

Animal Health

Journal
(AHJ)



CARI
Journals

Factors influencing Quail Farming: A critical literature review

By

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Abstract

Purpose: This paper aims at generating resourceful information for stakeholders, that is, the department of livestock and Non- Governmental Organizations to implement policies which will promote quail farming as a viable source of protein and income.

Methodology: The paper used a desk study review methodology where relevant empirical literature was reviewed to identify main themes and to extract knowledge gaps.

Findings: 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. 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.

Recommendations: The study 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 and that, the government should promote the formation of marketing associations in order to assist quail farmers to get market for their products.

Key words: *Brooding, hatchery, bio security, market poultry, quail farming, quail management, poultry production*

1.0 INTRODUCTION

1.1 Background of 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). 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, 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 (Lightner, J. K. 2020). 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 Worlds' 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 (Shalome, G. O, 2021). 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 recent study conducted 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 (Umar, A. U et al 2018). 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.

1.2 Statement of the Problem

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. According to the MOLP Annual Report (2013) the numbers of poultry farmers rearing chickens (indigenous, broilers and layers) are 39,250 farmers while only 300 farmers are keeping quails. Quail production 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 order to improve production and income of farmers.

1.3 Objectives of the Study

This study will be guided by the following objectives:

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

1.4 Justification 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 endeavor 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. Programs 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

2.0 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 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.

2.2.1 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 Program (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 labor 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 Hussain, A., Asif (2020), 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, 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 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).

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 (WHO 2018). 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 exception; the Namibian women have more control over the poultry they produce and market.

In general, women, men, boys, and girls provide labor 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 labor 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 (Jones-Rogers, S. E. 2019). 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 labor and responsibilities in animal production remaining under recognized and underappreciated by those designing and implementing livestock policies and plans (IFAD). 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 (Jones-Rogers, S. E. 2019)

As keepers of local knowledge, women and men contribute to the enhancement of gene flow and domestic animal diversity (FAO). 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).

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 (Okolo-Obasi, E. N. et al 2019). 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.

2.2.2 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) (Akarikiya, S. A. 2021). (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 cm² per bird on floor pens and 125 cm² 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), behavior tests have shown that domesticated quail do not change that behavior 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 (Rayan, G. N. et al 2021). 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, and fishmeal and soybean meal.

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 (Shalome, G. O 2021). 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 live is one year two months but their life expectancy is 2 to 2½ years (Alnour, A. 2020).

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 (Alnour, A. 2020). 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 (Vinnerås, B. et al 2018).

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 bird's 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 (Vinnerås, B. et al 2018). 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. 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.

2.2.3 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. 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 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 B1 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 favorably to chicken eggs in some nutrient values.

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. 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 anemia by promoting hemoglobin (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 (Khose, K. K. et al 2019). 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. Nigeria is among the least consumer of animal protein in the world (Aminu, F. O et al 2020). The problem of malnutrition in Nigeria is attributable to low consumption of meat. 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 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.

2.2.4 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.

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 labor 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 (Kristiawan, M., & Wardiah, D. 2019).

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.

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.

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).

2.3 Empirical review

Onayngo (2018), conducted a study on the genetics and immunity of indigenous chicken in Kenya. This study was undertaken to contribute to improved productivity of indigenous chicken (IC) of Kenya through sustainable breeding for disease tolerance and enhanced immunity by searching for appropriate probiotics. Blood was drawn from the wing vein of IC and plasma separated. Natural antibodies (IgM, IgA, IgG) titer values binding KLH were determined by indirect ELISA. One way ANOVA and Mixed model analyses were used to determine sources of Nab titer variation and estimate repeatability parameter. The IC genetic diversity and population structure was achieved by DNA extraction from blood and genotyping using the MHC linked LEI0258 marker and sequencing of subset of representative alleles. Polymorphism and population genetic parameters were determined using bioinformatics tools. Effect of commercial probiotics on IgM titer values was done by comparing treatment and control means using one factor ANOVA. Metagenomics employed usage of DNA from fecal samples and next generation sequencing. Qiime pipeline was used to call operational taxonomic units (OTU) and for alpha and beta diversity analysis of microbial composition. The microbiome abundance between immune competency levels was compared using one factor ANOVA. The results of the study showed the presence and variation of Nabs amongst the IC. The variance estimate for chicken components were high and significant for IgM ($p=0.003$), IgG ($p=0.0001$) and IgA ($p=0.0001$). The repeatability of the ELISA assay to Nabs was high in all the immunoglobulin isotypes. Repeatability was 0.68, 0.99 and 0.99 for IgM, IgG and IgA respectively. The LEI0258 locus showed high diversity and presence of four gene pools among the IC. The locus observed high diversity as revealed by the average Shannon's information index of 2.768. The mean overall observed heterozygosity and Polymorphic information Content (PIC) was 0.844 and 0.932 respectively for the total population sampled. The

central population had the highest observed heterozygosity (0.878) while coastal had the lowest (0.792). Use of commercial probiotic did not have significant effect on IgM titer values of IC. The metagenomics revealed extensive microbial diversity. Candidate bacterial species differed significantly for immune response level.

Macharia (2018), conducted a study on the phenotypic characterization and functional polymorphisms at prolactin and VIPR1 genes in emerging poultry species from Western Kenya. The aim of this study was to characterize the phenotypic traits of emerging poultry species from Western Kenya and to evaluate functional polymorphisms in Prolactin and Vasoactive Intestinal Peptide receptor 1 (VIPR1) candidate genes for egg production in these species. A cross sectional study design was employed with 214 poultry being sampled. R Core statistical package was used to investigate the relationship between sex and the morphometric measurements. The results of the showed that sexual dimorphism in favor of males was evident in ducks, geese, pigeons and turkey. The opposite was true for the wild quails where the females had higher body weights and longer shanks compared to the males. A total of 105 poultry were used for the molecular work, with 20-32 poultry per species. Prolactin and Vasoactive Intestinal Peptide Receptor 1 genes were amplified via PCR and the amplicons sequenced. The pigeon prolactin sequences clustered into four haplotypes while the quail VIPR1 sequences formed eight haplotypes. The prolactin and VIPR1 sequences for the other poultry species were all found to be monomorphic. Analysis of molecular variance (AMOVA) revealed variation among individuals to be 66.41% while within individuals to be 33.59% in the pigeons. In the wild quails variation amongst individuals variation was 88.41% while within individuals was 11.59%.

Ng'ang'a (2014), conducted a study on factors influencing implementation of poultry farming enterprises for economic empowerment of local communities in Mombasa county, Kenya. The target population of study comprised of 588 poultry farmers and 41 livestock officers. The study focused more on commercial poultry farmers who keep chicken for either eggs (layers) or meat Broilers .The researcher selected a sample of 70 farmers and 10 livestock officers. A descriptive survey method was used in this study due to its reliability and ability to produce statistical information that could be analyzed. Data was collected from commercial poultry farmers and livestock officers while interview was done to key informants in the viability and reliability of questionnaires administered. The hypothesis were tested to determine the relationship between independent and dependent variables using Pearson chi-square at 95% level of confidence .The relationship between technology and skills, marketing factors, production costs, land and infrastructure and implementation of poultry farming enterprises for economic empowerment of local communities in Mombasa county was tested. The results of the study showed that technological skills, marketing factors, production costs and land& infrastructure influence implementation of poultry farming enterprises for economic empowerment of local communities in Mombasa County, Kenya.

Ogali (2020), conducted a study on molecular diversity and risk factors of Avian Paramyxovirus in domestic poultry in Kenya. A cross-sectional study of 225 poultry farms and 21 live bird markets was conducted in five regions in Kenya. The study used the large polymerase protein (L) and Fusion (F) gene fragments as well as the whole genome to characterize the genetic diversity of APMV and multivariate regression to analyze the association between APMV occurrence and.

management/trade factors. Based on this evaluation, the virus was significantly higher in poultry farms which introduced 'new' birds from markets or neighbors, kept mixed poultry species or those with chicken flock size (>30). Live bird markets located in cities or major towns and traders who purchased their stock from multiple sources also had significantly higher APMV infection. The average mean haplotype diversity L and F gene was 0.759 (± 0.02) and 0.906 (± 0.03) respectively. The average mean nucleotide diversity L and F gene was 0.018 (± 0.001) and 0.021 (± 0.001) respectively. Phylogenetically, Kenyan APMV-1 together with Ugandan strains were classified in a novel sub-genotype of genotype V, Clade II. The genome of Kenyan strains was 18% ($\pm 1.7\%$) distant from that of commonly used vaccine strain Lasota. Unique signatures were identified in APMV-1 strains circulating in Kenya. The study also detected signature of selection on different lineages and amino acid sites of APMV-1 genes. Selective pressure was highest on the fusion protein gene ($dN/dS=0.289$) and phosphoprotein gene ($dN/dS=0.272$). The results of the study showed that management and trade factors are associated with APMV occurrence in domestic poultry in Kenya and revealed presence of virulent closely related genetic variants of APMV-1 strains of a novel sub-genotype. Further, the study showed that natural selection affects the variation and diversity of lineages and proteins of global APMV-1 strains.

2.4 Research Gaps

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 organized market for those undertaking quail farming.

Methodological gap is the gap that is presented as a result in limitations in the methods and techniques used in the research (explains the situation as it is, avoids bias, positivism, etc.). Macharia (2018), conducted a study on the phenotypic characterization and functional polymorphisms at prolactin and VIPR1 genes in emerging poultry species from Western Kenya. The aim of this study was to characterize the phenotypic traits of emerging poultry species from Western Kenya and to evaluate functional polymorphisms in Prolactin and Vasoactive Intestinal Peptide receptor 1 (VIPR1) candidate genes for egg production in these species. A cross sectional study design was employed with 214 poultry being sampled. R Core statistical package was used to investigate the relationship between sex and the morphometric measurements. The results of the showed that sexual dimorphism in favor of males was evident in ducks, geese, pigeons and turkey. The opposite was true for the wild quails where the females had higher body weights and longer shanks compared to the males. The studies presented a methodological gap as it used exploratory and descriptive survey research design while our current study adopted a desktop literature review method.

3.0 METHODOLOGY

The study adopted a desktop literature review method (desk study). This involved an in-depth review of studies related the factors influencing quail farming. Three sorting stages were implemented on the subject under study in order to determine the viability of the subject for research. This is the first stage that comprised the initial identification of all articles that were based on factors influencing quail farming. The search was done generally by searching the articles in the article title, abstract, keywords. A second search involved fully available publications on the subject on the factors influencing quail farming. The third step involved the selection of fully accessible publications. Reduction of the literature to only fully accessible publications yielded specificity and allowed the researcher to focus on the articles that related to factors influencing quail farming which was split into top key words. After an in-depth search into the top key words (brooding, hatchery, bio security, market poultry, quail farming, quail management, poultry production), the researcher arrived at 4 articles that were suitable for analysis.

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Further, the study showed that natural selection affects the variation and diversity of lineages and proteins of global APMV-1 strains.

4.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

4.1 Introduction

This section presents results based on the objectives of the study. The results are on the factors that influence quail bird farming.

4.2 Conclusion

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 neighbors 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.

4.3 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.

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