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# Training on Agribusiness, Value Addition and Performance of Farmers in Selected Counties in Central Kenya

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# Abstract

Despite intensive knowledge and skill presumably passed on to the dairy farmers, there is a huge outcry from these farm entrepreneurs of high cost of dairy production and low returns on their dairy farming investment. Nevertheless, a small portion of the farmers have gone ahead to venture into dairy farming as business. This study sought to establish the dairy different investment strategies or combination of investment strategies and their resulting performance in the agribusiness farms. The study focused on the dairy agribusiness strategies of dairy farms in Nyeri, Kirinyanga, Murangá and Kiambu counties of Kenya. Data was collected from 60 dairy agribusiness farms. The sample size was proportionally determined from the total number of active dairy farmers who delivered milk to Milk Associations (processor, Union, Federation, Cooperative (D.F.C.S.) self-help (S.H.G.), Investment Company) data sourced from Kenya Dairy Board 2015. Data was analyzed using the SPSS and STATA computer software, where both descriptive and inferential statistics were derived. Stochastic frontier production function was estimated using the maximum likelihood estimation technique. The study found that training to dairy agribusiness farmers and end product value addition influence the performance in dairy farming in central Kenya. The study recommends area for further studies to consider other

County Governments in Kenya for purpose of making a comparison of the findings with those of the current study.

**Keywords:** *training, value addition, performance, farmers, Central Kenya*

### 1.1 Introduction

Under World Bank Development report 2008 titled Agriculture for development, they stated that Agricultural is one of the most important and effective strategies for economic growth and poverty reduction in rural areas where the majority of the world's poor live. Gross domestic product (GDP) growth in agriculture has been shown to be at least twice as effective in reducing poverty as growth originating in other sectors.

It is important to consider inclusive business strategies that will create value for the rural and urban poor, or innovative models that will help build bridges between businesses and the poor. Past agricultural policies and programs have focused mainly on improving production (World Bank, 2013). Hence, the failure of agriculture to function as an engine of growth stems not only from 'production' considerations but from the organization and performance of the value chain as a system. For instance, coordination with urban markets, relations between farmers, processors and traders, transportation, finance, diffusion of knowledge, infrastructure, are all part of the bigger picture. Issues, such as who benefits from the agribusiness value chains, value chain dynamics and upgrading, sector linkages, governance and coordination mechanisms, and social diversity (age, gender), are all important lines of inquiry that have only been fragmentally understood and partially explored in the Kenyan context. Broadly, these aspects are all encompassing to include interaction of factors facilitating upgrading and inclusion or exclusion of actors in the value chain. Inter alia, institutional settings, the governance structure, and standards influence linkages and participation of actors and their role and position in the local and global agricultural value chains (Rutashobya, 2013).

Under the Vision 2030 Economic Pillar (other Pillars includes Social and Political), Agriculture is among the sectors in target to realizing the set objective (moving the economy up the value chain). The sector has for many years formed the backbone of Kenya's economy, contributing about 24 per cent of the Gross Domestic Product (GDP) and accounts for 80 per cent of national employment, mainly in rural areas. Agriculture also contributes more than 60 per cent of the total export earnings and about 45 per cent of government revenue, while providing for most of the country's food requirements. The sector is estimated to have a further indirect contribution of nearly 25 per cent of GDP through linkages with manufacturing, distribution, and other service related sectors.

The promulgation of Kenya's Constitution in 2010 enunciated a plethora of reforms key amongst them being; devolution of various sectors including agriculture. Devolved framework for agriculture is anchored in Part 2 of the Fourth Schedule, providing that the national government shall have exclusive responsibility of agricultural policy formulation whilst the county government shall facilitate, implement and oversee all other agricultural related matters

including the implementation of national policies on agriculture. The new constitution has the national ministry making policy, but crop and animal husbandry, fisheries, disease control and other services being undertaken at the county level (Simiyu, 2012)

In Kenya, we have a State Department of Agriculture that has the mandate "to promote and facilitate production of food and agricultural raw materials for food security and incomes; advance agro based industries and agricultural exports; and enhance sustainable use of land resources as a basis for agricultural enterprises." These government objectives show the renewed focus on the agriculture management. Among the areas being addressed include; Crop Resources, Agribusiness & Marketing; Policy, Crop Research & Regulations; Infrastructure & Mechanization; Licensing, (Simiyu, 2012).

The whole world produced an estimated 721.4 million tonnes of dairy milk. Leading among the countries were India (137.5 million tonnes), USA (84.3 million tonnes, Pakistan (41.6 million tonnes), China (33.9 million tonnes) and Brazil (32 million tonnes) (Hoards Dairyman, 2013).The U.S. is top in milk processing worldwide followed but Germany, China, France and Spain (Hoards Dairyman, 2013). Based on International Farm Comparison Network Data 2013 (IFCN), only 62% of the world milk production is delivered to processing plants, 38% is consumed on farms or sold informally.

In the year 2004, total cow milk production in Africa was 21.2 million tons produced from a total of 46 million dairy cows giving an average milk yield of 461 Kg milk per cow over the year, which is only one fifth of world average yield (FAOSTAT 2006). The top five African milk producing countries in terms of milk volume are Sudan, Egypt, Kenya, South Africa and Algeria. Meanwhile, the first four countries alone produce 52% of total African milk, (Ndambi, Hemme & Latacz, 2007). Dairy trends and production systems can be greatly influenced by policies. In Kenya, for example, the small-scale specialized dairy production system has witnessed enormous growth within the past years, due to the vast adoption of policies favoring this system (Thorpe, 2000).

Kenya's dairy industry is dynamic and plays an important economic and nutrition role in the lives of many people ranging from farmers to milk hawkers, processors, and consumers. Kenya has one of the largest dairy industries in sub-Saharan Africa. Though the last livestock census was conducted in 1966, the current official cattle population statistics come from the Ministry of Livestock and Development, through its field reports compiled by extension officials. The official statistics place the number of milking cattle at 3.8 million, (Wambugu, Kirimi & Opiyo, 2011).

According to Kenya National Bureau of Statistics 2009 Kenya had 17,417,824 cattle. Data under Kenya Dairy Board (KDB) -2015 shows that 34 counties had active dairy farms which delivered milk to Milk Associations (processor, Union, Federation, Cooperative (D.F.C.S.) self-help (S.H.G.), Investment Company). The total number of these Milk Association were 411 with a total of 180,132 active farmers. Dairy production in Kenya is divided into small scale and large scale with the small scale farming being the most popular as it constitutes 70-80% of the total

dairy subsector (Ngigi, 2003; Karanja 2004; IFAD, 2006).A survey conducted by Smallholder Dairy Project (SDP) asserts that there were approximately 6.7 million dairy cattle in Kenya (SDP, 2005). The Food Agricultural Organization (FAO) on the other hand estimates a figure of 5.5 million milking animals (Wambugu, Kirimi and Opiyo, (2011). In Africa, Kenya is the only country, after South Africa that produces enough milk for both domestic consumption and export. In this study 17 districts under central Kenya will form sample representation of the region.

In Kenya, livestock farming is an important economic activity due to its role in raising household incomes, improving food security, providing manure for crop production and providing marketable products like milk, calves and meat (MOA, 2009,Technoserve 2008, Karanja, 2003). With annual milk production in Kenya estimated at 4.2 billion liters in year 2009, the Dairy sub sector in particular provides a means of livelihood to about 2 million Kenyan households and creates forward and backward linkages with the rest of the economy. Dairying is a type of livestock farming whereby cattle are kept for milk production with sole purpose of selling the milk to the consumer.

The industry contributes 14 percent of agricultural GDP and 3.5 percent of total GDP in Kenya. The industry has grown tremendously since its liberalization in 1992 that led to the growth of the informal milk trade, which mainly consists of small-scale operators dealing in marketing of raw milk. The informal milk market controls an estimated 70 percent of the total milk marketed in Kenya. Milk is the main product from a dairy enterprise. A dairy farmer must therefore aim at maximizing on milk output from his/her dairy herd. Raw milk markets offer higher prices to producers and lower prices to consumers but have several challenges relating to quality control and standards, and the associated health and safety concerns.

The rising cost of living in Kenya, and in particular rising prices for branded milk products, has increased the popularity of mobile milk traders selling unpackaged fresh milk (the quality of which is not guaranteed) at lower prices in urban residential areas. This situation has also encouraged supermarkets operators, mainly bigger chains such as Uchumi, Tuskys and Naivas, to establish in-store milk bars/dispensers where consumers can purchase unpackaged fresh pasteurized milk at more affordable prices than branded milk products. It has now been acknowledged that merely improving productivity at the farm level will not suffice to improve the situation for the rural poor, and requires an analysis of agriculture as a system incorporating the whole value chain (World Bank, 2013).

According to Tegemeo Institute in Policy Brief Document titled Productivity Trends and Performance of Dairy Farming in Kenya No. 4/2011), they studied trends in milk productivity and performance of the Kenyan smallholders' dairy sector nationwide between years 2000-2010.The objective of their study was to examine milk productivity trends, assess variable costs of production and gross margin at the farm levels for different grazing systems, and highlight the constraints in the dairy industry. Their findings included; Households keeping improved animals increased over the years 2000-2010. There was positive trend in milk production between 2000-2007 declines in 2010 due to prolonged drought. Milk production was higher in higher potential

areas. Production in any year was associated with seasonal variation. There were relatively low proportions of milk sold indicating that while dairy production was practiced by many households, most of the produced milk is mainly for home consumption. Purchase of concentrates formed the largest cost component in both non-zero grazing and zero grazing system.

Cost of maintenance and repairs was second for zero grazing system. Cost of labor is second in non-zero grazing system. Dairying is an economically viable enterprise in the short run. Both total value of milk produced by each lactating cow per month and the monthly variable cost per lactating cow were higher in zero grazing enterprises. The gross margin per cow per month in zero grazing system was lower with monthly return over variable costs of ksh 935, (Tegemeo Institute in Policy Brief, 2011).The gross margin per cow per month in non-zero grazing system was Ksh 1,567 which was 1.7 times higher than that in the zero grazing system, (Tegemeo Institute in Policy Brief, 2011).Overall the ratio of gross margin to variable expenses was low for all households regardless of the grazing system, with every shilling invested in total variable costs returning just a few cents. The gross margin rate was low on average.

### 1.2 Statement of the Problem

Despite intensive knowledge and skill presumably passed on to the dairy farmers, there is a huge outcry from these farm entrepreneurs of high cost of dairy production and low returns on their dairy farming. Nevertheless, a small portion of the farmers have gone ahead to venture into dairy farming as business. This study seeks to establish the different strategies or combination of strategies and their resulting performance in these agribusiness farms. This will help answer the question: "are the small dairy farmers not using the right strategies in their milk production"

Various studies conducted on smallholder dairy farms in the 1990's concurred that nutrition i.e. feed availability and utilization was a major factor limiting animals' performance (Omore, 1996; Omore, 1997; Staal, 1997; Methu, 1998). Some of the identified technologies that could solve the problem of feed shortage were growing of a wide variety of forages and fodder trees, fodder conservation using cost-effective methods, and efficient utilization of crop and industrial by-products. Ter-Hemen, Amah Tony (2015) did a case study of dairy farmer groups in Njabini, Nyandarua County. The general objective of this study was to examine the challenges facing dairy farming groups in Njabini locality. The study concludes that dairy farmers are faced with challenges such as limited finance access, lack of working capital, low liquidity, low spending on agriculture by governments, high costs of production, unavailability of agricultural based financing and agricultural grants.

As per the studies cited above in the two and a half decades farmers have been faced with almost similar challenges even though suggestions have been coined on how to address the challenges. Nevertheless, a few farmers have taken the challenges and implemented the suggested steps in addressing the challenges and claim to have succeeded in taking dairy farming as an agribusiness venture. Question is. What are the strategies these dairy farmers have used that make them have a competitive advantage in the dairy venture? Can we take these strategies across the board to

make the dairy farming venture into the profitable margins hence help the dairy farmers? This study addressed itself on dairy agribusiness strategies farmers have used and how they affect performance.

### 1.3 Objectives of the Study

i. To establish whether training to dairy agribusiness farmers affect the performance of dairy farms in central Kenya region.
ii. To determine the effect of end product value addition on performance in dairy farming in central Kenya.

## 2.0 Literature Review

### 2.1 Theoretical Orientation

Various theories have been developed by various scholars that relate to this study. Among the theories that have been discussed in relation to the research topic is: diffusion of innovation theory; theory of reasoned action; classical conditioning theory; and the value chain theory. These theories touched on each objective strategy or a combination of objectives and point out the way each help affect performance.

#### 2.1.1 Classical Conditioning Theory

Classical conditioning (Theory by Ivan Pavlov, 1849-1936) is a form of learning whereby a conditioned stimulus (CS) becomes associated with an unrelated unconditioned stimulus (US) in order to produce a behavioral response known as a conditioned response (CR). The conditioned response is the learned response to the previously neutral stimulus. The conditioned stimulus is usually neutral and produces no particular response at first, but after conditioning it elicits the conditioned response. In this study context, this theory will apply on the training and operation objectives bring about a desired conditioned performance.

When a farmer acquires skills and knowledge (conditioned stimulus) on how the dairy cow converts feds into milk within it body, the farmer results into enhancing the nutritional balanced aspects (unconditioned stimulus) of what help the cow generate more milk (conditioned response). When a farmer also engages in research on best breeding dairy cow and apply the knowledge to enhance and upgrade the dairy farming (conditioned stimulus) by propagating the best genetic makeup (unconditioned stimulus) of dairy cows high milk productivity performance (conditioned response).Research on dairy farming involves experiments and demonstrations on nutrition and management. Experiments conducted on the dairy farming are investigating: feeds and feeding activities; improving health of dairy cows through management and feeding programs. Skilled and well trained farm workers are essential. Intimate knowledge of dairy cattle and their management is necessary in providing the milking cow with the kind of nutrition that will allow dairy cow to produce the optimum amount of quality milk. By having skilled and trained workers a dairy farmer not only increase milk production but may as well minimize other cost related to wastage (of resources), diseases and pest control. This eventually enhances performance.

### 2.1.2 The Value Chain Approach

The term 'Value Chain' was used by Michael Porter in his book "Competitive Advantage: Creating and Sustaining Superior Performance" Porter, (2013). Every farm is a collection of activities that are performed to design, produce, and market, deliver and support its products. All these activities can be represented using a value chain model. Competitive advantage is created and sustained when a farm performs the most critical functions either more cheaply or better than its competitor(s). Value chain can be used to examine the various activities of a farm and how they interact in order to provide a source of competitive advantage by, performing these activities better or at a lower cost than the competitors (Sivapalan & Rajendran, 2012). The value chain analysis describes the activities the organization performs and links them to the organizations competitive position.

Agriculture due diligence focuses heavily on value-chain analysis that assesses the structure, conduct and performance of each segment of the value chain: agricultural production process/activities, the value-added processes and the market. A value chain analysis will include a focus on actors (who handle the process as it moves through the value chain), supporters (who provide essential services) and regulators (who create the enabling environment). According to Porter (2013), a firm must decide whether to attempt to gain competitive advantage by producing at a lower cost than its rivals or differentiate its products and services and sell them at a premium price. Then, the firm must decide whether to target the whole market (broad) with its chosen strategy or to target a niche (narrow) market. If a firm wish to pursue the strategy of cost leadership, it has to be the low-cost producer (Porter, 2013). A firm may gain cost advantage through economies of scale, appropriate technology, cheap raw material, etc. Organizations that achieve cost leadership can benefit either by gaining market share through lowering prices (whilst maintaining profitability,) or by maintaining average prices and therefore increasing profits (Porter, 2013). All of this is achieved by reducing costs to a level below those of the organization's competitors.

In this study though the value chain approach under Porters theory address itself to the whole firm systems, the study will focus much on the objectives farming activities and look at them deep analyzing them to bring out the exact activities that derive the competitiveness by reducing cost or enhancing productivity. Feeding activities to ordinary farmers would entail providing pastures/fodder to the dairy cow to satisfy the hunger with expectation of milk. In dairy agribusiness, a dairy farmer will plan to give the dairy cow pasture/fodder that is balanced in both quality and quantity, at the right time for the right stage of the dairy cow, in the right manner, using right feeding trough etc. In doing all these farmer targets to get the best out of each activity he does in the feeding.

Milk value addition; Small scale dairy farmers often deliver their milk to the milk processors who buy milk direct from farmer or indirect from the collectors then process, package and transfer raw milk into final product. This act as the centre of the value chain and also the ruler in the game with dairy farmer. The processors set the quality control to the milk assessment. And base on the quality of the milk, they would set the price. The dairy farmer become the one who

suffer a lot in this trade due to the fact that the processor normally uses the approach of "buy low sell high". In the light of this agribusiness dairy farmers have seen the challenge of having to "sell low" their produce hence is further investing to ensure they do more value addition to their milk produced and thus fetch better prices for their milk from consumers.

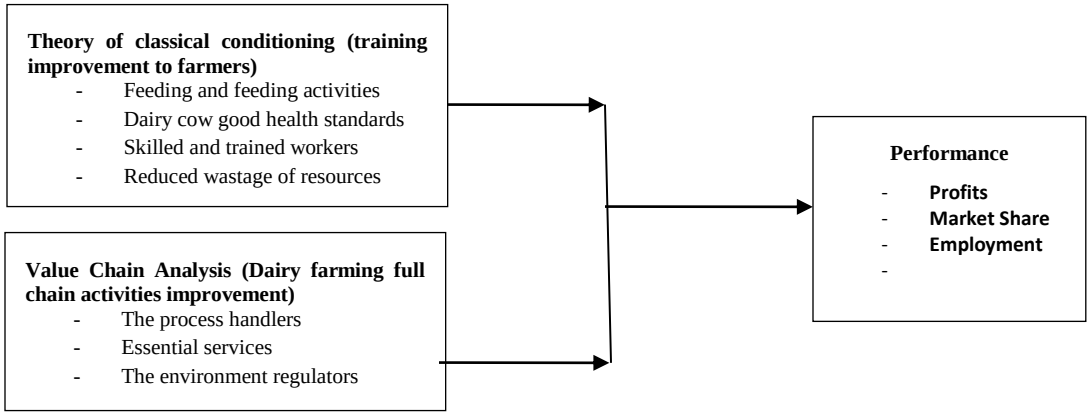


**Figure 1: Theoretical Framework**

## 2.2 Conceptual Framework

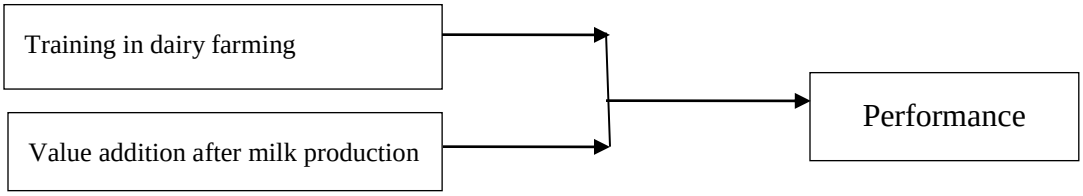


**Figure 2 Conceptual Framework**

### 2.2.1 Dairy farming training

Research needs within agricultural economics have changed, with greater emphasis now being placed on agribusiness. In particular, there is an ever-increasing need for research on the operations of the agribusiness sector as supply chains become more tightly aligned; businesses become more consolidated with mergers, acquisitions, joint ventures and strategic alliances; and a general industrialization mentality unfolds (Dooley & Fulton, 1999). Agricultural economics departments have increasingly taken notice of these trends or new realities and have started responding to these demand factors. Norman and Obwona (2001) noted how institutions had moved from an initial response of only changing department names to reflect agribusiness to having programmed that place more explicit emphasis on agribusiness. Training is a key means of informing producers about issues but is has yet to reach its potential and is in danger of failing

and robbing traditional producers of a useful low level source of information government subsidies are withdrawn.

### 2.2.2 Value addition

Adding value to agricultural products beyond the farm gate usually has several times the economic impact of the agricultural production alone. Agricultural producers receive a much smaller portion of the consumer's dollar than do food processors, especially processors who produce brand name items (D Hanselka, 2009). Capturing those additional dollars by adding value to farm or ranch products is a goal of many producers. This leaflet defines value added activities, outlines the economic forces that make adding value important, and provides guidelines for starting your own value added business. Value added means adding value to a raw product by taking it to at least the next stage of production. This can be as simple as retaining ownership of your calves and wintering them on wheat pasture or placing them in a feedlot. Value can be added through membership in a cooperative that processes your products, such as a cooperative cotton gin. Or, adding value may be as elaborate as going all the way to the consumer with a case-ready food product, (Barkema&Drabenstott, 2012).

### 2.3 Operationalization

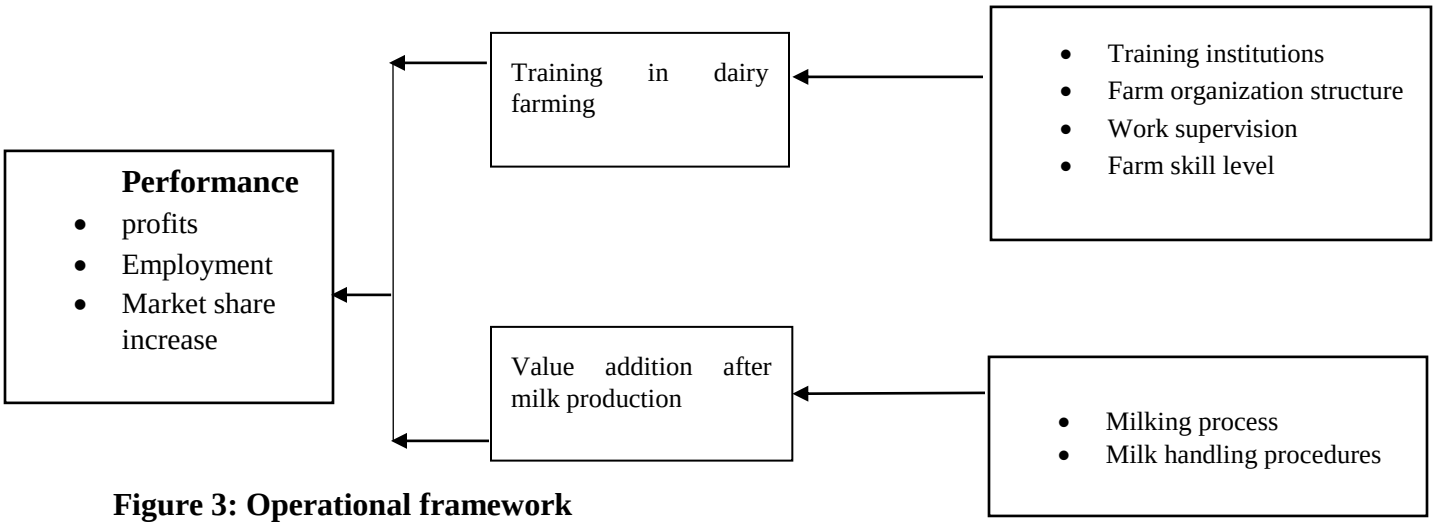


**Figure 3: Operational framework**

### 2.3.1 Operationalization

Human capital quality directly influences agricultural productivity by affecting the way in which inputs are used and combined by farmers. Improvements in human capital affect acquisition, assimilation and implementation of information and technology. Human capital also affects one's ability to adapt technology to a particular situation or to changing needs. Norman and Obwona (2001) noted how institutions had moved from an initial response of only changing department

names to reflect agribusiness to having programs that place more explicit emphasis on agribusiness. Research and training can be measured by Vet services, Farm visit and Training institutions.

The lack of value addition in developing countries has partly been traced to a lack of local competences and the difficulties in successfully competing with already established processors in the Western countries. Moreover, much value chain analysis has rather narrowly focused on exploring the value chain operators and their activities, often with a particular emphasis on describing the predicaments of the on-farm producers, when in fact there is a need to understand the whole chain from pre- to post-production while simultaneously considering the value chain influencers (the enabling environment and facilitating institutions) and supporters (facilitating services). Value addition can be measured by Milk process and Packaging and branding.

## 3.0 Research Methodology

The study concentrated in Central Kenya which is mostly an agricultural area with farmers practicing mixed farming. The research study utilized a descriptive, qualitative and quantitative research design to analyze the performance of dairy agribusiness farming in central Kenya region. The target population was 69481 active farmers. The sample size of 384 was determined by Cochran's formula. During the data collection questionnaires were the major instrument. Data validity and data reliability were also conducted. Regression analysis was used in estimating the relationships among variables.

## 4.0 Analysis, Results and Discussions

### 4.1 Response Rate

A total of 384respondents were issued with the questionnaires which imply that the entire sample population was used for the study. The result of the analysis of the respondents is presented in Table 1.

**Table 1: Response Rate**

| Response | Frequency | Percent |
|---|---|---|
| Returned | 346 | 90.10% |
| Unreturned | 38 | 9.90% |
| **Total** | **384** | **100%** |

Table 1 show that a total of 384 questionnaires were distributed. Out of these, 346 questionnaires were properly filled and returned. This represented an overall successful response rate of 90.10%. According to Mugenda and Mugenda (2003) and also Kothari (2004) a response rate of above 50% is adequate for a descriptive study. Babbie (2004) also asserted that return rates of above 50% are acceptable to analyze and publish, 60% is good and 70% and above is very good. Based on these assertions from these studies, 94.06% response rate is considered very good for the study.

### 4.2 Dairy Agribusiness Training

Training on dairy agribusiness was measured by seven questions. The analysis is a shown Table 2.

**Table 2: Training**

| Statements | Strongly Disagree | Disagree | Not Sure | Agree | Strongly Agree | Mean | Std. Dev |
|---|---|---|---|---|---|---|---|
| The farm send its key staff for dairy farm seminars, trade fares, trainings or farm visits. | 7.2% | 4.3% | 11.8% | 39.3% | 37.3% | 3.95 | 1.15 |
| The farm has trained and skilled manager/supervisor on dairy cow production | 5.2% | 9.2% | 13.0% | 47.7% | 24.9% | 3.78 | 1.08 |
| The dairy farm has an organization structure of Manager - Supervisor - workers | 7.2% | 6.9% | 10.7% | 36.4% | 38.7% | 3.92 | 1.19 |
| The dairy farm follows the command chain when performing its activities | 7.5% | 8.4% | 10.4% | 35.8% | 37.9% | 3.88 | 1.22 |
| The farm work is done according to specified schedule and according to plan. | 2.9% | 12.4% | 11.6% | 37.9% | 35.3% | 3.90 | 1.10 |
| The dairy farm is visited by other dairy farmers to learn from its operations | 6.1% | 4.7% | 18.0% | 36.6% | 34.6% | 3.89 | 1.12 |
| The dairy farm trains new staff the ways of dairy farming and ensure the knowledge is passed on to everyone | 6.1% | 8.4% | 17.2% | 34.0% | 34.3% | 3.82 | 1.17 |
| **Average** | | | | | | **3.88** | **1.15** |

From the findings in Table 2, majority of the respondents who represented 76.6% agreed that the farm send its key staff for dairy farm seminars, trade fares, trainings or farm visits, 72.6% agreed that the farm has trained and skilled manager/supervisor on dairy cow production, 75.1% agreed that dairy farm had an organization structure of manager - supervisor - workers, 73.7% agreed that the farm followed the command chain when performing its activities, 73.2% agreed that farm work was done according to specified schedule and according to plan, 71.2 % the farm was visited by other dairy farmers to learn from its operations while 68.3% agreed that the farm trained new staff the ways of dairy farming and ensure the knowledge was passed on to everyone.

On a five-point scale, the average mean of the responses was 3.88 which mean that majority of the respondents agreed with most of the statements on training. The answers, however, were varied as shown by a standard deviation of 1.15. The highest of the mean was 5 while the lowest was 1.

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### 4.3 Products Value Addition

Products value addition was measured by seven questions. The analysis is a shown Table 3

**Table 3: Products Value Addition**

| Statements | Strongly Disagree | Disagree | Not Sure | Agree | Strongly Agree | Mean | Std. Dev |
|---|---|---|---|---|---|---|---|
| The dairy farm has section for milking (milking parlour) | 4.1% | 7.3% | 16.0% | 37.8% | 34.9% | 3.92 | 1.08 |
| The dairy farm use milking machine for milking the dairy cow | 4.9% | 9.3% | 20.3% | 31.4% | 34.0% | 3.80 | 1.15 |
| The dairy farm use workers to milk the cows | 7.2% | 11.3% | 18.0% | 28.4% | 35.1% | 3.73 | 1.25 |
| Produced milk is stored in the cooling section awaiting delivery to the milk association | 4.6% | 9.9% | 15.1% | 42.9% | 27.5% | 3.79 | 1.09 |
| Produced milk is stored in the cooling section awaiting pasteurization process and packaging | 4.3% | 9.6% | 16.5% | 34.8% | 34.8% | 3.86 | 1.13 |
| The dairy farm has a different section dealing with milk processing, packaging and distribution | 9.6% | 5.8% | 15.9% | 30.7% | 38.0% | 3.82 | 1.27 |
| The milk produced is delivered to establish outlets and not any Milk Association like cooperatives etc | 4.9% | 9.9% | 10.4% | 44.1% | 30.7% | 3.86 | 1.11 |
| **Average** | | | | | | **3.83** | **1.15** |

As shown in Table 3, 72.7% agreed that the farm had section for milking (milking parlour), 65.4% agreed that the farm used milking machine for milking the dairy cow, 63.5% agreed that the farm use workers to milk the cows, 70.4% agreed that produced milk was stored in the cooling section awaiting delivery to the milk association, 69.6% agreed that produced milk was stored in the cooling section awaiting pasteurization process and packaging, 68.7 % agreed that the dairy farm had a different section dealing with milk processing, packaging and distribution while 74.8% agreed that milk produced was delivered to establish outlets and not any milk association like cooperatives etc.

On a five-point scale, the average mean of the responses was 3.83 which mean that majority of the respondents agreed with most of the statements on value addition on products. The answers, however, were varied as shown by a standard deviation of 1.15. The highest of the mean was 5 while the lowest was 1.

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### 4.4 Performance of Dairy Farms

On the dependent variable was measured using eight questions. Table 4 shows the findings

**Table 4: Performance of Dairy Farms**

| Statement | Strongly Disagree | Disagree | Not Sure | Agree | Strongly Agree | Mean | Std. Dev |
|---|---|---|---|---|---|---|---|
| As a dairy farmer I have been delighted to see a great progress in my dairy farming. | 6.7% | 4.9% | 12.5% | 36.2% | 39.7% | 3.97 | 1.15 |
| There has been increased production of milk over the years | 9.2% | 4.6% | 9.0% | 29.8% | 47.4% | 4.01 | 1.26 |
| The milk profitability has been on an upward trend over the years | 7.2% | 12.7% | 11.8% | 34.1% | 34.1% | 3.75 | 1.25 |
| The market share of milk products has increased over time | 4.6% | 4.3% | 9.5% | 40.2% | 41.3% | 4.09 | 1.05 |
| The cost of production is low hence improvising income | 4.6% | 7.5% | 14.7% | 41.9% | 31.2% | 3.88 | 1.08 |
| There has been a wide sale of different milk products that has improved the incomes | 7.2% | 6.9% | 10.7% | 36.4% | 38.7% | 3.92 | 1.19 |
| The total biological assets for different farmers has grown high over the years | 7.5% | 8.4% | 10.4% | 35.8% | 37.9% | 3.88 | 1.22 |
| Increased innovation has lowered the cost of production and production of different products | 4.6% | 6.1% | 12.4% | 40.8% | 36.1% | 3.98 | 1.07 |
| **Average** | | | | | | **3.95** | **1.15** |

According to table 4, 75.9% agreed that there has been increased production of milk over the years, 77.2% agreed that the milk profitability has been on an upward trend over the years, 68.2% agreed that the market share of milk products has increased over time, 81.5% agreed that the cost of production is low hence improvising income, 73.1% agreed that there has been a wide sale of different milk products that has improved the incomes, 75.1% agreed that the total biological assets for different farmers has grown high over the years, 73.3% agreed that increased innovation has lowered the cost of production and production of different products.

On a five-point scale, the average mean of the responses was 3.95 which mean that majority of the respondents agreed to most of statement items. The answers, however, were varied as shown by a standard deviation of 1.15. The highest of the mean was 5 while the lowest was 1.

### 4.5 Correlation Analysis

The data presented before on innovation activities, operation activities, farm training, value addition and performance of firms were computed into single variables per factor by obtaining the averages of each factor. Pearson's correlations analysis was then conducted at 95%

confidence interval and 5% confidence level 2-tailed. The Table 5 indicates the correlation matrix between farm training, value addition and performance of dairy farm.

**Table 5: Correlation Matrix Table**

| | | | Performance | Training | Value Addition |
|---|---|---|---|---|---|
| Performance | Pearson Correlation | | 1.000 | | |
| | Sig. (2-tailed) | 0.000 | | | |
| Training | Pearson Correlation | | .679** | 0.059 | .204** |
| | Sig. (2-tailed) | | 0.006 | | |
| Value Addition | Pearson Correlation | | .190** | .175** | .219** |

** Correlation is significant at the 0.01 level (2-tailed).

Results in Table 5 present the results of the correlation analysis. The results revealed that that training on dairy agribusiness farmers and the performance of dairy farms were positively and significantly related (r=0.679, p=0.000). Similarly, results showed that end product value addition and performance in dairy farming were positively and significantly related (r=0.190, p=0.000).

**4.6 Regression Analysis**

Regression analysis was performed by using the composites of the key variables. The data was input to the SPSS software. Results were then presented in Tables 6, 7 and 8.

**Table 6: Model Fitness**

| Indicator | Coefficient |
|---|---|
| R | 0.740 |
| R Square | 0.547 |
| Adjusted R Square | 0.542 |
| Std. Error of the Estimate | 0.356 |

The results presented in Table 6 present the fitness of model used in the regression model in explaining the study phenomena. Farm training and value addition was found to be satisfactory variables in the performance in dairy farming. This was supported by the coefficient of determination also known as the R-square of 0.547. This means farm training and value addition explain 54.7% of the variations in the dependent variable which is the performance of dairy farms. These results further mean that the model applied to link the relationship of the variables was satisfactory. Table 7 presents results of analysis of variance.

**Table 7: Analysis of Variance**

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 52.25 | 4 | 13.062 | 102.951 | 0.000 |
| Residual | 43.266 | 341 | 0.127 | | |
| Total | 95.516 | 345 | | | |

Table 7 provides the results on the analysis of the variance (ANOVA). The results indicate that the overall model was statistically significant. Further, the results imply that the independent variables are good predictors of performance of dairy farms. This was supported by an F statistic of 102.951 and the reported $p<0.05$ which was less than the conventional probability of 0.05significance level. Regression of coefficients results is presented Table 8.

**Table 8: Regression of Coefficients**

| | B | Std. Error | Beta | t | Sig. |
|---|---|---|---|---|---|
| (Constant) | 0.065 | 0.262 | | 0.246 | 0.806 |
| Training | 0.710 | 0.042 | 0.675 | 16.867 | 0.000 |
| Value addition | 0.126 | 0.036 | 0.143 | 3.514 | 0.001 |

Table 8 shows that dairy farm training had a positive and significant effect on performance of dairy farms ($r=0.710$, $p<0.005$). Similarly, results showed that dairy product value addition had a positive and significant effect on performance of dairy farms ($r=0.126$, $p<0.05$).

## 5.0 Conclusions

Based on the findings above the study concluded that training to dairy agribusiness farmers and end product value addition influences the performance in dairy farming in central Kenya.

The study concluded that training to dairy agribusiness farmers play a crucial role in any initiation and adoption farm production activities. It has great power to influence farm performance within the county. Through long term strategic vision, training to dairy agribusiness farmers can encourage the entire county to learn and participate in dairy farming.

Lastly, the study concludes that end product value addition has a positive and significant effect on dairy farming performance. Value addition in dairy farming needs little innovative ways whose product sales will result in the farm increased performance.

## 6.0 Recommendations

Training and continuous training is highly recommended to dairy farmers. This will ensure that they learn the innovative ways, new operational activities and ways on farm management hence leading to improved farm performance.

Lastly, the study recommends for the development of end product value addition. The County Government should make sure that farm products are added value before they are sold outside the county. End product value increases farm revenue and hence profitability

## 7.0 References

Faostat, (2006). Dairy production and products. http://faostat.fao.org

IFAD, (2006) Small holder Dairy Commercialization Program Report, IFAD and G.O.K report.

Ivan Pavlov, 1849-1936. Classical conditioning Theory.

Karanja M., Andrew. (2003). The dairy industry in Kenya: The post-liberalization agenda, Paper presented at a dairy industry stakeholders workshop held in Nairobi, Kenya (27th August 2002).

Karanja AM. (2003). The dairy industry in Kenya: The post liberalization agenda.

Methu. J. N., Owen, E., Abate, A., Mwangi, D. M. and Tanner, J. C. (1996). SmallholderDairying in the Central Kenya Highlands: Practices in the Utilization of Maize Stover as a Feed Resource. Proceedings of the 5th KARI Scientific Conference: 243 - 251.

NdambiO.A, T. Hemme & U Latacz-Lohmann, (2007). Dairying in Africa. IFCN Dairy Research Center at the Department of Agricultural Economics, University of Kiel,SchauenburgerStrasse 116, 24118 Kiel, Germany, Department of Agricultural Economics, University of Kiel, Germany

Ngigi M. (2004). Building On Successes in African Agriculture Smallholder Dairy in Kenya, Focus 12, Brief 6, of 10 April 2004, Copyright © 2004 International Food Policy Research Institute.

Omore, A., McDermott, J. J. and Gitau, G. K. 1996. Factors Influencing Production on Smallholder Dairy Farms in Central Kenya. *Proceedings of the 5th KARI Scientific Conference: 370 – 380.*

Porter, Michael E. (1985). Competitive Advantage: Chapter two, pg. 36. Creating and sustaining superior Performance

Rutashobya K. & Bangens L. (2011) The Search for Poverty Reduction and Sustainability in Agribusiness in Tanzania: Will Value Chain Approaches provide the Insight? In Sigue, S (ed) "African Business and Sustainable Development: Challenges in the Era of Globalization" Edmonton, International Academy of African Business and Development (IAABD)

Staal, S. J. and Omore, A. (1998). Use of farmer recall versus direct measurement in gathering lactation data: Lessons from Kenyan smallholder dairy systems. Food, Land and Livelihood. *Setting Research Agendas for Animal Science*, pg. 184 – 185.

SivapalanAchchuthan, RajendranKajananthan. (2012). Vol 12, No 21. A Study on Value Chain Analysis in Dairy Sector Kilinochchi District, Srilanka

Tegemeo Institute. (2011). Policy Brief Document, Productivity Trends and Performance of Dairy Farming in Kenya No. 4/2011

Ter-Hemen, Amah T. (2015). The challenges affecting dairy farmers in Kenya: a case study of dairy farmer groups in Njabini, Nyandarua County. (United States International University - Africa, 2015)

Wambugu S, Kirimi L and Opiyo J. (2011). Policy Brief Productivity Trends and Performance of Dairy Farming in Kenya. Tegemeo Institute

World Bank (2008). World Development Report 2008: Agriculture for Development.Washington, DC. © World Bank. https://openknowledge.worldbank.org /handle/10986-5990. License: CC BY 3.0 IGO.