QUALITY MANAGEMENT AND SOCIO-ECONOMIC FACTORS AS DETERMINANTS OF DAIRY FARMERS' PRODUCTIVITY; A CASE OF MUTHIRU DAIRY SELF-HELP GROUP OF MAARA DISTRICT, THARAKA NITHI COUNTY.

BY

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DECLARATION

This research project is my original work and has not been presented to any other examination body or university, to the best of my knowledge.

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DEDICATION

This work is dedicated to my dearest wife Mrs. Christine Wato Racho and my lovely daughters Arbe and Gumato Jirma, and not to forget my precious twin boys, Barack and Abudho Jirma for their support, encouragement and tolerance during my research period.

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ACRONYMS & ABBREVIATIONS

CGS—Closed Grazing System

AEZ—Agro-Ecological Zones

KDB—Kenya Dairy Board

MOLD—Ministry of Livestock Development

FAO—Food Agricultural Organization

GOK—Government of Kenya

SRA—Strategy for Revitalizing Agriculture

COMESA—Common Market for Eastern and Southern Africa

KCC—Kenya Co-operative Creameries

KDSCP—Kenya Dairy Sector Competitive Programme

SDCP—Small Dairy Commercialization Programme

EADD—East African Dairy Development

IFAD—International Fund for Agricultural Development

KDP—Kenya Dairy Programme

UNDP—United Nations Development Programmes

ZTBL—Zarai Tarraqati Bank Limited.

ESACA—Ekiti State Agricultural Credit Access

USAID—United States Agency for International Development

DFID— Development Fund for International Development

SSMVs—Small Scale Milk Vendors

ROSCA's---Rotated savings and credit association

MFI's-------Microfinance finance institution

ABSTRACT

Quality Management thinking has influenced a revolution in the way organizations are managed over the past few decades. The study sought to evaluate determinant factors of productivity of farmers, who are members of Muthiru dairy self help group in Maara District of Tharaka Nithi County. Data was collected from randomly sampled 69 farmers across the three ecological zones of Muthiru dairy self help group and 4 management staff (Muthiru) using a structured questionnaire. Data was analyzed using frequency distribution and percentages. The quantitative methods employed was descriptive statistics to caption the effects of Quality management standards at Muthiru dairy in terms of products quality, accessible and affordable services delivery to its members and social economic characteristics in relation to determining farmers productivity levels. Factors of age, gender and education of a farmer was explored further. Also other factors critical to study were factors of credit access by farmers, and finally farmer participation in farmer groups. Questions were raised on how meaningful will be the impact in agricultural production when farmers are motivated with the needed credit facilities, Quality trainings and other crucial inputs, the study examined how social factors of age, gender and education of farmers affect farmers productivity levels. Despite ample trainings on quality management, access to credits and other farm inputs advanced to members by the Group the Net margins of majority of the individual farmers are still very low(less than ksh.10,000/- annually) according to the study findings. The situation requires interventions by all stakeholders to improve the dairy sector.

CHAPTER ONE

INTRODUCTION

1.1Background of the study

Kenya's dairy industry is dynamic and plays an important economic and nutrition role in the Lives of many people ranging from farmers to milk hawkers, processors, and consumers. Kenya has one of the largest dairy industries in sub-Saharan Africa. Though the last livestock census was conducted in 1966, the current official cattle population statistics come from the Ministry of Livestock and Development, through its field reports compiled by extension officials. The official statistics place the number of milking cattle at 3.8 million (Government of Kenya, 2008). A survey conducted by Smallholder Dairy Project (SDP) asserts that there are approximately 6.7 million dairy cattle in Kenya (SDP, 2005). The Food Agricultural Organization (FAO) on the other hand estimates a figure of 5.5 million milking animals (TechnoServe, 2008).

In Africa, Kenya is the only country, after South Africa that produces enough milk for both domestic consumption and export. Sudan on the other hand is the largest producer of milk in the Common Market for Eastern and Southern Africa (COMESA), but it does not produce enough to satisfy both domestic and export markets. The dairy industry is the single largest agricultural sub-sector in Kenya, larger even than tea (Muriuki et al. 2004). It contributes 14 percent of agricultural GDP and 3.5 percent of total GDP (Government of Kenya, 2008). The industry has grown tremendously since its liberalization in 1992. Liberalization led to a rapid growth of the informal milk trade that mainly consists of small-scale operators dealing in marketing of raw milk. At that time, there was an emergence of new institutional arrangements in milk collection, processing and marketing, which included hawkers, brokers, self-help groups, neighbours and business establishments like hotels (Karanja, 2003).

The informal milk market controls an estimated 70 percent of the total milk marketed in Kenya (KDB 2009; Government of Kenya 2006). This sector is important and is driven by among other factors the traditional preferences for fresh raw milk and its relatively lower cost. Raw milk markets offer both higher prices to producers and lower prices to consumers but with several challenges relating to quality control and standards, and the associated health and safety concerns.

The informal milk market has in the past faced several challenges. This was because prior to Policy change in 2004, informal vendors, including mobile milk traders and bar vendors, and Milk transporters, were not officially recognized under the old dairy policy. As a result, they Were frequently harassed as powerful dairy market players sought to protect their interests and increase market share. There were also concerns over food safety and quality of milk sold by the informal sector players. The dairy policy at the time focused on promoting value addition and increasing the market share of pasteurized milk while attempting to address potential public health risks of consuming raw milk. However, since 2004, there has been a major change in policy and practice towards the informal milk market (Leksmono, C.et al 2006). The Dairy Policy now clearly acknowledges the role of small scale milk vendors (SSMVs) and contains specific measures to support them. These include: development of low-cost appropriate technologies, training on safe milk handling, provision of incentives for improved milk collection and handling systems, and establishment of a supportive certification system. While the Dairy Policy is still in progress, awaiting approval by parliament, there has been a proactive engagement by the Kenya Dairy Board in training and certification of SSMVs, in order to safeguard public health and assure quality of the raw milk (Leksmono, C. et al 2006).

According to a study by (Stella Wambugu, Lilian Kirimi and Joseph Opiyo,2011) to examine the Kenya dairy sector through a synopsis of the trends in milk productivity over time, and the performance of the dairy enterprises at the farm level. Findings from the study established that economic viability of smallholder dairy production units depends mostly on the regulatory and policy environments being developed within the sector given the competitive nature of the industry due to liberalization. The specific objectives of the study were to examine milk productivity trends; assess variable costs of production and gross margin at the farm level for different grazing systems; highlight the constraints in the dairy industry; and, outline policy implications in relation to the socio-economic issues in milk production and marketing.

1.2 Statement of the Problem

In Kenya, there are about 625 thousand smallholder dairy farmers (Peeler and Omore 1997) whose main source of income is dairying. About 40% of the milk produced is retained at home for household consumption and for calf feeding. This confirms the importance of dairy both as a source of income for rural household and as a source of household nutrition. Per capita milk consumption for households producing milk on the farm is higher than the national rural average (MoLD 1991) emphasizing the importance of milk in the diets of the Kenyan rural community who constitute three quarters of the poor people in the country.

The informal market comprises direct deliveries to consumers, or through intermediaries such as traders, self help groups or sometimes through cooperatives. This channel accounts for about 85% of marketed milk. Only 15% of marketed milk flows through the formal market via cooperatives and processors (Thorpe, 2000; USAID, 2008).However, the industry is less competitive in regional and international markets due to quality issues. The large number of smallholders estimated at more than 650,000 poses a challenge in controlling quality (KDB, 2008).

Dairy farming is a business and successful dairy producers are generally profitable. Maximizing profitability is the result of applying proven Quality management principles. Management principles that have been documented and tested in most industries, have not had widespread application in the dairy industry until the recent expansion in the size of dairy farms(Thomas J. Fuhrman,2002). Therefore, the need to explore more on the topic of Quality management and socio economic imperatives to output levels in order to build on the existing knowledge of Dairy industries' Quality management standards and performance analysis. As confirmed by a study done by (Muia, Kariuki, Mbugua, Gachuiri, Lukibisi, Ayako, & Ngunjiri,2011) that smallholder dairy cattle production was below the potential for Nyandarua County and was influenced by the following factors of poor road network, marketing, Quality management issues, high costs and inaccessibility of dairy production inputs and support services, inappropriate dairy production technologies, and limited value addition of milk.

Since, Quality management of a Dairy group had not been studied in depth. This study therefore sought to investigate how Quality management and social economic factors impact on dairy productivity levels at Muthiru Dairy Self help Group, of Tharaka Nithi County.

1.3 Purpose of the study

The study aimed at examining the determinants of milk output levels among farmers of Muthiru Dairy self help group. It sought to establish the effects of Quality management of the farmers self help group, effects of credit facilities, farmer groups' participation and other social demographic factors like age, gender and education skills of a farmer on enhancing farm production levels.

1.4 Objectives of the Study:

The study was guided by the following objectives

1. To evaluate the influence of social demographic factors of age, gender and education of the farmers on the productivity levels.
2. To establish the influence of credit facilities extension to dairy farmers on productivity levels.
3. To assess the influence of Quality management trainings of dairy farmers at Muthiru Dairy self help group in affecting production levels.
4. To establish how farmer groups participation affect the level of productivity.

1.5 Research Questions

The study was guided by the following research questions;-

a) How does the socio demographic factors of Age, gender and education of a farmer affect the level of production?

b) How does the extension of loans to dairy farmers in Muthiru Dairy project, Tharaka Nithi County affect the level of productivity?

c) How does Quality management trainings of farmers at Muthiru dairy self help group affect their productivity?

d) How does influence of farmer group's participation affect the levels of productivity?

1.6 The Significance of the Study

There was need for improving small scale dairy farmers' output levels in Kenya in order to address the frequent menace of food insecurity in the country, and also to increase the per capita income of every farming household. These may be achieved by better understanding

the determinant factors to increased production levels. Through in depth study of Quality management standards, assessing impacts of loans to small scale farmers who in turn will hold the required financial capital to purchase the necessary farm inputs, thus help the small scale farmer expand his/her farm in terms of purchasing more dairy meals, buying better milking equipment, drugs and vital concentrates to improve the nutritional regimes of their dairy stock, and also add value by ensuring proper hygiene for milk delivery, processing of other products like yoghurt. With the imperative need to value chain addition and a food sufficient country the farmers especially the small scale dairy farmer who forms the larger part of farmers in Kenya need financial credit to upgrade their farming practices.

This study will be useful for financial institutions dealing with agricultural credit, the small scale farmers group to enhance productivity and efficiency, and research institutions especially those which are agriculture based. It will help the ministry of agriculture and the government in their spirited effort to achieve food sufficiency in Kenya and achievement of vision 2030.

1.7 Delimitation of the study

The study analysed some of the determinant factors which affect the level of milk output in Kenya. It was geographically limited to Muthiru Dairy of Tharaka Nithi County. With specific focus on context of production performance levels at Muthiru Dairies. Those were boundaries of the study and was to be controlled. The study was to investigate the determinants factors of productivity at Muthiru Dairy self help group, Tharaka Nithi County.

Accessibility to the farms where the targeted respondents live was a major a problem due to poor infrastructure, but suitable means like motorbikes were used to access the place, there was also constraints of time and resources which were overcome by sampling to represent the large population targeted by the study. The study focused on sampled farmers of Muthiru dairy self help group and management team interviewed. The study also was to focus on the independent variables to understand how they can be determinants to milk output levels.

1.8 Limitations of the Study:

According to Best and Kahn (1998), limitations are conditions beyond the control of the researcher that may place restrictions on the conclusions of the study and their application to other situations. The respondents may not be honest in giving the information or may simply

give incorrect information to please the interviewer. The study only focused on the Muthiru dairy self help group, whose results was generalized, as compared to various other dairies in the country.

1.9 Assumptions of the study:

The study assumed that the factors mentioned affect Dairy productions' performance, and that the respondents provided the required information honestly without fear or intimidation. However, it is prudent to mention too that, other factors not under this study may pose a far much greater impact than those under study.

1.10 Definitions of Significant Term

Productivity- amount of output of a given firm in relation to the inputs and other variables at play.

Quality management- It is a measure of how effective and efficient the processes are conducted by dairy group in provisions of services and products delivery.

Milk output level- produce or yield measured in kilograms or monetary value for the total production output after every input had been utilized to get the final outcome of products.

Gross Margin-Total amount of output in monetary terms after the direct variable costs have been deducted.

1.11 Organization of the study

This study project consisted of three chapters. Chapter one comprised: The background of the study; statement of the problem; study objectives, research questions, purpose of the study all intended to give a clear sense of objectivity in the study. Chapter two contains the literature review which dealt with the scope and challenges of the research problem as encountered in previous studies leading to the assumptions of this study. It also looked at the theoretical framework and consequently the conceptual framework that underpins the study. In the third chapter, the study methodology used in conducting the study was discussed; comprising the design, site, and study population, sample size, sampling methods and procedures and the research instruments to be used. Chapter four discusses data analysis, interpretation and presentation of the findings. The purpose of the study was to assess quality management and socio-economic factors as determinants of productivity. Frequency tables and correlations were used to present the data. Chapter five summarizes findings of the study based on empirical findings in chapter four. It also presents summary of the findings, discussions, conclusions, recommendations and suggestion for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1Introduction

The main aim of the literature review in this study was to acknowledge the input of other researchers in their contributions to the body of knowledge in order to shed more light on the topic of discussion. In this study, empirical and theoretical literature by various researchers and authors were related or compared in support of the study on the determinants of farm output levels. The chapter was organized in reviewing literatures, firstly, from the global perspectives, to national level and finally the local aspects of literature that exists to demystify the topical issues under study.

2.2 Overview of the Kenyan Dairy Sector

Kenyans are amongst the highest milk consumers in the developing world, consuming an Estimated 145 litres per person per year, more than five times milk consumption in other East African countries (SDP, 2005). Among all developing countries, only Mongolians and Mauritanians consume more milk per dollar earned than do Kenyans (ILRI, 2007). Kenyans Consumed about 3 billion litres of milk in 2005 with conservative milk demand estimates Suggesting an increase of milk consumption of between 3 and 4 percent per annum, which is Largely driven by increases in population, urbanization and incomes. At that time, it was Expected that milk consumption would rise to 3.5 billion litres by 2010 and 4.2 billion litres by the end of the Strategy for Revitalization Agriculture (SRA) plan period (Government of Kenya, 2006).

On the production side, Kenya is self-sufficient in milk. In 2005, the country produced Approximately 3.5 billion litres of milk, against a consumption of about 3 billion litres. In Addition, policies adopted by the government are expected to lead to significant increases in Dairy production. For instance, the Kenya dairy policy change of 2004, which incorporated Small-scale milk producers and traders into the milk value chain and liberalized informal milk Markets, has led to an increase in the amount of marketed milk, number of licensed milk vendors and a boost in demand for milk, leading to benefits for Kenyan milk producers, vendors and consumers. As a result of this policy change, milk production was targeted to increase to 4.2 and 5 billion litres by 2010 and 2014, respectively (Government of Kenya,

2006). In 2009, dairy industry statistics by the Kenya Dairy Board estimated the national milk production at 4 billion litres.

Milk production in Kenya is predominantly by small scale farmers, who own one to three dairy animals, and produce about 80 percent of the milk in the country. Smallholder dairy production systems range from stall-fed cut-and-carry systems, supplemented with purchased concentrate feed, to free grazing on unimproved natural pasture in the more marginal areas. Upgraded dairy breeds tend to be kept in stall-feeding units, cross-bred cattle in semi-zero-grazing systems, and zebu cattle in free-grazing systems. The production systems are influenced by the agro climatic characteristics of the area, land productivity potential and prevalence of animal diseases. The widespread adoption of dairy cattle in the country was stimulated by several interacting factors such as: the conducive policy and institutional environments provided by successive Governments; the presence of significant dairy populations (owned by settler farmers); a subtropical geography suitable for dairy cattle; and, smallholder communities who kept cattle and who had milk as an important part of their diet (Thorpe et al, 2000).

The dairy processing industry in Kenya comprises of large, medium and small scale processors. Until the 1990s, the Kenya Creameries Corporation (KCC) processed all the milk in Kenya, but its monopoly slowly decreased between 1993 and 1996 (Olok-Asobasi and Sserunjogi, 2001). Despite liberalization and restructuring of the dairy sector, political interventions, inefficient management and political rent-seeking behavior led to the collapse of KCC as a state monopoly in the 1990s. Consequently, the end of government monopoly status of KCC encouraged private sector participation through other large-scale processors. Many private processors joined the dairy business in 1992, and have increased greatly since 1999. According to the industry statistics by the Kenya Dairy Board, in 2010, there were an estimated 27 processors, 64 mini dairies, 78 cottage industries and 1138 milk bars.

Over the last few years, milk processing in Kenya has been dominated by three major processors, namely, the New KCC, Brookside Dairy Limited and Githunguri Dairy Farmers Cooperative and Processors. The three processors command a large market share, in an industry with about 27 processors. Brookside and Githunguri Dairies process 400,000 litres and 150,000 litres a day, respectively, during the high season. The New KCC on the other hand processes 450,000 litres of milk a day during the high season, and controls 37 percent of

the market share. New KCC runs 11 cooling plants, 11 factories and 12 sale depots nationwide, and has been increasing its processing capacity largely through increased milk delivery resulting from goodwill and loyalty of farmers. Brookside too has been expanding through the acquisition of other medium and small processing plants, such as the merger with Spin Knit Dairy (Standard newspaper, published on 23/03/2010). Following this merger, the combined total installed capacity stood at 600,000 litres per day, up from 450,000 litres previously handled by the processor. Currently, Brookside Dairy has an installed processing capacity of 750,000 litres per day (Brookside Dairy website).

Industry statistics by the Kenya Dairy Board show that Brookside was the biggest processor in the month of December 2009, but was in January 2010 dislodged by New KCC, which was Processing about 620,000 litres of milk. In 2010, Brookside had a 40 percent share of the Kenyan dairy market, with milk sourced from approximately 120,000 suppliers. Seven percent of these suppliers were commercial farmers and the rest are small scale producers (Business Daily posted Friday, February 19, 2010). Githunguri Dairy Farmers Cooperative, on the hand, has an average installed processing capacity of 170,000 litres per day (Githunguri Dairy Farmers Cooperative website).

Although Kenya's dairy sector has a significant contribution to the national economy, household incomes and food security, the industry faces a number of technical, economic and institutional problems in milk production, processing and marketing (Karanja, 2003). These constraints affect the ability of the sector to participate and compete in the domestic and regional markets.

Specifically, some of the main constraints to increased milk production in Kenya have been Identified as seasonality in production, inadequate quantity and quality of feed, including limited use of manufactured cattle feeds, and lack of good quality animal husbandry and farming practices. Poor access to breeding, animal health and credit services and high cost of artificial insemination (AI) service are other constraining factors. In some areas, dairy producers are faced with the problem of poor infrastructure (roads, electricity), inadequate milk collection and marketing system, poor interaction and priority setting between research, extension and training, and limited farmers' involvement in the output market, hence reducing the incentives to increase milk production (SDP, 2005).

Milk processing and marketing on the other hand is limited by several factors. Primary Marketing faces infrastructure bottlenecks caused by poor road networks and lack of appropriate cooling and storage facilities. The poor road infrastructure in the small-scale production areas affects the transport of milk from farms to the collection centres, and subsequently from the collection centres to the processors. The lack of electricity in most areas has limited the establishment of cooling plants. As a result, particularly during the flush period of March to June, there is surplus milk that cannot be absorbed in the domestic market. In addition, low and irregular producer payments that coincide with the flush period could be largely responsible for the lack of investment in productivity enhancing inputs in the dairy industry. Over the last few years, the cost of electricity has been rising with the increase in fuel prices. This increase is likely to impact on the processors' cost of production and hence the consumer price for processed dairy products. On the other hand, majority of the processors operate below capacity, and they face competition from a fluid, cash-based informal market. Seasonal fluctuations in quantity of milk delivered and farm gate prices do also affect the profit margins.

Though Kenya shares some of the constraints with South Africa, South Africa still remains a large competitor to the Kenya dairy products. Both countries are constrained by seasonality in production, with an upsurge in milk production during the rainy months. Similarly, the market share of both countries' dairy sector is dominated by a few major players. As previously mentioned, milk processing in Kenya has been dominated by three major processors who account for more than 85 percent of the market. The South African dairy industry is dominated by five major milk buyers and almost 50% of the dairy market is controlled by only two buyers (Scholtz and Grobler, 2009). These milk buyers are only involved in the secondary industry and not in the primary industry. Among them, the three major players include Nestle, Parmalat & Danone. High cost of inputs such as feeds and fertilizer is also common in both countries.

There are also various differences in the dairy sectors of the two countries. The average daily Milk production in Kenya is 8-10 litres per cow, whereas in South Africa, in 2007, the national average milk production per cow was 4 590 kg, approximately 12.7 litres in daily production (Theron & Mostert, 2008). The South African dairy industry is more capital intensive, highly specialized and with fewer producers who are managing larger dairy operations. On the other hand, the Kenyan dairy sector is dominated by small scale

producers. About 89 percent of milk in South Africa is marketed through formal channels, and almost all the fresh milk sold is pasteurized. In Kenya, only about 30 percent of the milk is marketed through the formal channels. These characteristics give South Africa a competitive edge with regard to dairy processing and marketing, hence capturing a larger share of the export market.

2.2.1 Government Intervention

The Kenyan government over the past decade has recognized the challenges facing the dairy Industry. With the support from the private sector and donor agencies, various interventions have been spearheaded with the intention of analyzing the factors constraining the competitiveness of smallholder dairy farmers and policies and institutions affecting the dairy sub-sector, among others. These interventions include: the Smallholder Dairy Project jointly implemented by the Ministry of Livestock Development (MoLD), the Kenya Agricultural Research Institute (KARI) and the International Livestock Research Institute (ILRI), with primary funding from the UK Department for International Development (DFID); the USAID (United States Agency for International Development) Kenya Dairy Sector Competitiveness Program (KDSCP) which is a 5-year effort to improve Kenya's dairy industry competitiveness, and implemented by Land O'Lakes, Inc., with financial and technical support from USAID; IFAD funded Smallholder Dairy Commercialization Programme (SDCP) which is implemented by the Ministry of Livestock Development; East African Dairy Development (EADD) Programme funded by the Bill and Melinda Gates Foundation and being implemented by the Heifer Project International, TechnoServe and ILRI; Heifer International dairy project in parts of the Rift Valley and Central Province through gifts of income-producing animals and training; and, the Kenya Dairy Project (KDP) funded by private donors and implemented by Technoserve Inc. in Nyala in Nyandarua North, Sabatia Dairy Farmers Cooperative in Eldama Ravine, Ndumberi Dairy Farmers in Kiambu and Muki Dairy in North Kinangop (Land O' Lakes, 2008).

The government of Kenya has in addition since 2003 put in place several other measures to Revive the dairy industry. These measures that led to the improvement in milk production and Marketing included: restructuring and capacity building of Kenya Dairy Board; revival and Strengthening of New KCC and other farmer organizations like the Agricultural Finance Cooperation (AFC) and cooperatives; review of dairy policies and regulations; improved milk producer prices and timely payment to milk producers by the New KCC; encouragement

of development partners and private sector to mobilize more resources to the industry; monitoring of dairy imports; and improved coordination and collaborative ventures among stakeholders that created synergies and better use of resources (Kenya Dairy Board website, accessed in June 2010). These interventions resulted to strengthened producer organizations which were able to collectively market dairy produce and access extension services, among others things. Consequently, production and marketing of dairy produce increased with the annual milk production rising from 2.8 billion litres in 2002 to 4 billion litres in 2009 and intakes by processors rising from 143.5 million litres in 2002 to 407 million in 2009, representing a 180% increase (Kenya Dairy Board website, June 2010).

The review of import and export procedures for dairy produce as a legislative measure on the Other handled to diminished imports and a sharp rise in exports. The quantity of milk and milk products exported rose from 0.1 million Kg in 2001 to 10.9 million Kg in 2008, but due to drought, export figures dropped to 5 million Kg in 2009. Imports on the other hand declined from 5.2 million Kg in 2001 to 3.4 million Kg in the same period (Kenya Dairy Board website, June 2010). Disturbances in early 2008 arising from the post election violence however disrupted dairying activities in most parts of the Rift Valley (which is a major milk producing area) leading to a drop in milk production and marketed volume in the affected areas. Moreover, the country faced a severe drought in 2009 causing scarcity of animal feed and water which led to a further drop in milk production. Due to this shortage, the local dairy processing plants were unable to sustain the previously acquired export markets.

On the contrary, with the onset of the rains in late 2009 (October/November), there was an Upsurge in milk production leading to increased milk intakes by the formal sector. This sudden increase in production overstretched the handling capacities of the major milk processors. Daily intakes by processors rose sharply from an average of 0.8 million litres in May 2009 to 1.7 million litres by January 2010 (Kenya Dairy Board website, June 2010). Consequently, the government of Kenya proposed various short, medium and long term interventions to deal with increased milk production in future. The short term interventions included availing a grant of Kshs 300 million to the Kenya Dairy Board (KDB) to buy the excess processed milk from the processors. The medium term interventions included financial support to the New KCC to refurbish and commission a UHT plant in Eldoret and a condensed milk plant in Naivasha, as well as procure, install and commission an additional milk drier. In the long term, the government plans to incorporate milk powder into the

National Food Strategic Reserve to improve uptake of excess milk which can then be offloaded into the market during times of scarcity; expand dairy markets away from the traditional markets; enhance quality production of milk and milk products; upscale the existing school milk programme; and create a Dairy Development Fund to provide resources for necessary interventions in the dairy industry including marketing, surveillance, product development and compliance to standards.

The private sector has also taken steps to deal with upsurges in milk production. For instance, in February 2011, Githunguri Dairy launched a UHT milk production unit in a bid to increase its market share. It is expected that the UHT factory will enable the dairy to absorb more milk during periods of glut and increase exports of long-life milk to markets like South Sudan, Rwanda and Mauritius(Kenya Dairy Board website, 2011)

2.3 Influence of Credit on farm output levels

Another important factor that has been empirically proven to influence productivity is credit. Akinseinde (2006),using data envelopment and To bit model, showed that having access to credit facilities contributed positively to a household's production efficiency in the humid forest agro-ecological zone of Nigeria. Similarly, Obwona (2000),using the translog production function, showed that access to credit contributed positively towards the improvement of efficiency among tobacco farmers in Uganda. The unavailability of financial resources to farmers in the developing countries is one of the major constraints to increase farm production. The importance of agricultural credits, especially from the institutional sources, is widely recognized as affective tool to enhance agricultural productivity. Keeping in mind the effective role of timely availability of financial capital to the farmers; A study was designed to analyze the impact of short term credit scheme of Zarai Tarraqiati Bank Limited on farm production. According to the study by(Naushad khan, Inayatullah Jan, Mujib ur Rehman, Anwar Mehmood and Akhtar Ali) carried out in four villages of district Karak in 2005-06. The main findings of the study suggest that short term agricultural credit by Zarai Tarraqiati Bank has positive effects on wheat, gram and livestock production. Based on the encouraging response of the farmers towards credit programme and timely repayment by the farmers, it is recommended that for increasing production per unit area in the area, ZTBL should expand the short term credit programme and increase the credit limits so that large number of farmers could benefit from the credit programme of the bank.

Pakistan is an agro-based developing country where agriculture plays an important role in the economy. Agriculture absorbs 45 percent labor force and shares 23 percent to the GDP of Pakistan. The growth rate of agriculture was 4.03 percent during 2004-05 (Govt. of Pakistan, 2005). The rural population accounts for almost 68 percent of the total population (UNDP, 2006) which directly or indirectly depends on agriculture for their subsistence. The development of agriculture has direct influence on the improvement of socioeconomic life of the rural inhabitants. Previous studies show that agricultural credit has played a key role in improving socioeconomic conditions of rural people through increased farm production (see for example, Richard, 1990;Khandker and Faruqee, 2000).

Like other developing countries, there are two types of financial institutions for agricultural credits in Pakistan; formal and informal (Zeller and Sharma, 1998). The formal credit sources in Pakistan include Zarai Tarraqiati Bank Limited (ZTBL), other commercial banks, cooperatives and microfinance institutions (MFIs). ZTBL is leading agricultural credit source in Pakistan. In the supply of credit from the organized creditors, there are only minor differences with respect to the upper credit limits and the security demanded.

According to a study done by fou S. B. Fakayode, M.O. Adewumi, S. A. Salau and O.A. Afolabind to examine the impact of the "on-lending" scheme to crop in Ekiti State, Nigeria, under the State Agricultural Credit Agency. Those beneficiaries of the loan facilities were young (about 44 years old) with at least the primary level education and well experienced in subsistence arable cropping. The loan sum disbursed was small; consequently, the resultant gross margin from cropping activities was low (only N34, 924.9), though this was higher than the gross margin for non-beneficiaries. The ESACA loan beneficiaries undertook diversified cropping practices involving a mix of food and cash crop production which enhanced their gross margins compared with non-beneficiaries. Purchased inputs and farmer's accessibility to ESACA loan facility were major determinants of farmers (beneficiaries and non-beneficiaries) crop output. Non-beneficiaries of the scheme attributed their situation to heavy bureaucracy in loan processing; even the beneficiaries complained that late disbursement of loans negatively affected their cropping schedule. We conclude that the ESACA initiative was well intentioned and should be better funded. However, considering the large sum already committed to the program me , there is need to ensure better fund management and prompt disbursement to farmers. Undue and unnecessary hurdles like collaterals and complex loan application processes should be minimized so that the loan can readily get to the targeted

small scale farmers for increased production. Farmers may also be encouraged to venture into the more cash cropping.

Interestingly according to a study by (Mugweru, 2011) conducted in Kenya on the determinants of coffee production showed the relationship between coffee output and credit advanced is negative but statistically significant. However, results also indicate that coffee output has a positive and statistically significant relationship with hectarage planted. Therefore, an increase in hectarage leads to an increase in coffee output (Tonage).However, a deviation from this fact was from a study by, Diagne and Zeller (2001) confirmed that landholding size has no effect on access to both formal and informal credit.

2.4 Quality management

Quality Management thinking has influenced a revolution in the way organizations are managed over the past few decades. Ideas such as customer focus, ethical management, continuous improvement, Six Sigma, leadership and organizational learning have all been impacted by – and in some cases developed from - this important field.(Graeme knowles,2010).

Resistance to change is a complex issue facing management in the dynamic and ever evolving organizations of today. It can lead to the failure of many well-intended and well-conceived efforts to initiate change within organizations. Managers and change agents need to be adept at understanding and managing the phenomenon. The dairy sector is experiencing substantive growth and as such a lot of change is inevitable especially in quality as a result of the increased competition (Kihanya, Anne Muthoni; issued 2009-2010).

The business world is competitive, and often cut-throat. Improving your business management can give you the competitive advantage you need to grow your business and thrive. Management techniques such as Lean Speed and Six Sigma are well-known for helping managers and businesses improve. In fact, these are two of the leading approaches to business improvement in the world. The benefits of combining the two management disciplines, creating synergy from the core concepts. This synergy results in making work better and faster. Six Sigma stresses elements that are critical to quality, such as reducing manufacturing or processing defects.(Prof. Jiju Anthony & Maneesh Kumar,2010)

The requirements in terms of information availability, risk precaution and control in the food industry continue to increase. In this context the interest of companies in the Total Quality Management (TQM) approach is also increasing. This development attracts notice to Business Excellence and connected systems. Similarly, various quality management tools and techniques are available. Statistical analysis provides evidence that there is a positive correlation between the implementation of the activities of TQM and the medium- to longterm success of a company.(Clemens Morath and Reiner Doluschitz)

The TQM approach is useful for companies in terms of improving their business performance. This is in accordance with the findings of Pochtrager (2002). Unfortunately the enterprises only use this approach to a limited extent, so that the activities required by the TQM can not develop their full potential. The enterprises should particularly consider the concerns of employees; they are better able to assess their processes and improve them and, in addition, their motivation is important. In this respect it is helpful to provide transparency and visualize the usefulness of the activities of the quality management system to all employees.

Moreover, the leaders must exemplify the companies' philosophies and desire for quality through their own behaviour. To prepare staff for adequate operation in their duties, training and continuous education should be compulsory. Therefore it is important that the continuous improvement process is used in terms of the quality management system itself and not just for the requirements of the TQM system. Employees need to know that their work is valued; therefore, companies should more significantly reward the efforts of employees. Furthermore, enterprises should measure the satisfaction of employees as well as collect and analyze the feedback of the employees about how they judge their situation in the enterprise. As a consequence of this the enterprises must communicate the results and initiate the necessary steps of implementation; otherwise, they would not be using the information they get. This is also true for all the societal implications are adjusted to what the employees need in their jobs so that unnecessary resource consumption can be avoided.(Poignée and Schiefer, 2007)

As dairies grow larger, management of the milking facility becomes crucial in delivering quality milk while maximizing productivity and profitability of the dairy. Management defines what is to be done, who is to do it and what results are expected. A written milking routine is the system milkers implement to produce quality milk. The system is composed of

processes, milking procedures, each of which is further defined by tasks or the properly sequenced details of each milking procedure. Flow charts can be used to define a specific milking routine for any milking parlor configuration and size. (Thomas J. Fuhrmann,2002)

Dairy production in Kenya is faced by a multitude of perceived and often experienced risks, which contribute to high costs of production and low average productivity (Muriuki et al 2003).

According to a research conducted in Kikuyu division by.(Tuei, B. Chepkoech,2010) Regulation in the dairy industry targets the small scale producers and milk traders with the aim of ensuring that they meet requirements for milk quality control. Farmers adopt hygienic milk production and handling if the practices are cost effective and simple to understand. There is need to develop pro-poor interventions, strengthen infrastructure, farmer groups and security so as to maximize the production of quality and quantity of milk.

2.5 Age of a farmer and output levels

The age of farming household heads was observed to have an inverse relationship with productivity of farmers in studies from Adeoti (2002), Ajibefun and Abdulkari (1999, 2004), Ajibefun and Daramola (1999), Ajibefun et al. (2002 ,2006), Coelli and Battesse (1996), Idjesa (2007), and Ogundele (2003). All of these studies were carried out in the humid forest, dry savannah, and moist savannah regions of Nigeria, except for the Coelli and Battesse study, which was carried out in India. This was understandable since it is expected that as a farming Household head becomes older his or her productivity will decline.

Years of farming experience is another factor that enhances productivity among farming households Years of farming experience in Nigeria increases as age of the farmer increases. It is within this context that years of farming experience were discussed together in this section of the report. Age is also positively correlated with productivity; older farmers have also been observed to have higher productivity than younger farmers. For example, Ajani (2000), Ajibefun and Abdulkadri (1999, 2004), Ajibefun et al (2002, 2006), and Idjesa (2007) observed that productivity in the humid forest and moist savannah agro-ecological zones of Nigeria was positively associated with more experience in farming.

2.6 Gender influence of a farmer and output levels

The connection between agricultural productivity and gender were well documented in the studies of Adekanye (1988), Babalola (1988), and Odii (1992), and Olawoye (1988). Odii (1992) observed that the contribution of female farmers to agricultural productivity was highly significant. Adekanye (1988) offered evidence of gender differentials in agricultural productivity in Nigeria with women's lower productivity arising from their weak bargaining position within the Family and in the labor market. Further support for this gender bias in Africa derives from the fact that women have far less access to land and other productive inputs (Babalola, 1988, Olawoye, 1988). A high dependency ratio and high ratio of female adult were factors identified by Akinseinde(2006) as detrimental to productivity. Using data envelopment analysis and the Tobit model, the study showed that the higher the dependency ratio and the higher ratio of female adults to all adults living on the farm in the humid forest agro-ecological zone of Nigeria, the lower the farming household productivity.

The measurement of gender differences in agricultural productivity is complicated by differences in farming systems and social and cultural institutions. It may be possible to estimate gender differences in efficiency in farming systems where men and women manage separate plots, as in many African farming systems (Boserup 1970), but it is more difficult to isolate managerial efficiency differences in agricultural settings where plots are cultivated jointly by male and female family members and hired labor. In the latter setting, found in the "male" farming systems of Asia and Latin America, the farm manager is usually assumed to be the male head of the household, regardless of the actual contribution of women to decision making and farm labor.

2.7 Influence of Education on output levels

Education is one of the key assets needed to foster productivity in any profession. Findings of Adetiba (2005), Adeoti (2002), Ajani (2000), Ajibefun and Abdulkadri (1999, 2004), Ajibefun et al. (2002, 2006), Amaza (2000), Bravo-Ureta and Rieger (1991), Idjesa (2007), Idumah (2006), and Kehinde (2005) confirmed that education was key to enhanced productivity among farming households in the humid forest, dry savannah and moist savannah agro-ecological zones of Nigeria and in New England. This was likely because good education propels heads of farming households to adopt new innovations and technologies that are vital to enhancing farm productivity. Acknowledging the importance of

education in labour market success of individuals, governments all around the world routinely advocate further investment in education. However, a majority of the population in developing countries depends on agriculture for their livelihoods.

Knowledge of market returns to education is less useful as a guide to increase educational investment in such agrarian societies. In theory, education is expected to improve productivity in all spheres of activities including agriculture. A positive return to education arises, for example, because educated farmers are better managers, adopt more modern farm inputs and prefer risky (high-return) production technologies. Despite such common beliefs regarding the benefits of schooling in farm activities, there is weak empirical evidence to advocate educational investment in agrarian societies. The existing studies on the determinants of farm productivity and efficiency are largely in conclusive on the question of a positive return to education.

For instance, Ali and Flinn (1989), Wang et al. (1996), and Seyoum et al. (1998) demonstrate significant role of farmers' education in raising farming efficiency in Pakistan Punjab, India, China, and Ethiopia, respectively. On the other hand, Battese and Coelli (1995) and Llewelyn and Williams (1996) fail to identify any significant impact of farmers' education on farming efficiency in India, and Java-Indonesia, respectively. Hasnah et al. (2004) rather report a significantly negative impact of education on technical efficiency in West Sumatra-Indonesia.Nevertheless, there is some agreement in the literature that education significantly influences adoption of technological innovations in agriculture (for example, Hossain et al. 1990, Weir and Knight 2004, Asfaw and Admassie 2004).

One reason for the differences in findings across studies lies in the cross-country variation in the nature of technology underlying agricultural production. An education effect is more likely to prevail in economies where farm production is modernizing as opposed to being traditional (Lockheed, Jamison and Lau 1980). Partly for this reason, studies using data from Asian countries tend to find a positive return to education in farm work while such effect is often lacking for Latin America and Africa (Philips 1994). Similar to other countries in Asia, Bangladesh agriculture has undergone significant modernization so that a positive return is also more likely for the Bangladeshi data. Surprisingly, the majority of studies on returns to education in farm production in Bangladesh fails to find any significant impact. Given the modernisation of farm production following the 'green revolution', the current controversy surrounding the returns to education in Bangladesh is puzzling. For instance, Deb (1995),

Wadud and White (2000), Coelli et al.(2002) and Rahman (2004) did not find any significant effect of education on production efficiency.

The authors attributed this finding to the fact that education system in Bangladesh was not agriculturally orientated. The only study that reports a positive education effect on farm efficiency is Sharif and Dar (1996). However, findings of this study are difficult to generalize. Most of the earlier literature employed empirical models that were underspecified in two ways. Almost all the studies focusing on internal returns to education preclude the possibility of centralized decision making in farm work (Yang 1998). Consequently, farm education stock is modeled either as education of the household-head or that of an average householder. Given that much of the farm work in agrarian societies is household (instead of individual) specific, such proxies may contain little information and therefore, undermine the actual returns to education.

Earlier research on Bangladesh by Deb (1995), Wadud and White (2000), and Rahman (2004) used farmer education as the sole measure of farm human capital. Second, the existing studies on farm production in Bangladesh and other developing countries exclusively centre on internal returns to schooling, ruling out presence of any externality effect of education in improving productivity and efficiency. Three exceptions are Appleton and Balihuta (1996), Knight et al. (2003) and Weir and Knight (Forthcoming).

Educational externalities arise as uneducated farmers learn from superior production choices of other educated farmers in the neighbourhood. A similar externality arises when educated farmers are early innovators and are copied by those with less schooling (Knight et al. 2003). Apart from such social learning, an externality effect could capture the possibility that uneducated farmers simply access basic literacy and numeracy skills of their educated neighbours.

Partly motivated by such arguments, Appleton and Balihuta (1996) examine the effect of mean education of other farmers in the same enumeration area on agricultural productivity in Uganda. They conclude that externality benefit of education is sizable: mean primary schooling of neighboring farmers enhances own farm's productivity. Weir and Knight (Forthcoming), on the other hand, explores the external effect on productivity and efficiency using Ethiopian data. Their analysis reveals significant externality benefit of education on productivity but no such benefit is found in improving technical efficiency.

In conclusion, that education externalities affect adoption and spread of innovations, thereby, raising productivity in farming. Similar education externalities could prevail in farm production in Bangladesh. In the dense and closely-knit society of rural Bangladesh characterized by an extremely low level of literacy, educational externality could serve as an important non-market determinant of farm level productivity and efficiency. The scope for social interactions is widened by the way the agricultural production system in Bangladesh is organized, particularly, rice production in irrigated areas.

2.8 Farmer Participation in a group and Social Networking

Another key factor vital to enhancing farm productivity is social networks or social capital. Adeyeye (1986) and Idumah (2006) observed that social capital enhanced productivity among crop farmers in the humid forest, dry savannah, and moist savannah agro-ecological zones of Nigeria. This was likely because social capital tends to promote membership welfare and reduce conflict, which is important for enhancing productivity of farming households.

According, to other studies conducted in Kenya, by Robert E. Everson & Germano Mwabu(1998) on the effects of agricultural extension on farm yields in Kenya. While controlling for other determinants of yields, like the schooling of farmers and agro ecological characteristics of arable land. The finding of the study suggested that for a given level of extension input unobserved factors such as farm management abilities affect crops/dairy yields differently, effects of schooling on farm yields that was positive but statistically insignificant; other determinants were characteristics of farms, fallow acreage and types of crop grown. The study was conducted using quantile regression technique and was conducted in six districts of Kenya namely, Machakos, Muranga, Tana river, Trans zoia ,Uasin gishu and Kakamega.

The benefits enjoyed by membersfor bulking their milk at the centre, entails great savings on transport costs, improvedquality, hygiene, development of a social fabric and a common place for distribution of inputs.(Dairy mail Africa,2008)

2.9 Conceptual Framework

Conceptual framework is a graphical representation of the effect of the independent variable on the dependent variable (Mugenda& Mugenda 2003).This study concentrated on one dependent variable that is productivity visa Vis four independent variables. These were; the access to credit, farmer participation in groups, the level of Quality management of a dairy farmer, the social demographic factors of age, education and gender of a farmer. The

mediating variable was the Government policies and other intervention measures as prescribed by the authorities. This includes artificial insemination, availing of farm inputs due for planting time, market and policy formulations etc. All these were described in the flow chart below.

Conceptual Framework

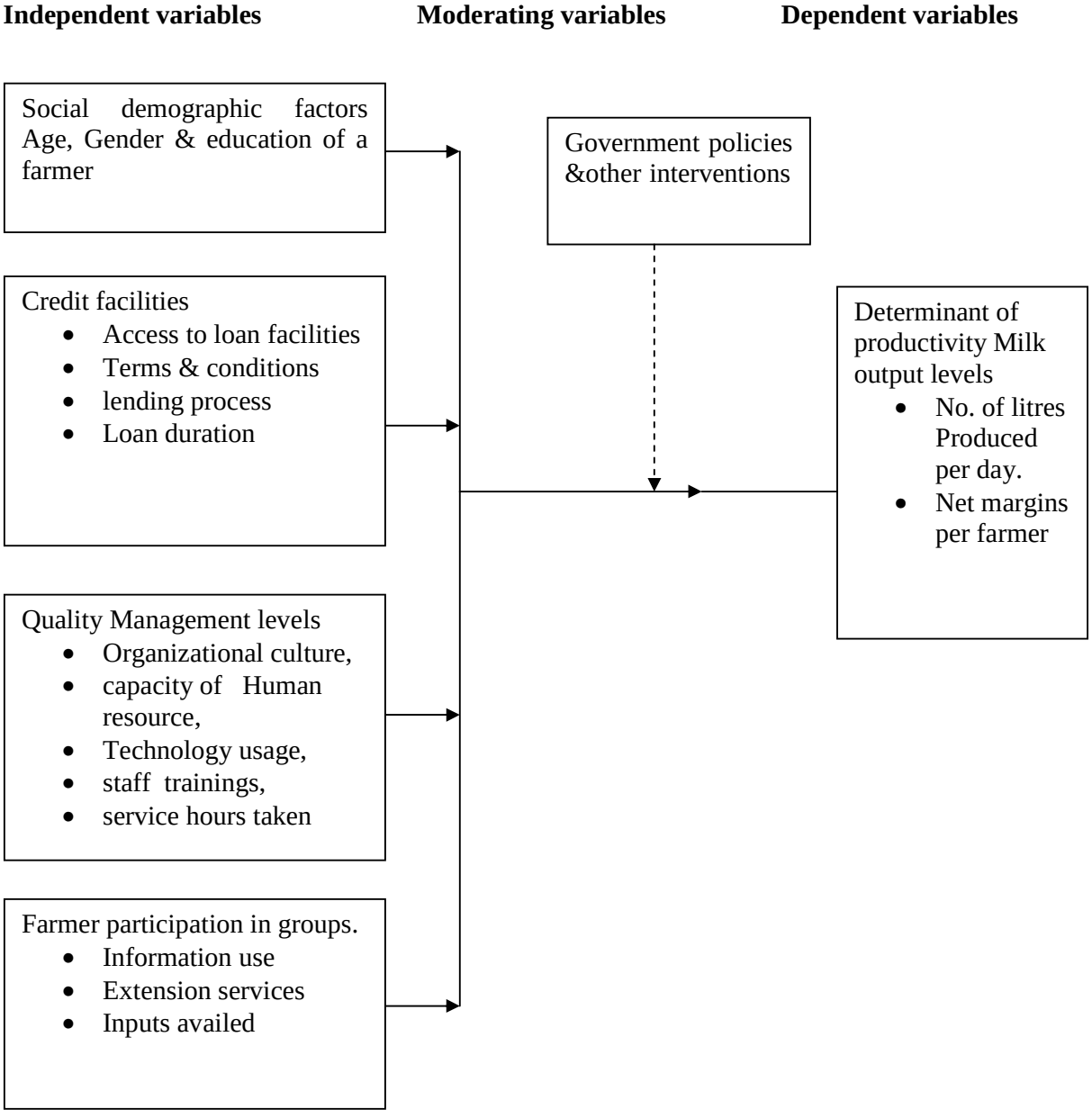

Figure: 1

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter covers the research design plan for the project, area of study, target population and sampling design, data collection method which will be used, data analysis technique used to process the data for eventual report writing.

3.2 Research Design

A descriptive survey research design was adopted. According to Saunders, Lewis and Thornhill (2009) survey strategy is a deductive approach popular in business research. The main advantage of this research design is the ability to collect large amounts of data from sizeable population in a highly economical way. Using this strategy which is designed to obtain precise information concerning the current status, valid general information about Quality management in Muthiru Dairy self help project and the socio economic factors that determines the performance and levels of productivity. The descriptive research was adopted in order to have an in-depth and exhaustive investigation. The research involved the collection of secondary data from libraries and internet sources for the purposes of literature review while primary research involved collection of first hand data by use of face to face administration of semi structured questionnaires.

3.3 Area of study; Marima Location

The study sample was drawn from Members of Muthiru dairy farmers in Marima location of Maara District, Tharaka Nithi County of Kenya's Eastern province. About 4000 active members of Muthiru are now delivering an average of 18000 litres of milk per day and are selling their milk to Sameer groups' Daima holdings. The farmers are paid between ksh30-50 per litre, as all the milk they sell to Daima was chilled and transported to Nairobi on a day-today basis. The sample comprised five management members and 73 farmers- active members who come from the various ecological zones around Muthiru dairy within Tharaka Nithi county, across the two bordering districts of Maara and Meru south. This area is located on the eastern slopes of Mount Kenya, and is characterized by a series of ridges and valleys running down from west to east. The area has two ecological zones, the upper zone (above 1500m) known for tea, coffee and dairy and the middle zone (below 1400m) known for subsistence cereals farming, Tobacco and Bananas with the establishment Self help groups irrigation schemes. The economic advantages enjoyed by the upper zone have, nonetheless,

translated into population pressure and an increasing scarcity of land and employment opportunities.

3.4 Target Population

The target population of the study was 4009 persons comprising of active Muthiru dairy Farmers and Management staff from whom data was collected for situation on production as at today. Muthiru Dairy self help project of Tharaka Nithi County, is wholly owned, member managed, small business organization formed to curb the challenge of an unfriendly market structure for the mutual interest of its members. Population of study therefore consisted of the two types of interviewees, the management and selected active members of the dairy project.

3.5 The sample size and sampling procedure

The sampling procedure used the below(Table 3.1) as a sampling frame to constitute a sample. The sample frame is a complete listing of all the sampling units or elements that can adequately represent that population (Nachmias and Nachmias,1996). However, there is no such a complete list that can adequately satisfy a researcher as a sample frame (McDaniel and Gates, 1996). In such circumstances, they suggest that a researcher develops a sample frame that produces a representative sample of the population elements with the desired characteristics or attributes. Simple random sampling was used to select the sample size from the population, based on the provided list of active members gathered from the Management office of Muthiru dairy group in relation to farmers ,across the agro ecological divides encompassing the area of study. Sampling will greatly remedy logistical issues, time and resources availability for the study.

73 out of 4000 active dairy farmers and 5 out of 9 management staff will be selected randomly across the two Agro-ecological zones of Muthiru Dairy area, which are upper level zone, and middle level. Given the large size of the population and considering the homogeneity, there is very little in terms of variability:- all are members of the same self help group, all are dairy farmers and live within similar agro ecological zones. Hence, the sample size has been worked out using Cochran's (1977) formulae, which states;

Formulae: $n=Z^2pq/d^2$

Where; n= is the desired sample size,

Z= abscissa of the normal curve, or the confidence level=$(1.96)^2$

p= estimated proportion that one is trying to estimate with desired characteristics in the population=5%

q= total population minus the estimated population being measured, 1-p=95%

d= degree of accuracy desired, assumed to be half the confidence interval.$(0.05)^2$

work out;-how the formulae was applied

$n=Z^2pq/d^2$

$n=(1.96)^2*0.05*0.95/(0.05)^2$

that is, 3.842*0.05*0.95/0.0025= 0.182476/0.0025=72.99 rounded to 73

Since the target population was large but homogenous, the sample was adequate according to Mugenda and Mugenda (1999) and finally 4 out of 9 management members were interviewed purposively. An appropriate method which ensured that every farmer had an equal chance of participating was applied. The sample was picked randomly from the list of active farmers (members) provided by the management.

Once the sample was been identified, then it was easy to trace the farmers through liaison with the management of the dairy through office contacts, hence farmers phone contacts was necessary for calling on them and those referred by their colleagues were traced easily.

Table 3.1 Sample size

Type of Interviewee	Approx. total population	Sample size
Management staff	9	5
Farmers	4000	73
TOTALS	4009	78

Source: Muthiru Dairy self help group- Tharaka Nithi

3.6 Data collection method

Primary data was collected using questionnaires, interviews and observation. Questionnaires had both structured and unstructured questions. These interview questionnaires were both open and close ended and will be directly administered to both the management and farmers.

In order to giving them a chance to express themselves freely especially on matters relating to the Quality management, access to credits, extension services offered by the Dairy group organization. The study also employed documents analysis to extract and confirm some information such as production levels of farmers from respective individual farmers' data at the group, milk sheets or books of records, inorder to establish validity of the data. A dully signed letter of transmittal from the university was be presented to the management of the dairy group by the researcher. Then upon granting of permission by the management, questionnaires were administered by a competently trained research assistants appointed by the researcher, to the respondents. Literate respondents like the management, were given a time frame within which the administration of the questionnaire would be dropped and picked. Finally, the researcher thanked the respondents and once more assured them of the confidentiality of their information.

3.7 Reliability & Validity

Reliability refers to the degree to which instruments yield consistent results after repeated trials Mugenda and Mugenda(1998). Reliability is a necessary condition for validity. To increase the reliability of the data collected the study employed test-retest technique where the same instruments was administered twice to the same respondents comprising of 5 farmers and 3 management staff in a pilot study. Scores were assigned in each case and then compared. Eventually after tallying the instrument were concluded as reliable. The instrument was also presented for further scrutiny to experts (supervisor) to ascertain their face validity before administration.

Validity refers to the degree to which an instrument measures what it purports to measure Mugenda (2008). Validation of the data was done using content validity by crosschecking the data before analysis. Instrument validity was also be ensured through test-retest technique and expert advice of the supervisor as earlier mentioned.

3.8 Ethical consideration

Any data collected from the respondent was handled carefully and respondents' confidentiality safeguarded. Confidential matters on family background, religious affiliation, home set up; personal attributes like intelligence of the person were to be held confidential. When collecting data the researcher and his assistants were friendly rather than forceful to the respondents in order to allow a free mind set. There was not going to be lies peddling or cheating the respondent in order to attain the required data. No incidence of bribery was accepted on the respondent so that they provide data.

3.9 Method of Data analysis

Descriptive and quantitative data analysis methods were used to understand the study variables. A combination of quantitative and qualitative methods of data analysis were appropriate. Firstly, the collected data was edited in order for easier penetration of the data and also to familiarize with it. Editing will assist in checking for completeness, accuracy and uniformity of the data collected. Then the collected data was coded by assigning it to the relevant research questions and relevant research objectives. Subsequently, themes emerging from the various responses pertaining to the research questions was identified. Finally, the researcher came up with description of each of the themes, by referring and giving direction on where the findings was headed in order to make the issue clearer. Descriptive statistics used were frequency distribution, mean, mode, range, percentages and tables. The quantitative methods that were employed was regression and correlation analysis of the variable factors of farmers; social demographic features in the production of milk product. Net margins analysis will be used to determine levels of income and surplus returns. Hence making conclusions from numerical values through the process of quantification that can allow reliability, comparability, and validity of the findings. The data was analyzed using statistical package for social sciences (SPSS) version 16.

OPERATIONALIZATION OF VARIABLES

Objective/Research question	Type of variable	Indicators	Measurement	Level of scale	Tools for analysis	Type of analysis
To what extent do the social demographic factors like Age, gender and education of the farmer influence the level of dairy milk output.	Independent • Social economic factors.	• Ability to actively engage in productive agriculture • Ability of a farmer in a particular age bracket, or gender to fully participate in farming activities.	• No of farmers in various age brackets and gender actively employed in farming. • No of farmers based on age and gender who are viably engaged.	Nominal, Ordinal, interval and Ratio	Frequency and percentages, Spss.	Descriptive
To what extent does access to credit influence Milk output levels.	Independent • Access to credit	• Ability to buy the required farm inputs • Ability to meet the market demands. • Ability to create employment. • Ability to diversify farming activities.	• Level of yield from the farm. • Gross margin of the farmer • Cash income levels	Nominal, ordinal	Frequencies and percentages, Spss.	
To what extent does Quality management at Muthiru dairies affect productivity e.g. efficiency in services delivery, influence of	Independent • Level of Quality manage	• Ability to adopt modern forms of production technologies.	• No of farmers using latest technologies. • No of farmers accessing	Nominal Ordinal Interval	Frequency and percentages,	Descriptive

training on quality, human resource capacity, organizational culture, technology adoption	ment.	• Ability to deliver quality and efficient services and products to farmers. • No. of farmers and staff trained on Quality management.	services at dairy group. • Level of services in terms of efficiency, quality e.g. man-hours used in delivering specific services, • No of quality trainings.		Spss.	
To what extent does farmer participation to a farmer group influence milk output levels,	Independent • Farmer participation in groups	Ability to network and get the necessary information through farmer's participation in groups and other social contacts. • Ability of farmers to utilize extension support of social capital into advancing	• No of farmers involved in a farmers group, co-operatives etc • No of farmers who participate in farmer's field days.	Nominal, Ordinal	Frequency and percentages, Spss.	Descriptive

		their farming activities.				
Determinants of milk output levels.	Dependent variable • milk output levels	• Increased yield levels • Increased gross margins • Improved living standards	• Level of yield in kgs • Gross margin on a combined set of farm enterprises	Nominal ,interval and ratio	Frequency and percentages, Spss.	Descriptive

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter discusses data analysis, interpretation and presentation of the findings. The purpose of the study was to assess quality management and socio-economic factors as determinants of productivity: A case study of Muthiru Dairy self help group, Tharaka Nithi County. The data from the four variables namely; socio demographic factors of age, gender and education; extension of loans to dairy farmers; quality management standards; and farmer group's participation were analyzed. Frequency tables and correlations were used to present the data.

4.2 Response rate

The study targeted 78 respondents which included 5 questionnaires for the management and 73 questionnaires for the farmers were distributed. After the collected questionnaires were cleaned, one questionnaire from the management, and four from the farmers were found to be incomplete and could not be used in the analysis of the data. Therefore, the researcher made use of 69 questionnaires which represented a 95% response rate which is way above the recommended response rate of 75% and above.

4.3: Socio-Economic Factors of Age, Gender and Education of the farmers. The study sought to evaluate the influence of social demographic factors of age, gender and education of the dairy farmers on the productivity levels. The respondents were requested to indicate their age and the findings were presented in Table 4.1.

Table 4.1: Age Bracket of the Respondents(farmers)

Age bracket	Frequency	Percent	Productivity levels (Net margins(kshs.))
<20	1	1.4	35,176/=
21-30	25	36.2	879,400/=
31-40	16	23.2	562,816/=
41-50	18	26.1	633,168/=
>50	9	13.0	316,584/=
Total	69	100.0	2,427,144/=

From Table 4.1, 1.4% of the respondents were less than 20years, 36.2% were aged between 21-30years, 23.2% of the respondents were aged between 31-40years, and 26.1% of the respondents were aged between 41-50years. Only 13.0% of the respondents were aged more than 50years. It is evident from Table 4.1 that majority of the respondents aged between 21-30 years and they are the most productive group of farmers in terms of Net margins.

The respondents were also requested to indicate their marital status. The findings were presented in Table 4.2.

Table 4.2: Marital Status of the Respondents(Farmers)

	Frequency	Percent
Married	58	84.1
Single	11	15.9
Total	69	100.0

From Table 4.2 it is evident that majority of the respondents at 84.1% were married. Only 15.9% of the respondents indicated that they were single.

Table 4.3: Gender of the Respondents(farmers)

	Frequency	Percent	Productivity levels(net margins) Kshs.
Male	54	78.3	1,864,328/=
Female	15	21.7	527,640/=
Total	69	100.0	2,391,968/=

In relation to the gender of the respondents, 78.3% of the respondents were male whereas 21.7% of the respondents were female. It is evident that majority of the respondents under study were male and also going by their margins the most productive gender in terms of productivity levels as computed using average mean of the farmers Net margins. Also this confirms the general societal perception that female gender has been marginalized in terms of asset ownership in most African countries, hence same can be concluded here.

Table 4.4: Level of Education

	Frequency	Percent	Productivity(net margins) Kshs.
Primary	17	24.6	597,992/=
Secondary	36	52.2	1,266,336/=
Post secondary	15	21.7	527,640/=
None	1	1.4	35,176/=
Total	69	100.0	2,427,144/=

From Table 4.4 the findings indicated that 24.6% of the respondents were primary school graduates, 52.2% were secondary school graduates, 21.7% post secondary school graduates and 1.4% had no formal education. From the above findings we can deduce that majority of the respondents at 52.2% were secondary school graduates and the most productive lot in terms of net margins, hence it can be inferred that educational level of a farmer affects the productivity levels since he/she can adopt to new technologies easily to do farming.

4.4 Influence of Access to Credit on Farm Production

The study also sought to establish the influence of credit facilities extended to dairy farmers' productivity levels. The researcher requested the respondents to indicate whether access to loans affected farm activities. The findings were presented in Table 4.5.

Table 4.5: Effects of Loans on Farm Activities

	Frequency	Percent
Yes	38	59.4
No	26	40.6
Total	64	100.0

From Table 4.5, 59.4% of the respondents indicated that access to loans affect farm activities. 40.6% of the respondents indicated that access to loans did not affect farm activities. It can be inferred that more than half of the respondents agreed that access to loans affected farm activities. The respondents who indicated that access to loans affected farm activities were further asked to explain how it affected farm activities. Majority of the respondents indicated that access to loans enable them buy farm inputs whose cost was high and thus enabled them to increase production. A few respondents explained that access to loans affected farm activities by causing poor earnings from production. This was due to high interests rates which affected their earnings.

Table 4.6: Extent to Which Access to Credit Affect Farm Output Levels

Perceptions	Frequency	Percent
Great extent	17	30.9
Moderately significant	31	56.4
Smaller extent	7	12.7
Total	55	100.0

In relation to the extent to which access to credit affected farm output levels, 30.9% of the respondents indicated that access to credit affected farm output levels to a great extent, 56.4% suggested moderately significant. Only 12.7% of the respondents indicated that access to credit affected farm output levels to a smaller extent.

The study sought to know whether the respondents had accessed any loans. The findings are presented in Table 4.7.

Table 4.7: Access to Loans in the Previous One Year

Taken/not	Frequency	Percent
Yes	52	75.4
No	17	24.6
Total	69	100.0

From Table 4.7, 75.4% of the respondents under study indicated that they had accessed loan in the previous one year. 24.6% of the respondents indicated that they had not accessed loans in the previous one year. The researcher probed further to find out what inputs the respondents bought with loan accessed. Majority of the respondents indicated that they bought dairy animals. This was followed by a significantly high number of respondents who indicated that they bought farm tools such as chaff cutters for cutting hay and straw into small pieces, *boda bodas* for ferrying milk to the collection centres. Also a significant number of respondents indicated that they used the loans to buy animal feeds. This could be attributed to high cost of animal feeds which was beyond farmers reach thus necessitated them to access loans. A few respondents indicated that they used loans to buy fertilizer and to construct modern cow sheds.

Table 4.8: Extent to which the Loans have Improved Farmers Level of Output

Perceptions	Frequency	Percent
Most significant	23	45.1
Moderate	27	52.9
Less significant	1	2.0
Total	51	100.0

From Table 4.8, 45.1% of the respondents who have accessed loans in the previous one year indicated that it improved their level of output most significantly. 52.9% of the respondents indicated that the loan moderately improved their level of output. Only 2% of the respondents indicated that the loan accessed in the previous one year had less significantly improved the level of output. It can be inferred that 98.0% of the respondents had the loans

significantly improve their level of output. The researcher requested the respondents where they accessed their loans. The findings are shown in Table 4.9.

Table 4.9: Sources of Loans to farmers

	Frequency	Percent
Formal (banks, AFC, MFIs)	35	68.6
Informal (dairy group, roscas)	16	31.4
Total	51	100.0

In relation to where the respondents accessed their loans in the previous one year, 68.6% of the respondents indicated that they accessed their loans from formal institutions such as banks, agricultural finance corporation (AFC) or micro-finance institutions. 31.4% of the respondents indicated that they accessed their loans in the previous one year from informal institutions such as dairy groups, or Roscas.

4.5 Influence of quality management on output levels

The third and major objective of the study was to assess the influence of quality management standards at Muthiru Dairy Self Help Group in affecting production levels. The respondents were asked to indicate who managed their farms. The findings are presented in Table 4.10.

Table 4.10: Farm Manager

	Frequency	Percent
Self	40	58.0
Hired employee	9	13.0
Family member	20	29.0
Total	69	100.0

From Table 4.10, 58.0% of the respondents indicated that they managed their farms alone, 13.0% indicated that they employed a farm manager, and 29.0% indicated that a family member managed the farm. It can be concluded that majority of the respondents managed their farms on their own.

Table 4.11: Manager's Level of Education

	Frequency	Percent
Primary	24	35.3
Secondary	33	48.5
Post secondary	11	16.2
Total	68	100.0

From Table 4.11, 35.3% of the respondents indicated that the farm manager level of education was primary school graduate, 48.5% indicated that the managers level of education was secondary, and only 16.2% of the respondents indicated that the managers level of education was post secondary school.

Table 4.12: Cross-tabulation between Farm Manager and Managers Level of Education

What is your manager's level of education?				
		Primary	Secondary	Post secondary
Who manages your farm?	Self	35.0%	47.5%	17.5%
	Hired employee	44.4%	33.3%	22.2%
	Family member	31.6%	57.9%	10.5%
Total		35.3%	48.5%	16.2%

From the findings it was evident that most of the respondents (47.5%) who manage their farms on their own were secondary school graduates. However, 44.4% of the respondents who indicated that they hired employee, were primary school graduates. 57.9% family member farm managers were secondary school graduates.

The respondents were requested to rate the level of quality management at their farm. The findings are presented in the Table 4.13.

Table 4.13: Rating the Level of Quality Management

Level of Ratings	Frequency	Percent
Significantly high	26	38.2
Moderately low	40	58.8
Lowest	2	2.9
Total	68	100.0

38.2% of the respondents indicated that the level of management in their farms was significantly high. 58.8% of the respondents indicated that the level of quality management was moderately low. Only 2.9% of the respondents indicated that the level of management in their farm was lowest.

Table 4.14: Milking Method applied

	Frequency	Percent
Manual methods/pails	64	94.1
Applying machines	4	5.9
Total	68	100.0

In relation to milking method, 94.1% of the respondents indicated that they used manual methods. 5.9% of the respondents indicated that they applied machines in their milking method.

Table 4.15: Net Margins from the Milk Output per Year

	Frequency	Percent	Aver. Net margins(kshs.)
Less than Ksh.10,000	24	35.3	844,224/=
Ksh.20,000-40,000	19	27.9	668,344/=
Ksh.40,000-60,000	10	14.7	351,760/=
Ksh.60,000-80,000	5	7.4	175,880/=
Ksh.80,000-100,000	7	10.3	246,232/=
Above Ksh.100,000	3	4.4	105,528/=
Total	68	100	2,391,968/=

From Table 4.15 it is evident that majority of the Farmers at 35.3% respondents indicated that their net margins from milk per year was less than Ksh.10,000.00, this was followed by 27.9% who indicated that their net margin lied between Ksh. 20,000.00 and Ksh. 40,000.00. Only 4.4% of the respondents indicated that their net margins from the milk out per year was above Ksh.100,000/=,from the findings a bulk majority of the farmers who constitute 63.2% get less than ksh.40,000/- in terms of annual Net margins from milk. Average net margins per farmer is ksh.35,176/=

Table 4.16: Trained On Quality Management

Trained	Frequency	Percent	Net Margins(kshs.)
Yes	54	78.3	1,899,504/=
No	15	21.7	527,640/=
Total	69	100.0	2,427,144/=

From Table 4.16, 78.3% of the respondents indicated that they had been trained on quality management. 21.7% of the respondents indicated that they had not been trained on quality management. It can be concluded that majority of the respondents(farmers) trained on quality management have earned higher net margins of ksh.1,899,504/= while those not trained earned lower average margins of ksh.527,640/=

Table 4.17: Cross-tabulation between Training on Quality Management and Type of Breed

Are your cows improved or local breed?				
		Improved	Local	Total
Have you been trained on quality management aspects?	Yes	94.2%	5.8%	100.0%
	No	73.3%	26.7%	100.0%
Total		89.6%	10.4%	100.0%

In relation between training on quality management and type of breed kept by the respondents, 94.2% of the respondents indicated that they had been trained on quality management and kept improved breed. 73.3% of the respondents indicated they had not been trained on quality management but they kept improved breed. The high percentage of

farmers who kept improved breed was an indicator that as a result of trainings on quality management farmers had shifted from keeping local breeds to improved breeds which give higher returns. This agrees with correlation between training on quality management and type of breed respondents kept.

Table 4.18: Correlation between Services Offered and Level of Management

			How do you rate the services offered by the group?	How do you rate the level of management of the group affairs by those in position?
Spearman's rho	How do you rate the services offered by the group?	Correlation Coefficient	1.000	.149
		Sig. (2-tailed)	.	.221
		N	69	69
	How do you rate the level of management of the group affairs by those in position?	Correlation Coefficient	.149	1.000
		Sig. (2-tailed)	.221	.
		N	69	69

Spearman's correlation between rating of the services offered by the group and rating of the level of management of the group by those in position is positive at 0.149. The correlation is significant at 0.221. This positive correlation confirms that the better the services offered by the group, the better the rating of the level of management of the affairs by those in position.

Table 4.19: Frequency of Cows Dosage

	Frequency	Percent
Once	3	4.3
Twice	4	5.8
More	62	89.9
Total	69	100.0

In relation to the number of times a farmer dosed his cows, 4.3% of the respondents indicated that they dose their cows once, 5.8% indicated that they dose their cows twice and

89.9% indicated that they dose their cows more than twice. It can be concluded that majority of the respondents dose their cows more than twice.

Table 4.20: Frequency of De-worming Cows

	Frequency	Percent
Once	2	2.9
Twice	9	13.0
More	58	84.1
Total	69	100.0

In relation to how regularly respondents de-wormed their cows 2.9% of the respondents indicated that they de-wormed only once, 13.0% indicated that they de-wormed their cows twice and 84.1% indicated that they de-wormed their cows more than twice. This could be attributed to training on quality management where 78.3% (Table 4.26) of the respondents indicated that they have been trained on quality management.

Table 4.21: Milk Cooling and Temperature Maintenance Methods

	Frequency	Percent
Cold water	10	14.5
Do not cool	3	4.3
Taken directly to dairy before cooling	56	81.2
Total	69	100.0

Table 4.21 indicates that 14.5% of the respondents indicated that the cold water for milk cooling and temperature maintenance methods, 4.3% indicated that they do not cool at all and 81.2% indicated that they took milk directly to dairy before cooling.

4.6 Farmer Participation in the Dairy Group and Benefits Accruing From It

The fourth and final objective of the study sought to establish how farmer groups participation affect the level of productivity. The respondents were asked to indicate the length of period they have been active members of Muthiru Dairy self Help Group. The findings are presented in Table 4.22.

Table 4.22: Period a Farmer Has Been an Active Member of Muthiru Dairy Self Help Group

Period (years)	Frequency	Percent
0.5	2	2.9
1	6	8.7
2	10	14.5
3	7	10.1
4	3	4.3
5	15	21.7
6	2	2.9
7	3	4.3
10	11	15.9
12	1	1.4
13	1	1.4
15	3	4.3
20	4	5.8
25	1	1.4
Total	69	100.0

In relation to the number of years a farmer has been an active member of Muthiru Dairy Self Group, majority of respondents at 21.7% indicated that they had been active members of the group for 15years followed by 15.9% of the respondents who indicated that they had been active members for 11years.

Table 4.23: Mean, Standard Deviation, Range and Skewness of the Period a Farmer Has Been Active Member of Muthiru Dairy Self Help Group

N	69
Mean	6.57
Std. Deviation	5.545
Skewness	1.402
Range	24

The mean number of years farmers had been members of Muthiru Dairy Self Help Group was 6.57 and a standard deviation of 5.545. This indicated that average number of years did not deviate much from the standard deviation. The skewness of the number of years was 1.402 which indicated that the number of years was positively skewed. The range which is the difference between the highest number of years and lowest number of years farmers had been members of the group was 24. The researcher also sought to find out the benefits respondents got as members of Muthiru Dairy Self Group. More than 60% indicated that the group provided them with loans and animal feeds. A few indicated that the group trained them on the best milk production techniques, and also provided them with farm inputs.

Table 4.24: Rating of Services Offered by the Group

Services level	Frequency	Percent
Poor	3	4.3
Good	39	56.5
Satisfactory	27	39.1
Total	69	100.0

The researcher wanted to find out how respondents rate the services offered by Muthiru Dairy Self Group. The findings indicated that 4.3% of the respondents indicated that they rate services offered by the group poorly, 56.5% indicated they rate the services offered as good and 39.1% indicated that they rate the services as satisfactory. It can be concluded majority of the respondents are comfortable with services offered by the group.

Table 4.25: Rating of Level of Management of the Group Affairs by Those in Position

Level of Mgt.	Frequency	Percent
Below Average	5	7.2
Above Average	15	21.7
Satisfactory	49	71.0
Total	69	100.0

The researcher also wanted to find out how members of Muthiru Dairy Self Group rated management of the group affairs by those in position. From the findings 7.2% of the respondents indicated that management of the group affairs by those in position as below average, 21.7% indicated that management of the group affairs by those in position as above average and 71.0% of the respondents indicated as satisfactory. It can be inferred that majority of the respondents are happy with how those in position are running the affairs of the group.

Table 4.26: Correlation between Services Offered and Level of Management

			How do you rate the services offered by the group?	How do you rate the level of management of the group affairs by those in position?
Spearman's rho	How do you rate the services offered by the group?	Correlation Coefficient	1.000	.149
		Sig. (2-tailed)	.	.221
		N	69	69
	How do you rate the level of management of the group affairs by those in position?	Correlation Coefficient	.149	1.000
		Sig. (2-tailed)	.221	.
		N	69	69

Spearman's correlation between rating of the services offered by the group and rating of the level of management of the group by those in position is positive at 0.149. The correlation is significant at 0.221. This positive correlation confirms that the better the services offered by the group, the better the rating of the level of management of the affairs by those in position.

Table 4.27: Regular Meetings

	Frequency	Percent
Yes	68	98.6
No	1	1.4
Total	69	100.0

In relation to whether the group held meetings regularly, 98.6% of the respondents indicated that the group held meeting regularly. 1.4% of the respondents indicated that the group did not hold meetings regularly. It can be concluded that almost all the respondents indicated that the group held meeting regularly.

Table 4.28: Number of Times Meetings Are Held

	Frequency	Percent
Quarterly	11	16.2
Weekly	2	2.9
Annually	55	80.9
Total	68	100.0

In relation to how often the group held meetings, 16.2% of the respondents indicated that they held meetings quarterly, 2.9% indicated that they held meetings weekly and 80.9% indicated that they held meetings annually. From the findings it can be concluded that majority of respondents at 80.9% held meetings annually which is even a common practice among companies.

The study also sought to know the type of milk products Muthiru Self Help Group was involved in. Majority of the respondents indicated that the group was involved in fresh and yoghurt products. Less than half of the respondents indicated that the group was involved in yoghurt only. Only a few respondents indicated that the group was involved in fresh milk only.

Table 4.29: Group's Direction

	Frequency	Percent
Yes	64	92.8
No	5	7.2
Total	69	100.0

The researcher probed the respondents further to indicate whether they thought Muthiru Self Help Group was heading in the right direction. 92.8% of the respondents indicated that the group was heading in the right direction. 7.2% indicated that the group was heading in the right direction. It can be inferred that based on how the respondents rated the services offered by the group (Table 4.34) and how they rated the level of management by those in position (Table 4.35), majority of the respondents thought that the group was heading in the right direction.

4.7 Business Capacity Assessment

Production

Muthiru self help group is located at Marima in Tharaka Nithi County, owns three factory plants, the biggest having a potential for about 20,000ltrs of milk intake. Also owns fleet of trucks and vans for transporting milk. The group processes milk as a group on daily basis. The busiest production periods are Decembers whereas low production of milk is experienced in august and September possibly because of cold weather. The average daily production is 16,000 litres of milk. The group collects raw materials from members' group contribution. According to the management only yoghurt milk is certified by Kenya Bureau of Standards.

Marketing

The group sells its products to the local market. Retailer customers make the huge proportion of regular customers who purchase products on a weekly basis. The group normally conducts market research and product promotion services in Chuka town where a big proportion of retailer customers come from.

Business Management

The group keeps various records such as accounting records, stock control records and working records. In order to enhance financial accountability, the group prepares monthly financial report based on the financial records. The group also conducts profit and loss

analysis. The group operates bank account with Cooperative Bank of Kenya which they opened in 1996. All members have shares with the group. However, the group has never paid dividend to its members. The group has business plan which describes their financial performance and strategy. This has made the group access additional capital from commercial banks.

Group management

The group has a constitution and members meet once in a year. Management records such as copy of minutes and attendance registers are also kept. The group has also guidelines such as processing, chilling, pasteurization, inoculation and quality control guidelines in place.

Support from other organizations

The group receives support from other organizations such as non-governmental organizations and the government in form of training in areas such as quality management, hygiene, calf raising and book keeping, and in form of production facilities such as modern chillers.

Group's challenges:

The group like many others in the industry are currently faced with lack of enough capital for future investment and products diversification, poor infrastructure network is also a major hindrance on the fresh milk transport to reach its intended destination, cut throat competition from giants within the industry players and poor pricing by the bigger milk companies.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The purpose of this study was to establish the factors influencing Dairy farmers' productivity at Muthiru dairy self help group in Marima, Tharaka Nithi County**.** This chapter summarizes findings of the study based on empirical findings in chapter four. It also presents summary of the findings, discussions, conclusions, recommendations and suggestion for further research. The thrust of the study was to examine factors influencing farmers production performance.

5.2 Summary of findings

From the analysis of data collected for the study, a number of findings emerged as presented in the preceding chapter. In reference to objective one which sought to establish the influence

of social demographic factors of age, gender and education on farmer productivity in Muthiru dairy; Majority of the farmers are aged in 21-30 years age bracket, this constituted 36.2% of the respondents. This shows that farmers in Tharaka Nithi are mainly young and of prime age to undertake a much involving farm activities. Only one out of the seventy respondents was less than twenty years. In terms of Gender, majority of the dairy farmers in Muthiru are men, as shown by 78.2% of the respondents, while only 21.7% were female. This actually confirms the disparities that have existed within our societies in relation to asset ownerships, of land, businesses and farming ventures. As regards, education status of the farmers the study established that majority of the respondents were secondary school graduates, who constituted 52.2%. Hence it is imperative to conclude that majority of farmers have the necessary educational background to undertake modern forms of dairy farming as alluded to by the study.

The second variable of interest was access to loans by the farmers. The researcher sought to know how loans affected the farmers, 59.4% of the respondents indicated that access to loans

affected farming activities. 40.6% of the respondents indicated that access to loans did not affect farm activities. It can be inferred that more than half of the respondents agreed that access to loans affected farm activities. The researcher also asked the respondents who indicated that access to loans affect farm activities, to explain how it affected farm activities. Majority of the respondents indicated that access to loans enable them buy farm inputs whose cost was high and thus enabled them to increase production. This was elaborated in the following ways, 98% of the respondents felt that access to credit significantly improved their farming activities. The respondents mentioned how the loans were used to purchase farm inputs, like fertilizers, Vet drugs, animal feeds and even bought improved breeds of cows. Most of the farmers accessed their loans via formal banking channels, In relation to where the respondents accessed their loans in the previous one year, 68.6% of the respondents indicated that they accessed their loans from formal institutions such as banks, agricultural finance corporation (AFC) or micro-finance institutions. 31.4% of the respondents indicated that they accessed their loans in the previous one year from informal institutions such as dairy groups, or roscas.

Quality management was the third major objective of the study, where the interviewee gave a lot of in depth probing on quality management issues. According to the data collected majority of those interviewed said they managed their farms themselves, that was 58% of the respondents, while another 29% of them said they were assisted by family members. Only 3% hired workers. On whether they had been trained or not,78.3% of the respondents indicated that they had been trained on quality management. 21.7% of the respondents indicated that they had not been trained on quality management. It can be concluded that majority of the respondents had been trained on quality management. In relation to, training on quality management and type of breed kept by the respondents, 94.2% of the respondents indicated that they had been trained on quality management and kept improved breed. 73.3% of the respondents indicated they had not been trained on quality management but they kept improved breed. The high percentage of farmers who kept improved breed was an indicator that as a result of training on quality management farmers had shifted from keeping local breeds to improved breeds which give higher returns. It is evident that there existed a positive correlation (0.288) between training on quality management and type of breed kept by farmers. The correlation was two tailed and was significant at 0.016. Asked on the level of quality management on their farms, 38.2% of the respondents indicated that the level of management in their farms was significantly high. 58.8% of the respondents indicated that

the level of quality management was moderately low. Only 2.9% of the respondents indicated that the level of management in their farm was lowest.

Lastly, but not least, Farmer participation in a group was studied as the fourth objective. The findings on how many years a member has been with the group and benefits accruing from the same were addressed in the study questionnaire. A range of 25 years was considered as the longest period for a farmer participation while the lowest range was taken to be one year. In relation to the number of years a farmer has been an active member of Muthiru Dairy Self Group, majority of respondents at 21.7% indicated that they had been active members of the group for 15years followed by 15.9% of the respondents who indicated that they had been active members for 11 years. The respondents were further investigated on how they rated the quality of services offered by their group as well as the level of management by those in leadership of their group. The findings indicated that 4.3% of the respondents indicated that they rate services offered by the group poorly, 56.5% indicated they rate the services offered as good and 39.1% indicated that they rate the services as satisfactory. It can be concluded majority of the respondents are comfortable with services offered by the group. The researcher also wanted to find out how members of Muthiru Dairy Self Group rated management of the group affairs by those in position. From the findings 7.2% of the respondents indicated that management of the group affairs by those in position as below average, 21.7% indicated that management of the group affairs by those in position as above average and 71.0% of the respondents indicated as satisfactory. It can be inferred that majority of the respondents are happy with how those in position are running the affairs of the group. The researcher probed the respondents further to indicate whether they thought Muthiru Self Help Group was heading in the right direction. 92.8% of the respondents indicated that the group was heading in the right direction. 7.2% indicated that the group was heading in the right direction. It can be inferred that based on how the respondents rated the services offered by the group and how they rated the level of management by those in position, majority of the respondents thought that the group was heading in the right direction.

The researcher administered a different set of questionnaire on Business performance of the group and on four thematic areas of interest questions were raised. These were production, marketing, Business management and general group management. Data collected was analysed qualitatively. The groups' core business activity is daily intake of fresh milk from

its members as raw materials. It owns a factory facility for processing of milk and other products like yoghurt. December was mentioned to be their busiest month. In terms of marketing , they sale there fresh milk to Daima which is a subsidiary of Sameer group of companies. While the yoghurt product is targeted to the local market. The group keeps proper financial records, and conducts annual audits of their profit and loss analysis. They also operate a bank account with co-operative bank. On management the group has a clear strategic business plan. The group is officially constituted and has a group constitution.

5.3 Discussions

In reference to the findings of the study that farm productivity is influenced by demographic factors of age, gender and education. Majority of the farmers are aged in 21-30 years age bracket, this constituted 36.2% of the respondents. It is evident from the statistics that farmers in Tharaka Nithi are mainly young and of prime age to undertake a much involving farm activities. In terms of Gender, majority of the dairy farmers in Muthiru are men, as shown by 78.2% of the respondents, while only 21.7% were female. This actually confirms the disparities that have existed within our societies in relation to gender inequities on asset ownerships, of land ownerships, businesses and farming ventures. As regards, education status of the farmers the study established that majority of the respondents were secondary school graduates, who constituted 52.2%. Hence it can be concluded that majority of farmers have the necessary educational background to undertake modern forms of dairy farming as alluded to by the study.

The age of farming household heads was observed to have an inverse relationship with productivity of farmers in studies from Adeoti (2002), Ajibefun and Abdulkari (1999, 2004), Ajibefun and Daramola (1999), Ajibefun et al. (2002 ,2006), Coelli and Battesse (1996), Idjesa (2007), and Ogundele (2003). Age is also positively correlated with productivity; older farmers have also been observed to have higher productivity than younger farmers. For example, Ajani (2000), Ajibefun and Abdulkadri (1999, 2004).Years of experience has been positively correlated to productivity by various studies.

In regards to education status of the farmers the study established that majority of the respondents were secondary school graduates, who constituted 52.2%. Hence it is imperative to conclude that majority of farmers have the necessary educational background to undertake modern forms of dairy farming as alluded to by the study.However,despite such common

beliefs regarding the benefits of schooling in farm activities, there is weak empirical evidence to advocate educational investment in agrarian societies. The existing studies on the determinants of farm productivity and efficiency are largely in-conclusive on the question of a positive return to education. For instance, Ali and Flinn (1989), Wang et al. (1996), and Seyoum et al. (1998) demonstrate significant role of farmers' education in raising farming efficiency in Pakistan Punjab, India, China, and Ethiopia, respectively. On the other hand, Battese and Coelli (1995) and Llewelyn and Williams (1996) fail to identify any significant impact of farmers' education on farming efficiency in India, and Java-Indonesia, respectively. Hasnah et al. (2004) rather report a significantly negative impact of education on technical efficiency in West Sumatra-Indonesia. Nevertheless, there is some agreement in the literature that education significantly influences adoption of technological innovations in agriculture (for example, Hossain et al. 1990, Weir and Knight 2004, Asfaw and Admassie 2004).One reason for the differences in findings across studies lies in the cross-country variation in the nature of technology underlying agricultural production. An education effect is more likely to prevail in economies where farm production is modernizing as opposed to being traditional (Lockheed, Jamison and Lau 1980).

In terms of Gender, majority of the dairy farmers in Muthiru are men, as shown by 78.2% of the respondents, while only 21.7% were female. This actually confirms the disparities that have existed within our societies in relation to asset ownerships, of land, businesses and farming ventures. Adekanye (1988) offered evidence of gender differentials in agricultural productivity in Nigeria with women's lower productivity arising from their weak bargaining position within the Family and in the labor market. Further support for this gender bias in Africa derives from the fact that women have far less access to land and other productive inputs (Babalola, 1988, Olawoye, 1988). A high dependency ratio and high ratio of female adult were factors identified by Akinseinde(2006) as detrimental to productivity.

In regards to access to loans by the farmers. The researcher sought to know how loans affected the farmers output, 59.4% of the respondents indicated that access to loans affected farming activities. 40.6% of the respondents indicated that access to loans did not affect farm activities. It can be inferred that more than half of the respondents agreed that access to loans affected farm activities. This is another important factor that has been empirically proven to influence productivity is credit. Akinseinde (2006),using data envelopment and To bit model, showed that having access to credit facilities contributed positively to a household's

production efficiency in the humid forest agro-ecological zone of Nigeria. Similarly, Obwona (2000), using the translog production function, showed that access to credit contributed positively towards the improvement of efficiency among tobacco farmers in Uganda.

Quality management was the third major objective of the study, where the interviewee gave a lot of in depth probing on quality management issues. On whether they had been trained or not, 78.3% of the respondents indicated that they had been trained on quality management. 21.7% of the respondents indicated that they had not been trained on quality management. It can be concluded that majority of the respondents had been trained on quality management. In relation to, training on quality management and type of breed kept by the respondents, 94.2% of the respondents indicated that they had been trained on quality management and kept improved breed. 73.3% of the respondents indicated they had not been trained on quality management but they kept improved breed. The high percentage of farmers who kept improved breed was an indicator that as a result of training on quality management farmers had shifted from keeping local breeds to improved breeds which give higher returns. It is evident that there existed a positive correlation (0.288) between training on quality management and type of breed kept by farmers. Quality Management thinking has influenced a revolution in the way organizations are managed over the past few decades. Ideas such as customer focus, ethical management, continuous improvement, Six Sigma, leadership and organizational learning have all been impacted by – and in some cases developed from - this important field.(Graeme knowles,2010).

Resistance to change is a complex issue facing management in the dynamic and ever evolving organizations of today. It can lead to the failure of many well-intended and well-conceived efforts to initiate change within organizations. Managers and change agents need to be adept at understanding and managing the phenomenon. The dairy sector is experiencing substantive growth and as such a lot of change is inevitable especially in quality as a result of the increased competition (Kihanya, Anne Muthoni; issued 2009-2010).

The business world is competitive, and often cut-throat. Improving your business management can give you the competitive advantage you need to grow your business and thrive. Management techniques such as Lean Speed and Six Sigma are well-known for

helping managers and businesses improve. In fact, these are two of the leading approaches to business improvement in the world. The benefits of combining the two management disciplines, creating synergy from the core concepts. This synergy results in making work better and faster. Six Sigma stresses elements that are critical to quality, such as reducing manufacturing or processing defects.(Prof. Jiju Anthony & Maneesh Kumar,2010)

5.4 Conclusions

However, in concluding the findings, the research gave a very grim picture in terms of net margins of dairy farmers enterprises. As statistics states, majority of respondents, who constituted 35.3% indicated that their net margins from milk per year was less than Ksh.10,000.00, this was followed by 27.9% who indicated that their net margin lied between Ksh. 20,000.00 and Ksh. 40,000.00. Only 4.4% of the respondents indicated that their net margins from the milk output per year was above Ksh.100,000/= . It can be inferred that going by the evidence as alluded to by those poor figures, the dairy farmers in Tharaka Nithi County have not been able to fully reap returns from the dairy industry with all the potential that lies in it. Besides, the groups many trainings, accessibility to loan services and their modest educational backgrounds, those farmers have still not harnessed much from their dairy enterprises. It is a situation that begs so many answers and that needs urgent intervention measures from all the stakeholders and players in this sector. It may be prudent to mention that huge chunk of small holder dairy farmers are held up in an economic quagmire that seeks concerns from the Government and other donor agencies. Main challenges as cited are deplorable states of infrastructure, especially those feeder roads that goes to the farms, poor pricing by giant industry players, lack of enough capital to venture into other products, and high pricing of inputs especially feeds and concentrates.

5.5 Recommendations

The dairy sector is the mainstay of many small scale farmers, who account for about 80 percent of the milk in the country. The South African dairy industry is more capital intensive, highly specialized and with fewer producers who are managing larger dairy operations. On the other hand, the Kenyan dairy sector is dominated by small scale producers. About 89 percent of milk in South Africa is marketed through formal channels, and almost all the fresh milk sold is pasteurized. In Kenya, only about 30 percent of the milk is marketed through the formal channels. These characteristics give South Africa a competitive edge with regard to dairy processing and marketing, hence capturing a larger

share of the export market. From this foregoing the Kenyan dairy sector has a major huddle to reach a viably commercialized status to thrive with this kind of regional and international competitors. The Government must come up with intervention measures to stem the problems of small holder dairy farmers. Issues of fair pricing, wider market channels from the traditional processors, also to effect the powder milk in the National strategic reserve as a food security measure to check on excesses and store for future scarcity.

The Government to fully capitalize the Dairy sector through a revolving fund to support the small scale dairy farmers in order for them to fully embrace a modern form of dairy enterprises.

There is need for stakeholders to fund and commission a research on why the small scale dairy sector is ailing despite the efforts by the Government and other donor agencies.
Further research to be done on how Total quality management can be adopted in the smaller dairy sector organizations, thus dairy self help groups, co-operatives etc
Another further research area is the extent to which smaller dairy organizations have embraced modern technology in dairy enterprises.

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APPENDIX 1: Letter of introduction to the respondent

University of Nairobi

Meru extra-mural centre

P.O. Box

Meru

Dear Respondent,

RE: COLLECTION OF RESEARCH DATA:

I am a postgraduate student at the University of Nairobi Meru extra mural centre. In order to fulfill the degree requirements; I am undertaking a research on **"Quality management & Socio- Economic factors as Determinants of productivity. A case of Muthiru dairy Self help group of Tharaka Nithi county. '**You have been selected to form part of this study. Therefore, I kindly request your assistance to fill in the accompanying questionnaire. The information provided will be used exclusively for academic purposes and will be held in strict confidentiality.

Thank you

Yours faithfully,

Halake J. Mamo

APPENDIX 2: DAIRY FARMERS QUESTIONNAIRE

Name of the Farmer_____

Answer the following Questions which are open (fill in the space) and close ended (tick in the box) for the right answer you give. Your answer will be confidentially kept.

A: Social Economic factors (age, gender and education of a farmer)

1. Age bracket (years): <20 ( ) 21 – 30 ( ) 31 – 40 ( ) 41- 50 ( )

   >50 ( )

2. Marital status:

   Married ( ) Single ( ) Divorced / Separated ( )

3. Sex: ( ) Male ( ) Female ( )

4. What are your Educational levels?

   Primary ( ) secondary ( ) Post secondary ( ) none ( )

B: Influence of Access to credit on farm production levels

1. Does access to loans affect farm activities?

   Yes ( ) No ( ) , If yes how does it affect_____

2. To what extent, does Access to credits affect farm output levels?

   Great extent ( ) significant ( )

   Small extent ( )

3. Have you accessed any loans recently (like 1 year ago)?

   Yes ( ) No ( )

4. Have you used the loan amount fully for the intended purpose of farming?

   Yes ( ) No ( ) , what inputs did you buy with the loan amount_____

5. Has the loan improved your level of milk outputs?

   Yes ( ) No ( )

6. Where did you access your loan?

   Formal (Banks, AFC,Mfi's) ( ) Informal (Dairy Group, Roscas) ( )

C: influence of Quality management; e.g. (hygiene handling, Sanitation, Farm management levels) on output levels

1. Who manages your farm?

   Self ( ) hired employee ( ) family member ( )

2. What is the manager's level of education level ?

   Primary ( ) secondary ( ) post secondary ( )

3. What No. of years in experience does the manager have?

   5-10 ( ) 10-15yrs ( ) 15yrs and above ( )

4.how do you rate the level of Quality management at your farm?

   lower ( ) moderate ( ) higher ( )

5.Besides dairy enterprise, what other type of farming enterprises are you currently involved in?

   Tea ( ) Coffee ( ) Bananas ( )

Diversified crops ( ) Vegetables ( )

6.What is your Net margins level from the total milk output for the year?

   Less than ksh10, 000/= ( ) 20,000-40,000/= ( ) 40,000-60,000/= ( )

   60,000-80,000/= ( ) 80,000-100,000/= ( ) 100,000/= and above ( )

7.Have you been trained on Quality management aspects?

   Yes ( ) No ( ) , How often is the training_____

   Do you pay for the training yes ( ) No ( )

8.How many times do you dose your cows?

Once( )twice( )More ( ) ,are they improved breed or local_____?

9. how regularly do you deworm the cows?once( )twice( )more ( )

D: farmer participation in the Dairy group and benefits accruing from it,

1. Are you an active member of Muthiru Dairy Self Help Group?

   Yes( ) No ( ) , For how many years now_____

2. What benefits do you get as a member of the group_____

3. How do you rate the services offered by the group?

   poor( ) Good ( ) satisfactory ( )

4. How do you rate the level of management of the group affairs by those in position?

   Below average( )above average( ) satisfactory ( )

5. Does the group hold regular meetings? Yes( ) No ( )

   If yes how often, quarterly ( )weekly ( ) monthly ( )annually ( )

6. What type of milk products is your group involved in currently? _____

7. Do you think your group is focused in the right direction currently? Yes ( )No ( )

APPENDIX 3

Questionnaire for Business Capacity Assessment of the Group, to be administered to the Management team.

Name of Group: **MUTHIRU DAIRY**

Date:

Instructions; please Answer the following both open ended and closed ended questions by either filling the spaces or ticking the options given: Your true answer will greatly help in this research work, and will be kept confidentially.

1. Production

1: Do they have particular place for group activities?

a) What is the place for? a)factory, b) shop and c)office

b) Where is it located?

c) Do they show the place at the interview time? Yes or no

2: How do they process their products?

i) a) they process as a group? b)Individually? c) Divided by processing steps?d) Or any other?

ii) How often do they process their products?

a) daily / weekly / monthly)

3: How much is the production volume?

a) Daily 17000litres

b) Weekly_____

c) Monthly_____

d) Annually_____

4: When is the busiest production period? When is the idle production period?

a) Busiest period_____b) Idle period_____

5: How do they collect raw material for their production? a) Group contribution b) purchase from group member c) purchase from community

6: Does the group have KBS certificate? Yes or no

i) What is certified end product?_____

ii) When?_____

3) How is it applied and to who? _____

2. Marketing

1: Where do they sell their products? (Local community (vending) / Local market / Local market outside of their community / Market in town near their community / Nairobi / Export)

2: Do they have regular customers? Yes or no

i) Who are the regular customers?_____

ii) How often do the customers purchase the products? (daily / weekly / monthly)

3: Does the group have experiences for any of marketing research? _____

a) When?_____b) Where?_____c) How?_____

4: Have they conducted any of production promotion activities? (Promotion event, free distribution of the products, poster, broacher etc)

i) When?_____ii) Where?_____iii) How?

3. Business Management

1: What kind of record is the group keeping) (Accounting Record, Stock Control Record and Working Record)

2: Do they show the records at the interview time? Yes or no

3: How often are they keeping financial record, especially, petty cash record

i) (Daily / weekly / monthly / occasionally)

4) Do they make monthly financial report based on the financial record? Yes or no

5) Do they conduct any of business analysis

(brake-even analysis, profit loss analysis)?

6) Do they show the financial record, financial report and business analysis report at the interview time?Yes or no

7: How much is the business performance of the group?

i) Sales (Ksh) Daily: _____litres

Weekly:_____

Monthly:_____

ii) Expense (Ksh)_____

iii) Profit (Ksh) _____

Monthly:_____

Yearly:_____

8: Does the group have bank account? Yes or no

i) Which Bank? Cooperative, Equity bank, KCB

ii) When was the account open? _____

9: Do they have shares(contributions) from group members for their business? Yes or no

10) How much do they accumulate their capital from the shares (contributions)? (Actual amount. not estimated amount.)_____

i) How many group members buy the shares (or contributed)?_____

ii) Have they paid any of dividends before? yes or no

iii) Apart from the share or contributions, has the group access to any capital for their business?

(MFIs / Bank / Private investor / donor fund / government fund)

11: How do they share their sales amount and profit? i) Sales amount_____

ii) Profit_____

12: Do they have "Business Plan"? Yes or no

1) Does the business plan describe their financial performance (eg; sales, profit and expenditure)?

2) Who made the business plan? _____

3) Who are supported to make the business plan? _____

4) Do they show the business plan at the interview time? Yes or no

4. Group Management

1: Do they have group constitution? Yes or no

i) Do they have the document of constitution at the interview time? Yes or no

2: How often do they have a meeting as a group? _____

3: When was the last meeting? _____

4: Do they have a minute for last meeting at the interview time? Yes or no

5: Does the group have guidelines? Yes or no

i) Processing Guidelines Collect, chilling, pasteurization, inoculation then sales

ii) Quality Control Guidelines Test? Yes or no

3) Working Guidelines Punctuality? _____

5. Experience of Supports from other organization

1: Training? Yes or no

2: Which organization? Ngo's, Government

3: What kind of training? (Quality management, feeding regime, hygiene handling, book keeping, Calf raising)

4: When?_____

5: Production facilities (equipment/machinery and factory structure)

i) Which organization?

ii) What kind of facilities and equipment?_____

iii) When?_____

6: Micro Finance Loan? Yes or no

i) Which organization? _____

ii) How much is loan amount? _____

iii) What is the purpose of loan?_____

iv) When?_____

7: Marketing? Yes or no

i) Which organization?_____

ii) What kind of marketing support? (Trade fair and product promotion)

iii) When?_____

6. Others

1: What are challenges they are facing?(Market for the product, Poor prices, Weather, Inadequate, facilities, Transport, Training and Quality issue)

2: What is their future plan to expand their business?(Packing and processing of milk product, Manufacturing of animal feeds, Upgrading of cows, Use of a modern technology to process)