FACTORS INFLUENCING SMALLHOLDER DAIRY FARMERS' CHOICE OF MILK MARKETING OUTLET IN KIPKAREN DIVISION OF NANDI COUNTY, KENYA

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DEDICATION

To my late sister, Leah Elizabeth Awino; "To live in hearts we leave behind is not to die".

ABSTRACT

Dairy farming is an important industry in Kenya with an estimated value of Ksh 160 billion and supporting over 1 million households. Commercial smallholder dairy farmers number over one million and produce about 80% of marketed milk in the country. However, the smallholder dairy farmers have had to contend with ups and down in the industry since its liberalization and collapse and revival of the then Kenya Cooperative Creameries (KCC) in 1990s. However, the factors that influence smallholder dairy farmers' in Kipkaren division to choose one milk marketing outlet over another had not been known thereby making this study necessary. The purpose of this study was to explore the factors that influence smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division. It is hoped that the findings of the study will improve policy makers understanding of factors that influence smallholder dairy farmers' choice of milk marketing outlet and serve as a tool to improve the milk marketing system in Kenya. Survey research design was employed in the study with the study area being Kipkaren division of Nandi County. The population of study was made up of smallholder dairy farmers in Kipkaren division who practiced mixed farming. Proportional stratified sampling was employed to determine the number of household heads to be interviewed per location while simple random sampling was used during the actual interview in the field to identify households to be interviewed. The study sample size comprised of 185 household heads and a semi-structured interview schedule was used as the data collection instrument. Descriptive and inferential statistics were used to analyze the data with chi-square test used to determine the relationship between the independent and dependent variables. The findings from the study indicate that the amount of milk produced, the state of the road infrastructure, the services offered by the milk chilling plants and ownership of appropriate means of transport influenced the smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division. In contrast, the mode of milk payment in urban and rural centres was found to have no influence on the smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division. The study concludes that smallholder dairy farmers are not just looking for milk price but also, a market outlet offering other services such as credit and inputs. The study recommends that there is need for government support of the dairy marketing groups through capacity building by offering trainings as well as support the groups in contracts enforcement.

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ABBREVIATIONS AND ACRONYMS

A.I	Artificial Insemination
DANIDA	Danish International Development Agency
DDP	Dairy Development Policy
DMG	Dairy Marketing Group
ESAP	Economic Structural Adjustment Program
FMG	Farmer Marketing Group
GDP	Gross Domestic Product
GOK	Government of Kenya
HI	Heifer International
IFPRI	International Food Policy Research Institute
KCC	Kenya Cooperative Creameries
KDB	Kenya Dairy Board
KDFCS	Kitinda Dairy Farmers Cooperative Society
KNBS	Kenya National Bureau of Statistics
MCDFCU	Meru Central Dairy Farmers Cooperative Union
MOFLD	Ministry of Fisheries and Livestock Development
MOPND	Ministry of Planning and National Development
NARC	National Rainbow Coalition
NCST	National Council for Science and Technology
NGO	Non-Governmental Organization
NLDP	National Livestock Development Policy
USAID	United States Agency for International development

CHAPTER ONE

INTRODUCTION

1.1. Background Information

The dairy industry plays an important role in the global economy due to its overall contribution to the global economy and its direct importance to the global food security. Due to the intensiveness in dairy production, the dairy sector employs a large bulk of the global labour force, especially in developing countries where numerous smallholder producers are directly involved in dairy industry with minimal technology adoption (Hemme, 2012). In some developed countries, such as New Zealand, the dairy sector has consistently played an important role in the economy by being a major foreign exchange earner and directly and indirectly creates employment. With the systematic increase in the global middle class, especially in the developing countries, it has been estimated that the total global milk demand would drastically increase. In this regard, it has been estimated that global milk production would grow from 692 million tons in 2010 to 827 million tons in 2020 with the bulk of the growth occurring in the developed countries due to the adoption of technology (Knips, 2010).

In Africa, Kenya is one of the largest producers of dairy products with an estimated dairy herd of 3.5 million improved breeds and 9 million Zebus (Ministry of Livestock and Fisheries Development (MOLFD), 2007). The country also has the highest per capita milk consumption in Africa, consuming about 90 kilograms (kg) per capita annually compared to average 25 kg per capita annually in Sub-Saharan Africa (MOLFD, 2007). Dairy farming is one of the most developed sectors in Kenya with estimated annual revenue close to Kenya shillings (Ksh) 160 billion. The milk industry represents between 6-8% of gross domestic product (GDP) and supports over 1 million smallholder dairy farmers' households (Land O'Lakes, 2009). There are about 600,000 commercial smallholder dairy farmers in the sector most of them in central highlands and Rift Valley. These dairy farmers on average keep 1 to 4 cows and deliver their milk to hawkers/milk vendors, their cooperatives or local milk cooling centers. Notwithstanding, 50% of the smallholder dairy farmers rely on daily milk sales as a source of income (Institute of Economic Affairs (IEA), 2001). Therefore, the dairy sector is critical for development and poverty alleviation in Kenya.

The dairy sector in Kenya has undergone a lot of changes and challenges before and after independence. Before independence and up to 1969, the dairy sector was largely unregulated with the then Kenya Cooperative Creameries (KCC) formed in 1925 playing a dominant role in milk processing and marketing. Indigenous Africans were not allowed to be involved in commercial dairy production until 1954 when the Swynnerton plan allowed them to produce and sell milk to KCC on quota basis (Jaffe, 1995). Starting with privatization of Artificial Insemination (A.I) services in 1980s, the government fully liberalized the monopoly of the giant KCC in milk marketing in urban areas in 1992 (MOLFD, 2007). With liberalization, there was entry of various processors and marketers in the sector bringing about competition and thus the start of decline of KCC and its eventual collapse in 1999. The collapse of KCC changed milk marketing system from a highly controlled production and marketing chain supported by the government to a market system with multiple players subject to forces of demand and supply.

The liberalization of the dairy sector in 1999 brought the sector into disarray with most smallholder dairy farmers losing out. Liberalization led to collapse of KCC which was the main milk marketing outlet for smallholder producers. Although KCC was later revived in the year 2001, the period of its demise led to the growth of other milk processors thereby increasing milk marketing avenues for smallholder farmers'. Concurrently, the informal milk marketing outlets, comprising of milk hawkers, transporters and others, also grew tremendously and became the preferred marketing outlet for the smallholder dairy farmers. With this in mind, this study set to explore the factors that influence smallholder dairy farmers' choice of milk marketing outlets in Kipkaren division in Nandi County. The factors that were explored included: the amount of milk produced by the smallholder farmers, the state of road infrastructure, the ownership of means of milk transport, the influence of services offered by milk chilling plants and the mode of milk payment in urban and rural centers on the smallholder farmers' choice of milk marketing outlet. A set of objectives and subsequent hypothesis were developed to explore the influence of the above listed factors on the smallholder dairy farmers' choice of milk marketing outlets in Kipkaren division.

1.2. Statement of the Problem

As indicated above, the dairy sector in Kenya has undergone a lot of challenges especially immediately before liberalization in 1992 and after the collapse of KCC in 1999. Through the structural adjustment programmes (SAP) proposed by the external donors, The World Bank and International Monetary Fund (IMF), the government embarked on privatization and economic liberalization agenda from mid 1980s. This led to eventual liberalization of the dairy sector in 1992. Liberalization brought about the entry of other milk processors ensuring diverse marketing outlets in Kenya. In Kipkaren division, with its proximity to three urban centres, Eldoret, Webuye and Kakamega, the farmers have access to various milk marketing outlets to which they market their milk. However, the factors that influences smallholder dairy farmers' in Kipkaren division to choose one milk marketing outlet over another has not been known for long. Different studies have looked at the trends, growth and impact of the dairy sector in Kenya but none had conclusively analysed the factors influencing smallholder dairy farmers' choice of a marketing outlet in Kipkaren division. There was, therefore, an existing knowledge gap that this study aimed to fill.

1.3. Purpose of the Study

The purpose of this study was to explore the factors that influence smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division of Nandi County in order to understand what drives the smallholder dairy farmers in the division to choose one market outlet over another.

1.4. Objectives of the study

The objectives that guided the study were to:

1) Describe the socio-economic characteristics of the smallholder dairy farmers in Kipkaren division and the existing milk marketing outlets in the division.

2) To determine the influence of the amount of milk the smallholder dairy farmers' produces on their choice of milk marketing outlet.

3) To determine the influence of the state of road infrastructure on smallholder dairy farmers' choice of milk marketing outlet.

4) To determine the influence of ownership of means of milk transport on the smallholder dairy farmers' choice of milk marketing outlet.

5) To determine the influence of services offered by the milk chilling plants on the smallholder dairy farmers' choice of milk marketing outlet.

6) To determine the influence of the mode of milk payment by urban milk consumers (Eldoret, Kakamega, and Webuye) and farm gate buyers on smallholder dairy farmers' choice of milk marketing outlet.

1.5. Hypotheses of the Study

The hypotheses of the study were:

H_{01}. The amount of milk the smallholder dairy farmers produces has no statistically significant influence on the choice of milk marketing outlet in Kipkaren division.

H_{02}. The state of road infrastructure has no statistically significant influence on smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division.

H_{03}. The ownership of the means of milk transport to the market has no statistically significant influence on smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division.

H_{04}. The services offered by the milk chilling plants have no statistically significant influence on the smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division.

H_{05}. The mode of milk payment at the farm gate and in urban centres (Webuye, Kakamega, and Eldoret) have no statistically significant influence on smallholder dairy farmers choice of milk marketing outlet in Kipkaren division.

1.6. Significance of the Study

Efficient marketing structures have been cited by the World Bank as one of the key pillars in improving smallholder farmers' earnings (World Bank, 2008). This in turn has the potential of reducing rural poverty and inequality within regions especially among the smallholder farmers by enabling them to sell their produce to better paying markets. Milk production is mainly a rural based enterprise and as such, to the smallholder dairy farmers', the most important issue is a fast and efficient system of milk delivery to the market at minimal cost (Danish International Development Agency (DANIDA), 1991). Understanding the dairy marketing system as well as the factors influencing smallholder dairy farmers choice of milk marketing outlet was deemed significant for the study because of the potential to influence policy thus bringing about efficient marketing system for the smallholder dairy farmers. Similarly, it is hoped that the findings from the study, has brought out an understanding of smallholder dairy farmers milk marketing needs and the resultant report will be key to further research in the area of milk marketing in Kenya..

1.7. Scope of the Study

The study was restricted to 185 smallholder dairy farmers' households in Kipkaren division of Nandi County. The smallholder dairy farmers explored were the ones keeping between 1-4 dairy cows. The findings of the study were generalized only for the population in Kipkaren division of Nandi County.

1.8. Assumptions of the Study

The study was based on two assumptions:
  i.   That the smallholder dairy farmers in Kipkaren division marketed their milk to various milk marketing outlets
  ii.   That the information availed by the interviewed household heads was truthful.

1.9. Limitation of the Study

The major limitation to the study was the language barrier between the researcher and the research participants during fieldwork process. This prompted the use of a translator to assist in translating the questions in the questionnaire for the research participants.

1.10. Definition of Terms

The following terms were defined for the purpose of the study.

Collective action

It is an action taken by a group in pursuit of members perceived shared interest (Marshall, 1998). In the context of this study, collective action was taken to be farmers coming together to market their milk in order to enjoy the benefits of bargain.

Formal market

Refers to the milk marketing outlets that process and distributes the finished milk products to final consumers (Ngigi, 2005). In this study formal milk outlets were taken to be milk markets that buys un-processed milk from farmers or middlemen, processes the milk and the final product is marketed through shops and supermarkets for example Brookside dairy and New KCC.

Household head

Refers to an individual or a person who is the decision maker within a family (Wallace, 1991). In this study, a household head was taken to be an adult decision maker in the family who decides where the milk is sold.

Informal market

The informal market refers to milk marketing outlet that buys un-processed milk from the farmer and sells to the consumers or a milk processing plant without processing in between (Ngigi, 2005). In this study, informal milk market was taken to be a marketing outlet which buys un-processed milk from the farmer and either sells the milk to final consumer in the same form or to a processer for processing.

Moderator variable

In general terms, a moderator is a qualitative (e.g., sex, race, class) or quantitative (e.g., level of reward) variable that affects the direction and/or strength of the relation between an independent variable and a dependent variable (Kothari, 2006). In this study, a moderator variable was taken to be a variable that affects or influences the relationship between the factors influencing market choice (Independent variable) and the market outlets (dependent variable).

Smallholder dairy farmer

A smallholder agricultural producer is one who may be semi-subsistent, semi-commercial or semi-intensive in his/her production system (Bekele, Muricho & Obare 2006). In this study, a smallholder dairy farmer was assumed to be one owning 1-4 dairy cows.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

The literature was drawn from works of various scholars and organizations of different but relevant fields in the study of milk marketing and dairy industry in general. The literature review covered: the history of dairy industry in Kenya, influence of state of road infrastructure, ownership of means of transport, the milk chilling plants and the services they offer, mode of milk payment in both urban centres and at farm gate and quantity of milk produced to choice of milk marketing outlet. The theoretical and conceptual framework were also covered, the former to give relevance to the study while the latter to connect the study variables in a clear way.

2.2 Dairy Industry in Kenya: Historical Perspective

This section reviews the historical emergence of commercial dairy farming in Kenya with particular emphasis to smallholder dairy farming. The section is divided into three parts: pre-independence period, post-independence period and liberalization period and beyond. The emergence of commercial dairying in Kenya began with the arrival of the white settlers who imported superior breeds suitable for milk production. Before the arrival of the white settlers, the local Africans kept indigenous breeds producing low milk quantity.

2.2.1 Pre–independence period

Livestock, especially cattle, have historically played multiple roles in both economic life and socio-cultural traditions of African people (Ngigi, 2005). Cattle have been used as a source of draft power, dowry payment, barter trade, source of milk and beef among other uses. Before coming of the British settlers, the breeds kept were the Zebus and other local breeds which were not economical in commercial dairying. The industry was not commercialized prior to colonisation though dairy products such as ghee and butter were crudely processed and battered with other goods in local markets. Commercial dairying was, therefore, introduced by the British settlers. They brought exotic breeds of cattle from Europe and South Africa with high milk output. These breeds were susceptible to the local conditions such as diseases and pests. To reduce their susceptibility crossbreeding was introduced to upgrade the local cattle using the exotic bulls. At first the bulls were used but later A.I was introduced since the exotic bulls could not survive the local conditions for long. A number of institutions aimed at enhancing dairy

production, such as national animal husbandry station at Naivasha and Kabete veterinary laboratory were established in 1910. With such institutions the white settlers began to produce more milk and thus commercial dairying emerged (MOFLD, 2007).

The history of milk marketing and dairy cooperative movements in Kenya goes back to early 1900. By 1908, a white farmer by the name of Mr. Watts started to make butter in his farm near Lumbwa (now Kipkelion) and he immediately developed trade with Uganda (Jaffe, 1995). Soon the demand for the butter increased. He then invited other farmers in the neighbourhood to supply cream to him so that he could make butter and sell to specific markets. In addition, Jaffe has pointed out that KCC was formed in 1925, KCC by large European farmers in Naivasha and Nakuru to produce cheese, share technical information and pool sales revenue. In 1928 a group of white farmers around Nanyuki formed Nanyuki cooperative creameries to process milk. However, the two dairy companies merged in 1930s into KCC due to the economic depression of 1930s coupled with limited domestic market. In 1950 KCC began to market fresh milk on pilot basis in Nairobi and Sotik, this proved profitable and milk marketing was extended to other locations.

Furthermore, in this period, the indigenous Africans were not allowed to be involved in commercial dairy. Commercial dairying was carried out exclusively by the European settlers. However, this changed in 1954 when the Swynnerton plan (from a commission led by Roger Swynnerton) opened up commercial farming to indigenous Africans thus legitimizing Africans to be involved in commercial dairying and selling the milk to KCC on quota basis (MOLFD, 2007). This was the beginning of smallholder production and eventual domination of the dairy industry in Kenya. With competition from small dairies and private milk dealers, KCC advocated for creation of a dairy board to regulate the sector and pool the marketing of all dairy products. The government was at first reluctant in the creation of the Kenya Diary Board (KDB) but eventually, due to competition from imported dairy products, the board was established in 1958 by an act of parliament to regulate the dairy sector (Jaffe, 1995).

2.2.2 Post-independence period

After independence in 1963, there was massive land subdivision by the government to accommodate the Africans in the former white owned farms. Coupled with this, the Kibaki's commission of 1964, established to streamline the dairy sector with exit of white farmers, abolished the quota milk marketing to Africans thereby opening up KCC to their milk without discrimination (MOLFD, 2007). These two factors increased the smallholder dairy farmers' participation in the dairy industry. In addition, KCC increased its presence in the country by opening new factories and cooling plants especially in high milk producing areas dominated by smallholder dairy farmers. The 1960s to 1970s saw the rapid and steady development of smallholder dairy production and its initial incorporation into formal dairy marketing system (Ngigi, 2005).

Despite the growth of smallholder dairying, most of the smallholder farmers faced problems in marketing their milk. This was because most of the smallholder farmers produced low milk quantities and as such, the cost of individual marketing of milk to KCC was high. This, therefore, led to formation of various milk marketing cooperatives by the smallholder farmers to amalgamate milk from various farms and market to KCC collectively. This began the genesis of cooperative society's role in milk marketing. This period was also marked with price controls and domination by KCC killing any form of competition in milk marketing from other players. Similarly, Jaffe has pointed out that KCC procurement arrangement discriminated against smallholder cooperatives thereby limiting their incorporation into formal milk marketing system. Production and transport costs were major impediments to the expansion of the milk cooperatives. Furthermore, milk pricing and the economies of scale favored the large scale milk producers.

As a result of the poor performance of the cooperatives the government, in 1980 though the National Livestock Development Policy (NLDP), intervened in the sector to try and assist the milk cooperatives (MOLFD, 2007). The policy was aimed at promoting the rural dairy processing activities. Dairy cooperatives were to be facilitated to assume major milk collection, cooling and transportation functions in areas where KCC was not established with support from donors (Jaffe, 1995). This was a major boost to the cooperatives which at that time were in financial problems mostly due to mismanagement and delayed payment by KCC for delivered milk. The dairy cooperatives were to be assisted in establishing small-scale dairy processing

plants in areas where KCC was not present. This led to the formation of Kitinda Dairy Farmers Cooperative Society (KDFCS) in Bungoma and Meru Central Dairy Farmers Cooperative Union (MCDFCU) in Meru. These two dairy cooperatives were to collect milk from the farmers around, process and then market the milk. The two functioned briefly before going under. The same year A.I. services were privatized due to budgetary constraints (Jaffe, 1995).

2.2.3 Liberalization and beyond

Eventually due to many problems facing the sector, part of the SAP and recommendations from the dairy master plan of 1991; the government through a ministerial statement liberalised the milk marketing sector in June 1992 (Lamuka, 1993). The liberalisation involved opening up of the milk procurement, processing and distribution system to new entrants subject to hygienic regulations from KDB (Jaffe, 1995). This led to the formation of small processors at first such as Illara dairy in Rongai, Spin knit dairy in Nakuru, Delamere dairy in Naivasha, Roost limited in Kapsabet, Brookside dairy in Ruiru, Donana in Mombasa and Taita estate in Mwatate. The liberalisation led to increased competition in the sector and as such it was hoped the smallholder dairy farmer will eventually benefit from the competitive prices offered by the different processors. However, as Lamuka has argued, the liberalisation did not benefit the smallholder dairy farmers as had been envisaged by creating extra marketing outlets. The large dairy farmers still dominated milk supply to these processors at the expense of the smallholder dairy farmers.

As part of the liberalisation, the government introduced the Dairy Development Policy (DDP) in 1993 to guide the industry from old ethos of subsidization into a new era of privatization. The government role was reduced to regulation and creation of an enabling environment. With the sector liberalised and other milk processors licensed, KCC faced intense competition for the first time in its history and since it was not prepared for this, its decline began. In the 1980s KCC was expanding its operations in the country with loans from government and other donors and on the other hand it was making losses due to slow milk sales during peak production period. Thus, with liberalization in 1992 and eventual competition, the debts weighed heavily on KCC and its decline began with eventual collapse in 1999. Since KCC owed farmers a lot of money in unpaid milk deliveries, most farmers were discouraged with marketing their milk to other formal buyers and resorted to informal channels (MOLFD, 2007). In this period, the informal sector enjoyed tremendous growth as smallholder dairy farmers opted for spot cash milk sales in urban centers. KCC was revived in 2000 with a new name and sold to private individuals under the name "KCC

2000". However, in 2003 the National Rainbow Coalition (NARC) government took it back, rehabilitated the dairy cooperative and handed it back to farmers under the name "New KCC".

Since liberalization in 1992, new institutional arrangements in milk collection, processing and marketing have emerged yet the smallholder farmers have still found it difficult to market their milk. The new institutions have benefited the large scale farmers at the expense of the small-scale farmers. It is estimated that 80% of marketed milk pass through informal system with only 20 % passing through formal system of pasteurization (Muriuki, 2011). Moreover, Karanja (2003) identified 5 milk marketing channels existing in rural areas; processors/ farmer groups, transporters, brokers, hawkers and cooperatives. However, Karanja's study never went further to identify the preferred milk marketing outlet and the reasons for the smallholder dairy farmers choosing an outlet over another thus necessitating this study to fill the gap. As the history of the dairy sector shows, smallholder dairy farmers' have had to contend with losses due to poor marketing structures with many eventually quitting the commercial dairy. The disorganized marketing channel has not been beneficial to the smallholder dairy farmer. The study intended to provide knowledge on the milk marketing sector for the benefit of the smallholder dairy farmers.

2.3 Influence of Road Infrastructure on Milk Market Choice

The role of road infrastructure in agricultural development, growth, poverty reduction and enhancing food security has been discussed in a wide development literature. Road infrastructure plays a critical role in general economic development of a country. In the agricultural sector, good roads facilitate fast movement of agricultural produce from one area to another. Similarly, good roads play a key role in the dairy sector necessitating fast transport of milk which is a highly perishable commodity. The bulk of milk and other agricultural produce are produced in the rural areas where the roads are often not well developed. In the case of Kenya, bad roads are common in most high agriculture potential areas. Odongo (1999) has acknowledged that transport bottlenecks in the form of poorly maintained rural roads network has been a major impediment to the agricultural sector. In his study on groundnut production and marketing in Homabay, Odongo found that poor roads added to the costs of the groundnuts in the major markets in urban centers. The findings indicate that poor or inadequate rural road maintenance inhibits both production and marketing of agricultural produce for the smallholder farmers limiting their choice of marketing outlet.

The SAPs of 1980s and 1990s were aimed at liberalizing the economy, eventually reducing poverty and opening up markets for economic growth (Bekele et al., 2006). Successful implementation of the SAPs depended among other things good infrastructure especially in the agricultural areas (Doward & Kydd, 2004). The opening up of markets was expected to create opportunities for smallholder dairy farmers and eventually lead to scaled up production. But this was not to be because of the lack of infrastructural and institutional impediments necessary to support market development key being poor road infrastructure (World Bank, 2002 & 2003). The World Bank (2003) has further suggested that poor roads limit smallholder dairy farmers' capacity to access markets by increasing the marketing costs. It is probable that some farmers chooses the nearest milk marketing outlet even if the prices offered are low in order to avoid extra costs and losses associated with poor roads.

Different studies have shown that inadequate infrastructure inhibits agricultural production resulting in farmers incurring enormous losses. According to Rhodes (1993), transport bottlenecks in the form of poor roads conditions create post-harvest losses reaching up to 25% of total agricultural production in Kenya. The rural roads and the feeder roads in the country are a major impediment in marketing of the produce from these areas to urban markets. Furthermore, poor infrastructure has been cited as a hindrance to marketing of livestock and its products in a study by European Commission (2003). In addition, Bekele et al., (2006) have argued that poor roads often increase the geographical and market isolation of smallholder farmers. This in turn has led to underdeveloped agricultural markets, fluctuating milk prices and less competition especially in the rural areas. Therefore, the poor roads in the rural areas are a major cause for the under-developed agricultural sector in Kenya increasing the costs of production for the farmers and limiting market access. The study hypothesized that the state of road infrastructure influences smallholder dairy farmers' choice of marketing outlet in Kipkaren division as the literature above indicates.

2.4 Influence of Ownership of Means of milk Transport on Choice of Marketing Outlet

Transport is closely linked to state of road infrastructure. The state of the road influences the means of transport that farmers prefer in moving their produce to the market. Places with good roads allows for use of diversified means of transport while places with bad roads inhibits choice of means of transport. A well-developed transport system is vital in moving agricultural produce from one area to another. Transport is not only vital in agriculture development, but to the whole

economic growth and development. In this regard, Adam Smith, the father of modern economics, in his seminal work '*The Wealth of Nations'* (1776), argued that countries endowed with good transport system will develop faster than those without such systems. To Smith, well developed transport system facilitated industrial growth and development. In a similar way, efficient transport system plays a vital role in agricultural development in a country.

The government has estimated that 3% of total milk produced during flush period of March to June is wasted due to bad roads during transportation to the market (MOLFD, 2007). The flush period is always the same period that the rains are heavy, making most feeder roads impassable in the rural areas. Similarly, the deficient communication infrastructure limits the range of marketing and confines sales to nearby consumer/buyer. Therefore, transport is important in agriculture because it adds up to total cost of marketing. The smallholder dairy farmers in rural areas are hardly able to afford transport cost more so with bad roads adding up to the cost. Muriuki (2011) has pointed out that the lack of ownership of means of transport among the smallholder dairy farmers reduces their frequency of milk sale. This means that the smallholder farmers' are forced to consume the milk produced in the evening instead of marketing the milk. In addition, Abbot (1966) forecasted that many agricultural producers in the developing countries will be confined to village markets and remain so until appropriate transport facilities make other outlets accessible.

Appropriate means of transport facilitates ease of access to the market as demonstrated in a study by Abdi (2004) in Nyandarua County. The study found that smallholder dairy farmers who were 75 km or more from a major urban center earned 22% less income from their produce compared to the farmers close to Nairobi because of transport costs. Therefore, high transport costs can negatively affect increased income opportunities for the farm households. Similarly, lack of ownership of a means of transport limits the smallholder farmers to the rural markets which have low prices due to overwhelming supply of similar commodities (Chianu, Ajani & Jonas, 2008). Thus, owning an affordable means of transport can open up marketing opportunities to the smallholder dairy farmers' because it facilitates their access to diverse marketing outlets. The ownership of means of transport was hypothesized in the study to influence the smallholder dairy farmers' choice of milk marketing outlet.

2.5 Farmer Marketing Groups

Farmer marketing groups (FMG) evolved to take the place of government parastatals which were being dismantled as a result of the SAPs in 1980s. In the 1980s to 1990s, most of the farmers' cooperatives were collapsing due to mismanagement and abolished government subsidies in the agricultural sector. As a result of the vacuum left by the collapsed cooperatives, the farmers marketing groups came about to take the place of the cooperatives. The FMG's have in turn grown to tremendous size and in some countries such as U.S.A., it is estimated that these farmer organizations control 80% of dairy production (World Bank, 2008).

2.5.1 History of cooperatives in Kenya

Cooperatives were first introduced in Sub-Saharan Africa during the colonial period for the purposes of promoting production of cash crops by peasant farmers (Hussi, Murphy, Lindsberg & Breneeman, 1993). The idea was to amalgamate the produce of several peasant farmers for easier marketing. After independence, these cooperatives grew in terms of revenue and members as result of the growth of smallholder production. The reason for the growth, as suggested by Hussi et. al, was that the African governments and donors were promoting the cooperatives as a potential source of credit, inputs and commodity markets.

The performance of the cooperatives was good until the 1980s, when due to mismanagement, most of them went under. Furthermore, the liberalization of the dairy sector in 1992 added to the woes of the cooperatives. Before the liberalization, the cooperatives were operating with limited competition however, with liberalization and increased competition from the newly formed dairy processors, most of the cooperatives went under. This was because the cooperatives could no-longer compete in a liberalized economy lacking state protection (Jaffe, 1995). As a result, the smallholder dairy farmers, who were the major shareholders in these cooperatives, lost their faith in them due to non-payment of delivered milk. The consequence of this was increased milk hawking in the urban areas by the smallholder dairy farmers. However, the revival of the dairy sector from 2003 onwards, led to some of these cooperatives being revived under new auspices as FMGs. Marshall (1998) has pointed out that the FMGs are different from cooperatives in that they operate in the principle of collective action and some are commodity specific.

2.5.2 The dairy marketing groups

A World Bank (1995) study found that the FMGs perform better when; farmers manage them with minimal government interference, there is farmers' active participation in every stage of decision making and their activities are profitable. In the dairy sector, these marketing groups have come to be known as dairy marketing groups (DMG) as they are specifically involved in milk marketing. The DMGs are commonly made up of smallholder dairy farmers in a specific location or division involved in commercial dairying. In recent times, there have been donors, such as Heifer International (HI) and the Bill and Melinda Gates Foundation, who have provided support to the DMGs in the form of milk chilling plants. The chilling plant has helped in increasing milk shelf life in the rural areas and thereby reducing losses (Muriuki, 2011). Therefore, the DMGs play an important role in the dairy industry especially among the smallholder dairy farmers. Abbott (1966), identified the powers and procedures associated with the marketing groups;

i. They engage in mutual contract between members and the group under which the members commit to sell an agreed part of their output to the marketing group.

ii. Centralized sales of produce. All the produce from individual members is centrally sold to one buyer at a specified price.

iii. Arrangements to pool and bulk individual members produce.

iv. Provides market information narrowing the range over which farmers must find information themselves.

One of the incentives for the smallholder dairy farmers joining the marketing groups is the stability of price for their produce throughout the year due to contracts with milk processors such as New KCC (Muriuki, 2011). This enables the smallholder dairy farmers' plan for the use of their money in advance. Similarly, the pooled monthly payout for the milk delivered is also an incentive to the smallholder dairy farmers to join the marketing groups Therefore, the DMG can play a significant role for the smallholder dairy farmers' not only in marketing their produce but also in providing other services.

2.5.3 Services offered by the milk chilling plants

The main service that most milk chilling plants offer is marketing of milk from their members in bulk. This has led to reduction in the costs of marketing for the individual smallholder dairy farmer. In the long run, the reduced marketing costs, has acted as an incentive for the smallholder dairy farmers to join the milk chilling plants Bekele et al., (2006) extends this notion by arguing that most smallholder dairy farmer joins the marketing groups because of the expectation that the produce will be marketed at reduced transport costs. The reduction in the marketing costs has been due to the bulking of milk from various farmers therefore, facilitating cost sharing among the farmers. In such a scenario, a smallholder dairy farmer would be motivated to join the chilling plant in order to benefit from reduced milk marketing costs. The milk chilling plants have come to be identified with the smallholder producers since the large-scale producers are capable of marketing their milk individually. As a result, Bekele et al., have argued that the milk chilling plants, facilitates the smallholder producers to bring their milk together in order to; spread the costs of marketing, enhance their ability to negotiate for better prices and improve their market power.

In addition, some of the chilling plants have come to include other initiatives to the services they offer to the smallholder dairy farmers. These organisations have taken it upon themselves to facilitate smallholder dairy farmers' access to input, output for their produce and service delivery thus promoting activities and technological change in agriculture (Kindness & Gordon, 2001). Input supply is one important service offered by the chilling plants to their members. This is because most of the smallholder producers have limited capacity to purchase farm input on their own. This initiative works in such a way that the smallholder farmers' who delivers their milk to the chilling plant can access farm inputs on credit which is later deducted from the milk delivery payments. This has worked well for most of the smallholder dairy farmers as it has enabled them to afford feeds and other inputs for their farms at a reduced cost. In addition, the milk chilling plants have also incorporated trainings for their members, within the services they offer, at a small fee to facilitate the production of standardized milk from the farmers in order to get higher milk prices from the processors. Such trainings and the benefits thereof have acted to be incentives to some smallholder farmers joining such organisations.

It is a well-known fact that access to credit is a problem in the developing countries especially within the smallholder farming community (World Bank, 2008). As a result, some of the chilling

plants have begun to offer banking and micro-credits services to their members at lower interests' rates. The World Bank has further pointed out that, the producer organisations offering credit to their members, has been influenced by the realisation that affordable credit is an important component for diversification of livelihoods and risks among the smallholder producers. In most of the developing countries, the hindrance to credit access has been the high interest rates which have discouraged the smallholder producers from accessing credit. Therefore, the milk chilling plants in Kipkaren division were offering credit facilities to their members to meet the demands for credit among their members. .

The dairy producer organisations have, therefore, become an integral part of the dairy industry in Kenya especially among the smallholder producers. Due to their increasing importance in milk marketing, Bekele et. al. (2006) have stressed that producer organisations are likely to perform well if the expected benefits from lower transaction costs, better prices for input and output, empowerment and capacity enhancement outweighs the associated costs of complying with collective rules and norms. The study hypothesized that the services offered by the milk chilling plants, influences the smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division. Kipkaren division had a dairy producer group in the form of Tanykina dairy which had two branches in the division. As discussed above, Tanykina dairy had evolved from only marketing the members' milk to offering other services to the members such as credit to the smallholder dairy farmers.

2.6 Urban Centers Consumers Buying Behavior

Wallendorf and Zaltman (1983) have described consumer behavior as acts, concepts and social relationship exhibited by individuals, groups and organizations in the attainment, usage and consequent experience with products and other services. This behavior is sometimes characterized as choice, preference and loyalty. Understanding the behavior of a consumer of a product is a complex phenomenon. Otwori's (2006) study on Nakuru milk consumers' choice of fresh milk brands admits that understanding and alienating factors that influences a consumer buying behavior is complex. At any given time, many factors are acting on an individual consumer influencing his/her actions. The behavior of consumer is often directed towards the goal of obtaining products, services or other resources for use in their own right.

Furthermore, Kottler and Armstrong (2004), have argued that consumers make many buying decisions every day which are influenced strongly by cultural, social, personal and psychological

characteristics. For the urban consumer, the factors are many and diverse. Modern (1993), has reported that people's purchasing behavior is influenced by basic economic factors such as: real disposable income available to them for expenditure, the price of the available products, basic personal perceptions of what constitute good value for money and the relative prices of complementary products.

The rapid urbanization in Kenya has in recent years significantly increased the consumption of raw milk within the most urban areas in Kenya (Kaburu, 2009). A study by Wakhungu, Gitu & Mburu (2007) in Nairobi found that raw milk consumption in the urban areas was highest in the informal settlements. This has been partly driven by the increased milk hawking in the urban centers by smallholder dairy farmers as well as the higher prices of the processed milk. Since, the winding up of KCC in the late 1990s, the urban areas have provided an alternative milk marketing outlet for the smallholder producers. In due time, milk hawking has grown tremendously with estimates in 2011 indicating that 80% of produced milk is hawked by the smallholder dairy farmers' (Muriuki, 2011). There have been various reasons for the smallholder dairy farmers' preferring to sell their milk to the urban centers through hawking even with revival of KCC and entry of other processors in the market. Karanja (2003), has pointed out that the cash payments and the dynamics of milk prices are the major allure for hawking milk in the urban areas by smallholder dairy farmers. In the informal milk marketing sector, there are no fixed prices but the forces of demand and supply are the major determinant of prices. The high prices offered in the urban areas as well as the cash payments have acted as incentives for dairy farmers' to market their milk in the urban areas despite the efforts to stop this by the KDB.

In similar note, the concept of consumer loyalty has been mentioned to be an important incentive for the smallholder dairy farmers' to market their milk in the urban areas. Youjae (2003) has defined consumer loyalty as the repeated purchases of particular products and services during a certain period of time. Milk hawking began in late 1990s with collapse of KCC and with time the hawkers had established a base with loyal consumers of their milk. Oliver (1997) has emphasized that the aspect of consumer loyalty entails the commitment to re-buy or re-patronize a preferred seller consistently in future despite situational influences in the marketing efforts having the potential of switching behavior.

Studies have shown that market share is related to brand loyalty (Youjae, 2003; Oliver, 1997). In the same note, some estimates also have shown that selling to existing customers can be five

times more profitable than winning new ones (Wambugu, 2002). For the smallholder dairy farmers, retaining existing customers of their raw milk is an incentive as they can get advance payment in case of need of emergency cash. This could be an explanation to the growth of milk hawking despite attempts by KDB to stop it. The KDB has recently changed tract and owned up that milk hawking is an important source of revenue for the smallholder dairy farmers and has therefore proposed the training of the farmers' on milk hygienic issues (Kaburu, 2009). Therefore, customer loyalty plays an important role in milk hawking in the urban areas by the smallholder dairy farmers'. A repeat customer is more valuable for a number of reasons such as multiple purchases from the same seller as well as being price insensitive. Developing a high degree of loyalty, as suggested by Wambugu, is therefore an important goal of marketing as it pays to know and retain your customers particularly the loyal ones. The study hypothesized that the mode of milk payment which is influenced by customer loyalty in the urban areas has an influence on smallholder dairy farmers' choice of milk marketing outlet on Kipkaren division.

2.7 Amount of Milk and Market Choice

Although a smallholder dairy farmer has been described to be one keeping 1-4 dairy animals, the type of animal kept determines the quantity of milk produced. Some smallholder dairy farmers keep cross breeds of local cows and grade cows. The cross breeds are not highly productive and produces about 10-15 litres of milk per day. On the other hand, other smallholder dairy farmers keep pure breeds of either Friesian or Ayrshire which can produce as high as 50 litres of milk per day under good management. Thus the breed of dairy animal farmer keeps will determine the amount of milk he produces. Wakhungu et. al (2007) have indicated that large scale dairy farmers' generally prefer organized milk marketing outlets even with lower prices. The literature reviewed did not give much on other studies on the smallholder dairy farmers' preference on marketing outlet based on quantity of milk produced, therefore the necessity for this study The study hypothesized that the quantity of milk produced influences the smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division.

2.8 Theoretical framework

The study was based on rational choice theory. Rational choice is a choice made out of many alternatives through rational thinking. The pioneering figure in establishing rational choice theory was George Homans (Homans, 1961). Homans set out a basic framework of exchange theory, which was grounded in assumptions drawn from behaviourist psychology. Theories of

rational choice are guided by the assumption that people are rational and base their actions on what they perceive to be the most effective means of achieving their goals (Wallace, 1991). It involves weighing up alternative means to alternate ends and choosing between them (Sen, 2010).

Rational choice theory generally begins with consideration of the choice behavior of one or more individual decision-making units. The rational choice theorist often presumes that the individual decision-making unit in question is representative of some larger group such as buyers or sellers in a particular market (Scott, 2000). Once individual behavior is established, the analysis generally moves on to examine how individual choices interact to produce outcomes. Rational choice theorists advocate that to understand more about how and why people behave in a certain way whether individually or socially then we have to see them as rational decision makers in a world of scarcity. Rational choice assumes that human beings are purposive and goal oriented and that every action taken is guided by a clearly identified goal or purpose (Scott, 2000). The theory has its roots in psychology and economics which has been termed as study of how people make choices. The central premise is that behaviour is purposive. Individuals have goals they try to achieve; acting as rationally as their knowledge, resources and situation permit.

The rational choice theory guided the study in trying to understand how the smallholder dairy farmers make decisions pertaining to milk market choice. It was assumed that the smallholder dairy farmers base their decisions on choice of milk marketing outlet on rational choice. Indeed, the study found that smallholder dairy farmers are influenced by economic and psychological factors at any given time when choosing milk marketing outlet. Economic factors such as monetary benefits, credit from DMG, advance payment of milk among others and psychological factors such as perceptions were found to have an influence on the smallholder dairy farmers'. Therefore, it can be assumed that smallholder dairy farmers are influenced by rational choice when choosing a milk marketing outlet. Although this could be the case, it happens without their knowledge as long as they get economic as well as psychological satisfaction.

2.9 Conceptual Framework

The conceptual framework was used to show the relationship between the independent and dependent variables. This attempted to show the effect of the independent variable on dependent variable. Smallholder dairy farmer choice of milk marketing outlet was hypothesized to be based on the independent variables such as the state of the road, the means of transport to the market

amount of milk produced, services offered by DMGs and mode of milk payment in urban areas. On the other hand, dependent variables were assumed to be the marketing outlets. When a farmer is deciding on where to market the milk at any given time, the decision is based upon several factors which give the best returns at minimal costs. The dependent variables made up of the marketing outlets were presumed to be reliant on the independent variables made up of the factors influencing the choice of the marketing outlet.

The moderator variables consisting of; cost of production, milk price and socio-economic factors such as education, were presumed to alter/reduce the effect of the independent variables onto the dependent variables. For instance, the price of milk at a market outlet may have influenced a farmer to choose a market outlet regardless of other factors such as state of road or ownership of means of transport. Therefore, the moderator variable may have weakened the effect of the independent variables on the dependent variables. This was conceptualized in the Figure 1.

Factors influencing choice of market outlet

- Road infrastructure- tarmac road, gravel and other
- Means of milk transport to market
- Amount of milk produced
- Services offered by milk chilling plant
- Mode of milk payment in urban centres

Choice of Milk marketing outlets

- Milk hawkers
- Milk chilling plant
- Transporters
- Urban centres milk consumers
- New KCC Eldoret
- Brokers/middlemen
- Local hotels
- Other farmer

Cost of production

Milk price

Farmer characteristics e.g. education level

Socio-economic factors

Moderator variables

Figure 1: Conceptual Framework for Factors Influencing Smallholder Dairy Farmers' Choice of Milk Marketing Outlet-Kipkaren Division

CHAPTER THREE
STUDY RESEARCH METHODS

3.1 Introduction

The previous chapter discussed and analysed various literature related to the dairy industry and milk marketing in Kenya with particular emphasis on the smallholder dairy farmers. Similarly, the chapter also briefly discussed rational choice theory which was the theory that guided the study. This chapter, therefore, in consideration of the study hypotheses, discusses the data collection methods used in the study. The chapter begins with a description of the study research design, study area and population of study. Thereafter, the chapter discusses the sampling procedure and sample size, the instrument used for data collection, validity and reliability of the instrument and finally data collection and analysis process are described.

3.2 Research Design

The study employed survey research design. Survey research consists of systematic standardized approaches to collecting information on individuals, households and organisations through questioning systematically identified samples (Marsden & Wright, 2010). For this study, survey research design was employed as the data gathering technique to enable collection of smallholder dairy farmers self-reported beliefs, opinions, characteristics and past or present behaviors. Survey research has the advantage of measurements being taken at one point in time, and of creating room for exploratory and descriptive data (Detels, McEwen, Beaglehole & Tanaka, 2004). Therefore, the choice of this research design was pegged on its ability to gather self reported opinions of the smallholder dairy farmers in Kipkaren Division and its useful in examining the possibility of a relationship between the independent variables (the presumed causes) and dependent variable (the market outlet).

3.3 The Study Area

Nandi County was created after the 2013 general elections which introduced new administrative units in Kenya. With the elections of a governor, his deputy and the county assembly members, the county began its operations. The county is situated in the north-west part of the former Rift valley province, it borders the following counties; Uasin Gishu to the North and East, Kericho to the South-East, Kisumu to the South, Vihiga to the South-West, and Kakamega to the West. The county is a high agriculture potential area with the main enterprises being tea, maize, horticulture

and dairy industry. The county is made of six sub-counties and several divisions and covers an area of 2,884.2 Km^2 (Commission on Revenue Allocation, 2013).

The study was carried out in Kipkaren Division which is located within Nandi North sub-county. Kipkaren Division is located in the southern part of the county and has an area of 300.5 km^2 and borders Uasin Gishu, Bungoma and Kakamega counties (Commission on Revenue Allocation, 2013). The division has 10 locations and a further 29 sub-locations, 9,325 farm households and average farm size of 3 hectares (Ministry of Livestock Development (MOLD), 2008). Kipkaren division was chosen for this study because it had the largest dairy herd at 29,811 cattle and produced the highest volume of milk at 12,658,619 litres per year (MOLD, 2008). In addition, the division had two milk chilling plants Tanykina dairy located at Kipkaren and Tulwo locations. Moreover, Kipkaren division was suitable for this study because of its proximity to four urban centres i.e. Eldoret, Webuye, Bungoma and Kakamega. This therefore ensured a diverse milk marketing outlets from which the smallholder farmers could choose from. Most of the smallholder farmers in the division kept a herd of dairy crosses, a few had high-grade animals and there were a few Zebu cattle in the lower parts of Kipkaren division where conditions were not suitable for the high-grade animals. Continuous grazing was the preferred mode of production in the division although a few farmers practiced rotational and zero grazing on farms that were pad-docked.

3.4 Population of Study

The population of study constituted household heads that were made up of either male or female farmers and practiced mixed farming keeping both dairy animals and planting different crops. Maize and dairy productions were the most popular enterprises in the division. The population was rural based and made up of large and smallholder farmers although the bulk of the farming community were smallholder farmers with an average land size of 3 hectares and cattle herd of 1-4 cows (Ministry of Planning and National Development and Vision 2030 (MOPND, 2008). The division had a population of 69,041 and 13,332 households (MOPND, 2010). Forty percent of the households were smallholder dairy farmers keeping a mixture of Zebus, crossbreeds and pure dairy breeds ranging from 1-4 cows (MOLD, 2009). From the 13,332 households therefore, 5300 households were smallholder dairy farmers.

3.5 Sampling Procedure and Sample Size

The sampling frame was made up of 5,300 smallholder dairy farmers owning between 1-4 dairy animals (MOLD, 2009). The 5,300 smallholder dairy households provided the total population from which an appropriate sample was drawn for the study. Two sampling process (proportional stratified sampling and simple random sampling) were used for the study. First the appropriate sample size of household heads to be interviewed was determined. This was done using the formula below proposed by Kothari (2006):

$$n = \frac{z^2 (p \times q)}{d^2}$$

In the formula:

N= 5300

n = sample size

z = statistical constant representing 95% score at the respective confidence
Interval (1.96).

p = proportion of interest/ possibility of success (5,300 ÷ 13,332) i.e. number
of smallholder dairy households divided by the total number of households in
the division

q = possibility of failure. (1-p)

d = sampling error/alpha error/confidence interval (5% or 0.05).

Therefore. $n = \frac{1.96^2 (0.3975398(1\text{-}0.6970509)}{0.05^2}$

n (sample size) = 185

Therefore the sample size used was 185 household heads. The next step involved the use of proportional stratified sampling to select the number of farmers to be interviewed per location among the 10 locations in the division. Proportional stratified sampling has been defined by Kothari (2006, p. 208) as the sampling technique in which the researcher divides the entire target population into different subgroups, or strata, and then randomly selects the final subjects proportionally from the different strata. This type of sampling is useful when there are sub-groups within the population which in this study, the sub-groups were represented by the

26

different locations in the division. This sampling procedure was used for this study in order to enable representative distribution of research participants to the ten locations. This was done as follows: the sample size n (185) was multiplied by the total number of smallholder dairy farmers per location (y) (this number was acquired from the division livestock officer) then divided by the total population size N (5300). This ensured that the subjects randomly selected from each group were the same as the proportion of that group in target population (Borg and Gall, 1989). This is represented in the Table 1:

Table 1:

Proportional Stratified Sampling of Kipkaren Division Smallholder Farmers Households

Location	Total number of households	Number of smallholder dairy farmers for the location	Number of household heads to be interviewed per location (y × 185) / N
Kipkaren	2699	530	18
Kurgung	1783	713	25
Surungai	522	209	5
Kimng'oror	608	243	9
Kamasai	1634	1200	43
Kapkoimur	687	245	9
Kaptich	1146	458	16
Ndalat	1783	713	26
Kabiemit	1463	586	20
Chepterwai	1007	403	14
Total	13332	5300	185

Thereafter, simple random sampling procedure was employed to select specific participants to be interviewed. Simple random sampling has been described by Ritchie, Lewis and Elam (2003, p. 98) as the sampling process in which each member of the subset has an equal probability of being chosen. Simple random sampling is meant to produce an unbiased representation of a group. To achieve this, a random number table was used. This was done as follows: A list containing the names of smallholder dairy farmers in the division according to locations was obtained from the district livestock production office in Nandi north. The table of random numbers was then used to choose the households to be interviewed in the field by first allocating the smallholder dairy farmers a number then using the table to draw the actual farmer to be interviewed per location i.e. the 10th farmer was interviewed from the table of random numbers. This was repeated in all the ten locations.

3.6 Instrumentation

The study primarily used a semi-structured interview schedule to gather data from the respondents. The semi-structured interview schedule contained closed and open ended questions. The closed ended questions were used to get quick and easy response from the respondents while the open ended questions were used to get detailed answers from the respondents that entailed what is really important to the respondent as well as to get an answer to a question with many possible or sensitive answers (Neuman, 2000). The suitability of the semi-structured interview schedule in this study was based on its ability to facilitate in-depth study as well as its flexible nature (Mugenda and Mugenda, 1999; Neumann, 2000). The interview schedule, as given in the appendix, contained six sections; section A on socio-economic characteristics of the household; section B on influence of road infrastructure on choice of milk marketing outlet; section C on ownership of transportation to choice of milk marketing outlet; section D on amount of milk and market choice; section E on chilling plant and its services to choice of market outlet and section F on spot cash milk purchases in urban areas and choice of milk marketing outlet.

3.6.1 Validity

Validity is the accuracy of the test instrument to measure what it claims to measure (Kothari, 2006). In this case, the validity of the interview schedule was determined by submitting it to be reviewed and approved by the lecturers in the Faculty of Education and Community Studies and their suggestions incorporated in the instrument to improve its accuracy. The researchers in the faculty were chosen to ensure content validity, because of their expertise and experience in the area of study.

3.6.2 Reliability

Reliability refers to the consistency of a measure i.e. the ability to get the same result repeatedly (Kothari, 2006). In this study, the validated interview schedule was then pilot tested with a sample of 30 household heads within Kabiyet division of Nandi North district which also has high milk production and diverse marketing outlets. After piloting, the data thereof was analysed using Statistical Package for Social Sciences (SPSS) version sixteen to get the reliability coefficient. Reliability coefficient (Cronbach alpha) is a statistic commonly used as a measure of the reliability of a test (Borg & Galls, 1989). A reliability coefficient of 0.7 or above is generally accepted for survey research (Kothari, 2006). In this case a reliability coefficient of 0.78 was achieved indicating that the interview schedule was reliable.

3.7 Data Collection

Before data collection, a research permit (attached in the appendix) was obtained from the National Council for Science and Technology (NCST), through Egerton University Graduate School, before the actual data collection. Face to face interviews was conducted in each sampled household with household head being the respondent, and the responses entered in the interview schedule. The researcher employed one assistant to help in translation in cases where there was language barrier.

3.8 Data Analysis

The completed interview schedule was serialized, coded and double checked to ensure quality control. Data was then entered into the computer for analysis using statistical package for social sciences (SPSS), data management software. Inferential and descriptive statistics were used in data analysis. Measures of central tendency (median, mode and mean) were derived to show the

most common reason for choosing a marketing outlet. Frequency distribution tables were run to enable descriptive presentation of the data. Chi-square test was used to test hypothesis 1, 2, 3 and 4 at $\alpha = 0.05$ significance level. Chi-square test was chosen because of its appropriateness where data is nominal or ordinal as in this case (Kothari, 2006). Thus, the hypotheses were subjected to chi-square test to determine the association between the variables. This summary of the hypotheses and statistic to be used in data analysis is represented in the Table 2:

Table 2:

Summary of Data Analysis

	Hypothesis	Independent variable	Dependent variable	Statistic to be used for analysis
1	The amount of milk smallholder dairy farmers produces has no statistically significant influence on the choice of milk marketing outlet in Kipkaren division.	Amount of milk produced by smallholder dairy farmer	Milk market outlets (Hawkers, chilling plant, transporters, urban centres, KCC Eldoret and brokers)	Frequencies, percentages, mean and chi-square test
2	The state of road infrastructure has no statistically significant influence on smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division	Road infrastructure	Milk market outlets (Hawkers, chilling plant, transporters, urban centres, KCC Eldoret, and brokers)	Frequencies, percentages, mean and chi-square test
3	The means of milk transport to the market has no statically significant influence on smallholder dairy farmers choice of milk marketing outlet in Kipkaren division.	Means of transport to the market	Milk market outlets (Hawkers, chilling plant, transporters, urban centers, KCC Eldoret and brokers)	Frequencies, percentages, mean and chi-square test

4	Dairy marketing groups and the services they offer have no statistically significant influence on smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division	Services offered by chilling plant	Milk market outlets (Hawkers, chilling plant, transporters, urban centres, KCC Eldoret and brokers)	Frequencies, percentages, mean and Chi square test.
5	Mode of milk payment at the farm gate and in urban centres (Webuye, Kakamega and Eldoret) have no statistically significant influence on smallholder dairy farmers choice of milk marketing outlet in Kipkaren division.	Mode of milk payment	Milk market outlets (Hawkers, chilling plant, transporters, urban centres, KCC Eldoret and brokers)	Frequencies, percentages, mean and Chi square test

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

The previous chapter has discussed the methods that were used in data collection and analysis. This chapter presents the results from data analysis and discusses the key findings of the study in line with the stated objectives and the key variables of study as described under the methodology section. The chapter is in two parts: the first part presents descriptive analysis of the study participants and their choice of milk marketing outlets using descriptive statistics. This is followed by an inferential analysis of the study variables using chi-square test to test the study hypotheses. The discussion of the results is also included in the analysis of the study findings.

4.2 Objective One: Socio-economic Characteristics of the Respondents

The first objective of the study was to describe the socio-economic characteristics of the smallholder dairy farmers and existing milk marketing outlets in Kipkaren division. A summary of social-economic characteristics of the smallholder dairy farmers in Kipkaren division has been presented in Table 3. In terms of gender, the data indicates that majority of the study respondents were males at 73% while females were 27%; age wise, 76% of the respondents were between 28 and 47 years showing that most of the respondents were relatively young and that dairy farming was an economic activity important for the young and middle aged. This is consistent with the Kenya population census data of 2009 which showed that Kenya's population is made up of young people (Kenya National Bureau of Statistics (KNBS), 2012). Male headed households comprised of 79% while female headed households were 21% of the respondents. Most households were made up of married couples at 71% and of these 62% were nuclear families while the rest, 38%, were in extended families.

For educational level, most respondents had some educational background at 99% indicating some level of literacy among the smallholder farmers in Kipkaren division. However, most of the smallholder dairy farmers had primary and secondary education at 70% combined while a few had masters' degree (1%). This reflects the trend in the country where the transition rate from primary schools to secondary schools has been very low due to fewer secondary schools than primary schools (Ministry of Education, 2012). The same also applies to transition from secondary to tertiary institutions. There are far fewer tertiary institutions than secondary schools,

thus most students are locked out while others lack the capacity to continue with their education. This eventually leads to a population with majority having primary education followed by secondary education and the higher you go, in terms of educational qualification, the less the number of individuals with such qualifications. The data indicates that the same applied to most of the smallholder dairy farmers' households in Kipkaren division with more farmers having only primary school education compared to secondary school and college education. However, this indicates that most respondents had basic education that could help them understand their milk enterprises and make fairly rational decisions on market choice.

Education levels have been cited to be important for increased farmer productivity (Sharada, 1999). In a study in rural Ethiopia, Sharada found that increased level of education among the smallholder farmers corresponded with increased farm production. Sharada further pointed out that, education in farming may enhance farm productivity directly by improving the quality of labour, increasing the ability to adjust to disequilibria, and increasing the probability to successful adoption of innovations. A further study by Wakhungu et al., (2007) in Kiambu found that increased level of education among smallholder farmers corresponded with preference to formal milk marketing outlets. Therefore, the educational level of the farmers enabled them to make rational decisions on the choice of milk marketing outlet based on the benefits to be accrued from a market outlet. From the data, it is clear that the socio-economic characteristics of the smallholder dairy farmers within Kipkaren division were diverse. This, to an extent, could be an indicator to the diverse milk marketing outlets within the division, as each household with its unique socioeconomic characteristic, would market their milk to a preferred outlet.

Table 3:

Socio-Economic Characteristics of the Smallholder Dairy Farmers in Kipkaren (n=185)

Characteristic	Category	Frequency (n)	%
Gender	Male	136	73
	Female	49	27
Age	18-27	13	7
	28-37	70	38
	38-47	71	38
	48-57	20	11
	58-67	10	6
	Over 67	1	1
Household head	Male	146	79
	Female	39	21
Marital status	Single	24	10
	Married	132	71
	Separated	2	1
	Widowed	27	15
Household structure	Nuclear	115	62
	Extended	70	38
Education level	None	3	1
	Primary	73	40
	Secondary	56	30
	Middle level college	49	27
	Bachelor's degree	3	2
	Master's degree	1	1

Source: Field data (2011)

4.2.1 Smallholder dairy farmers milk marketing outlets in Kipkaren division

The data on milk marketing outlets is presented in Table 4. The existing milk marketing outlets in Kipkaren division were: chilling plants (Tanykina dairy), hawkers, New Kenya Cooperative Creameries (KCC) Eldoret, transporters, brokers and other farmer. From the data majority of the respondents at 63 % sold their milk to chilling plants while a lower figure of 1% sold their milk to other farmers around them. The data shows that there was diverse milk marketing outlets in the division preferred by different farmers. The probable reason for the diverse milk marketing outlets could have been the diverse socio-economic characteristics of the smallholder dairy farmers' in Kipkaren division. This is because smallholder dairy farmers with specific socioeconomic characteristics such as marital status, age or educational level, could have probably chose a marketing outlet that fitted or served their interests in a better way.

Table 4:

Milk Marketing Outlets where the Smallholder Farmers Sold their Milk (n=185)

Characteristic	Number of farmers (f)	Percentage (%)
Chilling plant	116	63
Kenya Cooperative Creameries	3	2
Transporters	4	2
Brokers	6	3
Hawkers	55	29
Other farmer	1	1
Total	185	100

Source: Field data (2011)

As mentioned above, the existing marketing outlets in Kipkaren division were diverse but the formal sector represented by chilling plant (Tanykina dairies) buying 63% and KCC Eldoret buying 2% of the milk, represented the largest market outlet among the smallholder dairy farmers in the division. The data indicates the growth of formal milk marketing outlet at the expense of the informal sector in the last few years. The Nandi North Ministry of Livestock Development report (2008) had indicated that the informal sector absorbed 60% of the milk while the formal market took up 21% of the milk. However, the study found that there had been substantial growth of the formal sector represented by the chilling plant and KCC Eldoret at the expense of the informal sector in Kipkaren division. Formal marketing outlets bought 65% of milk through

Tanykina dairies and KCC Eldoret while informal marketing outlet bought 35% of the milk through various outlets. The growth of the formal milk marketing sector can be linked to inception of the milk chilling plants in the division since 2005 which has provided reliable milk market outlet to the smallholder farmers in the division. Most of the smallholder dairy farmers indicated that they preferred the chilling plants due to the services they offered compared to other milk marketing outlets. The Ministry of Livestock Development (2011) report in the division indicated the growth of formal milk outlets. The report indicated that the formal milk sector bought 81% of milk in Kipkaren division while the informal sector bought 19% of the milk. Similarly, the same report also attributed the growth to the influence of the milk chilling plants in the division. The services offered by the chilling plant, such as credit and farm input, were a major attraction to the smallholder dairy farmers.

4.3 Objective Two: Relationship between Market Choice and Amount of Milk Produced

The objective that was investigated in this section was to determine the influence of the amount of milk the smallholder dairy farmers' produces on their choice of milk marketing outlet. Table 5 indicates the amount of milk that was produced by the respondents on a daily basis. The amount varied from as low as 1 litre to as high as 50 litres per day. Moreover, the result also indicates that 62% of the farmers kept three dairy cows while 31% kept two cows and a further 7% owned one dairy cow. In addition, 72% of the farmers kept crossbreed cattle, while the rest kept Ayrshire, Friesian, Jersey or indigenous breeds. Most of the farmers kept crossbreed cows because they were less expensive to maintain in terms of quantity of feeds needed per day as well as they were less susceptible to diseases and pests.

Table 5:

Amount of Milk Produced Daily by Kipkaren Smallholder Farmers (n=185)

Categories (litres)	Frequency (f)	Percentage (%)
1-10	77	41
11-20	55	29
21-30	39	22
31-40	11	6
41-50	3	2
Total	185	100

Source: Field data (2011)

4.3.1   Milk market choice with current milk production

This section set to test the first hypothesis of the study which was: **The amount of milk the smallholder dairy farmers produces has no statistically significant influence on the choice of milk marketing outlet in Kipkaren division.** From Table 5, the milk production for most of the respondents ranged from 1-40 litres. The chi-square test for the farmers' choice of milk marketing outlet with their current milk production is indicated in the Table 6.

Table 6:

Milk Marketing Outlet with Current Milk Production (n=185)

Current market outlet	Litres of Milk					Total
	1-10	**11-20**	**21-30**	**31-40**	**41-50**	
Chilling plant	53	30	23	11	3	120
KCC Eldoret	0	2	0	0	0	2
Transporters	1	0	0	0	0	1
Brokers	3	3	0	0	0	6
Hawkers	19	20	16	0	0	55
Total	77	55	39	11	3	185

$\chi^2 = 26.30$ df $= 16$, $p = 0.003$, Cramer's V $= 0.17$
Source: Field data (2011)

From the data, in Table 6 p value (0.003) is less than 0.05 therefore the null hypothesis is rejected implying that the amount of milk produced by the smallholder dairy farmers influences their choice of milk marketing outlet. The Cramer *V* value is 0.17 indicating a weak relationship between the amount of milk produced and the choice of milk marketing outlet in Kipkaren division.

4.3.2 Milk market outlet with increased milk production in Kipkaren division

The study further analysed the smallholder dairy farmers' in Kipkaren division choice of milk marketing outlet in the case of increased milk production. From the data, in Table 7, 67 respondents indicated they would change their milk marketing outlet to a different one with increased milk production while 118 of the respondents indicated they would not change their milk marketing outlet even with increased milk production. Of the 67 respondents who indicated they would change marketing outlet; 45 respondents indicated a preference of the milk chilling

plant, 20 respondents indicated a preference for KCC Eldoret while 1 respondent indicated a preference to brokers and transporters respectively. Majority of the smallholder farmers who preferred a change in marketing outlet with increased milk production preferred the formal milk marketing outlets represented by the chilling plant and KCC Eldoret. This indicated a preference for the formal milk marketing outlets with increased milk production at the expense of the informal outlets. Table 7 shows the chi-square test for the relationship between increased milk production and the choice of milk marketing outlet among the smallholder dairy farmers in Kipkaren division.

Table 7:

Milk Marketing Outlet with Increased Milk Production

Current market outlet		Change of milk market outlet with increased milk Production		
		Yes	No	Total (f)
Chilling plant	Count	45	96	116
	%	67	82.2	62.7
KCC Eldoret	Count	20	3	3
	%	30	1.6	1.6
Transporters	Count	1	3	4
	%	1.5	2.5	2.2
Brokers	Count	1	0	6
	%	1.5	0	3.2
Hawkers	Count	0	16	55
	%	0	13.6	29.7
Other farmer	Count	0	0	1
	%	0	0	0.5
Total	Count	67	118	185
	%	100	100	100

χ^2 = 11.03, df = 5, p = 0.005, Cramer's V = 0.001, n=185
Source: Field data (2011)

The *p*- value (0.005) is less than 0.05 indicating an existing relationship between the amount of milk produced (increased production) and the choice of milk marketing outlet among smallholder dairy farmers in Kipkaren division. The Cramer's *V* value (0.001) is low, indicating a weak relationship between increase in milk produced and choice of milk marketing outlet.

From the data analysis the null hypothesis is rejected and alternative accepted that there is a relationship between the choice of milk marketing outlet and increased amount of milk produced among the smallholder dairy farmers in Kipkaren division. In relation to this study, a study by Wakhungu et al., (2009) in Kiambu County found that farmers producing more milk often preferred formal milk marketing outlets such as KCC or local milk cooperatives because they were organized in terms of milk marketing and payment. The result of this study supports the findings of Wakhungu et al., in that as milk production increased among the smallholder farmers their preferred market choice was either KCC Eldoret or the milk chilling plants which represented the formal milk outlets.

A further study by Sikawa and Mugisha (2012) in Eastern Uganda found that farmers producing increased volumes of milk preferred to sell their milk to formal outlets which were capable of buying the increased milk produced. Moreover, a study by Bardhan, Sharma & Saxena (2012) in Uttarakhand India found that with scaled up milk production, smallholder farmers tended to change their milk marketing outlet from local cooperatives to milk processors. For this study, it was found that the smallholder farmers in Kipkaren division indicated a preference to the formal milk outlets when their milk production increased thereby supporting the above mentioned studies.

4.3.2   Milk marketing outlet with reduced milk production

The study also set to determine the smallholder dairy farmers' choice of milk marketing outlet with reduced milk production in contrast to market choice with increased milk production. From the data represented in Table 8, 54 respondents indicated a preference of changing their milk marketing outlet to a different one with reduced milk production while 131 respondents indicated they would not change their milk marketing outlet even with reduced milk production. Of the 54 respondents who indicated a preference to change the milk marketing outlet 40 of them indicated a preference to sell their milk to hawkers, 1 other farmer, 5 to local hotels, 5 to brokers and 3 to milk chilling plant. The data indicates that most of the respondents preferred the informal milk

marketing outlets with reduced milk production at the expense of formal milk marketing outlets. The chi-square test for this is represented in Table 8.

Table 8:

Milk Marketing Outlet with Reduced Milk Production

Current market outlet		Change Market outlet with reduced milk production		
		Yes	No	Total
Chilling plant	Count	3	86	116
	%	0	65.6	63
KCC Eldoret	Count	0	3	3
	%	0	0	1.6
Transporters	Count	0	2	4
	%	0	1.5	2
Brokers	Count	5	6	6
	%	9	4.6	3.2
Hawkers	Count	40	37	55
	%	74	28.2	29.7
Other farmer	Count	1	0	1
	%	2	0	0.5
Local hotels	Count	5	0	0
	%	9		0
Total	Count	54	131	185
	%	100	100	100

χ^2 =12.56, df= 6, p = 0.016, Cramer's V = 0.275, n=185
Source: Field data (2011)

The *p* value (0.016) is less than 0.05 indicating an existing relationship between the amount of milk produced (reduced production) and choice of milk marketing outlet among smallholder dairy farmers in Kipkaren division. The Cramer's *V* value (0.275) indicates a weak relationship between amount of milk produced (reduced milk production) and the choice of milk marketing outlet.

From the analysis of reduced milk production, the null hypothesis was rejected and the alternative accepted indicating that amount of milk produced (reduced production) by the smallholder dairy farmers in Kipkaren division has statistically significant influence on choice of milk marketing outlet. The smallholder dairy farmers in the division indicated a preference for the informal milk marketing outlets, represented by hawkers, brokers and local hotels, when their milk production reduced. Ngigi, Delgado, Staal and Mbogoh (2000) have argued that smallholder dairy farmers in the developing countries often have to contend with the same marketing and transaction costs that large scale farmers pay for in marketing their milk to formal outlets. Therefore, with reduced milk production, the smallholder farmers may opt to change their milk marketing outlet to informal outlets in order to avoid such high transaction costs in marketing their milk through the formal outlets. The transaction costs which may be represented by the cost of transport may be high especially if the formal milk outlet to be accessed is a distance from the farmer. Therefore, to avoid the transport costs and other costs that may be associated with marketing milk to formal outlets, the smallholder farmers indicated a preference to the informal milk outlets which were often situated within the farmers' locality. The farmers could sell their milk to the outlets such as local hotels or the hawkers within the village without incurring the costs of transport thereby the preference for the informal outlets with reduced milk production.

4.4 Objective Three: Relationship between Road Status and Choice of Milk Market Outlet

The objective under investigation in this section was to determine the influence of the state of road infrastructure on smallholder dairy farmers' choice of milk marketing outlet. The variables that were looked at were; the type of road, frequency of road repair, status of road in rainy season and choice of milk market considering road status.

4.4.1 Type of feeder roads in Kipkaren division

The results showed that tarmac roads represented 1% of feeder roads in Kipkaren division while gravel roads represented 23% of feeder roads. Other types of roads which included tarmac roads with pot holes, red soil roads and clay soil roads accounted for 76% of feeder roads. This indicates that most feeder roads in Kipkaren division are of poor quality. Furthermore, the data indicates that the frequency of road repair was generally minimal within the division. Of the respondents interviewed, 95% indicated that the feeder roads in their area were repaired once in two years while 5% indicated that their feeder roads had never been repaired. This indicates that most feeder roads in Kipkaren division were in bad condition especially during rainy season.

This is reinforced by the data which shows that over 85% of the respondents indicated that most roads in the division were either impassable or passable but with a struggle in the rainy season. Paradoxically, the peak milk production season was during the rainy periods and the bad roads were leading to high wastages during transportation. The poor feeder roads had an impact in milk marketing as poor roads limited the farmers' access to their preferred market outlet

4.4.2 Influence of state of road on the Kipkaren division smallholder farmers choice of milk marketing outlet

The study analysed the influence of the state of road infrastructure on the smallholder farmers' choice of milk marketing outlet in Kipkaren division. The hypothesis that was tested was: **The state of road infrastructure has no statistically significant influence on smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division.** Three tests were carried out to test the current choice of milk marketing outlet with current condition of roads, the probable choice of milk marketing outlet with improved road condition and with deteriorating road condition. The first test was on the choice of milk marketing outlet with the current road condition. The chi-square test is represented in Table 9.

Table 9:

Milk Marketing Outlet with Current State of Road

Current State of road	Milk market outlet						
	Chilling plant	KCC	Transporters	Brokers	Hawkers	Other farmer	Total
Fair	39	0	0	0	15	0	15
Bad	53	2	3	4	39	1	102
Very bad	24	1	1	2	1	0	29
Total	116	3	4	6	55	1	185

$\chi^2 = 18.30$ df = 10, p = 0.022, Cramer's V = 0.738, n=185
Source: Field data (2011)

From the data in Table 9, the p value (0.022) is less than 0.05 therefore the null hypothesis is rejected and the alternative is accepted implying that the state of roads within the division influenced the smallholder farmers choice of milk Marketing outlet. At the same time, the Cramer's *V* value is 0.738 indicating a strong relationship between the state of roads within the

Kipkaren division and the farmers' choice of milk marketing outlet. The chi-square test for probable market choice when road condition has deteriorated is indicated in Table 10.

Table 10:

Milk Market Outlet When Condition of Feeder Roads Have Deteriorated

	Different market outlet		
	Yes	No	Total
Chilling plant	16	83	99
KCC	0	0	0
Transporters	7	0	7
Brokers	15	2	17
Hawkers	53	2	55
Other farmer	3	0	3
Local hotel	3	1	4
Total	97	88	185

$\chi^2 = 12.59$, df= 6, p = 0.02, Cramer's V = 0.747, n=185
Source: Field data (2011)

The p value (0.02) is less than 0.05 indicating that there existed a relationship between choice of milk market outlet and road status. The Cramer's *V* value is 0.747 indicating a strong relationship between the two variables. Therefore, the status of the road had a strong influence on the choice of milk marketing outlet among the smallholder dairy farmers in Kipkaren division. In addition, a chi-square test for milk marketing outlet with improved road condition is represented in Table 11.

Table 11:
Market Outlet with Improved Feeder Roads (n=185)

	Different market outlet		
	Yes	**No**	**Total**
Chilling plant	5	94	99
KCC	18	1	19
Transporters	2	0	2
Brokers	5	12	17
Hawkers	26	22	48
Other farmer	0	0	0
Total	56	129	185

$\chi^2 = 11.07$, df= 5, p = 0.03, Cramer's V = 0.867, n=185
Source: Field data (2011)

From the above results, the p (0.03) is less than 0.05 indicating that there existed a relationship between road status and choice of milk market outlet. The Cramer's *V* value 0.867 indicated a strong relationship between the two variables. There was a change in respondents view on choice of milk market if the road were to be improved as indicated in Table 11. The results shows that 98 respondents would market their milk to the chilling plant, 20 respondents would market their milk to KCC Eldoret 2 respondents would market their milk to brokers while 28 and 1 respondents would market their milk to brokers and other farmers respectively. The smallholder dairy farmers preferred better roads for faster milk transportation to the market and to reduce wastage through spillage.

From the data analysis on the influence of road status (current road status, improved and deteriorated feeder roads) on the smallholder dairy farmers choice of milk marketing outlet, the null hypothesis is rejected and the alternative accepted meaning that the status of road infrastructure has an influence on the smallholder dairy farmers choice of milk marketing outlet in Kipkaren division. The dairy sector plays an important role in the agriculture for development agenda in Kenya. Different studies (World Bank, 2008; IFPRI, 2011 & Odongo, 1999) have

emphasized the importance of roads in smallholder agricultural development. A study by Odongo (1999) on groundnut marketing in Homabay district found that poor roads in the area limited the farmers' access to lucrative groundnut markets in Kisumu town. In addition Stiglitz (2002) has suggested that part of the reason for failure of the SAPs in Africa was because most governments misinterpreted their disengagement in economic activities to even neglecting building of rural roads to facilitate agricultural growth. This has been emphasized by International Food Policy Research Institute (IFPRI) (2011) that, lack of investment in infrastructure (roads) results in high transportation costs thereby forcing farmers to remain within a traditional subsistence mode of production.

The data from the study clearly demonstrates that the roads within Kipkaren division were of poor quality and were hardly maintained limiting the farmers' access to their preferred market outlets in farther places such as Eldoret town. The roads were a major barrier to the farmers' access to milk markets in the urban areas especially during the rainy season when the roads were impassable. In this regard, it has been suggested by IFPRI (2011) that when access to markets is difficult, then smallholder farmers often lack the incentives to increase production in their farms. In addition, Pollin, Heintz & Githinji (2007) have shown in their study that the bad road network in rural Kenya has been a major impediment to agricultural growth and productivity. Therefore, for the smallholder dairy farmers in Kipkaren division, the bad roads could have been a probable barrier to increased milk production especially when their access to preferred milk market was difficult.

This notion has been supported by a Remi & Alexander's (2012) study in Ghana that linked increased on-farm productivity to improved roads in the rural areas. Therefore, as much as the farmers would have preferred to access better markets in the urban areas, such as KCC, the poor infrastructure limited them. When asked about market preference with improved roads conditions, about 24% of the smallholder farmers indicated their preference for KCC Eldoret as their milk marketing outlet. This represented a 23% increase of the smallholder farmers preferring KCC as their market outlet. Therefore, the state of roads in Kipkaren division had limited the smallholder dairy farmers in accessing their preferred market outlet. As such, improving road infrastructure in Kipkaren division would open up market access for the smallholder farmers to markets in the urban centers around. The influence of state of roads in smallholder dairy farmers choice of milk marketing outlet is therefore linked to reducing transport costs, reducing product wastage and allowing for access to near as well as far market

outlets. Sachs (2005) has argued that when the pre-conditions of basic infrastructure (roads) are in place; markets development can be a powerful tool of development in the developing countries.

4.5 Objective Four: Influence of Means of Milk Transport to the Choice of Milk Market Outlet

The objective under study here was to determine the influence of means of transport to the market on smallholder dairy farmers' choice of milk marketing outlet. The variables under study were; the means of transport owned by the farmers, the most preferred means and the influence of ownership of means of transport to choice of market outlet.

4.5.1 Percentage of farmers who owned means of transport

From the data, 95% owned a means of transport to the market while 5% did not own the means they used to the market. Those who did not own either hired or used their neighbours's means to transport milk to the market. About a half of the respondents, 56% used bicycle to transport milk to the market, while the rest used other means indicated in Table 12. Ownership of means of milk transport was based on level of household income; those with low income owned bicycles while the ones with higher income owned vehicles and tractors.

Table 12:
Means of Milk Transport to the Market by Kipkaren Smallholder Dairy Farmers (n=185)

Characteristic	Frequency (f)	Percentage (%)
Tractor	4	2
Pick-up truck	7	4
Motorcycle	33	18
Bicycle	104	56
Self-carrying	37	20
Total	185	100

Source: Field data (2011)

4.5.2 The most preferred means of transport to the market

The study further assessed the preferred means of transport by the farmers as indicated in Table 13. The data indicates that about a half of the respondents at 48% preferred the pick-up truck. The preference of means of milk transport to the market was influenced by where a farmer sold the milk and the type of feeder roads around. The farmers delivering their milk to Eldoret KCC,

which was far, indicated their preference to pick-up truck. At the same time, farmers in areas with bad roads preferred either tractor or pick-up truck while the farmers near the chilling plants preferred motor-cycle. Generally distance from the market and type of the road determined the preference of the mode of milk transport.

Table 13*:*

The Preferred Means of Milk Transport to the Market (n=185)

Characteristic	Frequency	Percentage (%)
Bicycle	1	1
Motorcycle	22	11
Tractor	74	40
Pick-up truck	88	48
Total	185	100

Source: Field data (2011)

A chi-square test was carried out to test hypothesis three which was: **The ownership of the means of milk transport to the market has no statistically significant influence on smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division.** The results for the test are represented in Table 14.

Table 14:

Market Choice with Ownership of Means of Transport

Ownership of Means of transport	Milk marketing outlet					
	Chilling plant	KCC	Transporters	Hawkers	Brokers	Other farmer
Yes	100	3	1	0	9	0
No	16	0	3	6	46	1
Total	116	3	4	6	55	1

$\chi^2 = 11.07$, df= 5, p = 0.040, Cramer's V = 0.244, n= 185
Source: Field data (2011)

From the chi-square test, the p value 0.040 value is less than 0.05 thus the null hypothesis is rejected and the alternative accepted. This, therefore, implied that the ownership of the means of milk transport to the market influenced the smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division. The Cramer's *V* value of 0.244 indicates a weak relationship between the ownership of the means of milk transport and choice of milk market outlet.

The role of transport in agriculture is very vital for opening up markets and creating forward linkages in marketing system. Furthermore, an efficient transport system is important in reducing production costs and attracting investments. Remi and Alexander (2012) analysed the development of the rail-road in colonial Ghana and found that the construction of the rail-road permitted a massive decrease in cocoa transportation costs. Similar surveys in Benin, Madagascar, and Malawi by the World Bank (2008) found that transport costs account for 50-60% of total marketing costs among smallholder producers. Therefore, the means of transport of agricultural produce is closely linked with the type of roads and other transport infrastructure that have been constructed in the area. For Kipkaren division, the feeder roads in the area were in poor conditions and as a result most of the farmers indicated a preference for tractors or pick-up trucks as their preferred means of transporting milk to the market. Therefore, the bad roads within the division had a major influence on the smallholder dairy farmers preferred means of milk transport to the market.

With the bad roads the ttransport costs, in terms of fuel, tear and wear of means of transport are often high thereby limiting farmers' preference of a marketing outlet. In this regard, IFPRI (2011) report has suggested that inadequate means of transport in the rural areas have may push up marketing costs and thereby undermine existing local and export marketing opportunities. This could be more prominent in marketing of perishable agricultural produce such as milk where producers need to access markets as fast as possible to avoid wastages as pointed out by Muriuki (2011). The Ministry of Livestock and Fisheries Development had estimated that milk wastage in Kenya during the rainy season is often about 3% of the total amount of milk produced mainly due to inadequate means of transport and bad roads (MOLFD, 2007). From the data, over 70% of the smallholder farmers in the division were using inappropriate means of transport (bicycles and motorbikes) and this could have led to increased milk loss in the division.

Therefore, appropriate transport system in agriculture can play the vital role of increasing farmers' linkages to inputs and output markets thus transforming traditional agriculture into a

modern sector (World Bank, 2008). For Kipkaren division, appropriate means of milk transport to the market can enhance the smallholder dairy farmers' access to the milk markets in the urban centres thereby bringing about competitiveness in the dairy sector.

4.6 Objective Five: Influence of the Services of Milk Chilling Plant to Choice of Milk Market Outlet in Kipkaren Division

The objective under study here was to determine the influence of services offered by the milk chilling plants to the smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division. The variables under study were: chilling plant most frequented, services being offered by the chilling plants and the reasons for joining the chilling plant. These variables are further discussed below.

4.6.1   Existing milk chilling plants in Kipkaren division

Kipkaren division had 2 milk chilling plants; Tanykina Kipkaren and Tanykina Tulwo with 51% of the smallholder dairy farmers delivering their milk to Tanykina Kipkaren while 49% delivering their milk to Tanykina Tulwo. The choice of chilling plant was based on its nearness to the farmer. At the same time, 55% of the respondents indicated they had been members of the chilling plants for between 1-3 years, 9% had been members for below 1 year, 23% had been members for between 3-6 years while 13% had been members since the inception of the different chilling plants. This is represented in Table 15.

Table 14:

Duration of Membership to Chilling Plant (n= 185)

Variable	Frequency (f)	Percentage (%)
Less than 1 year	11	9
1-3 years	67	55
4-7 years	26	23
Since inception	16	13
Total	120	100

Source: Field data (2011)

The study further looked at the reasons for the smallholder farmers in the division joining the milk chilling plants. The respondents gave different reasons for joining the milk chilling plant. A

majority of the respondents at 62% indicated they joined the chilling plant due to the services being offered, 32% indicated they preferred the high milk prices being offered while 6% indicated they joined because of the stable milk prices in all seasons. This is shown in Table 16.

Table 15:

Reason for joining chilling plant (n=185)

Reason for joining chilling plant	Frequency (f)	Percentage (%)
Stability of milk price	7	5.8
Services provided by chilling plant	74	62
Good milk price	39	32.3
Total	120	100

Source: Field data (2011)

The study went further to investigate the most preferred service for those who indicated they joined the chilling plant because of services being offered. The result indicated that 47% of the respondents were attracted to join the chilling plants because of the availability of credit and the ease of accessing the credit. A further 28% indicated their attraction was subsidized inputs and feeds, 19% indicated their attraction was the dairy management trainings being offered for free while 6% indicated their attraction was the ease of access to subsidized A.I services. **A chi-square test was carried out to test the hypothesis four which was:** The milk chilling plants and the services they offered has no statistically significant influence on smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division. **The result of the chi-square test is indicated in Table 17.**

Table 16*:*

Kipkaren Smallholder Farmers' Reason for Marketing Milk in the Chilling

	Different milk market outlet		
	Yes	No	Total
Stability of milk price	7	12	19
Services at the chilling plant	12	50	62
Price of milk	10	29	39
Total	29	79	120

χ^2 = 11.06 df= 2, p = 0.037, Cramer's V = 0.74, n= 120
Source: Field data (2011)

From the data analysis, the p value (0.037) is less than 0.05 therefore the null hypothesis is rejected and the alternative accepted implying that the services offered by the milk chilling plant influenced smallholder farmers choice of milk marketing outlet in Kipkaren division. The Cramer's *V* value is 0.74 implying a strong relationship between the services offered by the milk chilling plant and choice of milk marketing outlet. The study further analysed the choice of milk marketing outlet when the prices of milk is low but services retained at the chilling plant. The chi-square test result is represented in Table 18.

Table 17:

Milk Market Choice When Milk Prices are Low But Services Retained at Chilling Plant (120)

Current market outlet		Different milk marketing outlet		
		Yes	**No**	**Total**
Chilling plant	Count	61	55	116
	%	93.8	100	96.7
KCC Eldoret	Count	1	0	1
	%	1.5	0	0.8
Transporters	Count	3	0	3
	%	4.6	0	2.5
Total	Count	65	55	120
	%	100	100	100

$\chi^2 = 5.91$ *df= 2, p = 0.047, Cramer's V = 0.74,* n= 120
Source: Field data (2011)

The p value for milk market choice when milk prices were low but services retained at the chilling plant was 0.047 which was less than 0.05 thus the null hypothesis was rejected while the alternative hypothesis was accepted indicating that the services offered by the chilling plants had an influence on smallholder dairy farmers choice of milk marketing outlet. The Cramer's *V* value of 0.74 indicated a strong relationship between services offered by the chilling plant and smallholder dairy farmers' choice of milk marketing outlet. Moreover, study further tested the relationship between the choice of milk chilling plant as a market outlet with milk prices high but services withdrawn at the chilling plant. The results of the chi-square test are indicated in Table 19.

Table 18:

Milk Market Outlet Choice When Prices are High at Chilling Plant But Service are
Withdrawn

Current market outlet		Different milk marketing outlet		
		Yes	No	Total
Chilling plant	Count	116	0	116
	%	96.7	0	96.7
KCC Eldoret	Count	1	0	1
	%	0.8	0	0.8
Transporters	Count	3	0	3
	%	2.5	0	2.5
Total	Count	120	0	120
	%	100	0	100

$\chi^2 = 5.93$, df=2 , $p = 0.031$, Cramer's V = 0.634, n= 120
Source: Field data (2011)

The p value for the chi-square test above was 0.031, which was less than 0.05 thus the null hypothesis was rejected while the alternative hypothesis was accepted indicating that the services offered by the chilling plants had an influence on smallholder dairy farmers choice of milk marketing outlet. The Cramer's *V* value of 0.634 indicated a fairly strong relationship between services offered by the chilling plant and smallholder dairy farmers' choice of milk marketing outlet.

From the above chi-square results, all the p values were less than 0.05 therefore null hypothesis was rejected and the alternative hypothesis was accepted implying that the services offered by the milk chilling plant had statistically significant influence on smallholder dairy farmers choice of milk marketing outlet in Kipkaren division. This implied that even with low milk prices in the chilling plants, some smallholder dairy farmers still preferred the chilling plants indicating that some farmers were attracted to the chilling plants by the services being offered with credit being the most preferred.

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In this regard The World Bank (2008) has termed the farmer's producer organizations as fundamental building block to agriculture for development agenda. Penunia (2011) has suggested that the producer marketing groups have can be essential institutions for the empowerment, poverty alleviation and advancement of farmers and the rural poor. The services offered by these producer organizations such as credit may sometime play a role in enabling the farmers' access services which in most cases are difficult to access. Some of the services offered by the producer groups, such as the milk chilling plants, often include; credit facilities, agricultural extension trainings and farm input supply among other services. It is important to note that in the developing countries, the rural smallholder farmers access to some of these services have been a challenge a good example is the access to credit facilities. With other mainstream lenders often offering expensive credit with heavy collateral requirements, the provision of credit facilities by the milk chilling plants is therefore important in enabling more farmers' access credit. A survey in Central and East Europe among smallholder farmers indicated that 50% of them reported financial constraints to be the major barrier to growth and expansion of their enterprises (World Bank, 2008). Therefore, credit access are critical to assisting smallholder farmers manage their risks that may undercut their ability to diversify enterprises, as a cushion against risks, and help push most of the poor smallholder farmers to the first rung of the ladder of success (Sachs, 2005). Majority of the smallholder farmers interviewed (63%) in the division were marketing their milk to the chilling plant with the services being offered being the main attraction to joining the milk chilling plant.

Although there has been significant increase in the use of farm inputs such as fertilisers by smallholder farmers (for instance in the export crop sector), the vast majority of Africa's smallholder farmers rarely use modern inputs (Kelly, Adesina, & Gordon, 2003). Therefore, the potential of the producer organisations, such as milk chilling plants, facilitating smallholder farmers' access to input supply is important. These producer organisations may eliminate the constraints in input access thereby increasing the usage of the inputs among the smallholder farmers (IFPRI, 2007). The chilling plant in Kipkaren division was providing inputs and other farm inputs to the farmers who were members at reasonably lower prices due to the fact that the chilling plant was purchasing the inputs in bulk therefore benefitting from economies of scale which was in-turn transferred to their members. Therefore, the services that were provided by the milk chilling plants in Kipkaren division were influencing the farmers' choice of milk marketing outlet.

4.7 Objective Six: Influence of Mode of Milk Payment to Choice of Milk Marketing Outlet in Kipkaren Division

The objective under study here was to determine the influence of the mode of milk payment by urban milk consumers and farm gate buyers on smallholder dairy farmers' choice of milk marketing outlet. The variables under study were: nearest urban centres to Kipkaren division, the number of respondents marketing their milk to the urban centre and finally the influence of the mode of payment to choice of milk marketing outlet.

4.7.1 The nearest urban centre to Kipkaren division

Kipkaren division is surrounded by three major urban centres; Eldoret, Webuye and Kakamega. From the data 35% of respondents indicated their nearest urban centre is Eldoret town, a further 59% and 6% indicated that Webuye and Kakamega towns respectively were their nearest urban centres. This is presented in the Table 20.

Table 19: Nearest Urban Centre to the Farmer (n= 185)

Characteristic	Frequency (f)	Percentage (%)
Kakamega	11	6
Eldoret	65	35
Webuye	109	59
Total	185	100

Source: Field data (2011)

In addition, 30% of the respondents indicated that they marketed their milk to nearby urban centres through hawkers who collected the milk on behalf of several farmers and eventually sold the milk to urban centres. Among the 30% of the respondents who marketed their milk to urban centres, 16% sold to Eldoret town, 80% sold to Webuye and 4% sold to Kakamega town. This is shown in the Table 21.

Table 20:

Urban centres where most of the milk is marketed (n= 65)

Characteristic	Frequency (f)	Percentage (%)
Eldoret	40	61.5
Webuye	23	35
Kakamega	2	3.5
Total	65	100

Source: Field data (2011)

4.7.2 The factors motivating the smallholder dairy farmers to sell their milk to urban centres

The study further analysed the motivating factors (push factors) for the smallholder dairy farmers in Kipkaren selling milk in urban centres alongside the mode of payment. The data indicates that nearly a half of the respondents at 54% indicated that they preferred marketing their milk to the urban centres directly or through hawkers due to on-spot cash payments. Some of the respondents further indicated that sometimes they were able to get advanced payments from their customers for un-delivered milk as a motivating factor. This mostly occurred when the smallholder dairy farmer had pressing needs such as school fees for the children. The loyal customers were often willing to loan the farmers the required amount of money which the farmers then repaid through milk delivery. This could have been influenced by the concept of customer loyalty. This is presented in the Table 22.

Table 21:

Urban Centres Pull and Push Factors on the Smallholder Dairy Farmers (n= 56)

Characteristic	Frequency (f)	Percentage (%)
Milk produced is little	3	5
High milk prices in urban centres	4	7
Advance payment in emergence	5	9
Easy access to urban centre	15	27
No delays in payment	29	52
Total	56	100

Source: Field data (2011)

Apart from the push factors, the study also went further explore if the urban areas had pull factors influencing the smallholder farmers to market their milk in the urban centres. There were similarities between the push and pull factors for instance the farmers mentioned the easy access to the urban centres and advance milk payment as some of the pull factors. However, there were also differences between the pull and push factors mentioned by the farmers. The different pull factors included the guaranteed milk market even in peak milk production period and the spot milk payment by the urban milk buyers. A chi-square test was carried out to test the hypothesis five which was: **The mode of milk payment at the farm gate and in urban centres (Webuye, Kakamega, Bungoma and Eldoret) has no statistically significant influence on smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division.** The result of the chi-square test is represented in Table 23. The study looked at two variables, delays in milk payments and advance milk payment in case of emergencies, in the influence on choice of milk marketing outlet.

Table 22*:*
Influence of Mode of Milk Payment on Smallholder farmers Choice of Milk Market Outlet in Kipkaren Division

Market outlet	Different milk marketing outlet		
	Yes	No	Total
High milk price	4	0	4
Advance payments	5	0	5
Prompt payment	30	0	30
Milk produced is little	1	0	1
Accessibility to urban centre	16	0	16
Total	56	0	56

$\chi^2 = 9.48$, df= 4, p = 0.927, Cramer's V = 0.126, n= 56
Source: Field data (2011)

The p value of 0.927 is greater than 0.05, therefore, the null hypothesis was accepted indicating that mode of milk payment in urban centre had no influence on the smallholder dairy farmers' choice of milk marketing outlet in Kipkaren Division. The Cramer's *V* value (0.185) indicated a weak relationship between choice of milk market and mode of milk payment in urban and rural centres.

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The urban centres play a major role in milk marketing in Kenya especially by providing market for milk through informal outlets such as milk hawking. Kipkaren division is surrounded by three major urban centres; Eldoret, Webuye and Kakamega. From the result, the mode of milk payment in the urban centres did not influence the smallholder dairy farmers' choice of milk market in Kipkaren division. The study found that farmers selling their milk to urban centres looked for more than just mode of payment; they looked for higher prices, nearness to urban centres and quantity of milk produced. The biggest attraction was the price of milk in urban centres. Urban centres offered higher milk prices compared to other milk marketing outlets with significant difference between milk prices at the urban centres and the rural milk outlets. Despite the numerous obstacles to marketing milk in urban centres, some farmers still marketed their milk to urban centres due to the high prices. However, the result indicates that the mode of milk payment in the urban centres had no influence on the smallholder dairy farmers' choice of milk marketing outlet.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter above has presented the results and discussion of the study based on the data. This chapter presents a brief summary, conclusion and recommendation of the study based on the results. The Washington consensus, which gave birth to the SAPs, was based on the premise of economic spillover effect. This indeed never occurred and instead the poor became poorer due to the abolishment of the social net programmes which had supported them and the neglect of the pro-poor sectors such as agriculture. However, the post-Washington consensus era called for pull-up effect with a major emphasis on investment on the pro-poor sectors. As a result, The World Bank's 2008 world development report, *agriculture for development*, emphasized the importance of investment in agriculture in order to lift the poor out of poverty and to create inclusive growth for all. An analysis of Kipkaren division smallholder farmers' dairy production has shown that investment in the sector is necessary in order to realize the agriculture for growth agenda. The main focus of this agenda should be investment in road infrastructure in the area. This chapter captures a summary of the research findings by objective and thereafter conclusion and recommendation for policy and areas for further research.

5.2 Summary

The study found varying socio-economic characteristics of the smallholder dairy farmers within Kipkaren division. The study also found there is diverse milk marketing outlets within the division. The existing milk marketing outlets were found to be; chilling plant, Kenya cooperative Creameries, hawkers, transporters, local hotels and local farmers. Farmers indicated various reasons for their preference of a marketing outlet ranging from price offered, services available, nearness of the outlet and bad roads. The study also found that the amount of milk produced influenced the smallholder dairy farmers' choice of milk marketing outlet within the division. Some of the farmers indicated that an increase or a decrease of amount of milk produced made them change their market outlet. An increase in milk produced by the farmers influenced some of the farmers to change their preferred market outlet from informal to formal market outlet such as KCC or the chilling plant. In contrast, a decrease in the amount of milk produced made the farmers move from formal outlets to informal ones like local hotels and hawkers.

Furthermore, the state of road infrastructure was found to have an influence on the Kipkaren smallholder dairy farmers' choice of milk marketing outlet. Farmers' access to market outlet was influenced by the state of roads within the area. The data indicated that most roads within the division were in bad condition. As a result, some farmers who would have preferred to market their milk in urban centres, such as KCC Eldoret, were forced to sell their milk to local outlets. This was because the bad roads increased the marketing transaction costs by making transportation expensive. Preference alone was not enough but the presence of good roads determined if one could achieve the preferred market outlet.

Ownership of means of transport was found to have an influence on choice of milk marketing outlet. Transport was closely linked to state of road. The state of road infrastructure determined the type of transport that was used in the area or preferred by a farmer. The study found that most farmers who owned pick-up trucks accessed farther markets in Eldoret such as KCC while those with motor bikes and bicycle delivered their milk to chilling plant or transporters. Those who did not own any means of transport sold their milk to hawkers or transporters despite their preference of KCC in Eldoret. Ownership of a preferred means of transport reduced the farmers marketing costs.

The study also found that the services offered by milk chilling plants had an influence on smallholder dairy farmers' choice of milk marketing outlet within Kipkaren division. Some farmers were looking for more than a better price. Some of the farmers who had joined the chilling plant did so because of the services that were being offered with credit availability being the major attraction. The milk chilling plant was providing credit to poor farmers because of low transaction costs involved compared to the large commercial banks. At the same time, their role in providing inputs and trainings to farmers was also of importance and an alternative way of availing extension to farmers. Despite the importance of the producer organizations, represented by the chilling plants in agricultural marketing, most of these organisations are often faced with challenges associated with high operation costs and low bargaining power in produce markets thereby aligning to the margins of agriculture marketing. Thus they need support in order to be able to overcome these challenges. The study found that the milk chilling plant facilitated the smallholder farmers, access to formal milk marketing outlet, something that had been a preserve for the large-scale diary farmers'.

Lastly the study found that mode of milk payment in urban areas had no influence on smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division. Most farmers had already decided where to market their milk in spite of closeness to urban centres. Four factors were found to influence choice of milk marketing outlet in Kipkaren division; amount of milk produced, road infrastructure, ownership of means of transport and services offered by milk chilling plant.

5.3 Conclusion

The study has shown that, several factors influences smallholder dairy farmers, choice of milk marketing outlet in Kipkaren division. Among the available markets, the farmers chose one or more at a time which offered more benefits. Some of the smallholder farmers sold their milk to two outlets at a time in order to benefit from the advantages of the two outlets at a go. The benefits ranged from higher milk prices, provision of credit and stable milk prices. On the basis of the findings, a conclusion can be made that Kipkaren smallholder dairy farmers based their decision on where to market their milk on rational choice theory. They were guided, by certain factors when choosing the preferred milk marketing outlet.

Consequently it is evident from the study that indeed there exist factors which influence smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division. The study found that the amount of milk produced by the Kipkaren division farmers influenced their choice of milk marketing outlet. As the farmers milk production increased, the farmers indicated that they preferred formal milk marketing outlet. On the other hand, when the milk production reduced the farmers indicated their preference of informal milk marketing outlets such as local hotels. In addition, the study found that the state of road infrastructure influenced the Kipkaren smallholder farmers' choice of milk marketing outlet. The bad roads in the area were a limitation to some of the farmers who preferred milk marketing outlets based outside the division such as Eldoret KCC.

Moreover, the study found that ownership of means of transport influenced the smallholder dairy farmers' choice of milk marketing outlet within Kipkaren division. The farmers who owned pick-up trucks and tractors were found to be delivering milk to their preferred milk outlets such as KCC Eldoret. In comparison, the farmers with bicycles or motorbikes were limited to selling their milk to outlets that were near the division. Some of the farmers who did not own any means of transport indicated that they would have preferred to deliver their milk to KCC Eldoret but the lack of means was an inhibiting factor. However, the ownership of means of transport was

closely linked to the state of the roads within the division with the bad roads in the division limiting farmers with motorbikes and bicycle from accessing milk outlets located outside the division.

It was also found that the services offered by milk chilling plants influenced smallholder dairy farmers' choice of milk marketing outlet within the division. Some of the farmers were attracted to the chilling plants because of the services they offered in addition to the milk prices. The farmers indicated that they preferred the credit facilities offered by the chilling plants. In conclusion, the mode of milk payment within urban areas was found to have no influence on the smallholder dairy farmers' choice of milk marketing outlet. The findings of the study were consistent with other studies done in other regions of Kenya, especially Kiambu milk shed.

In conclusion, improving and modernizing the agricultural marketing system in Kenya can foster competitiveness and lead to more farmers accessing markets reducing losses and risks for smallholder producers (World Bank, 2008). Market modernization, beyond improving basic transport includes commodity exchanges, market information systems (delivery of accurate and timely commodity prices), price risks management and enforcing of contracts. These can have a significant impact in modernising agriculture and improving household incomes among smallholder farmers. There is need also to improve the rural roads and to give support to the farmer marketing organizations by formulating favorable policies to enable them operate optimally with minimum interference. These farmer's marketing organisations have a potential of availing unavailable services to their members which is crucial to improving dairy production and marketing.

5.4 Recommendations

This section captures a summary of the recommendations for policy and areas for further research. This study offers lessons from a policy perspective. Recommendations are made in keeping with the outcome of the study and the conclusions drawn from the study.

5.4.1 Policy Recommendations

In lieu with the findings above the study makes the following recommendations. First there is need for increased investment in rural infrastructure roads network to improve farmers' access to markets, inputs and information. Secondly there is need for support to the milk chilling plants in terms of favourable policies, incorporating them in policy formulation and offering them access to financial capital and capacity building in order to improve service provision to farmers.

5.4.2 Areas for further research

In view of the study findings, a number of recommendations are made for further research. While the study has found that the amount of milk produced, state of road infrastructure, services offered by the milk chilling plants and ownership of means of transport influenced smallholder dairy farmers choice of milk marketing outlet in Kipkaren division, more research is needed to replicate the study elsewhere. Furthermore, more research is needed to determine the influence of socio-economic factors such as income levels and gender dimension in choosing milk marketing outlets. It would also be interesting to explore the influence of urban areas in choice of milk marketing in other dimensions such as milk price. Other studies can be conducted to determine what influences the large scale farmers' choice of milk marketing outlet. The combined findings of such studies with this can greatly help re-define milk marketing policy in Kenya. Further, the conclusions made in this study can later be verified in different research circumstances by other researchers.

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Appendix 1: Questionnaire

Dear Sir/Madam,

I am carrying out a research on selected factors that influence smallholder dairy farmers' choice of milk marketing outlet in Kipkaren division of Nandi north district, Kenya. I wish to kindly request you to participate in the study by providing information requested below. I appreciate your voluntary participation and your responses will be confidential and will be used only for the purposes of this study.

(Section A)Socio-Demographic Information

Interview Schedule Code Number _____   Location _____

1.   Gender: (a) Male {   }   (b) Female {   }

2.   Age:

   a) 18-27   {   }
   b) 28-37   {   }
   c) 38-47   {   }
   d) 48-57   {   }
   e) 58-67   {   }
   f) 67 and above   {   }

3.   Head of Household: (a) Male   {   }   (b) Female   {   }

4.   Marital Status:

  (a) Single {   }   (b) Married {   }   (c) Separated {   }
  (d) Widowed {   }

5.   Household structure:

       Nuclear {   }   (b) Extended {   }

  6. Highest education level attained/completed: *(Tick one)*

  (a) Primary   {   }   (e) Master's degree   {   }

  (b) Secondary   {   }   (f) Doctoral   {   }

  (c) Tertiary- middle level college   {   }   (g) None   {   }

  (d) Bachelor's degree   {   }

7. What is your main or primary occupation? *(Tick as appropriate)*

a) Farmer   { }   e) Domestic Worker   { }

b) Professional   { }   f) Housewife /husband   { }

c) Business man/woman { }   g) Student   { }

d) Labourer   { }   h) Other *(Specify)*………………

(Section B) Milk marketing and road infrastructure

8. Which marketing outlet do you sell your milk to? *Tick one.*

a) Chilling plant……….   d) Brokers………….

b) KCC Eldoret………….   e) Hawkers…………..

c) Transporters……….   f) Other (specify)……….

9. What is the type of feeder roads in your area? *Tick one*

a) Tarmac……..

b) Gravel…….

c) Other (specify)……….

10. How often are the roads in the area repaired? *Tick one.*

a) Twice in the year…….

b) Yearly……..

c) Once in two years…….

d) Never…….

e) Other (specify)………

11. What is the current state of roads in your area? *Tick one*

a) Good…..

b) Fair……

c) Bad……

d) Very bad……

e) Other (specify)……

12. What is the status of roads in rainy season in this area? *Tick one*

a) Passable………..

b) Fairly passable………..

c) Passable but with a struggle……….

d) Impassable………..

13. When the road is impassable in rainy season, where do you sell your milk? *Tick one.*

    a) Chilling plant……….   d) Brokers………….

    b) KCC Eldoret………….   e) Hawkers…………..

    c) Transporters……….   f) Other (specify)……….

14. If the road would be improved, where would you sell your milk? *Tick one.*

    a) Chilling plant……….   d) Brokers………….

    b) KCC Eldoret………….   e) Hawkers…………..

    c) Transporters……….   f) Other (specify)……….

15. If the status of the road would deteriorate to worse than it is today, where would you sell your milk? *Tick one*

    a) Chilling plant……….   d) Brokers………….

    b) KCC Eldoret………….   e) Hawkers…………..

    c) Transporters……….   f) Other (specify)……….

(Section C) Means of transportation of milk to the market

16. What means do you use to transport milk to the market? *Specify*

    …………………………………..

17. Do you own the means you use to transport milk to the market? *Tick one*

    a) Yes

    b) No

18. Is the means you use appropriate and reliable for your area considering roads and distance to market? *Tick one*

    a) Yes

    b) No

19. If you owned the reliable and appropriate means, where would you sell your milk? *Tick one*

    a) Chilling plant……….   d) Brokers………….

    b) KCC Eldoret………….   e) Hawkers…………..

    c) Transporters……….   f) Other (specify)……….

20) According to you, which means of milk transport is the most appropriate for your area, taking into consideration state of road, topography and distance to market? *Specify the means and reason*

    ……………………………………….

(Section D) Market channel and amount of milk a farmer produces

21. How many dairy cows are you keeping?

....

22. What breed of cow do you keep?

....

23. How many litres of milk do the cows produce daily?

....

24. Where do you currently sell your milk? *Tick one*

    a) Chilling plant……….   d) Brokers………….

    b) KCC Eldoret………….   e) Hawkers…………..

    c) Transporters……….   f) Other (specify)……….

25. If the amount of milk you produce was to increase, would you sell to a different outlet? *Tick one.*

    a) Yes

    b) No

26. If the answer to question above (27) is yes, which outlet would you sell to? *Tick one.*

    a) Chilling plant……….   d) Brokers………….

    b) KCC Eldoret………….   e) Hawkers…………..

    c) Transporters……….   f) Other (specify)……….

27. If the amount of milk you produce was to reduce due to some reason, would you sell to a different outlet? *Tick one.*

    a) Yes

    b) No

28. If the answer to question 27 is yes, which outlet would you sell your milk to? *Tick one.*

    a) Chilling plant……….   d) Brokers………….

    b) KCC Eldoret………….   e) Hawkers…………..

    c) Transporters……….   f) Other (specify)……….

(Section E) Chilling plant and the services it offers

(To be answered by those selling milk to chilling plants only)

29. Which milk chilling plant do you sell your milk to? *Tick one.*

    a) Tanykina Tulwo

    b) Tanykina Kipkaren

30. How long have you been a member of the chilling plant? *Tick one*

      a) Less than one year……

      b) 1-3 years……

      c) 4-6 years……

      d) Since its inception…….

31. What is the reason that made you join the chilling plant? *Tick one.*

      a) Stability of milk price……

      b) Services offered by the chilling plant……

      c) Prices of milk at chilling plant……

      d) Other………..

32. If the prices offered by the chilling plant were lower than it is today would you still sell your milk there? *Tick one.*

      a) Yes

      b) No

33. If yes what attracts you most to the chilling plant? *Tick one.*

      a) Accumulated payment……

      b) Price stability throughout the year……

      c) Services offered by the chilling plant……

      d) All the above……

      e) Other…………

34. Which services are being offered by the chilling plant you are a member of? *Tick one.*

      a) Dairy management trainings……

      b) Subsidized artificial insemination……

      c) Feeds and other inputs at subsidized prices……

      d) Ability to access bank credit……

      d) Other *specify*……

35. If the chilling plant would retain the above services but the milk price reduced drastically, would you still sell your milk to the chilling plant? *Tick one.*

      a) Yes……

      b) No……

36. If yes, what is the service you find most important to make you stick with the chilling plant? *Tick one.*

       a) Dairy management trainings……

       b) Subsidized artificial insemination……

       c) Feeds and other inputs at subsidized prices……

       d) Ability to access bank credit……

       d) Other *specify*……

37. If the chilling plant would withdraw all the above services, but make prices better than other outlets would you still sell your milk to the chilling plant? *Tick one.*

       a) Yes

       b) No

38. If no where would you sell your milk? *Specify*

……………………………

(Section F) Spot cash purchases in urban centres

39. Which urban centre is near you? *Tick one.*

       a) Eldoret……

       b) Bungoma…..

       c) Kakamega …..

       d) Webuye……..

40. Do you sell your milk to any of the urban centers? *Tick one*

       a) Yes

       b) No

41. If yes which of these four towns do you sell your milk to? *Tick one.*

       a) Eldoret……

       b) Bungoma……

       c) Kakamega……

       d) Webuye…….

       e) Other (specify)……..

42. What is/are the motivating factor(s) to selling your milk to urban centre?

………………………..   ………………………….

43. If the milk prices in urban centre would be lower than other outlets, would you still sell your milk to urban centres? *Tick one.*

     a) Yes……

     b) No……

44. If yes, what is the motivating reason/s to selling milk to urban centres? *Tick one.*

     a) Credit from the customer in case of need……

     b) Guarantee sales even in peak milk periods……

     c) Guarantee payments for milk delivered……

     d) All the above………………

     e) Other (specify)…………….

45. Do you sell the milk directly to the urban centre or through hawkers?

……………………….....

46. If you sell to hawkers or directly to an urban centre, what is the motivating factor/factors?

………………………..

47. What is the most important factor to you in choosing milk market?

………………………….

Thank you

Appendix 2: Proposal Approval

EGERTON

Tel. Pilot: 254-51-2217620
             254-51-2217877
             254-51-2217631
Dir.line/Fax: 254-51-2217847
Cell Phone

UNIVERSITY

P.O. Box 536 - 20115
Egerton, Njoro, Kenya
Email: eugradschool@wananchi.com
www.egerton.ac.ke

OFFICE OF THE DIRECTOR GRADUATE SCHOOL

Ref: EM21/2317/09 ·················   12ᵗʰ October, 2011 ···············

Mr. Fredrick Odhiambo Ajwang
Dept. of ACDS
Egerton University
P.O Box 536
EGERTON

Dear Mr. Ajwang

RE: **MASTERS RESEARCH PROPOSAL APPROVAL – 24ᵀᴴ AUGUST, 2011**

This is to inform you that the Board of Postgraduate Studies in its meetings held on 24ᵗʰ August, 2011 considered and approved your research proposal entitled: **"Selected Factors Influencing Smallholder Dairy Farmers' Choice of Milk Marketing Outlet in Kipkaren Division of Nandi North District, Kenya "** subject to the following corrections:

   i.   Use the correct rubric for the submission of proposal statement on the title page.
   ii.   Rewrite the declaration document and use the correct rubric.
   iii. Chapter three should be titled "Research Methodology".
   iv. Your instrument is actually a questionnaire and not an interview schedule.
   v.   Provide a title for figure 1 on page viii and put the abbreviations on page x and page ix.
   vi. Interchange section 1.7 and 1.8.
   vii. Definition of terms should be on its own page.
  viii. Subtitles key words should begin with capitals.
   ix. Format your tables properly.
   x.   Your instrument should be properly formatted and clear instruction included.

Yours sincerely,

Prof. Michael A. Okiror
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

c.c.   Dean   FEDCOS
        Dr. S.K. Makal   ACDS
        Dr. C.N. Munyua   ACDS

MAO/vk

Appendix 3: Fieldwork Approval

EGERTON   UNIVERSITY

Tel: Pilot: 254-51-2217620   P.O. Box 536 - 20115
               254-51-2217877   Egerton, Njoro, Kenya
               254-51-2217631   Email: eugradschool@wananchi.com
Dir.line/Fax: 254-51-2217847   www.egerton.ac.ke
Cell Phone

OFFICE OF THE DIRECTOR GRADUATE SCHOOL

Ref:............ EM21/2317/09 ....   Date:............ 3rd November, 2011 ....

Mr. Fredrick O. Ajwang
Dept. of ACDS
Egerton University
P. O. Box 536
EGERTON

Dear Mr. Ajwang
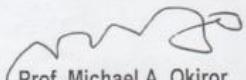
RE: CORRECTED PROPOSAL

This is to acknowledge receipt of two copies of your corrected proposal, entitled: "Selected Factors Influencing Smallholder Dairy Farmers' choice of Milk Marketing Outlet in Kipkaren Division of Nandi north District, Kenya"

You are now at liberty to commence your fieldwork.

Thank you.

Yours sincerely,

Prof. Michael A. Okiror
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

c.c.   Supervisors

MAO/das

Egerton University is ISO 9001:2008 Certified

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Appendix 4: Scholarship Letter

EGERTON
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              254-51-2217631
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Cell Phone

UNIVERSITY
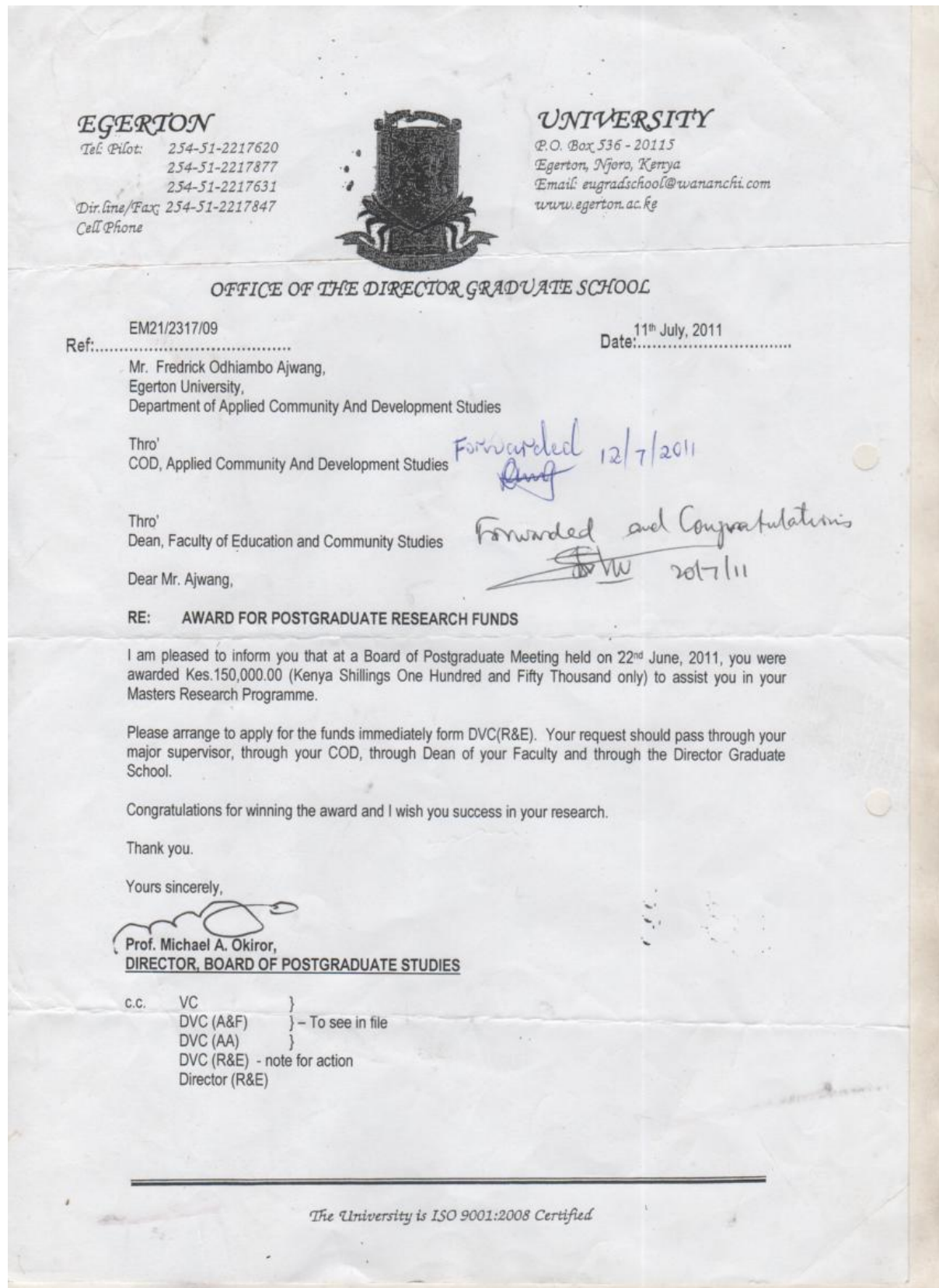P.O. Box 536 - 20115
Egerton, Njoro, Kenya
Email: eugradschool@wananchi.com
www.egerton.ac.ke

OFFICE OF THE DIRECTOR GRADUATE SCHOOL

Ref: EM21/2317/09   Date: 11th July, 2011

Mr. Fredrick Odhiambo Ajwang,
Egerton University,
Department of Applied Community And Development Studies

Thro'
COD, Applied Community And Development Studies   *Forwarded 12/7/2011*

Thro'
Dean, Faculty of Education and Community Studies   *Forwarded and Congratulations*
                                                      VW 20/7/11

Dear Mr. Ajwang,

RE: AWARD FOR POSTGRADUATE RESEARCH FUNDS

I am pleased to inform you that at a Board of Postgraduate Meeting held on 22nd June, 2011, you were awarded Kes.150,000.00 (Kenya Shillings One Hundred and Fifty Thousand only) to assist you in your Masters Research Programme.

Please arrange to apply for the funds immediately form DVC(R&E). Your request should pass through your major supervisor, through your COD, through Dean of your Faculty and through the Director Graduate School.

Congratulations for winning the award and I wish you success in your research.

Thank you.

Yours sincerely,

Prof. Michael A. Okiror,
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

c.c.   VC   }
        DVC (A&F)   } – To see in file
        DVC (AA)   }
        DVC (R&E) - note for action
        Director (R&E)

The University is ISO 9001:2008 Certified

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Appendix 5: Research Authorisation

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams:"SCIENCETECH", Nairobi
Telephone: 254-020-241349, 2213102
254-020-310571, 2213123.
Fax: 254-020-2213215, 318245, 318249
When replying please quote

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref:
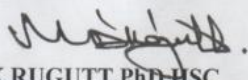**NCST/RCD/10/012/1**

Date:

23rd January, 2012

Fredrick O. Ajwang
Egerton University
P.O BOX 536
Egerton

RE:RESEARCH AUTHORIZATION

Following your application for authority to carry out research on;
"Selected factors influencing smallholder dairy farmers' choice of milk marketing outlet in Kipkaren Division of Nandi North District, Kenya"
I am pleased to inform you that you have been authorized to undertake your research in **Nandi North** for a period ending 30th June 2012.

You are advised to report to **The District Commissioner and The District Education Officer Nandi North District** before embarking on the research project.

On completion of your research project you are expected to submit **one hard** copy and **one soft** copy of your report/thesis to our office.

DR.M.K RUGUTT, PhD, HSC
DEPUTY COUNCIL SSECRETARY

Copy to:

The District Commissioner
Nandi North District

The District Education Officer
Nandi North District

Appendix 6: Thesis Submission

OFFICE OF THE DIRECTOR GRADUATE SCHOOL

Ref: EM21/2317/09

Date: 24th August, 2013

Mr. Fredrick Odhiambo Ajwang
Department of ACDS
Egerton University,
P. O. Box 536,
EGERTON.

Dear Mr. Ajwang,

RE: SUBMISSION OF LOOSELY BOUND COPIES OF THESIS

This is to acknowledge receipt of Seven loosely bound copies of your M.Sc.Thesis entitled "**Selected Factors influencing Smallholder Dairy Farmers' Choice of Milk Marketing Outlet in Kipkaren Division of Nandi North District, Kenya.**"

The thesis copies have been forwarded to examiners for assessment. Once the Board receives communication from all the examiners, you will be called upon for an oral examination of the thesis.

The verdict on whether you are successful or not will be conveyed to you during the oral examination.

Meanwhile you are strongly advised to prepare draft papers from your thesis to be produced at the Oral Defense. Note that your hardbound copies will not be accepted without copies of paper(s) published in refereed journals.

for Prof. Michael A. Okiror
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

MAO/cwk

Egerton University is ISO 9001:2008 Certified