcie and Morgan, 1970

**Note:** N= population, S= sample size

**Appendix 5: Photographs of quail, its eggs and houses.**



A mature male quail



mature male and female quail



Quail Egg as compared to a chicken egg and duck egg



Quail eggs



Colony cage housing of quails



Dip litter housing of quails