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INFLUENCE OF CONTRACT FINANCING ON INCOME GROWTH AMONG POULTRY FARMERS IN KIAMBU COUNTY, KENYA

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Abstract

This study empirically examined the influence of contract financing on income growth among poultry farmers in Kenya. More specifically the study examined the influence of capital, advance pricing, contractor credit services and veterinary services on income growth among poultry farmers in Kenya. Descriptive research method was adopted while target population was 60 contract farmers in Kiambu County. Primary data was used and collected using structured questionnaires. Data was analyzed using descriptive and inferential statistics. The findings indicate a positive causal relationship between capital and income growth among poultry farmers ($\beta = 0.014$, $p > 0.05$), advance pricing has significant positive influence on income growth among poultry farmers based ($\beta = 0.504$, $p<0.05$). Contractor credit services have a significant influence on income growth among poultry farmers ($\beta = 0.326$, $p<0.05$). Positive causal relationship between veterinary services and income growth among poultry farmers exists ($\beta = 0.662$, $p<0.05$). It was concluded that chicks provided to farmers by Kenchic as initial capital are a key pillar in enhancing farmers' engagement in contract farming. It is recommended that there should be a renegotiation between the contractor and the financial institutions that advance credit facilities to farmers on the guarantee by Kenchic.

Keywords: Capital, pricing, credit, contractor, income growth

INTRODUCTION

Contract financing (CF) has been seen as a promising linkage strategy between smallholders and agribusiness firms with vested interests in sharing the risks associated with the production of a specific crop. Through cooperation with smallholders either by providing the necessary farm inputs and technical assistance to farmers and/or through direct control of the farm production, agribusiness firms gain access to the land and labour of smallholders and are also enabled to meet their supply needs more regularly (IFPRI 2006).Contract financing is a form of contract farming. Consequently, the World Bank also recognizes contract financing as an avenue to create strategic partnerships between private capitals and smallholders which would lead to the transfer of modern agricultural technology, quality inputs, entrepreneurial development of smallholders and market growth (World Ban, 2005).

Contract financing has become an increasingly important aspect of agri-business as well as in the poultry sector in recent years. Contract financing in poultry farming could play an effective role in improving the economic status of small scale farmers by increasing their income, aside from providing nutritious food through meat and eggs. Contract financing could help alleviate poverty in most rural areas and empower poultry farmers to expand their capacity in order to effectively and consistently supply to other processing companies (Bernice, 2016). Alongside the neoliberal market reforms, other factors have led to the rise of contract financing arrangements in Kenya. These include; the revolution of the supply chain management which has been prompted by the rise of supermarkets, increased urbanization rates coupled by an increase in per capita incomes of the rising middle class nonfarm population (IFAD, 2010; Costales & Catelo, 2008).

Participation of smallholders in contract financing, which in turn impacts their welfare in various ways, is influenced by socioeconomic and institutional factors. For example, smallholders are constrained in terms of productive resources like water for irrigation and land, which often limit their production. Similarly, smallholders' limited access to production technologies and support services like credit, extension education and information on uncertainties regarding risks associated with new technologies deter their participation in such schemes (Barrett et al., 2012). Depending on the nature of the contract, contract farming may affect smallholder farmers' welfare through a number of pathways.

First, contracts that have interlinked services such as training, credit and technical advice including market information aim at alleviating constraints on smallholder productivity, thereby increasing marketed surplus. Second, contracts act as a strategy for fostering smallholder participation in restructured markets and value chains, thereby increasing and stabilizing smallholder incomes (Bellemare, 2012). Third, contracts that allow prices of outputs

as well as the terms to be decided in advance may reduce risks associated with price fluctuations (Baumann, 2000; Eaton and Shepherd, 2001), thereby providing incentive mechanisms for smallholders to allocate resources efficiently and maximize returns on factors of production (Du et al., 2013; Saenger et al., 2013).

Strohm and Hoeffler (2006) argue that contract financing has been gaining popularity in developing countries. Some of the enterprises where contact financing is widely used are French beans and other horticultural crops (Kenya and Ethiopia), fruits such as pineapples mangoes and passion fruits (Ghana), cotton (Zimbambwe) and poultry (Kenya). Indeed, much of the success in the horticulture industry in Kenya, Zambia and Ethiopia has for instance been attributed to contract farming with producer organization (Narrod et al, 2009; Okello and Swinton, 2007).

Sachiko, Nicholas and Dinghuan (2009) on their study on impact of contract financing on income: Linking small farmers, packers, and supermarkets in China. Their study compared contract and non-contract growers of apples and green onions in Shandong Province, China in order to explore the constraints on participation and the impact of contract financing on income. They found little evidence that firms prefer to work with larger farms, though all farms in the area are quite small. Using a Heckman selection–correction model, they found that contract financing raises income even after controlling for observable and unobservable household characteristics. These results suggest that contract financing can help raise small-farm income. In their result they suggest that contract farmers earn more than their neighbours growing the same crops even after controlling for household labor availability, education, farm size, share of land irrigated, and proximity to the village leader. Furthermore, the treatment effect regression model suggests that there is no selection bias caused by unobserved differences between contract and non-contract farmers such as industriousness or intelligence. Finally, direct questions to contract farmers revealed that three-quarters of them perceived an increase in income since they began contracting.

Kenya is categorized as an agriculture-based country due to its high share of agricultural contribution to GDP growth which averages at 32% (World Development Report, 2008). This is articulated by the Agricultural Sector Development Strategy (2009), which states that 70% of the population on average is predominantly rural of which close to 80% depend on agriculture for their livelihoods either directly or indirectly. According to ASDS (2009), the livestock sub sector contributes 17% with poultry contributing 6.1% of the livestock GDP. Poultry production is a key income generating activity for rural and peri urban farmers in Kenya and is estimated to contribute to the livelihoods of 21 Million people (Mwanza, 2010).

Contract arrangements in the Kenyan farming industry fall under the four models as explained by Eaton and Shepherd (2001) namely centralized model, multipartite model, intermediary model and the informal model. The centralized model involves a centralized processor and/or buyer procuring from a large number of small-scale farmers. The cooperation is vertically integrated and, in most cases, involves the provision of several services such as pre-financing of inputs, extension and transportation of produce from the farmer(s) to the buyers' processing plant. Multipartite contract model arises when a combination of two or more organizations (state, private agribusiness firms, international aid agencies or non-governmental organizations) work together to coordinate and manage the cooperation between buyers and farmers.

An intermediary model, on the other hand, shows many characteristics of a centralized model with the difference that they act as an intermediary on behalf of another firm. Normally, the intermediaries organize everything on behalf of the final buyer starting with input supply, extension service, payment of the farmers and final product transport. Indeed, handling several thousands of out growers involves significant management effort and therefore it might be economically attractive for a buyer to outsource this task to an intermediary. Lastly, informal arrangements involve casual oral agreements between contracting parties and regularly repeated marketing transactions, but are characterized by the absence of written contracts or equally binding and specifying documents.

According to the Population and Housing Census (2009), poultry population estimates were approximated at 32 Million birds with indigenous birds dominating at 81% while commercial birds (both hybrid layers and broilers) stood at approximately 14 % of the total poultry population. Commercial layers represented 8.3% or approximately 3.1 Million birds (Omiti, 2010). There has been tremendous growth of the commercial poultry sector in Kenya over the years especially by smallholder farmers due to the rising opportunities for income generation, employment, and other sector linkages such as: poultry feed industry, hotel industry and input supply industry (Mwanza, 2010; Omiti, 2010). For instance, Kenya Poultry Farmers Association (KEPOFA) approximates that 70% of the livestock feeds manufactured in Kenya constitutes poultry feeds.

Commercial poultry production is concentrated in the urban centers of Nairobi, Mombasa, Nakuru, Kisumu and Nyeri where ready urban markets are available. This has led to the growth of commercial hatcheries located in the peri-urban areas, which sell hybrid broiler and layer chicks to commercial farmers (Nyaga, 2007). Kenya has one of the most well-developed commercial poultry industries in Africa (Nyaga, 2007). Among the commercial poultry producing areas in Kenya, few counties such as Kiambu, Kisumu and Nakuru counties have

some form of contractual arrangement. The poultry contracting firm in Nakuru County is Kims Poultry Care Centre while in Kisumu is Chicken Basket, both work with smallholder farmers. On the other hand, the poultry contracting firm in Kiambu County is Kenchic Limited that deals exclusively with medium and large scale farmers. This study focused on influence of contract financing on income growth among poultry farmers in Kenya.

Statement of the Problem

A farmer's decision to participate in contract financing is affected by different physical, social and economic factors. This may explain why many poultry farmers are not participating in contractual arrangements despite the provision of higher prices compared to the spot market. For the farmers, the benefit of contract financing depends on different factors such as the type of agricultural sector, behaviour of the companies and other socioeconomic factors. For example, in some cases when farmers have no other option than trading with a single company, contractual arrangements may not be beneficial. Even though the contract approach is appreciated by different companies, it is questionable whether it really improves the farmers' income. Studies have confirmed improvement in farmers' income as a result of participation in contract financing (Warning and Key, 2002). Most contract financing arrangements entail provision of free veterinary services such as free training on the farmers on key management practices of the chicken. Equally frequent checkups and vaccinations are provided to the chicks. Some contract farmers argue that this has benefitted them, as finances that would be used on veterinary services are channeled to more useful aspects of the project. However, some farmers argue that the veterinary services provided by the contracting firms are very poor. They claim that the veterinaries are very negligent and thus key issues such as periodical vaccination and continuous checkups are not carried out thus a lot of loss has been incurred. The farmers argue that the veterinaries are not motivated in their work thus leading to inefficiencies in their performance. Contracting firms usually set an advance price at which they will buy the fully matured chickens after a rearing cycle. This price is usually set so as to attract most farmers to contract financing as it protects them from price fluctuations in the market. To some farmers this is an advantage in cases whereby the current market prices are minimal than the advance price set. Contrary to this is whereby the market prices are higher than the advance price set. The study sought to find out that if contract financing is really beneficial to the contracting farmers. Contract financing is taken as one of the strategies for enhancing production efficiency and enhancing marketing access for small farming business; however, not much research has been undertaken in Kenya pertaining to this. Therefore, this led to research study on the influence of contract financing on income growth among poultry farmers in Kenya, a case study of Kiambu County.

General Objective of the Study

The study examined the influence of contract financing on income growth among poultry farmers in Kenya.

Specific Objectives of the Study

In achieving the general objective, the study was guided by the following specific objectives:

i. To examine the influence of capital on income growth among poultry farmers in Kenya.
ii. To examine the influence of advance pricing on income growth among poultry farmers in Kenya.
iii. To determine the influence of contractor credit services on income growth among poultry farmers in Kenya.
iv. To evaluate the influence of veterinary services on income growth among poultry farmers in Kenya.

Hypotheses of the Study

The following research hypotheses were formulated and tested:

H01: Capital has no significant influence on income growth among poultry farmers in Kenya.

H02: Advance pricing has no significant influence on income growth among poultry farmers in Kenya.

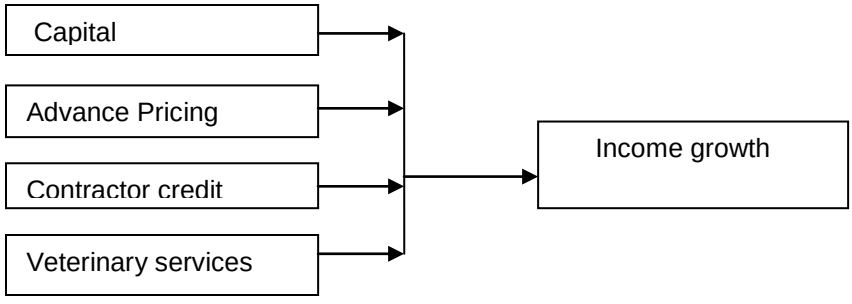
H03: Contractor credit services have no significant influence on income growth among poultry farmers in Kenya.

H04: There is no significant influence of veterinary services on income growth among poultry farmers in Kenya.

Conceptual Framework

The conceptual framework shows the independent variables as capital requirement, advance pricing, contractor credit services and free veterinary services. On the other hand, the dependent variable was income growth among poultry farmers

Figure 1: Influence of contract financing on income growth among poultry farmers in Kenya



LITERATURE REVIEW

Theoretical Framework

This research was anchored on Agency theory, Center-Periphery theory and Efficient Market Hypothesis. These theories formed the basis for this study's investigation.

Agency Theory

Jensen and Meckling (1976) the proponents of this theory argued that it is inevitable to avoid agency costs in contractual agreements Agency costs are the costs that arise when there are conflicts of interest between the agents and the principals (Berk & DeMarzo, 2007). Contract financing is a vertically integration form of production between the growers of an agricultural product and buyers or processors of that product (Harvey et al., 2005). Contracts may provide productions inputs, credit and extension services to the growers in return for market obligations on such considerations as the method of production, the quantity that must be delivered and the quality of the product (Warning and Hoo, 2000). Contracting farming scheme can be modeled as a principal-agent game between a firm and a grower of which the firm acts as the principal and a grower as the agent. In contract financing farmers find a means to manage risk in production and marketing, as contract farming being fundamentally a way of allocating risks between growers and firms (Warning and Hoo, 2000; Mshiu, 2007). The two work together to produce and market the crop. The firm chooses growers with whom it would like to contract and sets the contract terms. The growers in turn choose whether to participate or not to participate. The combination of these choices describes the selection process for the contract-farming scheme. The benefits participants get will depend on the terms of the contract and their own characteristics (Warning and Hoo, 2000; Mshiu, 2007). Baumann (2005) argues that with appropriate enabling environment the potential advantages of contracting to farmers and agribusiness firms tend to outweigh the potential disadvantages. To the extent that the benefits from a contract-financing scheme accrue more to larger growers than to smaller growers; the scheme will reinforce income stratification. To the extent the opposite is true; the scheme will have an equalizing effect (Warnings and Hoo, 2000). This theory was relevant to this study since parties to contract will choose to contract with one another based on the gains they accept to obtain from the contract. Moreover, the transaction costs and information costs in the market environment in which production takes place jointly influences both processes (Warnings and Hoo, 2000; Baumann, 2005).

Center - Periphery Theory

This study was underpinned on the theoretical prepositions by Samir Amin (1980), a Neo Marxist and a proponent of dependency theory which holds the view that imperialism has

actively underdeveloped the peripheral societies or at the very least obstructed their development (Martinussen, 1997). Amin drew his conclusions chiefly from empirical analyses of West Africa which were primarily concerned with the conditions and relations of production. According to Amin (1980), the peripheral economy is characterized by two sectors, the center which plays a determining role in creating and shaping the market and the export sector while the periphery serves as the source of capital in the form of raw materials and labour which are extracted by the center at prices unfavorable to the peasants. In addition, there are no development promoting links between agriculture and industry in the periphery hence the periphery fails to be self reliant (Martinussen, 1997).

The periphery therefore depends entirely on the center for industrial goods necessary for production of raw materials (Amin, 1980). This relationship exposes the periphery to a dependency state where the external demand of industrial goods from the center continues to be the principal driving force in maintaining the dependent relationship. Amin (1980) notes that the center has objectively sustained the dependency relationship and gained dominance over the periphery by ensuring there is minimal development of industry in the peripheral so that it may continue to sell industrial goods in the periphery.

This theory was relevant to the current study because on one hand the production relations in the contract financing arrangement are defined by the poultry farmers who obtain pre-financed inputs and in exchange provide labour, land and the poultry produce. On the other hand the contracting firms provide industrial goods, chiefly in form of poultry feeds on credit basis after which they obtain surplus value in form of poultry produce derived from the pre-financed inputs, labor and land. The theory provided an appropriate framework to analyze the nature of exchange relations between the farmer in poultry farming and the contract financing companies and establish whether the prepositions of the theory do hold or otherwise.

Efficient market hypothesis (EMH)

Fama and French, (1992) stated that the market is efficienct, therefore it is then impossible for participants to beat the market. The theory can be explained in three ways: allocative efficiency, operational efficiency and information efficiency. A market is allocatively efficient if it directs savings towards the most efficient productive enterprise or project. In this situation, the most efficient enterprises will find it easier to raise funds and economic prosperity for the whole economy should result. Allocative efficiency will be at its optimal level if there is no alternative allocation of funds channeled from savings that would result in higher economic prosperity.

Operational efficiency relates to the cost of the borrower and lender, of doing business in a particular market. The greater the transaction cost, the greater the cost and therefore the

lower the operational efficiency. Information efficiency reflects on the extent to which the information regarding the future prospect of a security or product is reflected in its current price. If all known information is reflected in the product price, then investing in it becomes a fair game. This theory was essential to the research in that the contractual arrangements reduce transactional costs of the poultry farmers thus operational efficiency is enhanced. Equally information efficiency is upheld as the contracting firms have the relevant information pertaining to the market prices.

Empirical Review

Past studies have been conducted relating to influence of contract financing on income growth among farmers.

Capital Requirement and income growth

Availability of capital determines how easy or difficult will it be to start up the business and eventually expand it. Businesses such as poultry farming on large scale are capital intensive. If the farming businessmen do not have access to sources of capital such as loans, the output will be low. In many African countries, farmers lack access to credit facilities. Many banks do not prefer taking the poultry and the farm structures as collateral and thus end up closing out many small and medium farmers as a result of inadequacy in security provided for the loans (Kwesisi, Margret & Sheila, 2015).

Smallholders may enter contracts to reduce transaction costs of accessing new markets, borrowing, managing risk, acquiring information or increasing employment opportunities (Tripathi et.al, 2005). A study by Patrice (2006) on factors that influence participation in a sugarcane contract farming scheme and the impact of contract participation on sugarcane farm households in Migori. The study shows that the contracted sugarcane growers were not necessarily better off than non-contracted farmers from welfare perspective. The contracted sugarcane farmers were experiencing a number of problems including higher cost of administering the contract, than those for the non-contract growers.

Birthal, Joshi, and Gulati (2005) found that the gross margins for contract dairy farmers in India were almost double those of independent dairy farmers, largely because contract growers had lower production and marketing costs. An agribusiness firm incurs very high transaction costs when engaged in informal markets in developing countries where quantity, quality and regularity in delivery are unpredictable owing to high levels of environmental and behavioral risk (Da Silva & Rankin, 2013). These uncertainties discourage investment in assets required to add value to products. The seasonality and perishability of agricultural products also

increases the complexity of transacting, particularly when markets require specific quality standards and credence attributes in products. Complexity increases transaction costs by increasing the uncertainty of supply, by increasing information and monitoring costs, by increasing the need for assets that have little value in alternative uses, and by increasing the cost of renegotiating incomplete contracts ex post (Bhattarai, Lyne, & Martin, 2013).

In a recent study to assess the impact of external funding on SME growth, the estimates showed that increasing the depth of credit pushes up the profit level of enterprise in all sample countries that were studied (significant at the 1% level). This showed that a firm's access to formal finance is a factor in facilitating its business growth. The extent of sales value in SMEs was typically found to be smaller than in large firms, being attributed to their constrained levels of credit access (Shinozaki, 2012). For developing countries, there are other potential benefits associated with CF. Since farm scale tends to be small, farmers are generally less educated, production and management technologies are less efficient, and infrastructure such as transportation, cold storage, and information channels are underdeveloped; contracting with a large agribusiness firm may be the only way farmers in developing countries can access higher end markets and receive higher returns (Barrett et.al., 2012). Transaction cost reduction is also an important motive given relative scarcity of resources (Bijman 2008). These two motives may be more important than the risk reducing motive (Wang et. al., 2011).

Advanced Pricing and Income Growth

A major source of risk that could possibly influence smallholders' decision to opt for contract production is price fluctuations which is common with most agricultural products due to the uncertain nature of the local agricultural output market. For this reason, the conditions of payment that a contracting firm adopts in its contract design to farmers for delivering the agreed quality and quantity of product is important to the smallholder. The commonly used price options in contract farming are fixed and variable options (Miyata et. al., 2009).

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. Risk sharing is one of the widely cited reasons for contracting. Numerous studies of contract financing emphasize risk reduction as a principal incentive for producers to enter in to contracts. Much of the price risk is reduced, in contract financing, by the use of a predetermined price rather than the market price (Martinetz, 2005).

Lucas et.al. (2016) carried a study on assessing challenges and prospects of contract farming schemes in Tanzania. They concluded that there is need to improve contract farming in the country. These include: availing and facilitating smallholder farmers access to long-term

sources of finance; contract enforcement; improvement of transport infrastructure to areas surrounding the schemes; establishment of irrigation schemes for sugar, tobacco and cotton; establishment of competitive environment for the cash crops; and step up public awareness on the significance of contract financing in raising incomes and welfare of farmers.

Contractor Credit Services and Income Growth

On top of technical efficiency, financial constraints have always prevented farms from gaining higher economic efficiency. This is especially true for small and poor farms without credit or collateral to obtain financing in developing countries. CF can help farmers receive credit from financial institutions, and in-kind credit such as seeds, fertilizers, and other inputs directly from the firms (Simmons et al. 2005; Ma et al. 2011).

Simmons et al. (2005) consider farmer access to credit as one potential motive for contract participation. They find that credit constraints are not significant in the corn and rice industry, but positive for broiler growers. This significant effect (for broilers) is intuitive because farmers with poor access to credit may be particularly vulnerable to market fluctuations, and may find increased safety in a contract. Simmons (2002) summarized possible reasons for engaging in CF from the smallholder perspective as: access to product markets with high transactions costs; access to relatively inexpensive credit where - for various reasons - they face high interest rates or credit is unavailable; access to services for managing on-farm risk; and access to information, inputs, logistics and marketing at relatively low cost.

Many of the contractors provide desired or required inputs, technical advice and machinery services (Huh, Athanassoglou, & Lall, 2012; Melese, 2012). Farmers can gain access to credit directly through the contract farming scheme or indirectly from banks, using contract farming as collateral. In the multipartite model of contract for example, the agribusiness company can become involved in a joint venture with a local bank that will provide growers with credit for the purchase of fertilizer, seeds, and other inputs. At harvest time, the company will pay growers the contract price, but take off a sum that goes to the bank to repay its loan to the grower (Vermeulen & Cotula, 2010).

In an imperfect input market situation or in a situation where there are not many suppliers of inputs, smallholders have limited access to specialized inputs. They may consider to participate in CF in order to have access to such inputs from the contracting firm, especially in the light of the fact that public provisions of agricultural inputs and services especially in developing countries have been noted to be inefficient and ineffective due to unreliable delivery (Dorward et.al., 2004) and also due to political interference (Banful, 2010).

Bellemare (2012) studied the welfare impacts of contract farming on smallholders in Madagascar and concluded that participation in CF by smallholder farm households did not only

increase net household income significantly but also had a spillover effect on income from other agricultural sources than CF, such as livestock. Key and Runsten (1999) had mixed results from their study of contract farming and smallholders in Latin America. On the positive side, the study noted that smallholders who participated in CF enjoyed enormous benefits such as increased household income, access to new markets, technical assistance, specialized inputs and financial resources as against non-participating smallholders. On the negative side, however, the study noted that in areas where agribusiness firms chose to contract with large-scale farmers to the exclusion of smallholders, the latter was made worse off.

Veterinary services and income growth

Non-price factors involved in the contracts, such as technical assistance, training and education could further help farmers to improve their efficiency, productivity and profitability. Improving technical efficiency of poultry farmers has the potential to increase their productivity, total output, and incomes without requiring increase in inputs or change of technology (Ruben and Sáenz-Segura, 2008; Chakraborty, 2009). Using cross-sectional data from sunflower farmers in Tanzania, Joseph A.Kuzilwa et al., 2015 found a significant selection bias. Contract farming significantly increases the yield potential but lowers the average group technical efficiency. As the first effect is slightly larger than the second, a small positive effect of contract farming on productivity was observed.

Greater consumer consciousness of health and safety issues generally translates into a demand for products that are not only healthy but also are pro¬duced in a healthy environment. Consumers may be prepared to pay a premium for products that originate from approved bio secure farms, even though the prod¬ucts' quality might not differ from the quality of prod¬ucts from ordinary farms. Nerlich et al. (2009) found that farm-gate bio security was not only beneficial in reducing disease risk but also sent out a symbolic message to consumers that the product was safe.

Masakure and Henson (2005) explored the motivations behind the decisions of small scale producers to grow non-traditional vegetables under contract for export. Based on a survey among smallholders in Zimbabwe (in 2001-2002), they found four factors motivating contracting, namely market uncertainty, indirect benefits (knowledge acquisitions), income benefits, and intangible benefits (status). Guo et al. (2005), in their study of contract farming in a number of eastern provinces in China, found that farmers enter CF arrangements to obtain the following advantages: price stability, market access, and technical assistance to improve product quality. Segura (2006), in his study on contract in the pepper and chayote supply chains in Costa Rica, provides empirical support for this argument. He found that contracts have one or more of the

following functions for farmers that consider the production of high value crops: (1) a security device to enable farmers to take up new production activities and to gain access to specialized markets; (2) a provision of incentives to make the investments needed for specialty production; and (3) a provision of information on specialty markets.

Francis (2012) did a study on the role of agricultural extension services in agricultural transformation for rural poverty reduction. He conducted a survey study of Ashanti region. He found that majority of agricultural producers in Ghana still need Agricultural Extension Services as a major agricultural transformation strategy. He recommended for the provision of extension services in the country. Some of these include disseminating technology to farmers in manageable groups of a maximum of twenty, increasing logistical and Extension Field Staff (EFS) capacity, motivating Field Staffs, institutionalizing provision of credit in kind and establishing a National Extension Services Provision Fund to help make extension services delivery sustainable.

Income Growth

Earning additional income is a primary motivation for farmers to enter contracts (Bijman, 2008). Smallholders enter the contract if their expected gain of contracting is greater than their reservation utility (Barrett et al., 2011; da Silva, 2005). Even though earning additional income is the primary motivation for farmers to engage in contract farming, farmers may also contract for other reasons (Prowse, 2012). Contract farming can also be used to allocate risk between the smallholders and the contracting firm (Bogetoft and Olesen, 2004). Smallholders usually take the production risk, whereas the contracting firms usually face the marketing risk (Bogetoft and Olesen, 2004). Bogetoft and Olesen (2004) argue that most of the smallholders use contract farming to diversify the risk rather than to maximize the production volume.

Contract farmer arrangements allow farmers to have access to an array of agricultural services which they would otherwise not have access to. By reducing risk, uncertainty and transaction costs, they have the potential to link farmers to markets and stimulate agricultural production in the face of globalization. The World Bank has officially promoted contract financing as a tool for poverty reduction in Africa (WB, 2007). Also, a large body of empirical literature has been developed and confirmed a positive impact of CFAs on participants' income (Bolwig et al., 2008; Bellemare, 2010; Miyata et al., 2009; Bijman, 2008).

Smallholder farmers can be empowered to take advantage of new market opportunities for high-value agricultural products which have emerged as a result of increasing global consumption of these products, particularly vegetables and fruits (Temu and Temu, 2006). With most of the world's rural poor engaging in agriculture, encouraging smallholders' access to

global export markets for high-value products is vital in increasing incomes and hence alleviating poverty, which is predominant in Sub-Saharan Africa.

An analysis of efficiency and distribution of contract financing of poultry production, in the state of Andhra Pradesh India, showed that contract production is more efficient than non-contract production. In addition, the study found that there was an income difference between the two groups. Farmers also gain appreciably from contracting in terms of higher expected returns and lower risk. From the average returns of contract and non-contract farmers, they concluded that the contract enables poor farmers to generate a comparable income (Ramaswami et.al., 2006).

Similarly, Gibbons et al. (2009) also analyzed the revenue effect of participation in smallholder contractual organic cocoa production in Uganda. They found that there was a positive revenue effect of contract farming. Besides, contract farmers have exposure to improved farming techniques that can enhance their yields. Contract farming arrangements have a higher ability to generate more income for the smallholder farmer in comparison to independent farming arrangements (Rusten & Key, 2002; Ramaswami et al., 2006; Wainaina et. al, 2012).

This is largely because contract farming ensures market access for the smallholder farmer produce thereby providing market certainty often at predetermined prices. This enhances the capacity of smallholder farmer to deal with the problem of marketing perishable farm produce which is a major challenge in commercial production (Woodend, 2003). In addition Masakure et ah (2005) notes that contract financing arrangements in Zimbabwe help smallholder farmer save costs associated with poor market information systems that characterize most developing countries. Kirsten and Sartorious (2002) argue that the limited scale of operations pose high transaction costs at individual level in producing and marketing especially when located in remote areas and therefore marketing through the contract financing arrangement positively influences their participation.

Although contract financing has the possibility of increasing total household income, the woman is generally excluded from participating in income access and allocation within the household (Maertens and Swinnen, 2009). Quisumbing and McClafferty (2006) observe that household income control by women has superior development impact because it is more likely to be associated with improved child nutrition, increased investment in children education, healthcare and other household investments. The effect of contract financing on women's work intensity and subsequent bias in income participation imply extending gender inequality and hampering genuine development within the household.

Warning and Key (2002) explore how participation in the NOVASEN (a private company) program affected the agricultural income of 32,000 peanut growers in Senegal. They found that farmers increased their income substantially by participating in the contract program compared to non-participating farmers. In addition, the authors found that the contract farming scheme did not favour larger or wealthier growers.

Research Gaps

Empirical findings, though important, essentially represent national and regional levels. It is not explicit how contract financing safeguards the position of the poultry farmers in the livestock sector. Further, most literature on contract financing in Kenya has tended to focus on the horticultural sector and little emphasis has been given to the poultry sector (Strohm and Hoeffler, 2006). This study sought to fill this gap by assessing the influence of contract financing on income growth among poultry farmers in Kenya.

RESEARCH METHODOLOGY

Research Design

The study employed a descriptive research design. This is because the design is well structured with clearly stated research questions. Descriptive survey research design was adopted as it enabled the researcher to generalize the findings to a large population. The study utilized quantitative approach in the collection of data. According to Kothari (2009), the approach enables data to be systematically collected and analyzed in order to provide a descriptive account of the questions under study.

Target Population

A population is a complete group of entities sharing some common set of characteristics. A target population is the complete group of specific population elements relevant to the research project (Cooper & Schindler, 2003; Zikmund, 2003). The target population for this study was the contract farmers in Kiambu County. There are 60 contracted farmers dealing with poultry farming in the county (Kenchic Farmers Database, 2017). Given the small number of these farmers, the study adopted a census survey with all the farmers acting as the study's respondents.

Data Collection Instrument

The study employed the use of questionnaires as the main tools for collecting data. According to Kothari (2006), a questionnaire is the best tool for a researcher who wishes to acquire the

original data for describing a population. Questionnaires enabled the researcher to reach a large sample within a short time. The questionnaires composed of short structured closed ended statement constructed on 5 point Likert scale. The questionnaire was self designed.

Validity of instruments

Brains and Manheim (2011) asserted that validity is the extent to which a concept, conclusion, or measurement is well-founded and corresponds precisely to the real world. In other words, the validity of a measurement tool such as a questionnaire is said to be the degree to which that tool measures what it claims to measure. The study sought to determine the content validity of the research instrument. Given that the content validity cannot statistically be determined, the researcher sought the expert opinion of University supervisor who helped in ascertaining validity of the data instrument.

Reliability of Instruments

Reliability is said to be the extent to which a measurement gives results that are consistent. When reliability is upheld, then the research instrument should collect similar data when administered to different sample populations exhibiting related characteristics. The study employed Cronbach alpha (α) coefficient to test the reliability of the research instrument. The Cronbach's reliability coefficient above 0.70 in the questionnaire was considered as an indication that the items on the questionnaire were reliable according to Kombo and Tromp (2009) rule of thumb.

Data Analysis

The questionnaires collected from the respondents were ascertained to ensure that only the sufficiently and appropriately filled ones were considered for the study. Data collected from the questionnaires was analyzed, summarized, and interpreted accordingly with the aid of descriptive (Frequencies, percentages, means and standard deviations) as well as inferential statistics (chi-square, correlation coefficient and regression analysis). Statistical Package for Social Sciences (SPSS) computer software version 24.0 was used for analysis. The findings were presented in the form of statistical tables and discussions thereof. The following multiple regression model was adopted.

$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$

Where:

Y representing Income Growth

B0 represents model Constant

X1 Stands for Capital

X2 Stands for Advance Pricing

X3 Stands for Contractor credit services

X4 Stands for Veterinary services

ε Represents Error term

β1, β2, β3, β4 Represents regression coefficients for independent variables

Regression Assumptions

Since regression analysis was used to test the research hypotheses, it is important to ensure that the assumptions of linear regressions are fulfilled. The assumptions of linearity, heteroskedasticity, normality and multicollinearity were tested before conducting regression analysis. Linearity of the relationship between dependent and independent variables was examined through residual plots and remedied by transforming one or both variables to achieve linearity. Heteroskedasticity is a systematic pattern in the errors where the variances of the errors are not constant (Gujarati, 2003). Scatter plot was be used to test whether data points are randomly and evenly dispersed around zero. Data was tested to determine whether it was well-modeled by a normal distribution or not. To test for normality, the normal probability plot was used and the plotted data values were compared with the diagonal. Before regressing independent variables on the dependent variable, collinearity of the independent variables should be examined (Hair et al., 2011). The study used Variance Inflation Factor (VIF) as an indicator of collinearity. As a rule of thumb, VIF values of more than 5 indicate multicollinearity (Hair et al., 2006).

ANALYSIS AND FINDINGS

Out of sixty questionnaires that were administered, fifty three were properly filled and returned back. This indicates a repose rate of 88.3 %. Mugenda & Mugenda (2003) recommends at least a 50% response rate as appropriate in achieving a study's objectives. Thus response rate in this study was appropriate for conclusion of research findings.

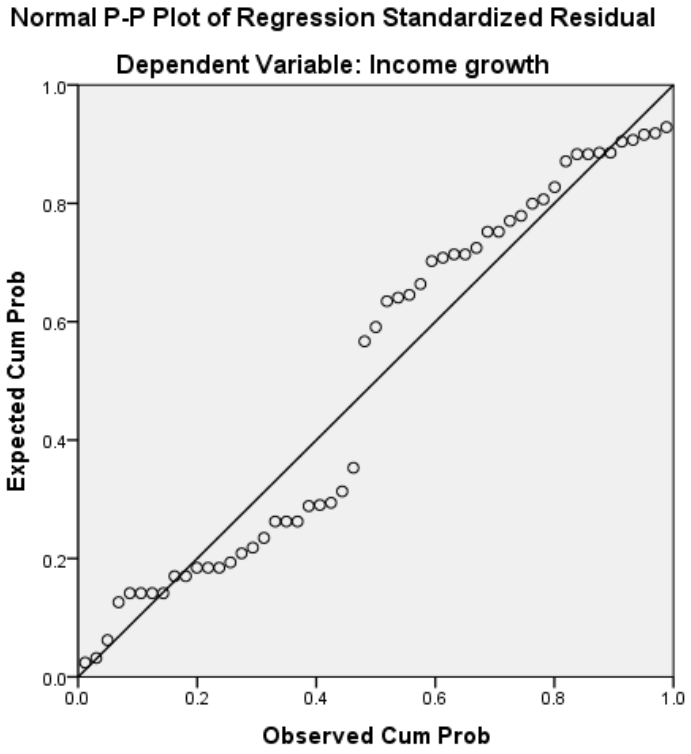
Reliability Test

In testing internal consistency reliability, all the research constructs had alpha coefficients of above 0.7. Kombo & Tromp (2009) indicates that an alpha range of 0.7 is an acceptable range that indicates good reliability. The instruments returned an overall alpha correlation coeffiient of 0.796 which indicated internal consistency reliability

Test of Normality

Normality test of data is applied to determine whether a data is well-modeled by a normal distribution or not, and to compute how likely an underlying random variable is to be normally distributed. To test for normality, the normal probability plot was used and the plotted data values were compared with the diagonal. Figure 2 shows the results of the test for normality.

Figure 2: Normal Probability Plot for Influence of Contract Financing on Income Growth among Poultry Farmers



Multicollinearity Test

Multicollinearity means that there is linear relationship between explanatory variables which may cause the regression model biased (Gujarati, 2003). VIF is a statistic calculated for each variable in the model to test Multicollinearity. Theoretically, a VIF greater than 5 may suggest that the concerned variable is multi-collinear with others in the model and may need to be excluded from the model (Gujarati, 2003). Hence, as presented on Table 2 , the VIF results indicate there was no collinearity in the explanatory variables. Moreover a tolerance of greater than 0.2 indicates non existence of multicollinearity. Tolerance and VIF results indicate there was no collinearity in the explanatory variables.

Table 2 : Multicollinearity Test

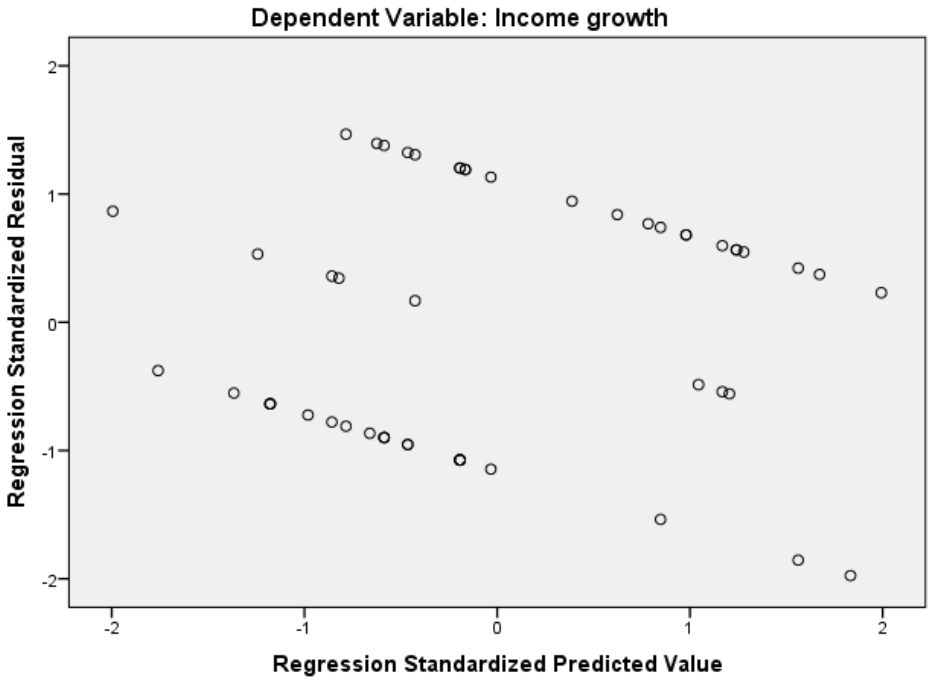
Model		Collinearity Statistics	
		Tolerance	VIF
1	Capital	.994	1.006
	contractor credit	.406	2.465
	veterinary services	.587	1.704
	advance pricing	.287	3.488

a. Dependent Variable: income growth

Test of Heteroskedasticity

Heteroskedasticity is a systematic pattern in the errors where the variances of the errors are not constant (Gujarati, 2003). Heteroskedasticity makes ordinary least square estimators not efficient because the estimated variances and covariance of the coefficients (βi) are biased and inconsistent and thus, the tests of hypotheses are no longer valid. Figure 3 shows that data points are randomly and evenly dispersed around zero, the graph does not funnel out and there is no sort of curve in the graph. This pattern indicates that the assumptions of linearity and heteroskedasticity were met.

Figure 3: Scatter plot for Influence of Contract Financing on Income Growth among Poultry Farmers



Descriptive statistics and discussions on study's variables

Capital

Respondents were asked to indicate the extent to which they agreed that provision of capital influences income growth among contracting poultry farmers in Kenya. Table 3 presents the results of the analysis.

Table 3 : Descriptive Analysis for Capital

Measurable Indicators	5	4	3	2	1	Mean	Standard Deviation
Chicks are provided to the farmers as an initial capital and this has enabled you engage in contract farming	1.9%	52.8%	7.6%	1.9%	35.8%	3.1698	1.43762
There is reimbursement (compensation with other chicks) for sudden chicks death Syndrome or immature death of chicks	35.8%	58.5%	1.9%	1.9%	1.9%	4.2453	0.75716
Pan feeders, automatic drinkers and chick drinkers are provided to the farmers which enhance contract farming	3.8%	28.3%	7.5%	43.4%	17.0%	2.5849	1.18377
Strict architectural design for poultry house is provided	45.3%	7.5%	1.9%	11.3%	34.0%	2.8113	1.84032
Strict heating and lighting dimensions in the poultry house are provided	1.9%	1.9%	1.9%	35.8%	58.5%	4.2453	0.75716
Specific heating and lighting materials in the poultry house are provided	12.60%	15.50%	21.0%	0.0%	50.9%	2.0943	1.18101

The findings on Table 3 Shows that majority of respondents (54.7%) agreed that Chicks are provided to the farmers as an initial capital and this has enabled them engage in contract farming (mean=3.1698, SD=1.43762). 94.3% of the respondents agreed that there is reimbursement (compensation with other chicks) for sudden chicks death Syndrome or immature death of chicks (mean=4.2453, SD=0.75716) while majority of respondents disagreed that Pan feeders, automatic drinkers and chick drinkers were provided to the farmers which enhanced contract farming (mean=2.5849, SD=1.18377). According to 52.8% of the

respondents, strict architectural design for poultry house is provided to farmers (mean=2.8113, SD=1.84032) while a larger majority (94.3%) disagreed that strict heating and lighting dimensions in the poultry house are provided (mean=4.2453, SD=0.75716). Specific heating and lighting materials in the poultry house are not provided as indicated by a fair majority (50.9%) of respondents (mean=2.0943, SD=1.18101). There was greater disparity in respondents' opinions with most of the responses registering standard deviation values greater than 1 or close to 1. The results indicate that the data was close to the mean values of the indicators since standard deviations were not very far from zero.

Advance Pricing

Regarding advance pricing, respondents were asked to indicate the extent to which they agreed that the statements of aspects of advance pricing influenced income growth among poultry farmers in Kenya. The responses were analyzed using mean scores and standard deviations.

Table 4 : Descriptive Analysis for Advance Pricing

Measurable Indicators	5	4	3	2	1	Mean	Standard Deviation
Assurance of a fixed sales price for product enhances poultry farming	22.6%	66.0%	7.5%	3.9%	0.0%	4.0755	0.67508
Through contract financing there is shift of price risks to processors among farmers	17.0%	43.4%	3.8%	28.3%	7.5%	3.3396	1.27012
The current market prices influence the advance pricing of the poultries' product	0.0%	0.0%	26.4%	62.3%	11.3%	2.1509	0.60116
The advance price is usually determined by the total cost of production	34.0%	28.3%	0.0%	9.4%	28.3%	3.3019	1.68232
Contract farmer has no power in pricing of products	39.6%	20.8%	0.0%	32.1%	7.5%	3.5283	1.47549
A farmer prefer to sell his or her product at the prevailing market prices as compared to the advance price set	3.8%	0.0%	7.5%	34.0%	54.7%	1.6415	0.92184

The results on Table 4 indicate that majority of respondents (88.0%) agreed that assurance of a fixed sales price for product enhance poultry farming (mean=4.0755, SD=0.67508). The conditions of payment that a contracting firm adopts in its contract design to farmers for delivering the agreed quality and quantity of product is important to the smallholder. The commonly used price options in contract financing are fixed and variable options (Miyata et. al., 2009). 60.4% of respondents agreed that through contract financing there has been shift of price risks to processors among poultry farmers (mean=3.3396, SD=1.27012). Contracts that allow prices of outputs as well as the terms to be decided in advance may reduce risks associated with price fluctuations (Baumann, 2000; Eaton & Shepherd, 2001). A larger majority of respondents (73.6%) disagreed that the current market prices influence the advance pricing of the poultries' product (mean=2.1509, SD=0.60116). The advance price is usually determined by the total cost of production as agreed by 62.3% of the respondents (mean=3.3019, SD=1.68232). According to 60.4% of the respondents, contract farmers have no power in pricing of products (mean=3.5283, SD=1.47549) while farmers do not prefer to sell their products at the prevailing market prices as compared to the advance price set as agreed by a larger majority (88.7%) of the respondents (mean=1.6415, SD=0.92184). Although there was disparity in respondents' opinions with some of the responses registering standard deviation values greater than or equal to 1, the results indicate that the data was close to the mean values of the indicators since standard deviations were not very far from zero.

Contractor Credit Services

Respondents were asked to indicate the extent to which they agreed with contractor credit services statements in influencing income growth among poultry farmers in Kenya. The responses were analyzed using mean scores and standard deviations. Table 5 presents the results of the analysis.

Table 5 : Descriptive Analysis for Contractor Credit Services

Measurable Indicators	5	4	3	2	1	Mean	Standard Deviation
Contracting firms guarantee farmers in order to access credits from financial institutions	50.9%	15.1%	0.0%	34.0%	0.0%	3.8302	1.36911

Table 5...

Contractor credit services attract interest costs during the actual payment for services	0.0%	0.0%	5.7%	79.2%	15.1%	1.9057	0.44996
Access to credit service has led to increase of farmers to engage in contract financing	64.2%	0.0%	0.0%	0.0%	35.8%	3.4340	1.93659
Penalties are charged in case the farmers make delayed payment for the services (such as contract termination)	0.0%	0.0%	32.1%	67.9%	0.0%	2.3208	0.47123
Repayment terms have influenced you as a farmer to engage in contract financing	35.8%	64.2%	0.0%	0.0%	0.0%	4.3585	0.48415
Level of stock (poultry) determines the amount of credit advanced	0.0%	35.8%	0.0%	64.2%	0.0%	2.7170	0.96829

As depicted on Table 5, a larger majority of respondents (66.0%) agreed that contracting firms guarantee farmers in order to access credits from financial institutions (mean=3.8302, SD=1.36911). According to Conning and Udry (2005), farmers' access to credit is also very crucial in the sense that it can facilitate the levels of input use closer to their potential levels when capital is not a constraint, consequently leading to higher levels of output per farm and productivity, given fixed resources such as land. 94.3% of respondents disagreed that contractor credit services attract interest costs during the actual payment for services (mean=1.9057, SD=0.44996) while access to credit service has led to increase of farmers to engage in contract financing according to 64.2% of the respondents (mean=3.4340, SD=1.93659). Aside the ready market for farmers, contract farming gives farmers the opportunity to use the contract agreement as collateral to arrange for credit facilities with commercial banks in order to fund inputs (Eaton & Shepherd, 2001). While 67.9% of the respondents disagreed that penalties are charged in case the farmers make delayed payment for the services (such as contract termination) with a fair majority of 32.1% held a neutral opinion (mean=2.3208, SD=0.47123). Petrick (2004) stated that high interest rates and the short-term nature of loans with fixed repayment periods do not suit annual cropping, and thus constitute a hindrance to credit access among farmers. According to a larger majority of respondents (100%), repayment terms on credit facilities advanced have influenced farmers to

engage in contract financing (mean=4.3585, SD=0.48415) while the level of stock (poultry) determines the amount of credit advanced according to 64.2% of the respondents (mean=2.7170, SD=0.96829).Credit providers often shy away from giving loans to farmers because of the high cost of administering such loans and the perceived high default rates among farmers. Ghosh et al., (2000), believe that it is largely because some farmers lack sufficient stock level to put up as collateral which usually is a prerequisite for borrowing from financial institutions. Most standard deviations were not far from zero, this indicates that the data was close to the mean of respective indicators.

Veterinary Services

Regarding Veterinary Services, respondents were asked to indicate the extent to which they agreed that the statements of aspects of veterinary services influenced income growth among poultry farmers in Kenya. The responses were analyzed using mean scores and standard deviations. Table 6 presents the results of the analysis.

Table 6: Descriptive Analysis for Veterinary Services

Measurable Indicators	5	4	3	2	1	Mean	Standard Deviation
Free, basic veterinary training has enhanced poultry farming productivity	32.1%	67.9%	0.00%	0.0%	0.0%	4.3208	0.47123
Health and safety training concerning poultry farming has enhanced your poultry farming productivity	90.6%	0.0%	0.0%	0.0%	9.4%	3.3774	1.18039
Regular visits by veterinary officers has increased your poultry yields	37.8%	9.4%	0.0%	52.8%	0.0%	3.3208	1.43813
willingness to learn or consult with veterinarians has enhanced poultry farming	52.8%	9.4%	37.8%	0.0%	0.0%	3.3208	1.43813

Table 6...

Keeping records of diagnoses and treatments has enhanced poultry farming	0.0%	0.0%	41.5%	0.0%	58.5%	2.4151	0.49745
Frequent collaborative extension services trainings between Kenchic Limited and the Ministry of Agriculture has enhanced poultry farming	0.0%	0.0%	78.1%	0.0%	21.9%	4.2453	0.64765

The findings on Table 6 show that majority of respondents (100%) agreed that free, basic veterinary training has enhanced poultry farming productivity (mean=4.3208, SD=0.47123) with 90.6% of respondents agreeing that health and safety training concerning poultry farming has enhanced poultry farming productivity (mean=3.3774, SD=1.18039). Regular visits by veterinary officers has increased poultry yields as agreed by 52.8% (mean=3.3208, SD=1.43813) while willingness to learn or consult with veterinarians has not enhanced poultry farming according to 62.2% of respondents (mean=3.3208, SD=1.43813). Keeping records of diagnoses and treatments has enhanced poultry farming as agreed by fair majority of 58.5% of the respondents with 41.5% holding a neutral opinion (mean=2.4151, SD=0.49745). 78.1% of the respondents held a neutral opinion on whether frequent collaborative extension services trainings between Kenchic Limited and the Ministry of Agriculture has enhanced poultry farming (mean=4.2453, SD=0.64765). Francis (2012) did a study on the role of agricultural extension services in agricultural transformation for rural poverty reduction. He found that majority of agricultural producers in Ghana still need Agricultural Extension Services as a major agricultural transformation strategy. Although there was disparity in respondents' opinions with some of the responses registering standard deviation values greater than 1, the results also indicate that the data was also close to the indicators' mean values since some standard deviations were close to zero.

Income Growth

Respondents were asked to indicate the extent to which they agreed with income growth measurable indicators. The responses were analyzed using mean scores and standard deviations. Table 7 presents the results of the analysis.

Table 7: Descriptive Analysis for Income Growth

Measurable Indicators	5	4	3	2	1	Mean	Standard Deviation
Contract financing has led to an increase in income levels which has led to increase in profits	28.3%	45.3%	15.1%	11.3%	0.0%	3.9057	0.94593
Contract financing has reduced the level of poverty since farmers gain more profits when engaging in contract farming	7.5%	12.1%	43.4%	0.0%	37.0%	2.4340	1.37993
Contract farmers gain higher expected returns and lower risks as compared to non-contracting farmers	28.3%	58.5%	3.8%	1.9%	7.5%	3.9811	1.04680
Contract financing ensures market access for farmers' produce thereby providing high ability to generate more income for the farmers	45.3%	30.2%	13.2%	3.8%	7.5%	3.0377	1.42724
Contract financing save costs associated with poor market information systems hence reduces the transaction costs	40.3%	8.8%	37.7%	13.2%	0.0%	3.1887	1.16118
Engaging in contract financing has helped you as a farmer reduce your overall variable costs thus increased income	3.0%	24.5%	44.2%	28.3%	0.0%	2.8868	0.91274

The findings on Table 7 indicate that 73.6% of respondents agreed that Contract financing has led to an increase in income levels which has led to increase in profits (mean=3.9057, SD=0.94593). Studies by Warning and Key (2002) have confirmed improvement in farmers'

income as a result of participation in contract financing. It was not clear on whether contract financing has reduced the level of poverty since farmers gain more profits when engaging in contract farming since a fair majority of respondents 43.4% held a neutral opinion (mean=2.4340, SD=1.37993). According to Bernice (2016), contract financing could help alleviate poverty in most rural areas and empower poultry farmers to expand their capacity in order to effectively and consistently supply to other processing companies. A larger majority of respondents (86.8%) agreed that contract farmers gain higher expected returns and lower risks as compared to non-contracting farmers (mean=3.9811, SD=1.04680). Birthal, Joshi, and Gulati (2005) found that the gross margins for contract dairy farmers in India were almost double those of independent dairy farmers, largely because contract growers had lower production and marketing costs. According to 75.5% of respondents, contract financing ensures market access for farmers' produce thereby providing high ability to generate more income for the farmers (mean=3.0377, SD=1.42724) while 49.1% of respondents agreed that contract financing save costs associated with poor market information systems hence reduces the transaction costs (mean=3.1887, SD=1.16118). Tripathi et.al (2005) asserts that smallholders may enter contracts to reduce transaction costs of accessing new markets, borrowing, managing risk, acquiring information or increasing employment opportunities. Majority of respondents (44.2%) held a neutral opinion on whether engaging in contact financing had helped farmers reduce their overall variable costs resulting to an increased income (mean=2.8868, SD=0.91274). Almost all the responses had standard deviation values greater than 1.0 indicating lack of cohesion in respondents' views.

Chi-square Test for Goodness of Fit Analysis

This section presents the findings of the chi-square test for goodness of fit for the variables under study.

Table 8: Chi-square test for goodness of fit

	Capital	advance pricing	contractor credit	veterinary services	Income growth
Chi-Square	25.868[a]	7.396[b]	33.321[b]	5.453[c]	7.962[b]
Df	3	2	2	1	2
Asymp. Sig.	.000	.025	.000	.020	.019

Table 8 presents these findings. The Chi-square test for equal proportions is a statistical test used to investigate whether the proportions of responses in each category are equal or whether there are statistically significant differences in the proportions of responses in each category. The null hypothesis of the Chi-square test is that the proportion of responses that fall into each of these categories is equal and any differences observed are due to chance or random variation. If the null hypothesis is true, then we cannot conclude anything based on the responses we observe, as these are essentially due to chance. We reject this null hypothesis of equal proportions at the 5% significance level (95% confidence) if the p-value of the test for that question is less than or equal to 0.05. The chi-square probability values shown are less than the conventional probability value of 0.05 (χ^2=25.868, p<0.05), (χ^2=7.396, p<0.05), (χ^2=33.321, p<0.05), (χ^2=5.453, p<0.05) and (χ^2=7.962, p<0.05) respectively, indicating that the results obtained are statistically significant, showing dominant and equal perception of respondents regarding the said questions.

Correlation Analysis

Correlation between variables is a measure of how well the variables are related. The most common measure of correlation in statistics is the Pearson Correlation which shows the linear relationship between two variables. Devore and Peck (2006) recommends a guideline for assessing resultant correlation coefficients which states that correlation coefficients less than 0.5 represent a weak relationship, correlation coefficients greater than 0.5, but less than 0.8, represent a moderate relationship whereas correlation coefficients greater than 0.8 represent a strong relationship. The Results are between -1 and 1. A result of -1 means that there is a perfect negative correlation between the two values, while a result of 1 means that there isa perfect positive correlation between the two variables. Result of 0 means that there is no correlation between the two variables (Gujarat, 2004). Before carrying out a test on research' hypotheses, the study examined how the variables of the study: capital, advance pricing, contractor credit services, veterinary services and income growth among poultry farmers were related. The analysis was carried out using Pearson correlation coefficient. Pearson correlation coefficient was used because the data was normally distributed. Table 9 presents the results of the correlation coefficient analysis. The correlation results in Table 9 show a statistically insignificant weak positive relationship between capital and income growth among poultry farmers (r = 0.037, p >0.05). Capital endowment (accumulation of non land fixed assets) has a positive relationship with growth acceleration of household's income among smallholder farmers (Sen, 2003).The results also show that there exists a statistically significant strong positive relationship between advance pricing and income growth among poultry farmers (r = 0.927, p <

0.05). According to Martinetz (2005) there exists a positive association between advance price setting and income growth since price risk is reduced, in contract financing, by the use of a predetermined price rather than the market price. The correlation results also reveal that there is a statistically significant moderate positive relationship between contractor credit services and income growth among poultry farmers (r = 0.741, p < 0.05). Significant relationship between credit access and income growth show that access to credit can significantly increase the ability of households with no or few savings to meet their financial needs for agricultural inputs; especially those that are highly necessary for pest, disease control and productive investments. Furthermore, easy availability and access to credit enables farmers and entrepreneurs to diversify by undertaking new investment (Robinson, 2001). Further, the results show a statistically significant moderate positive relationship between veterinary services and income growth among poultry farmers (r = 0.779, p < 0.05). These results are consistent with findings of Oladele (2004), who found a positive relationship between veterinary services and income growth among poultry farmers asserting that limited access to institutional services such as extension and veterinary services affect poultry production and hence income of farmers .

Table 9: Correlation analysis

		Capital	Advance Pricing	Contractor Credit	Veterinary Services	Income Growth
Capital	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	53				
Advance pricing	Pearson Correlation	.032	1			
	Sig. (2-tailed)	.818				
	N	53	53			
Contractor Credit	Pearson Correlation	.062	.755**	1		
	Sig. (2-tailed)	.661	.000			
	N	53	53	53		
Veterinary Services	Pearson Correlation	-.022	.615**	.345*	1	
	Sig. (2-tailed)	.876	.000	.012		
	N	53	53	53	53	
Income Growth	Pearson Correlation	.037	.927**	.741**	.779**	1
	Sig. (2-tailed)	.791	.000	.000	.000	
	N	53	53	53	53	53

**. Correlation is significant at the 0.05 level (2-tailed)

Test of Research Hypotheses

Combined effect of predictor variables on the outcome variable was tested. Table 10 presents the goodness of fit for the regression between the predictor variables (independent variables) and the outcome variable (Dependent variable). The overall R^2= 0.947 which indicates 94.7 percent of the variation in the dependent variable is explained by the independent variables that are included in the model. The F-statistics of the regression result is F=212.330 (df=4, 48) whose probability value is 0.000 which is less than the conventional probability value of 0.05. This indicates that the model is good and significantly fitted and that the coefficients of the model are not equal to zero. The Durbin-Watson statistic value of 1.902 indicates that there is minimal autocorrelation in the residuals from the statistical regression analysis. The Durbin-Watson statistic is always between 0 and 4. A value of 2 means that there is no autocorrelation in the sample, values approaching 0 indicate positive autocorrelation and values toward 4 indicate negative autocorrelation

Table 10: Model fitness for all the Predictor Variables

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.973[a]	.947	.942	.20301	.947	212.330	4	48	.000	1.902

a. Predictors: (Constant), advance pricing, capital, veterinary services, contractor credit

b. Dependent Variable: income growth

The following regression equation was obtained;

INGR = 1.746 + 0.014 CPTL+ 0.326 COCRE +0.662 VSER + 0504 ADPR

Where:

INGR - Income Growth among Poultry Farmers

CPTL - Capital

COCRE - Contractor Credit Services

VSER - Veterinary Services

ADPR - Advance Pricing

The regression analysis results on Table 11 indicate that there exist a statistically insignificant positive relationship between capital and income growth among poultry farmers ($\beta = 0.014$, $p > 0.05$). Numerically, the 0.014 beta coefficient of capital variable implies that for every one additional unit of fix capital, income growth among poultry farmers increases by 0.014 shillings.

The null hypothesis ($\mathbf{H_{01}}$) was thus accepted concluding that capital has no significant influence on income growth among poultry farmers. Sen, (2003) in a study of the Drivers of Escape and Descent reported that capital endowment (accumulation of non land fixed assets) has a positive relationship with growth acceleration of household's income among smallholder farmers.

The results indicated that the relationship between contractor credit services and income growth among poultry farmers was positive and statistically significant ($\beta = 0.326$, $p<0.05$). This implies that for every one additional loan amount advanced income growth among poultry farmers increases by 0.326 shillings. The null hypothesis ($\mathbf{H_{02}}$) was thus rejected concluding that contractor credit services have significant influence on income growth among poultry farmers. There is a significance link between credit and income growth among farmers since, access to credit may affect farm productivity because farmers facing binding capital constraints would tend to use lower levels of inputs in their production activities compared to those not constrained (Petrick, 2004).

It was also established that there exist a statistically significant positive relationship between veterinary services and income growth among poultry farmers ($\beta = 0.662$, $p<0.05$).This means that for every one additional veterinary services provided, income growth among poultry farmers increases by 0.662 shillings. The null hypothesis ($\mathbf{H_{03}}$) was thus rejected concluding that veterinary services have significant influence on income growth among poultry farmers. The results are consistent with those of Van Schaik (2001, who examined veterinary awareness of the farmers and the effect of veterinary participation by broiler poultry farmers. In the research findings Income of farmers who patronize veterinary services were compared with and non-veterinary patronage and found to be significant.

The results indicate that the relationship between advance pricing and income growth among poultry farmers was positive and statistically significant ($\beta = 0.504$, $p<0.05$), implying that for every one additional advance price set, income growth among poultry farmers increases by 0.504 shillings. The null hypothesis ($\mathbf{H_{04}}$) was thus rejected concluding that advance pricing has a significant influence on income growth among poultry farmers. The results are consistent with those of Martinetz (2005) who found that the main factor in encouraging smallholders to join contract farming projects is the price the project authorities will pay for the product and a guaranteed market which enhances income growth. Thus there exists a significant relationship between price set and income growth among farmers.

Tolerance and VIF results indicate there was no collinearity in the predictor variables since the VIF values are less than 5 and tolerance values are greater than 0.2. VIF greater than 5 may suggest that the concerned variable is multi-collinear with others in the model and may

need to be excluded from the model while tolerance greater than 0.2 indicates non existence of multicollinearity (Gujarati, 2003).

Table 11: Multiple regression analysis coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
	(Constant)	1.746	.279		6.254	.000		
	Capital	.014	.029	.016	.464	.644	.994	1.006
	contractor credit	.326	.086	.199	3.803	.000	.406	2.465
	veterinary services	.662	.077	.376	8.619	.000	.587	1.704
	advance pricing	.504	.058	.545	8.743	.000	.287	3.488

a. Dependent Variable: income growth

SUMMARY OF FINDINGS

According to the research findings, majority of respondents agreed that chicks are provided to the farmers as an initial capital and this has played a critical role in enabling farmers engage in contract farming. There is reimbursement (compensation with other chicks) for sudden chicks' death Syndrome or immature death of chicks as agreed by majority of respondents. However, Pan Feeders, automatic drinkers and chick drinkers are not provided to poultry farmers by Kenchick Limited as agreed by many respondents. In addition fair majority of respondents indicated that strict architectural design for poultry house is provided to farmers. However, respondents agreed that strict heating and lighting dimensions in the poultry house, specific heating and lighting materials in the poultry house are not provided. There exist statistically insignificant, positive causal relationship between capital and income growth among poultry farmers according to joint regression model coefficients results ($\beta = 0.014$, $p > 0.05$). The non-causal relationship between capital and income growth among poultry farmers was found to be weak positive and statistically insignificant ($r = 0.037$, $p > 0.05$).

The research findings indicate that assurance of a fixed sales price for product enhance poultry farming and through contract financing there has been shift of price risks to processors among poultry farmers. The current market prices do not influence the advance pricing of the poultries' product while the advance price is usually determined by the total cost of production. The results indicate that contract farmers have no power in pricing of products and

farmers do not prefer to sell their products at the prevailing market prices as compared to the advance price set. The correlation between the influence of advance pricing and income growth among poultry farmers was found to be strong, positive and statistically significant ($r = 0.927$, $p < 0.05$). The joint regression results also indicate that the advance pricing have significant positive influence on income growth among poultry farmers based ($\beta = 0.504$, $p<0.05$).

Contracting firms guarantee farmers in order to access credits from financial institutions. The contractor credit services offered by the contracting firms do not attract interest costs during the actual payment for services. The results also indicate that the credit service has led to more farmers engage in contract financing according to most respondents. In case of delayed payment for the credit advanced, there are no penalties charged as agreed by a majority of respondents. A fair majority held a neutral opinion on whether penalties are charged in case the farmers make delayed payment for the services (such as contract termination). Repayment terms on credit facilities advanced, do influence farmers to engage in contract financing while the level of stock (poultry) determines the amount of credit advanced to farmers. Contractor credit services have a significant influence on income growth among poultry farmers, as evidenced by the statistically significant positive relationship as shown in the overall regression model ($\beta = 0.326$, $p<0.05$). The correlation between the influences of contractor credit service and income growth among poultry farmers was found to be moderate, positive and statistically significant ($r = 0.741$, $p < 0.05$).

The research findings indicate that free, basic veterinary training, health and safety training concerning poultry farming has enhanced poultry farming productivity. The results also indicate that regular visits by veterinary officers have increased poultry yields while willingness to learn or consult with veterinarians has not enhanced poultry farming. Keeping records of diagnoses and treatments has enhanced poultry farming. However, it was not clear on whether frequent collaborative extension services trainings between Kenchic Limited and the Ministry of Agriculture has enhanced poultry farming due to neutrality opinion held by many respondents. There exist statistically significant, positive causal relationship between veterinary services and income growth among poultry farmers according to joint regression model coefficients results ($\beta = 0.662$, $p<0.05$). The non-causal relationship between veterinary services and income growth among poultry farmers was found to be moderate, positive and statistically significant ($r = 0.779$, $p < 0.05$).

CONCLUSIONS

It can be concluded that capital has a positive influence on income growth among poultry farmers but the influence is not statistically significant. There exists a positive significant

correlation between influence of capital and income growth among poultry farmers. Based on the results it can be concluded that chicks provided to farmers by Kenchic as initial capital are a key pillar in enhancing farmers' engagement in contract farming. Continuous compensation for sudden chicks' death Syndrome or immature death of chicks has also been a motivating factor that has enhances loyalty among farmers towards contractual poultry farming with Kenchic. It can also be concluded that there has not been provision of Pan Feeders, automatic drinkers and chick drinkers to poultry farmers something that need to be taken care of. Conclusions can also be made that Kenchick's strict architectural design for poultry house among poultry farmers has been important in enhancing survival of chicks although there exists no specific heating and lighting dimensions provided. Equally, heating and lighting materials are not provided.

Advance pricing has a significant influence on income growth among poultry farmers. There exists a positive significant relationship between influence of advance pricing and income growth among poultry farmers. It can be concluded that assurance of a fixed sales price for product enhances poultry farming. This is because poultry farmers are certain about the expected selling price thus building confidence in poultry farming. Conclusion can be made that contract finance helps in shifting of price risks to processors among poultry farmers thus acting as a good hedge against price fluctuation uncertainties. It can be concluded that current market prices does not in any way influence the setting of the advance pricing of poultries' products with farmers not preferring to sell their products at the prevailing market prices as compared to the advance price set. Though poultry farmers have no power in pricing of products since advance price is usually determined by the total cost of production, they still prefer to sell their products at the advance price set as compared to the prevailing market prices.

It can be concluded that contractor credit services has a significant influence on income growth among poultry farmers. There exists a positive significant relationship between influence of contractor credit services and income growth among poultry farmers. It can be concluded that contracting firms guarantee farmers in order to access credits from financial institutions. This guarantee enhances poultry farming as farmers are able to boost their stock level. Conclusions can also be made that credit facilities offered by contracting firms have favorable terms since they do not attract interest costs during the actual payment for services. Moreover the credit facilities do not attract huge penalties in case the farmers make delayed payment for the services. Such penalties may include contract termination. Thus it can be concluded that credit facilities terms influence farmers to engage in contract financing.

Veterinary services has a significant influence on income growth among poultry farmers. There exists a positive significant relationship between influence of veterinary services and income growth among poultry farmers. It can be concluded that free, basic veterinary training,

health and safety training concerning poultry farming has enhanced poultry farming productivity. More regular visits by veterinary officers have increased poultry yields since the officers are able to give regular diagnoses and treatments to poultry thus enhancing productivity. Conclusions can also be made that poultry farmers have been actively keeping records of diagnoses and treatments, a trend that has enhanced poultry farming. There exists no clear collaboration strategy between the Ministry of Agriculture and Kenchic Limited in a bid to offer regular extension services to poultry farmers.

LIMITATIONS OF THE STUDY

During the research process, the researcher experienced a number of limitations, however the limitations did not have a significant effect on the empirical findings. Firstly, the study was limited to poultry farmers in Kiambu County, the case study would not have been adequate to warrant generalization of the results. However the researcher did a census survey in a bid to select a sample size that was adequate for making inferences. Additionally, some respondents were unwilling to provide information for fear that the information was sensitive and confidential. The researcher ensured proper communication was made on the purpose of the study and by assuring respondents of confidentiality on information provided. Another limitation was the nature of data collection instruments and procedures. The questionnaires which were self structured and self administered relied on the honesty of respondents in indicating their responses. The variables used in this study were pure attitudinal survey thus subjective in nature. The responses were thus based non emotion attitude of the respondents which may have kept changing as at the time of completing the data collection instruments.

RECOMMENDATIONS

The management of Kenchic should put in place a strategy where of Pan Feeders, automatic drinkers and chick drinkers are provided to poultry farmers. This will save farmers on costs of buying these items thus minimizing their overheads and hence increasing their income level. There should also be provision of heating and lighting materials as well as specific heating and lighting dimensions to poultry farmers. These will ensure cost efficiency to farmers who don't need to source for sub standard heating and lighting materials as this may affect the productivity of poultry farming. Specific heating and lighting dimensions in the poultry house will ensure productivity is enhanced as a result of a favorable environment that minimizes sudden chicks' death syndrome.

It is recommended that through a mutual agreement with the contractor, farmers should be involved in advance price setting. This will ensure that farmers as well as the contractor are

able to hedge against price fluctuation in future enabling farmers to shift their preference from prevailing market prices to advance price set. Equally the advance price set should be continuously adjusted to the cost of production thus ensuring reap the benefit of being in contract farming.

It is recommended that there should be a renegotiation between the contractor and the financial institutions that advance credit facilities to farmers on the guarantee by Kenchic. The renegotiation will ensure that some bottlenecks are addressed including repayment terms since some of the respondents held the opinion that penalties charged in case of delayed payment of credit facilities are not realistic. This can create a mutual relationship between contracting parties thus enhancing engagement in contractual financing among poultry farmers.

It is recommended that continuous free veterinary trainings should be conducted through regular visits by veterinary officers. This will ensure that poultry farmers are equipped with basic veterinary training in bid to offer basic diagnoses and treatments in absence of veterinarians or in emergency cases. Respondents held neutral opinion on whether there exist frequent collaborative extension services trainings between Kenchic Limited and the Ministry of Agriculture. It is recommended that collaborative strategies be formulated so that the poultry farmers can benefit from such agreements in terms of enhancing their productivity through continuous training and working capital provision.

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