THE IMPACT OF THE COLLAPSE OF KENYA CO-OPERATIVE CREAMERIES ON SMALLHOLDER DAIRY FARMERS' INCOME: A STUDY OF CHEPKORIO DIVISION – KEIYO DISTRICT.

By

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DECLARATION

This research paper is my original work and has not been presented for examination in any other university.

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This research paper has been submitted for examination with my approval as university supervisor.

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DEDICATION.

This project paper is dedicated to my young family of my loving wife, Racheal and son Kirwa. It is also dedicated to my parents whose efforts have always been steered towards academic excellence for the entire family.

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ABBREVIATIONS.

A.I	Artificial Insemination.
OECD	Organization for Economic Co-operation and Development.
ILCA	International Livestock Centre for Africa.
ILRI	International Livestock Research Institute.
KCC	Kenya Co-operative Creameries.

ABSTRACT.

The focus of the research is on the smallholder dairy farmers It studied the consequences of the collapse of Kenya Co-operative Creameries on the farmers' income and how this has impacted on their welfare, their diversification of farm activities and the dairy farming improvement.

The study was undertaken in Chepkorio Division, which has a total of 13,393 households. There are 8 dairy co-operative societies in the Division. The sample units were obtained by use of probability sampling techniques. More specifically the study used the multistage cluster sampling procedure. 80 dairy farmers and 2 key informants were sampled as a representative of the population. Structured interviews were used in collecting data both from the sampled dairy-farming households and key informants. The impacts of the collapse of KCC on farm households are the units of analysis. The units of observation were the dairy farmers of Chepkorio Division. The collected data has been analyzed by use of social statistical techniques, both inferential and descriptive and then presented by use of percentages, frequencies, charts, graphs and tables.

The study is important on the basis that it is the beginning to the process of poverty alleviation in the rural areas where farming is the major economic activity. It will highlight other farming opportunities that exist as sources of income apart from dairying. Hopefully it will also pave way for diversifying the sourcing of raw milk by the new milk processors.

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CHAPTER ONE

1.0 INTRODUCTION.

1.1 BACKGROUND.

Agriculture is the backbone of Kenyan economy. It contributes 25 percent of Gross Domestic Product (Republic of Kenya, 2002); generates over 60 percent of foreign exchange earnings, provides employment to over 70 percent of the total production and provides raw materials for agro-industries, which account for about 70 percent of all industries (Okech et.al, 1996).

The full potential for the sector has however, not been realized and this has been compounded by poor performance. The agricultural sector growth rate decelerated from 1.2 per cent in 1999 to -2.4 percent in 2000. This was attributed to bad weather conditions, poor international prices of agricultural commodities and poor infrastructure (OECD, 2000). Other limitations stem from escalations on input costs, limited access to credit, and lack of reliable markets.

In Africa as a whole, according to ILRI (1997), smallholder dairying generates more regular income than any other rural enterprise. In Kenya, there are about 3 million smallholder farms that account for over 75 percent of total and over 50 percent of marketed production. The smallholder production account for over 80 percent of all the milk produced (Okech et.al, 1996).

Livestock accounts for about 10 percent of the GDP and over 30 percent of the farm gate value of agricultural commodities. The sub sector employs over 50 percent of the agricultural labor force (Republic of Kenya, 1991). Beyond being a regular source of

income, it is a source of food. Also income accruing from the dairy sector can play an important role as a driving force for more investment in either the dairy sub sector or other farm enterprises.

The dairy industry is an area of high priority. Dairy farming enterprise is a more relatively steady income generating activity for an average farmer compared to arable activities. It is a source of income all the year round. However the growth in output has been slow in relation to potential in many developing countries. This has been due to high-income elasticity of demand for livestock products, low animal productivity, and inappropriate technologies, inadequate research and extension support, poor infrastructure, and unfavorable external conditions (Jabbar et. al, 1995).

The history of the dairy industry in Kenya was for a long time centered on the Kenya Co-operative Creameries (KCC). However, the liberalization of the industry that was under the monopoly of KCC was followed by a rapid growth on milk processors. The Kenya Dairy Board reports that there are 45 licensed milk processors but only half of them are undertaking any meaningful processing. Shaw (2000) alludes that around two-thirds of total processing comes from two companies alone, Brookside and Spin Knit dairies, and the rest including the former KCC, are relatively small processors.

KCC Ltd was incorporated on August 22nd 1925 and the creamery opened on April 12th 1926 in Naivasha. Its role was to process and market milk products. It sourced its raw milk from the white farmers. In 1931 it amalgamated with the Lumbwa and Nanyuki creameries (Hill, 1956). Since then KCC grew to acquire a national coverage. They have processing plants in several towns and cooling plants in all milk producing areas. Price decontrols of milk and marketing reduced KCC's market share to 70

percent. It was then that they frequently delayed paying farmers. The liberalization of the dairy sub-sector in 1992 and corruption dealt the sub sector a serious blow plunging it into a plethora of problems ranging from high production costs, flooding of the market with cheap imported milk, inability to compete effectively to heavy indebtedness (Ogodo, 2002). By 1999 it had accumulated a debt of Ksh 4.5 billion and farmers owed Ksh 1,101 million (Daily Nation, August 6, 1999). In August it was put under receivership. Despite the buying out of KCC by the new KCC 2000 Company in 2001 it has managed to operate only two out of the eleven factories. Its performance has been dismal and has left a big gap in the purchase of milk from the producers.

1.2 PROBLEM STATEMENT

Dairy farming is an important part of the majority of smallholder farming systems in Kenya. ILCA (1992) contends that production increases will directly affect livestock holders, who are the majority of the population, boosting their income. Income generated from livestock sales and products provides the cash needed to buy farm inputs. It provides money for school fees, food supplies, and health care and for other basic necessities, improving the lives of rural people.

Inadequate markets and marketing infrastructure posits a serious problem for dairy farmers of Chepkorio Division. A guaranteed market for milk was offered by the KCC, which held a monopoly for many years. Following the policy and institutional reforms, and the subsequent collapse of KCC, the production and marketing of milk has been greatly affected. Where possible, milk is sold locally to the informal market at a higher price than that received from the emerging milk processors or KCC.

In high potential areas there is always a surplus over local demand even with the presence of the informal market as is the case in Chepkorio Division. In a study done by Helmrich, (1986) in Bangladesh a surplus of 10-15 percent of the average supply on the local meat and milk market leads to a price collapse and marketing problems. These factors have been disincentives to increased production. Decreased production results from the farmers' inability to intensify their dairying activities due to shortage of or little income to plough back into the enterprise. The collapse of KCC is also prone to lead to deteriorating welfare conditions and thus increased poverty levels amongst the farmers. As a coping mechanism to counter the shortfall in dairy incomes farmers may venture into other hitherto neglected but equally important farm activities.

Despite the entry into the industry, of private milk processors, the collapse of KCC has been a factor of tribulations to majority of the farmers. This is mainly because the new entrants are concentrated mostly around major urban centers while many remote production areas are not served and are unlikely to attract investors due to high transaction costs they are likely to incur. In other areas they have not been able to purchase all the milk and especially during the flush periods.

In Rift Valley, the dairy industry is struggling due to scarce marketing outlets of raw milk. Ogodo (2002) notes that processing firms are purchasing milk only from contracted farmers while thousands of small-scale dairy farmers are at the mercy of middlemen. The new KCC 2000 is yet to streamline its operations to handle milk from the 18 Districts of the province, which were formerly served by KCC. Some of these areas are hardly served by the new milk firms. The crisis is deepened further by the fact that almost all the factories that the new organization inherited from the defunct giant organization are not operational.

The collapse of KCC seems to have dealt a major blow to the dairy farming community and especially for smallholders whose production predominate Kenya's agricultural sector. Due to this therefore it is important to understand the farmers predicament given the essence of income from dairy output. Okech (1996) mentions on the milk price decontrols, liberalization of the dairy sector and KCC's failure to pay farmers. There is no analysis however, on the impacts of these on the smallholder dairy farmers.

1.3 RESEARCH QUESTIONS

The study was guided by the following research questions:

1. What has been the impact of collapse of KCC on farmers' welfare at the household level?
2. What has been the effect of the collapse of KCC on the non dairy farm activities?
3. What has been the effect of KCC's collapse on farmers' ability to improve or intensify on dairy farming?

1.4 RESEARCH OBJECTIVES

The general aim of the study is to bring into focus the effects of KCC's collapse on the smallholder dairy farmers. It is meant to assess the impact of the unavailability or scarcity of dairy income given that dairy farming is a steady income generating enterprise for an average farmer.

Specifically the objectives are as follows:

1. To analyze the effects of KCC's collapse on the farmer's welfare at the household level.
2. To find out the effects of the collapse of KCC on the non-dairy farming activities in Chepkorio Division.
3. To assess how the collapse of KCC has impacted on dairy farming improvement/intensification.

1.5 RATIONALE FOR THE STUDY.

Dairy farming enterprise has been a source of livelihood for households in milk producing areas. It is a source of income all the year round compared to arable activities. Market inefficiency for any farm output can be a factor of increased poverty levels. There is need to study the effects of collapse of a major buying organization like KCC on the farming households to find out if it is responsible for increased poverty levels. There is an urgent need to address the worsening poverty conditions and this study is the beginning for the way forward. It is meant to highlight the farmers' woes, which can be used as a basis for the necessary action by the government and other stakeholders in an attempt to eradicate poverty. Jabbar (1995) is of the opinion that livestock development in low income countries need to operate within the overall development objectives of reducing rural poverty, promoting rural growth and enhancing sustainable resource use.

According to Staal (1998) it is by understanding the nature of constraints limiting smallholder dairying so as to promote this activity and improve the livelihoods of smallholders, which is a key public policy issue for African countries. To develop strategies and policy guidelines that will alleviate the dairy sub sector problems there is need to first identify the problems and determine the goals. The study is therefore intended to contribute to policy formulation and implementation on dairy farming.

The study is meant to highlight the tribulations of dairy farmers against the background of extensive market both local and for export of milk products. Hopefully this will pave way for the necessary curative measures by the stakeholders.

It will also be an eye opener to the milk processors to tap their raw milk from the unreached rural areas. KCC 2000 Ltd is not operating at full capacity and most of the cooling plants have been closed. There is plenty of milk in such areas for the new milk processors. A lot of milk has gone to waste during flush periods and there is need for the processors to diversify their sources of milk and operations.

Through the study, farming activities that have been earlier neglected by the farmers despite the great potential to generate income will be highlighted. Some farmers have been contending only on dairy farming while other equally high income-generating opportunities have existed.

Finally by understanding clearly the impacts, it will highlight the prospects and the future of the sector that is important for the Kenyan economy, health of the population and for the farmer in terms of income earned. It is the beginning to searching for solutions to problems afflicting the farmers.

1.6 SCOPE OF THE STUDY.

The study focused only on the smallholder dairy farmers. Their ability to perform well in dairying and in other farm activities as well as their welfare conditions as influenced by failed markets due to the collapse of KCC are the major aspects of the study. This is because they bear the full brunt of the collapse of KCC as opposed to the large-scale farmers. The study was undertaken in Chepkorio Division of Keiyo District, Rift valley Province.

1.7 DEFINITION OF TERMS

Smallholders:

It refers to small and medium scale farmers as differentiated from plantations and large private farms. They are farmers who use, mainly family labour in farm enterprises (Berg, 1990).

Intensification:

This implies the use of high quality inputs like artificial insemination, dipping, use of purchased feeds, inoculation and vaccination, and deworming among others (McCarthy, 1982). In the study intensification and dairy improvement are used interchangeably to mean the same thing.

Farm Enterprises:

These are farm activities/ businesses that could be cultivation of a variety of crops, milk cows, beef cattle, poultry keeping, etc. In other words, they are the many different

sections of a farm each devoted to the production of one kind of crop or livestock (Upton et al, 1965).

Informal dairy market:

This is the selling of raw milk by producers or local traders directly to individual consumers (Staal et al, 1994).

Welfare:

This is the quality of life enjoyed by the people (Republic of Kenya, 1999). In the study it implies the accessibility to health facilities, education and food security occasioned by the change in income levels.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1.0 Introduction.

This chapter is devoted to the analysis of the various aspects related to dairy husbandry but mainly on the major variables contained in the objectives. First, for an overview it looks into the dairy co-operatives as a means in which farmers channel their outputs into the markets and the problems encountered by these co-operatives. The prospects of the sub sector are then reviewed by looking into the issues of milk production and consumption. They are a pointer to the fact that the potential is high but the poor marketing and pricing which act as a source of disincentives restrain the farmers.

The dairy enterprise contribution to the rural communities welfare as one of the study objectives is also reviewed. The collapse of KCC is likely to impact negatively on the welfare of the dairy-farming households. Finally the factors that allow for diversification of farm activities and the dairy farming improvement are dealt with as they relate to the collapse of KCC.

2.1.1 Dairy Milk Co-operative Societies.

The existence of an organized milk collection system in the rural areas influences the pattern of milk disposal. Jaffee (1995) notes that the most important outlet for the smallholders has been the primary co-operative societies. According to Ouma (1987) co-operative societies are neither private nor public undertakings but jointly owned

societies, which belong to larger or smaller groups of members. These groups of people join together voluntarily to achieve common social and economic objectives.

In 1990, there were 183 registered co-operatives with nearly 120,000 members who had dairy marketing as their main activity (Jaffee, 1995). The dairy co-operative societies have organized milk collection and delivery systems. The milk are transported by the co-operatives' vehicles to the cooling or to the processing plants. The co-operatives also sell milk directly to local consumers and institutions. Payments for milk delivery by the members are made at monthly intervals by the co-operative societies having deducted their transport charges.

Co-operative societies play a very important role, given that group efforts benefit from the economies of scale. They reduce the transaction costs that would otherwise be borne by individual farmers, therefore maximizing their returns. Ouma (1987) notes that the establishment and promotion of co-operative societies in Kenya, is regarded as one of the most important channels and instruments for economic, social and cultural initiative. However, the co-operatives have potentials for harm to the members if they are not managed well. This is because they have always had the responsibility of mobilizing the rural population and their resources. This has been the case with many of the Kenyan co-operative societies. The co-operatives are characterized by discontent by the members due to mismanagement by the officials.

The KCC was a nationwide co-operative, processing and marketing of the finished products. On the other hand the primary co-operative societies, according to Hyden (1973) are confined to the terminal end of the marketing chain, that is, the collection of milk from the farmers and delivery to KCC. The primary co-operative societies

therefore do little more than bulking the members produce and conveying them to the recognized buying points.

It is through the co-operative effort that people have been more involved in handling and marketing of milk. It is obvious then, notes Ouma (1987) that income from sale of farm produce, have not only lifted the standard and welfare of the people, but has contributed greatly to the foreign exchange earnings. This contrasts with Hyden's view who was doubtful as to the contribution of the co-operatives on the improvement of economic condition of the ordinary farmer. He was of the opinion that in most areas of the country, co-operatives have had little impact on agricultural productivity. The co-operative movement in the 1970s may not have been developed as it were in the late 1980s, hence the different viewpoints of the two authors.

It is true however, that co-operative societies have contributed greatly to the well being to the majority of the Kenyan farmers and especially the smallholders. It is also worth noting that despite the contribution of the co-operatives to the farmers and the economy, they have been faced with a myriad of problems which have greatly contributed to their underperformance or even to the demise of a number of them. Efficiency and democratic control are mentioned by Ouma (1987), Ocharo (1979) and Hyden (1973) as the major problems facing the co-operatives. The co-operatives are characterized by lack of honesty and integrity. Corruption and deliberate misuse of funds is the most serious of the many management problems (Hyden, 1973). Funds are misappropriated and political indulgence is prevalent resulting in the misuse of position. As Ouma (1987) puts it, it is the individual politicians who use co-operative societies as a stepping stone to achieve personal gain or personal glory. Other problems emanate from

ineffective supervision and control by co-operative and government officials. Some of the officials have been compromised by the deeply rooted corrupt practices which make them turn a blind eye to the malpractices they are meant to rectify. Lack of guidance in co-operative investments and election malpractices are some of the other problems. The lack of guidance in co-operative investments is compounded by the lack of understanding of business principles and the inability or unwillingness on the part of societies to recruit experienced staff at competitive salaries (Hyden, 1973).

Apart from the already stated problems, the failure to achieve the principle of economic efficiency can be attributed to what Ocharo (1979), notes is the lack of adequate size of business. The collapse of KCC has reduced the business activities of the dairy co-operatives, especially those in the rural areas where the new milk processors have not penetrated. Several co-operatives lacked cash to pay farmers for the milk delivered to KCC. They still owe farmers substantial amounts of money and their ability to perform effectively and efficiently continues to be hampered by the poor marketing infrastructure.

The current study focuses on the collapse of KCC as a national co-operative society as opposed to the primary co-operative societies. However this impacts on the latter which in turn affects the welfare of the farmers who are affiliated to these societies and on agricultural performance at the farm household level.

2.1.2.0 Milk Production and Consumption.

Kenya is one of the three largest producers of milk in Sub-Saharan Africa. Together with South Africa and Sudan, they accounted for 59 percent of Sub-Saharan total reported cow milk production in 1991 (Jaffee, 1995). Jaetzold and Schmidt (1982) notes that the Central and Rift Valley Provinces have the highest numbers of dairy cattle per head of population and are the only areas fully capable of meeting local demand and providing surplus for other parts of the country.

Milk and milk products provide important components to the human diet. They provide an estimated 2 percent of calories and 4 percent protein in the average diet in Sub Sahara Africa (Jaffee, 1995). Its availability to the population should therefore be a priority for any government. This can be achieved by keeping the prices low. However, on the other hand also, a higher income from milk production is one of the ways to increase the standard of life of the livestock owners. Dairy policies should therefore reach a compromise so that both the consumers and producers are well catered for. The focus of the study though, is not on the importance of milk on the diet of the population but on the standard of life due to the dairy income levels as indicated by the welfare conditions.

Demand for dairy products in Sub-Saharan Africa is strong and increasing, especially in the urban areas. ILCA (1990) notes that until the mid-1980s a large part of this demand was met by imports. This growing demand, coupled with declining imports should pave way for greater opportunities for domestic producers. Much of the demand for dairy products is concentrated in urban areas and according to the Ministry of Agriculture (1996) annual per capita milk consumption in Kenya is estimated at 125kg in urban

areas and 19Kg in rural areas. The government projects that production will outstrip demand.

Table 2.1 Supply and Demand Projections of Milk.

Milk (million litre)	Year	2001	2002	2004	2006	2008
	Production	2448	2497	2598	2729	2895
	Demand	2047	2113	2250	2404	2578

Source: Republic of Kenya (2002).

Table 2.1 above shows the supply and demand projections of milk by the government of Kenya from the year 2001 to 2008. For the five years, milk production is expected to be more than the demand for the milk products. This is despite the fact that demand shows an upward trend.

These projections however, contradict with Omiti and Muma (2000) who project that demand is expected to outpace supply as from the year 2005. Even with the contradictions, there is a rapid growth of demand in most of the developing countries. This can be attributed to the ever rising populations and rapid urbanization, and diversification of diets. According to Delgado et.al (1999) milk consumption has grown more than 3 percent per year in developing countries. Such a rapid change is creating opportunities for livestock producers in developing countries (ILCA, 1993 and Delgado

et.al, 1999). However, they both fail to comprehend the enormity of the effects of the poor marketing infrastructure, even with the prevailing opportunities.

The study of Chepkorio Division is mainly on the prevailing conditions occasioned by the collapse of KCC which may prevail upon the proper utilization of the existing opportunities. This is because the negative impacts of the collapse of KCC will ultimately frustrate the farmers efforts in increasing production despite of the opportunities prevailing.

2.1.2.1 Milk Marketing.

Milk marketing has been regulated for a long time through the Dairy Industry Act (CAP 336, Laws of Kenya). Under the Act, the KCC had the monopoly of processing and marketing of milk especially in the urban areas. It contributed to smallholder dairy development by acting as a 'buyer of the last resort' to the farmers when alternative markets were underdeveloped. It therefore offered a guaranteed market for producers. ILRI (2000) notes that KCC successfully lowered the transaction costs and risks of smallholders wishing to participate in the market. It is for this reason that, with the collapse of KCC coupled with the not so well established private sector that the study attempts to investigate the farmers predicament. Smallholders incurs higher transaction costs than larger production units, because the quantities of inputs they need and of output they sell, are smaller. Delgado et.al (1999) has noted that the small producer of perishables in the tropics typically is at a bargaining disadvantage with marketing agents because the production must be moved immediately or lose its value. The farmer's co-operatives constitute a favorable instrument for improving small farmer' bargaining

power on the market and channeling to him new inputs and technologies. However, the collapse of KCC has also led to the decline in the performance of primary co-operative societies. These co-operatives were also dependent on KCC for their market and unless the new milk processors perform exceptionally well to the level of the former KCC or unless KCC is restored to its former level of production, then the farmers are likely to experience deteriorating welfare conditions, declining dairy management practices. On a positive note, however the study postulates that it raises the possibility of diversification of farm enterprises whose markets for the outputs are readily available.

Both formal and informal markets characterize the structure of milk marketing in Kenya. The liberalization of the sector has seen the informal market expand tremendously. The notable thing about liberalization has been the emergence of a vibrant informal market. Much of the milk production is now channeled through the informal markets. It is estimated that of milk marketed by smallholders, about 60 percent is sold unprocessed to consumers through the informal market (Staal and Shapiro, 1998). Even with such a huge percentage a lot more milk remains in the households or goes to waste because of lack of market outlets, the effects of which the study focuses on.

George and Chokshi (1977) posit that any viable development of dairying sector depends on an integrated approach incorporating all activities from the stage of enhancement of milk production to efficient decisions programmes related to investment in dairy and milk production and disposal practices. Berg (1990) is in agreement and contends that any dairy development projects should encompass a 'milk chain'. However, according to him the most neglected and vulnerable part of the milk

chain for the farmers is marketability. It therefore, does not make sense to stimulate milk production if no market for the milk exists or is created.

The Kenya Government in its National Development Plan 2002 - 2008 (2002) and Philips (1981) recognizes the lack of reliable markets as being one of the constraints afflicting the dairy industry. McCarthy et.al (1982) alludes that milk production in small farms generated high income per hectare and high employment content. This he says is against the background of prevailing marketing problems. However, this may not hold for long if the marketing problems persist. The farmers may look for alternative sources of income to improve on their welfare conditions. This also means that dairy husbandry improvement and intensification will be adversely affected. Pingali and Rosegrant (1995) concern was the role of the market infrastructure in inducing farmers to move towards a commercial agricultural system. While Brokken and Williams (1991) mentions the market outlets, animal health and disease and suitable breeds as some of the constraints to increased livestock production in much of sub-Saharan Africa. They however, over emphasize on seasonal variability in supply of feedstuffs and poor quality of feed yet in Kenya the major constraint is market inefficiency that has also led to low prices and a shortfall in income levels especially in the rural areas as is the case of Chepkorio Division.

This is attested by Meilink (1985) who stated that inefficiencies in the marketing system could easily undercut the role of producer prices as a determinant of marketed output. Accordingly, proper emphasis should be placed on the marketing aspects. The supply and quality of feed is dependent on the returns from dairy outputs and the concern especially in Kenya is for an efficient and reliable market.

A major role of marketing in agricultural development is to expand domestic and export outlets, thus ensuring that the farmer has an incentive for greater production. Most literature however, attempts to determine the factors influencing farmers' milk production practices and marketing of milk.

2.1.2.2 Milk Pricing.

Prior to market liberalization, food prices were regulated, to make them available for those not engaged in food production. Due to this, Havnevik (1983) notes that the farmers found themselves victims of a marketing structure that compelled them to pay higher prices for goods essential for their farm operations while at the same time receiving steadily declining returns for their produce.

As noted earlier, when a more open market was permitted in 1992, prices for milk and dairy products were decontrolled. This has led to the emergence of an informal market, which offers higher net prices than that offered by the formal sector.

de Wilde (1967) explains how markedly different producers react to a drop in prices. On one hand a sharp drop in prices may profoundly discourage farmers who have only recently entered the market economy and have not yet formed consumption habits on the basis of the money income they received. On the other hand, where people have been accustomed to certain levels of income and consumption, a drop in prices may even spur them to greater effort to maintain their income standard, for example, diversifying in farm enterprises. In Chepkorio Division, dairy farmers have been accustomed to ready market and reliable payments for milk deliveries. The changes

brought about by the collapse of KCC are therefore likely to enhance diversification in non-dairy farm enterprises as postulated by the current study.

Several authors have explained how change in prices could affect the producer behaviour. Experience in Kenya, according to Mwangi (1981) shows that farmers do use prices in their production decisions. They adjust their land use as quick a response to prices changes so as to employ land labour in a more profitable way. Mwangi notes that in 1976 and 1977 bumper harvest of maize, for example, the government diminished maize purchases. And because the private traders could not buy the entire surplus the farmers responded by reducing the acreage under maize in 1978. The higher prices of sugar relative to maize in 1979 in both Nyanza and Western Provinces caused a shift to sugar production. The higher prices of maize and milk in 1976/77 are also associated with decreased pyrethrum production levels.

The relative prices of agricultural products therefore play a very important role in influencing agricultural output mix. The output of a commodity can as well be influenced considerably by the price being paid for other commodities compared with the prices of that commodity as in the case of maize, sugar, milk and pyrethrum above.

de Wilde (1967) explains that the planting of arabica coffee by Africans in Kenya was probably stimulated by rising prices in the 50's but the rapid increase in coffee areas continued while prices were falling. This he notes was because coffee still provided an income far beyond that of any alternative crop.

In the market-oriented economy like the Kenyan one Smith (1971) argues that price has a crucial role to play in influencing production decisions. The overall level of agricultural output, for example, responds positively to increases in the real price of

agricultural products, which increases occurs both at the extensive and intensive margin. The level of technology used in agriculture is also dependent on the absolute and relative farm gate prices paid for agricultural products. In terms of marketed surplus Singh et.al (1985) notes that the response to prices will change because it depends on the joint response to price variations of the farm as producer and the household consumers.

Upton's (1987) concern was not only on the output prices. To him the relative prices of outputs to inputs are important in determining both the income and welfare of the farm family and what and how much is produced. The 'income effect' is noticeable in that an increase in the product price must yield larger total cash income, even if there is no change in the farm system. An increase in the price of a particular product, however, encourages farmers to produce more of that product for sale. Upton, mentions further that there is an incentive to transfer resources from some other activity into producing more of the higher priced crop, for example, when in the late 1970's the price of sunflower seed rose relative to that of Maize in Zambia, farmers switched some of the area previously under maize into sunflower production.

In any commercial farming enterprise, farmers are expected to behave as rational economic beings. This means that their utilization of production inputs will be related with the marginal values of output. However, a study by George and Chokshi (1977) contradicted this postulation as the farmers response to price changes was contrary to the expectations. This was most likely because the farmers considered dairying not as a commercial activity but a subsidiary occupation. Thus, so long as dairying is considered a subsidiary occupation, price incentives may have only a limited role. In Kenya, and

especially in the high potential areas, dairying enterprise is being undertaken on a commercial basis and milk prices play a crucial role in producer decisions.

Prices are only one factor affecting production levels, yet very important. They interact with a range of other variables, which farmers take into account in their production decisions. Correct price incentives are therefore necessary though not a sufficient condition for attaining an output mix. On the other hand competition from private traders results in better price but may not ensure countrywide production and collection of milk. This is the scenario in Kenya at the moment. Milk production areas around the vicinity of urban centers have ensured consumption levels remains high. In such areas competition for milk products is high between the formal and informal market players. However, the high potential areas in the rural areas have had their milk prices falling very low because of the surplus and lack of markets. There is little or no competition for the milk produce and especially during flush seasons in such areas.

2.1.3 Dairy enterprise contribution to the rural communities.

Statistics in support of dairy farming are immense. Generally, ILRI (1997) states that nearly 2 billion people that are a third of the world population derived at least some of their livelihoods from farm animals, nearly one person in every eight depends almost entirely on livestock. As noted earlier, apart from just providing food, livestock also provide manure, draft power, and income. According to ILCA (1987) it accounts for around 35 per cent of the agricultural production of the countries of sub-Saharan Africa when their contribution in terms of draught power for cultivation, rural transport and manure for crop production is added to the direct economic value of livestock products.

Delgado et.al (1999) posits that the limited access to land and capital for the poor limits their opportunities to increase incomes. However, livestock production offers one of the few rapidly growing markets that the rural poor can join even with a substantial lack of amounts of land, training and capital. But if a situation of failing markets is envisaged then the rural communities will suffer declining welfare conditions due to less or no income. He argues further that the prospects for sustainable intensification of smallholder agriculture under rain fed conditions would be difficult without a dynamic livestock sector. Families that live on small farms cannot survive economically with crops alone and especially in the peri urban areas. It is the intensive livestock production on such farms that provide both a higher return to farmer's labour and land.

Smallholder dairying generates more regular income than any other rural enterprise. This is affirmed by ILRI (1997), Delgado et.al (1999), and Staal and Shapiro (1994). Dairying has proven to be fully competitive with other farming enterprises. A study done by Chitere (1976) in Kakamega District found out that dairy farming brings a high surplus income, is less labour intensive and earns the farmer livelihood during most months of the year and consistent income throughout the investment period. This was in contrast to the sugarcane and maize enterprises whose advantages were, high returns and low initial capital outlays. Chema (1971) notes that dairying shows some advantages over coffee, tea and other cash crops. This, he explains is because the prices of tea and coffee tend to fluctuate much more than the prices of milk and dairying also does not entail such sharp peaks in labour demand as many cash crops. This therefore, explains why farmers tend to keep dairy cows even in areas where dairy production cannot compete with cash crops in terms of gross margin.

A study done by Rop (1981) in Ainabkoi East and West found out that milk sales was the main source of cash and that all the money used on the farm accrued from the sale of farm produce. These farm incomes were used to meet the daily farm and farmers' cash requirements. The place for dairy enterprise in the agricultural sector is therefore very significant as a major source of income. It is the livestock that provided the largest proportion of total gross margins on most of the farms studied. Although the study reveals that maize is the most dominant crop grown once per year and potatoes grown twice a year, milk production offers an all year round income.

All the above studies points to the importance of dairying in terms of income and its advantages over other farm enterprises. The way in which marketing issues dictate the preferences for farm enterprises has not been of great concern. However, the study of Chepkorio Division will dwell much on how the failing marketing infrastructure is impacting on the dairy farming households.

Another study by Huss-Ashmore (1992) revealed that livestock farmers in Coast Province had considerably more land, larger households and higher incomes than the general coastal population. It is the wealthier households, that comprise a larger proportion of the small-scale dairy sub-sector and they have created rural employment opportunities for others. Dairying is labour intensive at farm levels and its contribution in providing employment cannot be underestimated. According to Jabbar et.al (1995) labour typically amounts to over 40 per cent of total costs in smallholder systems. Ogle (1998) further adds that livestock provides employment, providing part time job opportunities in particular for the landless women and children and allow a steady, more productive year-round utilization of labour. In the current study employment has not

been taken as one of the indicators for the welfare conditions. This is because the study postulates that dairy farmers may opt to diversify their farm enterprises to counter the reducing incomes from dairying implying that employment opportunities exist in other farm activities.

Livestock ownership has always been equated with wealth. However, livestock development often benefits the poor. In Morocco and Egypt, for example, small farms have 4 to 6 more animals per hectare than larger farms while the landless farmers in India and those with less that 1 hectare own more than 30 percent of cattle and buffalos and have four times more stock per hectare than larger farmers (Jabbar et al 1995). Higher stocking rates however, may not guarantee optimal efficiency but they demonstrate the importance of livestock development for rural growth and poverty reduction.

2.1.4 Contribution of Dairy Farming to Improved Welfare.

The level of welfare shows the quality of life enjoyed by the people. Some of these are employment levels, income levels and distribution, infant mortality rates, disease incidence, food availability and nutrition.

Research in Kenya, Mombasa by ILCA (1999) elucidated the impact of intensive dairying on women, who provide most of the agricultural labour in Africa. Adoption of intensive dairying increases household income and increases family nutrition. The study reveals further that despite of increasing their workload, the women favoured dairying because it boosts household income and increase dairy product consumption; two effects they say have improved the household welfare.

Reynolds et.al (1987) states further that income accruing to women is likely to be used to provide food to the household. The greater participation of women in dairying in Coast Province has therefore ensured households' food security. This is very important given the role of women in providing and preparing food for the family. Reynolds et.al notes that while undernourishment is prevalent in children throughout the Coast Province, better nutritional status is associated with smaller household size, higher income and steady sources of income such as wage employment or dairying. Nutritional status was also found to be sharply higher for families of laborers employed on dairy farms compared with the general population. Hoorwerg (1994) affirmed this when he mentioned that commercialization could influence household nutrition. Commercialized agricultural production may entail higher output of food crops or higher incomes to secure nutritional needs, or both.

Another study by ILRI (2000) found out that a household in Ethiopia that has adopted a small-scale dairy enterprise get a third of the earnings from milk. The households are more able to spend more on household goods, clothes and extra food. The earnings, which are supplemented by the sale of live animals, which account for two thirds of the incomes, are also used to pay school fees for the children.

Jabbar et.al (1995) notes further that in both Ethiopia and Mali a major part of livestock cash income was spent on food and medicines. In some crop-livestock systems, such as in semi arid areas of Botswana self-sufficiency in food crop production may not be a major goal. Most food crops may be purchased by income generated by livestock.

Sutter (1998) in a study of Marakwet District analyzed the impact of human welfare on liberalized agricultural markets. Liberalization led to a drastic fall in the prices of

locally produced foodstuffs, which were the leading sources of income in the region, therefore occasioning a drastic reduction of the net monthly incomes. Accordingly, this has contributed to the farmer's households' inability to meet the costs of their daily medical and educational requirements. The study found out that many children in the region dropped out of school completely or never joined their merited secondary schools due to lack of school fees.

In terms of food security, Sutter (1998) reveals that due to declining income, the residents of Koibarak location were unable to purchase their own food requirements. This is despite the fact that the prices of locally produced foodstuff may have reduced and especially those of maize grains. This is because most of the households were forced to sell more of their food produce to supplement their low income levels, thus doing away with a large part of their food stocks.

Sutter's concern was the effect of liberalized agricultural markets while the current study focuses on the collapse of a major marketing institution (KCC), as a major buyer of output from the dairy enterprise. However, the effect of ineffective markets and low product prices irrespective of the farm enterprise are bound to have the same effect on the household's welfare.

Von Braun (1994) notes that major increases are required in the income levels of rural poor households to have a major nutritional improvement effect. The long-term effect of increased income for nutrition is also likely to be higher. On the other hand changes in household welfare according to Alderman (1994) would be unambiguously measured in terms of real income gains. It is true that the higher the levels of profits, the higher the welfare of household.

House and Killick (1983), as well posits that access to education and health facilities tend to follow the differences in income. It is the level of income that largely determines malnutrition. Peter and Herrera (1994) also attest to this, however, House and Killick found out that Protein Energy Malnutrition (PEM) show contradicting outcomes. According to them the Central Province and the coffee growing areas East of the Rift Valley has relatively high smallholder incomes and consumption levels, as well as having a below average proportion of households below the poverty line. At the same time, the Western Province appears to have relatively low incomes and consumption with the largest proportions below the poverty line yet they suffer the lowest incidence of malnutrition. One possible explanation for this, is that the smallholders of Central Province have substituted cash crops for food crops and use their relatively high cash incomes to buy such non-food items as clothing and durable goods as well as for investment.

2.1.5 Diversification of Faming Activities.

Diversification is common amongst the small-scale farmers. A study by Peters and Herrera (1994) in Malawi confirmed that smallholders have highly diversified incomes, which entails juggling multiple sources of income in trying to achieve family food security and welfare. This is also noted by Sahn and Aruipragasam (1991). They found out that farmers have responded to relative crop price movements by reallocating incentives but are keen in taking into account both the production and price risks.

Diversification is a way of spreading risks among the farm enterprises. As Devandra (1995) puts it, diversification of resource use spreads risks and provides stability.

Farmers consciously diversify the use of the resources to produce a mix of activities that are economically rewarding. A diversified farm might combine crop and livestock enterprises or grow different crops. It may also produce a variety of animal products like wool, milk and pork. Mixed farms may be diversified, but the many enterprises in the farm may show some relationships for instance supplementary, competitive and complementary.

Upton (1987) defines risk as a measure of the effect of uncertainty on the decision maker and could be measured in terms of variation or instability of income or as the possibility of disaster or ruin. Farmers do behave in a risk averse behaviour, because when embarking on a farm venture there is uncertainty on what the actual outcome will be. Uncertainty or instability of relative prices would make farmers adopt a certain degree of diversification of farm products.

The dairy enterprise having been a profitable venture for farmers, the deterioration of the marketing infrastructure has led them to diversify to make up for the shortfall in incomes. The advantages of having several different enterprises are that labour requirements are spread more easily over the year, and income is spread more evenly over the year.

Specialization by farmers exposes them to greater risks of market price uncertainty and de Wilde (1967) stresses that the danger of excessive specialization should be avoided so that farmers can be protected against the consequences of market depression. However, it is not only market failure that exposes farmers to risks. Other risks could arise from pests and diseases and crop failure due to the vagaries of weather. Brokken and Williams (1991) contends that cattle milk and meat production is a risk business

and production takes place under highly variable economic, institutional and environmental conditions. Producers in sub-Saharan Africa therefore, face a variety of price, disease and resource risks, which make their income, fluctuate from year to year.

Von Braun et.al (1994) notes that the Guatemalan government perceives crop diversification and expansion in traditional agricultural exports as necessary to counteract the deterioration in market prices of traditional exports, growing foreign debt and dwindling foreign exchange reserves. This is however, a macro-level application of diversification as opposed to the present study, which attempts to find out how, the specific farm households are diversifying due to price uncertainties of dairy outputs occasioned by the collapse of a marketing institution. At the macro-level, farm units may specialize, in particular large scale farm enterprises or plantations. While diversification may be on the basis of this specialization by the different farm units, Swaminathan's (1992) argument supports diversification at the household level when he mentions about a sustained process of agricultural diversification. This provides higher incomes and more job opportunities in rural areas and the building of grass root institutions to enable the rural poor take advantage of development opportunities thus providing lasting solutions to the food insecurity problem.

Pingali and Rosegrant (1995) combine agricultural commercialization and diversification and see them as involving the gradual replacement of integrated farming systems by specialized enterprises for, livestock, poultry and agriculture product. Though they are in agreement with other authors like von Braun (1994), Upton (1987), Devendra (1995), Rop (1981) and de Wilde (1967) that changes in both the product mix and input use are largely determined by the market forces, their view of diversification

is different. They see diversification as a process in transition giving way to specialized farming. Accordingly the process of diversification out of staple food production is triggered by rapid technological change in agricultural production, improved rural infrastructure and diversification in food demand. They are of the opinion that as the level of commercial orientation increases, mixed farming systems give way to specialized production units designed to respond rapidly to market price and quality of inputs. The rural Kenya households, however, does not seem to gradually specialize in the farm enterprises. This is because part of the production is still subsistence. Farmers are keen on maximizing their incomes but part of the produce is still retained for family consumption.

2.1.6 Dairy Farming Improvement and Intensification.

Milk output from dairy animals is determined by the extent of enterprise improvement and intensification. Improvement and intensification of dairy enterprise encompass such factors as breeding, feeding, and disease and vector control. As already noted income from dairying activities are an important source of cash requirements for farm investment. A study in India by George and Chokshi (1977) showed that the respondents gave the investments in land the top most priority, followed by investments in cattle. However, farm enterprise intensification or improvement can only be possible with efficient and reliable market for the outputs.

The milk yields of animals, usually increases if the conditions of management and feeding are improved. In any commercial dairy production the availability of quality feed, animal-breeding services, disease and pest management are major inputs.

Increased demands for animal products and decreased grazing resources have led to intensification of production.

Livestock activities provide the main source of cash incomes for smallholder households and in the semi arid zone of Mali, Debra and Sissoko (1990) alludes that livestock were sold for the same reasons as crop products but in addition, livestock sales generated cash to buy animal feed and to purchase other livestock. This therefore implies that to be able to buy animal feed and to ensure proper management of dairy farming, there has to be incentives in the form of efficient markets for the dairy output. In studying agricultural mechanization and the evolution of farming systems in Sub Saharan Africa, Pingali and Rosegrant (1987) showed that for a given population density, improved market access caused further intensification of the farming system.

The introduction of very productive animals by the smallholder dairy farmers has led to increased costs of production and greater risks of diseases. However, the risk averse behavior of farmers may mean that improvements to animal management practices that increase productivity but increase variability of income may not be acceptable to smallholder unless the expected increase in income is substantial. The input costs should be commensurate with the output if the farmers are to intensify and improve on their productivity. Berg (1990) notes that the farmer has a marginal income and is therefore not prepared to buy lower than the costs of the feed. This is especially true if the feed is required during periods that milk production is low and there is hardly any income from milk sales. The collapse of KCC can be posited to be a major source of disincentive to increased milk production. The milk incomes, which would have otherwise been used for livestock improvement and intensification, are not enough.

Kariuki (1997) in a study of socio-economic factors in farm productivity, found that farmers sometimes go for months without any payment at all yet they are supposed to plough back some of their earnings to their holding for greater productivity. This has made it impossible for the farmers to increase production levels by improvement.

Devandra (1995) contends that the problem related to intensification is the lack of maximum profit motive leading to lack of incentive to intensify. He adds further that the low population density in many rural areas means that land is still available leaving farmers the option to move to new areas when soil fertility declines rather than developing intergrated system. However, with commercialization of agriculture the rural households now depend on farm products not only for food but also for their daily income. The profit motive is there but with the poor marketing infrastructure, intensification and any enterprise improvement is prone to suffer some setbacks. Farm incomes are prerequisite to facilitate intensification.

de Wilde (1967) lists the conditions governing intensification, as the amount of labour required, the difference in yields, differential population pressures, and spontaneous and induced intensification. The amount of labour required will depend on the amount of extra labour required in relation to the amounts of the increase in yield. And as for the yields de Wilde, says it is the level of yields which extensive cultivation can produce by comparison with more intensive methods under given ecological conditions. He however notes that the factors conditioning the success of intensification are changing, emanating from the demographic pressures. The tendency to want more and higher standards of living may well bring about a growing disposition to work harder and even to accept diminishing marginal returns to labour when this is essential. He fails to

mention the effects of output prices or sufficiency of income as an incentive to intensified production.

Arguably, market demand for milk and the ability of farmers to earn an attractive return from the sale of dairy outputs are the greatest stimuli for the expansion of dairy sub-sector.

2.2.0 THEORETICAL FRAMEWORK.

A theory is a set of ideas that provides an explanation for human society (Haralambos and Heald, 1980).

The study of the collapse of KCC has been based on the theory of innovations and systems theory.

Theory of diffusion and adoption of innovations.

Farming is always about diffusion and adoption of innovations and this theory therefore deems relevant to the study. The collapse of a major agricultural marketing institution may serve to hamper diffusion and adoption of new innovations. Alternatively, it may enhance adoption of other new farm practices as farmers attempt to meet the shortfall in their incomes.

Diffusion is defined by Rogers and Shoemaker (1971) as a process by which innovations are spread to the members of a social system. The authors also define an innovation as an idea, practice, or object perceived as new by an individual.

A major factor that may determine the rate of adoption of innovation is the relative advantage, which according to Rogers and shoemaker (1971) is the degree to which an innovation is perceived as better than the idea it supersedes. This could be the ability of an innovation to increase profits, reduce risks involved or reduce input costs.

However, as Lionberger (1960) notes, the final adoption is not always permanent adoption. Majority of the dairy farmers have adopted several farming techniques meant to improve productivity. Some of these include breeding through the use of exotic bulls and artificial insemination, the use of feed supplements and disease control methods. Poor marketing conditions for the dairy products reduces the chances of these innovations or practices being continued, given that they require enormous amounts of income against the background of low output prices and collapsed market infrastructure.

According to Rogers and Shoemaker (1971) the decision to cease using an idea is referred to as disenchantment or discontinuance. This results from dissatisfaction from that idea and may come about because the innovation is inappropriate for the individual and does not result in a perceived relative advantage over alternative practice. It is for this reason that the collapse of KCC is seen as a major setback to dairy farming improvement and intensification. In as much as dairy farmers lack incomes, which they can plough back and improve on their productivity, they are also apprehensive about continuous losses occasioned by higher input costs for low output prices. The best option for them would be to diversify their farming activities and to cut back on expenses (input costs).

Any new farm practice can only be adopted if the farmer perceives a need for it. Crises such as drought, floods or low prices are likely to expose them to other alternatives,

which were hitherto unknown or neglected. Rogers and Shoemaker (1971) defines a need as a state of dissatisfaction or frustrations that occurs when ones' desires outweighs ones' actualities, when 'wants' outrun 'gets'. Dairy farmers in this study are seen to develop a need when they learn of other farm enterprises, which are likely to earn them better incomes as opposed to dairying. Majority of the farmers may be aware of these, but may not have adopted them because they regard them as not relevant to the situation or as potentially useful.

A satisfied man is seen not to change much. Adoption of new farm practices therefore, may take place only when there is a feeling that the present situation is not the desired. Dissatisfaction with the conditions as they exist (collapse of KCC), is followed by awareness of alternatives, is prerequisite for change. Any form of farm diversification is because dairy farming no more results in a perceived relative advantage over alternative practice.

The theory of adoption of innovations explains the reasons for farmers adoption and, or discontinuance of certain farm practices. The collapse of KCC in this study is not only seen to impact on diversification and farm improvement, but also on dairy farming household welfare conditions. Systems theory will therefore be used to explain further some of the interrelations between the various variables of the study.

Systems Theory.

The reciprocal interrelations and the factors between the various sectors of a society can be explained by the systems theory. Helmrich (1986) notes that a system consists of elements which have attributes and which elements are interrelated.

Dairy farming is a sub-sector within the agricultural sector. The agricultural sector is one of the sub-systems that make up the economic system. Dairy farming is also in part a component of social activity. It is therefore closely associated with the social, cultural and ecological systems.

Ritzer (1992) says that systems theory is interested in the varied relationships of the many aspects of the social world. The argument of the theory therefore is that the intricate relationship of parts cannot be treated out of the context of the whole. How the dairy sub-sector performs will affect the other sub-sectors and sets a chain of reactions that will affect not only the economic system but other systems as well, like the political and the social systems.

The collapse of KCC is prone to bring about some alterations in the agricultural sector, within the economic system and in other systems as the farmers try to adjust to less or no incomes from the once well paying sub-sector. The income that accrued from the sub sector has been always used to meet social obligations. The shortfall of income as the study postulates, will enhance diversification of farm activities, will affect the farmer's welfare conditions and may hamper farm enterprise improvement. All these have implications on the economic, social and political sub-systems, as the farmers try stabilizing, maintaining or even improving on their standards of living.

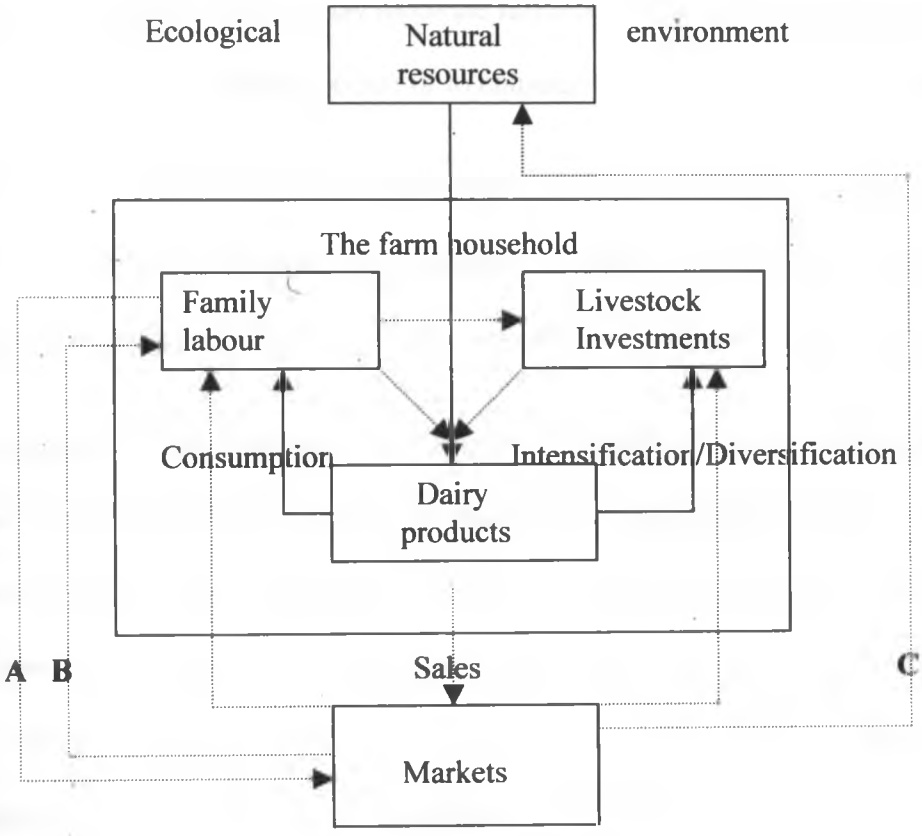
The parts of a system, and the system itself should be in equilibrium. Any changes in one part will lead to changes in others. In any social system there are various institutions and an institution, Parsons (1951) notes will be said to be a complex of institutionalized role integrates which is of strategic structural significance. Accordingly, the institution should be considered to be a higher order unit of social structure than the role, and

indeed it is made up of a plurality of interdependent role-patterns or components of them.

The household is seen as both an economic and social unit. Their inputs for production, as for milk are derived from the natural environment, which encompass the ecological system. It also derives the inputs from human resources both from the household and from the society. This interrelationship clearly shows that farming, as a system of its own has to interact with other systems for it to progress. Adjustments are made when changes occur, for example, when the marketing institutions (which falls under the economic system) fail, the farm households may decide to diversify their sources of income.

2.2.1 Conceptual Model.

Nachmias and Nachmias (1996) define a model as an abstraction from reality that orders and simplifies our view of reality by representing its essential characteristics.



A=Off-farm labour
B=Labour hire
C=Purchase or rent of land

Source: Upton, M. (1987)

Fig 2.1. A family dairy farm system.

Figure 2.1 illustrates that such inputs as labour, natural resources and capital services are used to yield milk products. These products may then be consumed, invested or sold to generate income. Investments hereby imply additions to the stock of capital, for example, when calves are retained for breeding. Other forms of capital such as land improvements are created directly using farm labour as shown by the arrow from labour to capital. The collapse of KCC may motivate farmers to invest in other farm enterprises (diversification) in an attempt to secure or to enhance a continuous source of income.

Reliability of dairy income ensures that farmers intensify and improve on dairying for maximized production. However the collapse of market infrastructure as the study postulates will affect the farmers' ability to undertake intensification and improvement.

The broken lines in the diagram represent farmers engaged in commercial dairying, that is; those who sell their farm produce for income. The income from the sale of outputs may then be used to buy consumer goods, such as clothing and food or for medical care and education. The collapse of a marketing institution as in the case of KCC will lead to less or no incomes from milk. For this reason the study postulates that the farm households' welfare conditions will be affected. Some of the proceeds may also be used to buy items of capital such as tools and machinery, or to hire labour and capital services like artificial insemination.

Line A in Figure 2.1 represents members of an household who provide their labour services to other non-farm sectors like those working in the civil service or service and industrial sectors. Off-farm income is used to supplement the households' farm

incomes. Some of these incomes are used to improve and intensify the farm enterprises for increased productivity.

Farm households may occasionally employ extra labour. Line B in Figure 2.1 represents this. It happens when the family labour proves inadequate for the farm operations. In most occasions income from the sale of farm produce is used to pay wages for the hired labour.

Some farmers may want to increase the acreage of land for either crop or animal husbandry. They may however, be limited by their small size holdings. To counter this, land may be purchased or rented depending on the ability of the farmer. Line C represents this.

The ecological and the socio-economic environment influence the farming systems. Human societies exploit the natural environment to meet the life's requirements. This in turn leads to the altering of the ecological equilibrium.

2.2.2 Hypothesis.

Singleton et.al (1988) defines hypothesis as a tentative answer to research questions and which Nachmias and Nachmias (1996) adds, is expressed in the form of a clearly stated relation between the independent and the dependent variables.

Study Hypotheses:

1) The collapse of KCC has enhanced diversification of farming activities by the farm households.

2) The collapse of KCC has led both to deteriorating household welfare conditions and poor dairy farming improvement/intensification.

The above hypotheses comprise three dependent variables and one independent variable, which are the main factors of the study. They are as follows:

- Dependent variables-

  These include intensification, diversification and household welfare conditions.

- Independent variable- Collapse of KCC

Operational definition of variables.

a) Intensification.

This implies the improvement of the dairy enterprise so as to increase the output without necessarily increasing the herd size. This will be measured by the extent and method of breeding, feeding, dipping and inoculation (proper disease control). This will be measured by recording any changes inherent in these major practices involved in dairy husbandry since the collapse of KCC.

b) *Diversification.*

This is the establishing of other farm enterprises to enhance further increment or to stabilize the level of income generated by the dairy-farming households. It will be measured by the extent to which dairy farmers are venturing into other farm enterprises, for example, poultry, pig keeping, and crop enterprises. Any form of improvement or intensification of non-dairy farm activities as recorded shall also indicate it after the collapse of KCC and with the intention of improving farm incomes.

c) Household welfare conditions.

This is the accessibility to some of the basic human needs that includes education, health and nutrition, and food security. In the study it will be measured by identifying any changes inherent in these welfare conditions as occasioned by the changes in income levels after the collapse of KCC. The welfare conditions looked at by the study are education and food security.

d) Collapse of KCC.

This is the inability of KCC to purchase part or all milk from the dairy farmers and or its inability to pay farmers their milk deliveries. The amounts owed to the farmers and the quantity of milk not sold because of the lack of market shall be the indicators of the collapse of KCC. Also the poor performance by the primary co-operative societies as indicated by the low turnover since 1992 will be one of the indicators. The creation of a new company by the name KCC 2000 also means that KCC ceased to exist.

CHAPTER THREE

3.0 METHODOLOGY.

According to Nachmias and Nachmias (1996) a scientific methodology is a system of explicit rules and procedures upon which research is based and against which claims for knowledge are evaluated. In this section therefore, variable selection methods, sampling and data analysis procedures will be discussed.

3.1 STUDY DESIGN.

The study used survey method, which involves the application of structured interviews. These according to Singleton et.al (1988) are targeted to part of a group to make generalizations about the whole group. The survey was carried out on members of two co-operative societies, after which the results were generalized, to infer to the larger population of Chepkorio Division.

3.2 SITE SELECTION AND DESCRIPTION.

The study was carried out in Chepkorio Division of Keiyo District. Chepkorio Division has been purposively sampled. According to Singleton et.al (1988), purposive sampling is an acceptable alternative that preludes random selection. Keiyo District is one of the 18 districts in the Rift Valley province. It is bordered by Marakwet District in the North, Uasin Gishu District to the West, Baringo District to the East and Koibatek District to the South East. It extends from latitude 0° 10" to 0° 52" North and longitude 35° 25" to

35° 45" East. (Republic of Kenya, 2001). It has four administrative divisions namely Chepkorio, Kamariny, Soy and Tambach. (See Map 1).

The Division has been purposely sampled because it has the highest population of 67,062 and also the highest number of households of 13,393 in the District.

It is also an agriculturally high potential area and apart from Kamariny Division, it is the only other Division in the District where dairy farming is being undertaken on commercialized basis.

The area of the study is easily accessible to the researcher in terms of culture and language. This facilitated easy communication, hence gathering reliable data from the respondents.

The District has 3 main topographical zones running parallel to each other in a North South Direction. The zones are the highland plateau, the Elgeyo Escarpment, and the Kerio Valley. The topographic zones have a bearing on the potential of development of the District. Chepkorio Division, for example occupies an area of high altitude implying it has a higher potential for both agricultural and livestock production.

The climate is hot and humid in Kerio Valley zone while the highlands are cold. The rainfall pattern is bimodal. Long rains occur from March to June while short rains are between June and December. The average rainfall during the wet season is 1500mm, mainly in the highlands. Temperatures are high in the Kerio Valley compared to the highlands, hence limited agricultural production.

Kamariny and Chepkorio Division are agriculturally high potential. Tambach and Soy are in Kerio Valley, which is a semi-arid area. The highlands have fertile soils hence their suitability for farming activities.

Agricultural and livestock sectors are the major economic activities in the district. There are no large farm sectors. In Chepkorio Division, Irish potatoes and maize are grown as the main food crops whereas Pyrethrum is grown as cash crop. Livestock production activities vary in the district according to the 3 district topographical features. (See Map 2 for the agro-ecological zones). However, the main types of livestock reared are dairy cattle, beef cattle, sheep, goats, poultry, donkeys, pigs, rabbits and honey bees.

Table 3.1 An estimated value of selected agricultural and livestock commodities of Keiyo District for 1994.

Sector		1994 (Amount in Ksh)
Agriculture	Maize	541,926,000
	Wheat	37,976,000
	Beans	177,980,000
	Tea	52,362
	Coffee	416,878
	Pyrethrum	9,570,100
Livestock	Milk	49,509,364
	Meat	71,535,900
	Hides/Skins	4,033,701

Source: Republic of Kenya, (2001)

Income from the district are derived mainly from sale of agricultural and livestock products, wage earning and from the informal sector.

It is therefore evident from the above table that agricultural and livestock incomes contribute greatly towards the general income of the farm family. From the livestock sector milk is ranked second in accrued earnings after meat. It is ranked fourth when other arable farming activities are included.

3.3 UNITS OF ANALYSIS.

This is what is going to be analyzed. Singleton et.al (1988) calls these, the entities of the study. They represent the level of social life on which the research question is focused.

In this study the units of analysis are the impacts of the collapse of KCC on farm households. Such impacts shall be measured by the extent to which the farmers are diversifying their farm enterprises and their ability to improve and intensify the dairy farming enterprise. Any change in the farmers' welfare could also be attributed to the collapse of KCC.

3.4 UNITS OF OBSERVATION.

These will be smallholder dairy farming households who will participate as respondents.

3.5 SAMPLING DESIGN.

Sampling design according to Singleton et.al (1988) is that part of the research plan that indicates how cases are to be selected for observation.

The study used probability-sampling technique. In this type of sample according to Bailey (1978), the probability of selection of each respondent is known. To collect accurate representative information within the shortest time and a limited budget, the study utilized multi-stage cluster sampling procedure. This, according to Nachmias and Nachmias (1996) involves first selecting larger groups called clusters and then selecting the sampling units from the clusters.

Having purposively sampled Chepkorio Division, two dairy co-operative societies out of a total of eight were randomly selected. This was done by use of simple random sampling procedure.

The sampling frame for the co-operative societies was obtained from the Divisional Agricultural Office. They were listed as follows:

1. Kabiemit
2. Nyaru
3. Kaptorokwo
4. Chepkorio
5. Metkei
6. Kipsaos
7. Tugumoi
8. Kapkitony.

Small pieces of paper were then written with numbers from 1 to 8 each representing a co-operative society as listed in the sampling frame. The papers were then folded,

placed in a tin and two of them picked after thoroughly mixing. Those picked had numbers 5 and 8 representing Metkei Farmers Co-operative Society and Kapkitony Farmers Co-operative Society respectively.

The second stage involved the random selection of dairy farmers, 40 each from the two co-operative societies, each representing a household. Sampling frames were obtained from the respective co-operative societies. Systematic random sampling procedure was applied in the selection of sampling units. In this procedure every K^{th} case from the sampling frame was selected starting with a randomly chosen case from the first K^{th} case on the list.

Kapkitony Farmers Co-operative Society has 600 members and the sampling interval was computed as follows:

$$K = \frac{\text{Population Size}}{\text{Sample Size}}$$

$$K = \frac{600}{40}$$

$$K = 15$$

The starting point was then established (any number between 1 and 15). Number 14 was randomly picked up from rolled up numbered papers.

Starting from the member number 14 every other 15th member was selected using the interval of 15. Some of the selected members were as follows: 14, 29, 44, 59,74, 89, 104, 119, 134, 149,.....

The same procedure was adopted in selecting the sampling units of Metkei Farmers Co-operative Society, which has 500 members.

The sampling interval was computed as follows:

$$K = \frac{\text{Population Size}}{\text{Sample size}}$$

$$K = \frac{500}{40}$$

$$K = 12.5$$

$$K \cong 13$$

The starting point was established as Number 2 (which falls between 1 and 13). This was randomly picked up from the 13 numbered rolled up papers in a tin. With the interval of 13 every other 13th member on the sampling frame was selected starting with

the member number 2. Some of the selected members on the sampling frame were as follows: 2, 15, 28, 41, 54, 67, 80, 93, 106, 119, 132, 145, 158,.....

However, of the total sampled households only 76 (95%) of them were interviewed.

Two key informants were also selected; one from each sampled co-operative society. Both co-operative societies have managers also acting as secretaries who oversee the day-to-day running of the co-operatives. These officials were selected because they have all the details pertaining the societies' operations. They are in charge of keeping all the records and are constantly in touch with the farmers. They were therefore the most well placed officials to interview.

Table 3.2 Co-operative society members interviewed.

Society	Frequency	Percentage
Kapkitony F.C.S	39	51.3
Metkei F.C.S	37	48.7
Total	**76**	**100**

3.6 DATA COLLECTION.

The study used both secondary and primary sources. Primary data collection involved the use of structured interviews both on the heads of the sampled households and on the key informants.

3.7 DATA ANALYSIS.

In data analysis both descriptive and inferential statistics have been used. Descriptive statistics are used to summarize information for accurate description and comparison, for example, the tables, percentages, frequency, charts and tables.

The study used inferential statistics to make generalizations from the collected data. The chi-square (X^2) has been used to test the hypotheses.

Conclusions and recommendations have been made based on the findings.

CHAPTER 4

4.0 DATA PRESENTATION.

4.1 Introduction.

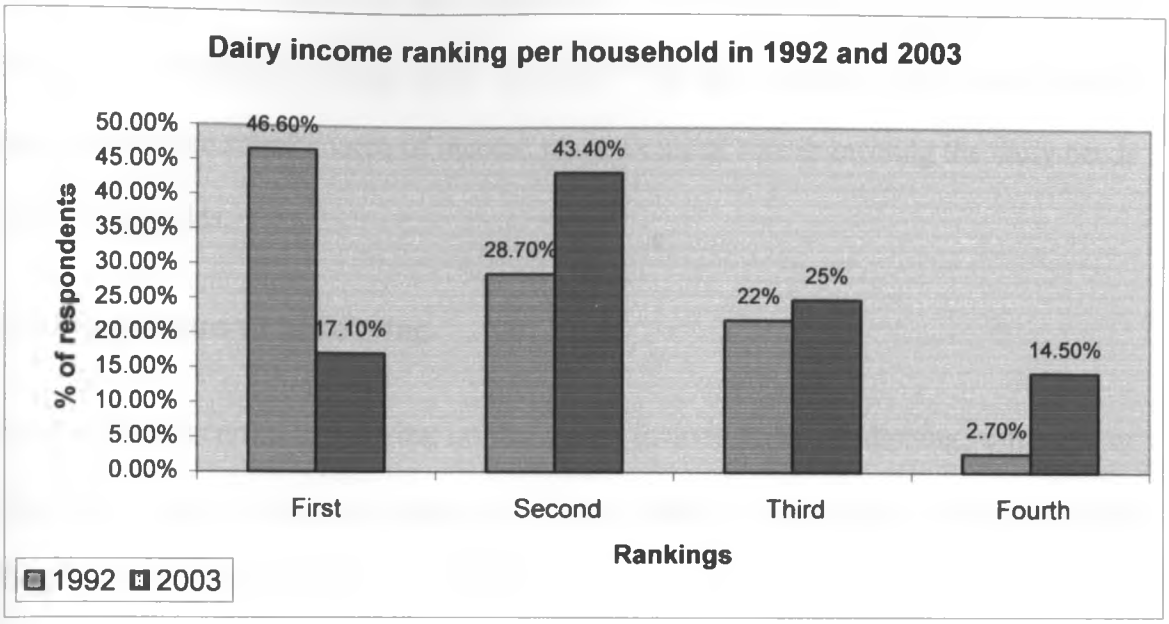
The research findings are hereby presented by use of descriptive statistics. This chapter precedes the field research and is meant to summarize the raw data, thus providing a single index that will enhance comparative analysis and description. Tables, pie charts and line graphs form the basis for data presentation in this study.

4.2 Importance of dairying.

Dairying is one of the major economic activities in Chepkorio Division. The study attempted to classify the importance of dairying by ranking the amount of income from dairying with that from other sources. This helps us put into perspective the likely impacts of the collapse of KCC as it relates to the major variables of the study.

In 1992, Figure 4.1 below shows that majority of the respondents (46.6%) derived much of their incomes from dairying. However, with the collapse of KCC, dairying seems not to play that crucial role of generating high incomes as evidenced by only 17.1% of the respondents who still rank it first. There is a marked increase in the number of respondents who ranked it second, third and fourth in 2003. 2.7% ranked it fourth in 1992 and now it is 14.5%. Those who ranked it third in 1992 were 22% and in 2003 it increased to 25%. This is a clear indication of how important dairying was and the ensuing suffering the dairy farmers endured with the collapse of KCC.

Figure 4.1. Dairy income ranking per household in 1992 and 2003.



By indicating the activity with which much of the dairy income was apportioned we will be able to know the importance of dairying.

Table 4.1. Apportioning of dairy income

Activity	Frequency	Percentage
Investment in dairying	6	7.9
Household expenditure	52	68.4
Investments in other farm activities	13	17.1
Others	5	6.6
Total	76	100

Much of the dairy income as shown in Table 4.1 above was spent on the household needs as alluded by 68.4% of the respondents. 13% of them use much of their dairy income in investment on other farm activities. The above implies that dairy earnings being an all time round source of income plays a crucial role in meeting the daily needs of the households.

4.3. Inputs incurred in dairying.

Expenditures incurred in dairying on the inputs include those on dipping, salt licks or other salts, vaccination, deworming and labour. Table 4.2 below shows the inputs and the percentage of households using them.

Table 4.2. Inputs incurred in dairying.

Inputs	Frequency	Percentage
Dipping	76	100
Salt	76	100
Vaccination	69	69.0
Deworming	73	96.0
Labour	31	40.8
Others	24	31.5

The study found out that the majority of the respondents (100%) dipped / sprayed their animals and gave them salt. 96% dewormed their animals regularly while 40.8% incurred some expenses on labour.

Shortage of incomes limits the farmer's ability to meet for the required inputs and this impacts negatively on dairying improvement. It retards any farm development efforts.

4.4. Financing of dairying activities.

The study had postulated that the collapse of KCC has affected dairy farming improvement/intensification. This is true if much or part of the dairy earnings at first were ploughed back into dairying. Any farming activity requires funds for its inputs and improvements to boost production. However, this may not be achieved especially for the smallholders if the major source of finance is disrupted. Majority of the smallholder farmers are not accessible to loans as they are the large-scale farmers.

It can be noted from Table 4.3 below that majority of the respondents (63.2%) ploughed back the dairy income into dairying in 1992. In 2003 though, it was income from other activities, for example farm crops and poultry that majority of the respondents (67.1%) used in financing dairy farming. It was 15.8% of the respondents in 2003 who used dairy income only. Those who combined both dairy income and income from other activities to finance dairying were 15.8% and 13.2% in 1992 and 2003 respectively.

Table 4.3. Financing of dairying activities.

Method	1992		2003	
	Frequency	%	Frequency	%
(A) Own income from dairying	48	63.2	12	15.8
(B) Income from other farm activities	16	21.1	51	67.1
(C) A+ B	12	15.8	10	13.2
(D) Loans	-	0	3	3.9
(E) Others	-	0	-	0
Total	76	100	76	100

None of the respondents used income from other sources like salary in 1992 but in 2003, 3.9% of them used. None of the respondents in either years used loans to finance dairying.

4.5. Collapse of KCC.

In the study hypotheses collapse of KCC was identified as the independent variable. Membership into the organization was in itself a proof that it still undertook its operations. 100% of the respondents interviewed were active members of the local co-operative societies. However it was when KCC was troubled financially and could not pay farmers their milk deliveries that membership declined. In 2003, 89% of the

respondents delivered their milk to the new milk processors through their local co-operative societies. The remaining 11% are no longer active members of the local co-operatives. They deliver their milk to institutions like schools and local hotels while others supply them to the milk hawkers in the nearest town of Eldoret. These are shown in Table 4.4 below.

Table 4.4 Milk delivered elsewhere other than through the local co-operative societies.

Place of Delivery	Frequency	Percentage
Schools	2	2.6
Hotels	2	2.6
Milk Hawkers	4	5.3
Total	8	10.5

It should be noted that by the time the research was being undertaken all the dairy farmers were not active members of KCC because their milk was delivered to the new milk processors by the local co-operative societies. It is their responsibility to deliver the farmers products to reliable markets. In most cases the decisions on where to market the milk are made by the co-operative societies and not by the farmers. The key informers, however, content that if KCC's operations improve they are willing to go back to them.

The quantity of milk handled by the two co-operative societies sampled reduced between 1992 and 2003 as shown in Table 4.5 below.

Table 4.5. Quantity of milk handled in 1992 and 2003 (Kg)

Co-operative Society	1992	2003
Metkei F.C.S	59,633	56,829
Kapkitony F.C.S	28,000	18,500
Total	87,633	75,329

The total difference for the two co-operative societies amounted to 12,304Kg. The key informants attributed this to the collapse of KCC. When KCC collapsed milk was delivered to the new milk processors but during the flush periods they limited the quantity to be supplied. This meant a lot of milk went to waste because there was no other ready market.

Despite the efforts made to revive KCC having been put in place the two co-operative societies still do supply the milk to the new processors because it is the only better option now. They are still apprehensive about delivering milk to the New KCC 2000 lest it fails to pay them again. At the moment the co-operative societies have no problems paying farmers for their milk deliveries though they are still faced with inefficient markets. Milk that had been delivered to KCC prior to its collapse is yet to be paid to the farmers through their respective co-operative societies.

4.6. Farm Diversification.

Diversification is looked at as an attempt by the dairy farmers to diversify their sources of farm incomes. It could be starting of new ventures, increasing the acreage of certain crops or intensifying on already existing ventures. This is seen as a coping mechanism whereby the farmers try to readjust their income levels to be able to meet for the shortfall in incomes. However, this may not be as effective in attaining frequent income. This is because dairying is a source of income all the year round as opposed to majority of the farming activities in Chepkorio Division, some of which take up to one year to harvest.

The respondents affirmed to have undertaken more intensification on arable activities like crop rotation, increased poultry keeping and increase in acreage of other crops like potatoes and vegetables.

From Table 4.6 below it can be noted that 41% of the respondents now engage in arable activities for example planting of crops not earlier planted or increasing their acreage. 34% on the other hand have intensified their arable practices like more crop rotation, use of high yielding varieties of seeds, intercropping and more usage of fertilizers. 25% of the respondents have started new farm ventures altogether like beekeeping and poultry keeping.

Table 4.6. Diversification of farming activities.

Form of Diversification	Frequency	Percentage
New farm enterprises	16	21.1
Intensification of arable practices	26	34.0
Increased arable activities	31	41.0
No change	3	3.9
Total	76	100

All the above activities are geared towards improving production to achieve maximum returns. It is an attempt to boost the household incomes, which spiraled downwards with the collapse of KCC.

4.7.0 Dairy farming improvement /intensification.

These are the activities undertaken by the dairy farmers to increase their output. These include breeding, feeding, dipping and inoculation of the animals. The study undertook to investigate these aspects of dairying to identify the inherent changes if any, since the collapse of KCC.

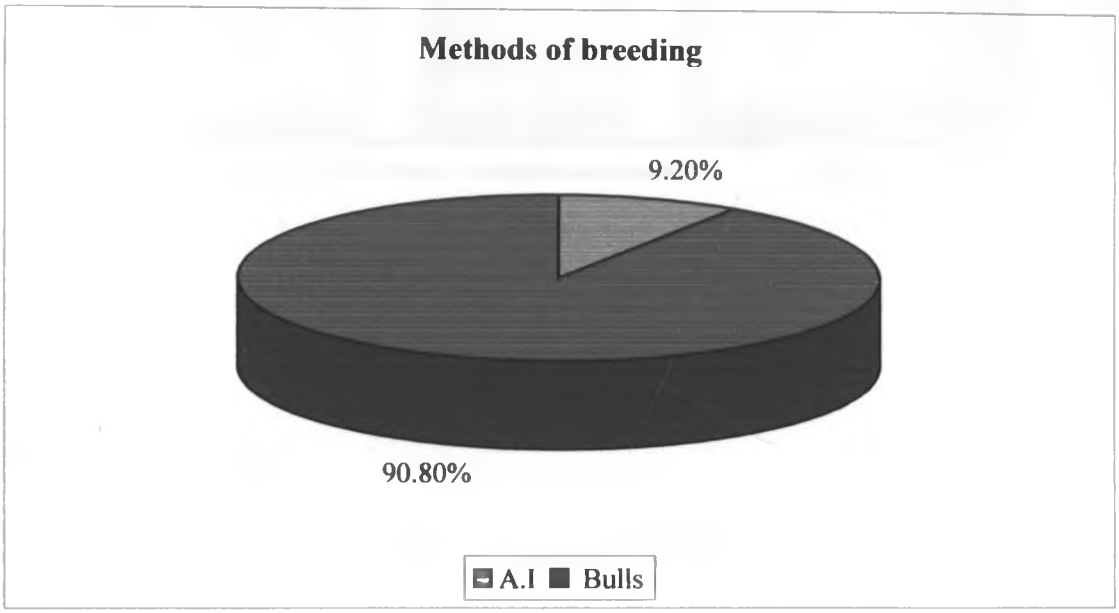
4.7.1 Breeding.

Breeding of cows is either by artificial insemination or by use of bulls. The method of breeding and the quality of bulls used largely determines the quality of dairy cows.

Artificially inseminated cows calf high milk yielding breeds than bulls that are crossbreeds.

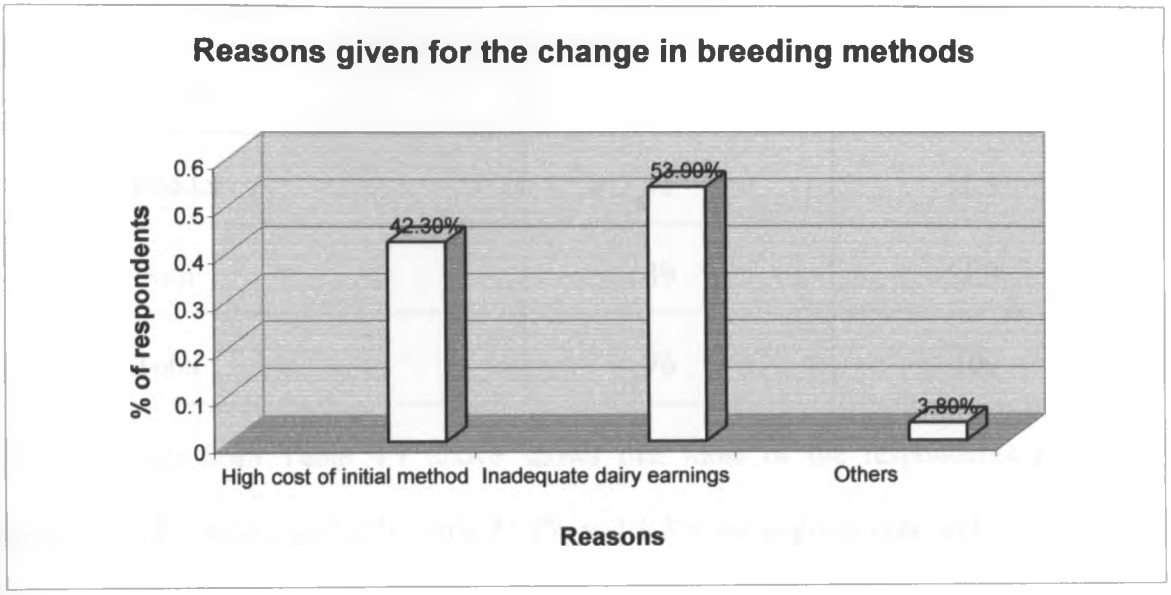
It is clear from Figure 4.2 below that majority of the respondents (90.8%) use bulls as opposed to those who use artificial insemination services (9.2%).

Figure 4.2. Breeding methods in 2003.



Respondents whose method of breeding in the year 2003 was different as that of 1992 gave varying reasons for the changes as shown in Figure 4.3 below. Majority of the respondents (53.9%) gave the inadequate dairy earnings as their reason for changing the breeding method while it was the high cost of the initial method for 42.3% of the respondents.

Figure 4.3. Reasons given for the change in breeding methods



4.7.2 Feeding methods.

Well-fed cattle produce high yields. It is not only the amount of feed available but also the diversity or mixture that determines the output of dairy cows. The most frequently used methods are grazing the animals in the open fields or in the paddocks within the farm. Animals can also be fed by use of fodder. There are other feed supplements available in the shops like the dairy meals.

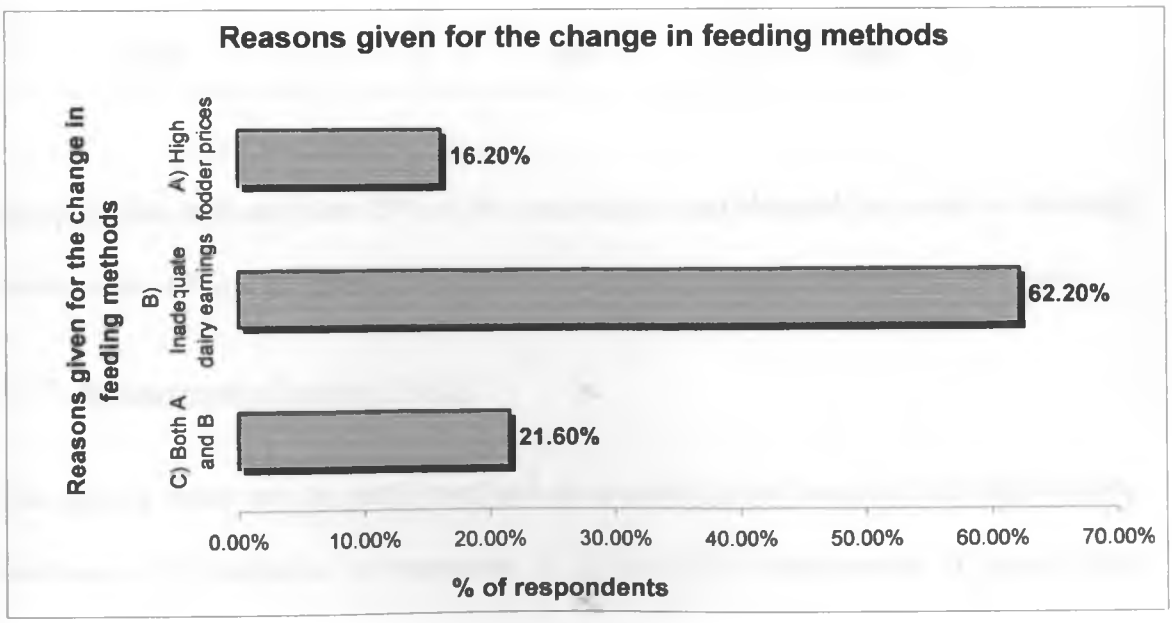
Table 4.7. Feeding methods in 2003

Feeding method	Frequency	Percentage
Grazing	36	47.4
Fodder	1	1.3
Both	39	51.3
Total	76	100

The summary from Table 4.7 above shows that most of the respondents (51.3%) combine both feeding methods while 47.7% and 1.3% use grazing only and fodder only respectively.

In 2003 however, 48.7% of the respondents had changed their mode of feeding the animals for the reasons shown in Figure 4.4 below.

Figure 4.4. Reasons given for the change in feeding methods.



The major reason given as in Figure 4.4 for the change in feeding method was the inadequate dairy earnings that comprised of 62.2% of the respondents. 21.6% gave both high fodder prices and inadequate dairy earnings as the major reasons while it was due to high fodder prices for 16.2% of the respondents.

Respondents who identified fodder as one of the feeding methods were 52.6%. Fodder was obtained from own farms by 54.8% of them. Those growing as well as buying comprise of 38.1% while those buying entirely were 7.5% of the respondents. These are summarized in Table 4.8 below.

Table 4.8. Methods of obtaining fodder.

Method	Frequency	Percentage
Grow	21	52.5
Buy	3	7.5
Both	16	40.0
Total	40	100

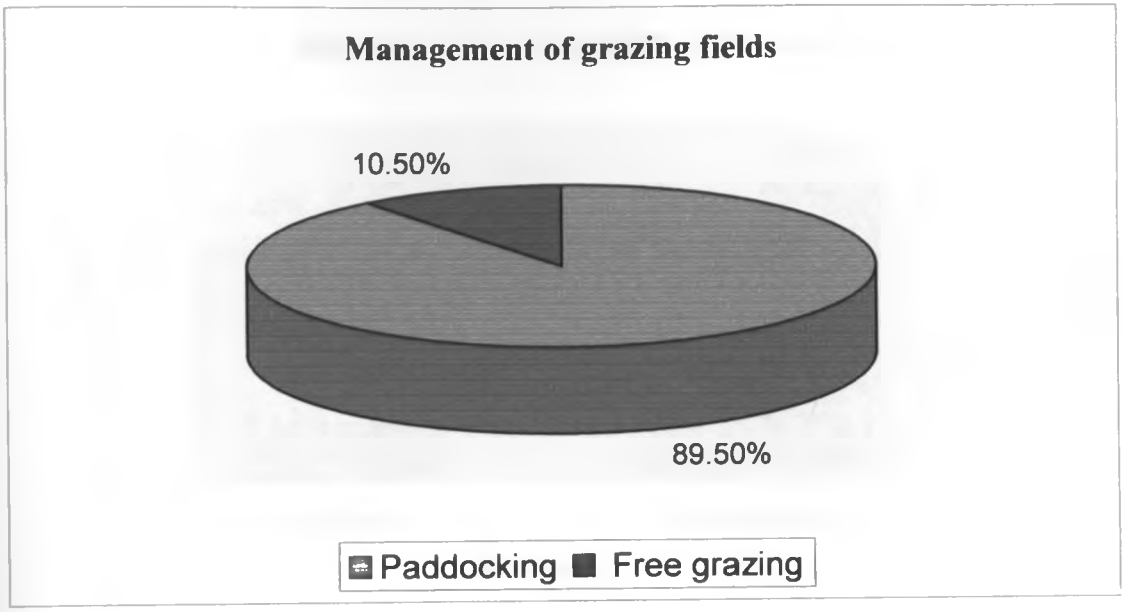
Sampled data indicated that 29% of the respondents had changed the mode of obtaining fodder since 1992. This change was attributed to less income accruing from dairying.

4.7.3. Management of grazing fields.

The grazing fields may be partitioned and the animals grazed on rotational basis leaving sections of the paddocks to regenerate. It is one of the requirements of proper dairy

management practices. To get an insight into this the respondents were questioned on how they managed their fields.

Figure 4.5. Management of grazing fields



The summary provided in Figure 4.5 above shows that 89.5% of the respondents have paddocked their farms as opposed to 10.5% who graze their animals freely.

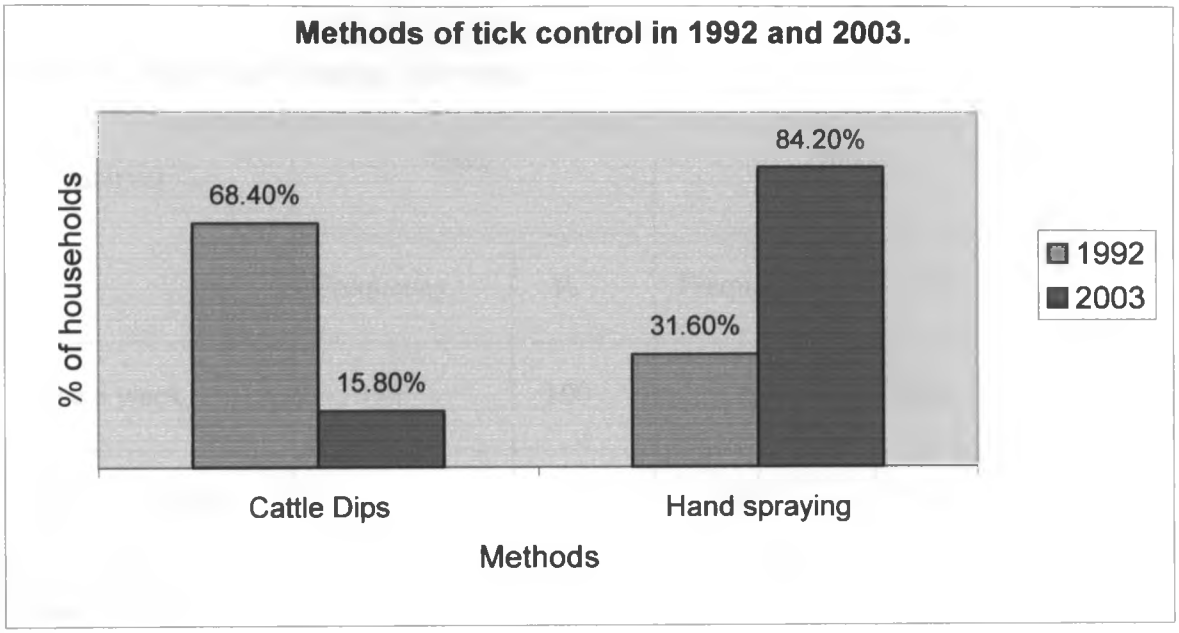
The collapse of KCC has affected the way it is being managed now by some of the respondents (32.9%).

4.7.4. Parasite control (Dipping/ Spraying)

In Chepkorio Division cattle are dipped to rid them mainly of ticks. An health animal is the concern of every farmer because it guarantees maximum production. The changes

inherent in methods and intervals of dipping the animals were covered by the study. It helps in analyzing the overall effect of the collapse of KCC.

Figure 4.6. Methods of tick control in 1992 and 2003.



In 1992 as in Figure 4.6 above, 68.4% of the respondents used the cattle dips but by 2003, 84.2% of them were spraying the animals at their farms. It is only 12% who still use cattle dips.

52.5% of those who opted to spray at home in 2003 gave the decreased dairy incomes as the cause for the change. 32.5% on the other hand opted out of using cattle dips because of the inefficiency of the initial method while 15% responded that the initial method was expensive.

4.7.5. Spraying/ Dipping interval.

Any shortfall in the amount of income earned may disrupt the frequent dipping intervals thus exposing the herd to greater risks. Table 4.9 below shows the frequency of dipping by the respondents.

Table 4.9. Spraying/ Dipping intervals.

Interval	1992		2003	
	Frequency	%	Frequency	%
Once a week	73	100	52	68.4
Once in 2 weeks	-	0	24	31.6
Once a Month	-	0	-	0
Total	*73	100	*76	100

* The difference in the total number of respondents for the two periods is attributed to those who by 1992 had no cattle.

In 1992, 100% of the respondents used to spray their cows once every week but in 2003 only 68.4% still maintained the dipping interval. 31.5% of the respondents are now dipping their animals once in two weeks. 8.3% of them cite increased dipping costs as their major reason while 91.7% attribute the changes to lack of enough dairy income to meet the dipping expenses, as was the case initially.

4.7.6 Immunization.

Immunization on animals is always undertaken to protect them from such outbreaks as foot and mouth and East Coast Fever. From the research it was noted that it is the government, through the Ministry of Livestock, Veterinary Department that undertake the exercise. This is done normally once a year depending on disease outbreaks. All the respondents therefore affirmed that they immunize when the government steps in and not by themselves.

4.8.0. Household welfare conditions.

This has been defined as the accessibility to some of the basic human needs like education and food security. The study had hypothesized that the collapse of KCC has affected the household welfare conditions. Dairy incomes are used not only to intensify and improve on dairying but also to meet the household needs as seen in the previous chapters. Was the collapse of KCC therefore detrimental to the respondents' ability to improve their well-being?

4.8.1. Sources of financing education.

Respondents were asked to identify only one choice he/she considered the major source of financing education. It is likely that the smallholder farmers combine various sources of income to meet the amount of fees required. No single source in most cases can meet the amount of fees required especially if there is a bigger number of school and college going members of the household.

Figure 4.7. Major sources of financing education in 1992 and 2003.

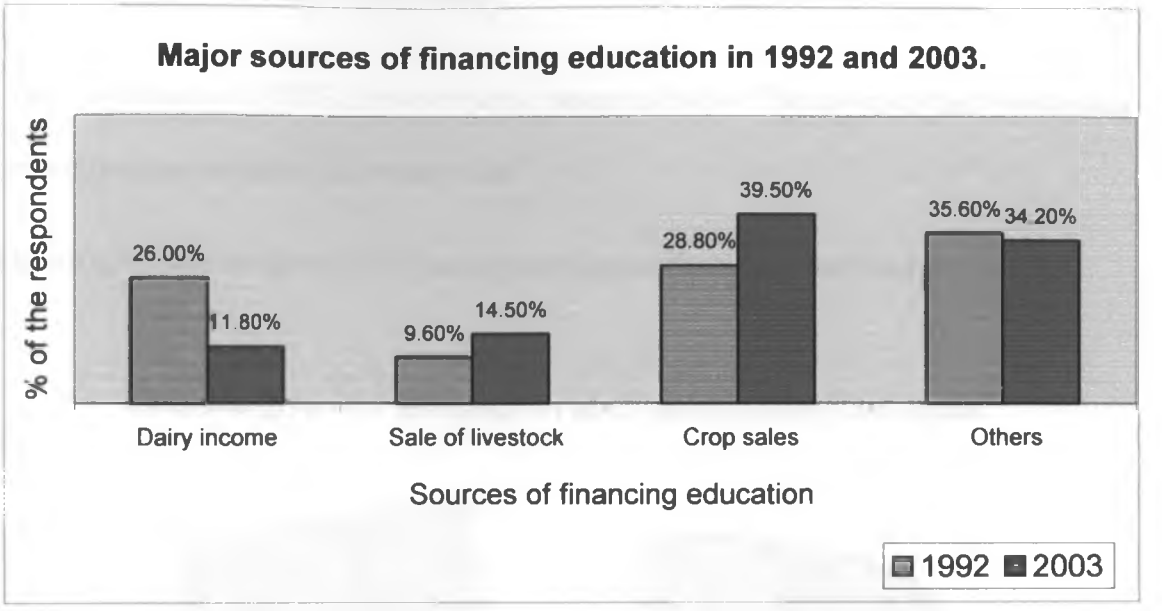


Figure 4.7 above shows that in 1992 the dairy income was the third placed source of financing education as opposed to 2003 when it was the least placed source. 11.8% of the respondents though, still depend heavily on dairy earnings. In 1992 the major source of financing education was income accruing from other sources like salary, bursary or donations but in 2003 it was 39.5% of the respondents who used income from crop sales.

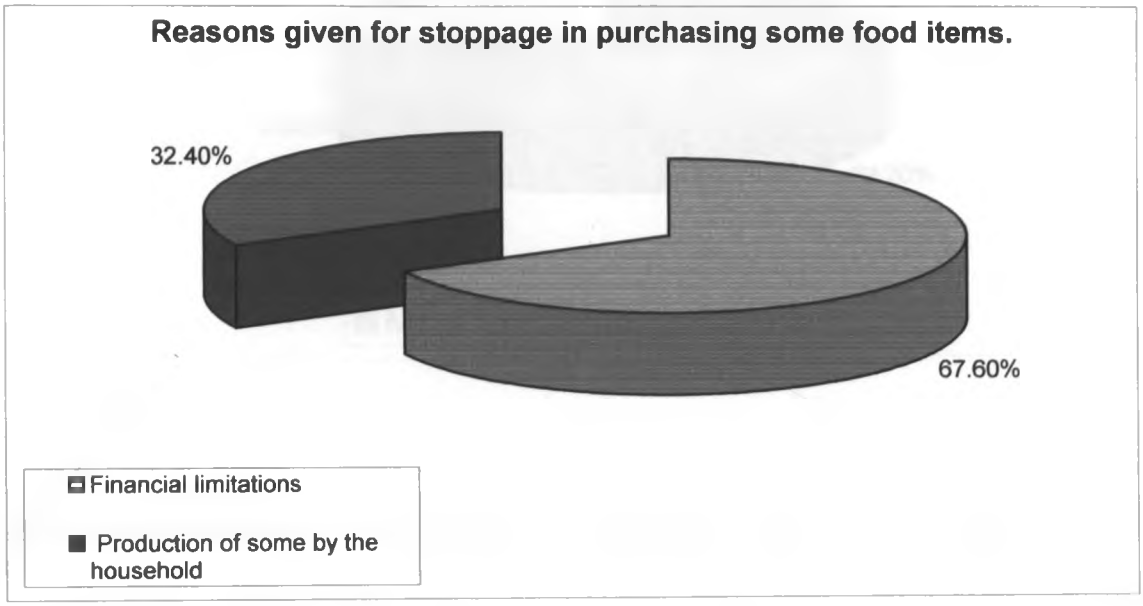
4.8.2. Food security.

All the 76 respondents indicated that they buy from the shops food commodities that are not produced in the farms. These are items like rice, wheat flour and sugar. Other items include tea leaves and millet flour. Maize, potatoes, peas and beans are produced in the

farms as they suit the climatic conditions of Chepkorio Division. However, not every farmer produces them all in their farms.

Since the collapse of KCC, however some households (44.7%) have stopped purchasing certain food items while 55.3% have not.

Figure 4.8. Reasons given for the stoppage in purchasing some food items.

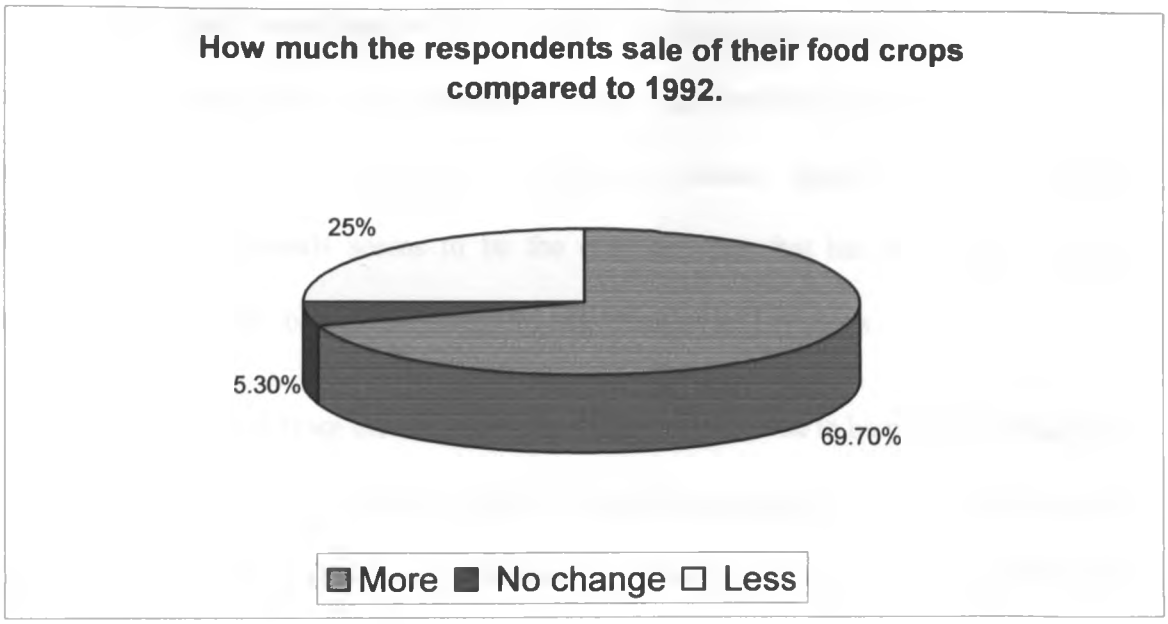


Financial limitation was given as the major reason for not buying certain food items as earlier done by 67.6% of the respondents but for 32.4% of the respondents it is because the households have started producing them in their farms.

When the respondents were asked on how much they sale of their crops now compared to 1992, 69.7% said they now sale more of the food crops. There was no change in the amount of food crops sold for 25% of the respondents while 5.3% sale less of the food crops than in 1992.

These are reflected in Figure 4.9 below.

Figure 4.9. How much the respondents sale of their food crops.



In summary the data presented shows that dairying was rated highly in terms of income earned prior to the collapse of KCC. It is now rated lowly compared to other farm incomes.

The daily needs of the households were afforded courtesy of dairy incomes. This was possible because dairying was an all the year round source of income. However, the collapse of KCC has affected this. From the research undertaken it was found out that dairying is now the last placed source of financing education. Food security has too been compromised because more food is sold to be able to meet the shortfall in incomes.

Dairying like any other farm venture needs inputs. However, the collapse of KCC has led to a drop or no more dairy incomes thus limiting the farmers affordability of prerequisite inputs. Due to this therefore, practices geared towards dairying improvement and intensification like breeding, feeding, management of grazing fields and parasite control have all changed in varying proportions.With such a prevailing situation, production has declined leading to farmer apathy towards dairying. Immunization of animals seems to be the only practice that has not changed much because it is normally being undertaken by the Ministry of Livestock.

It can also be implied from the data presented that there is little to be ploughed back into dairying due to less diry incomes. With this trend dairying cannot sustain itself as was the case initially. This is because the financing of dairying was mostly through the dairy incomes.

It is clear from the research findings that dairy farmers have undertaken more diversification of farming activities mainly through the increase and intensification of arable practices. Some farmers have ventured into new farm enterprises. It was only 3% of the respondents who have not effected any changes.

CHAPTER 5.

5.0. INFERENTIAL ANALYSIS OF DATA.

5.1. Introduction.

This is the process of drawing conclusions about the attributes of the population based on the analysis of the sample data. This chapter is meant to point out to any positive relationships between the changes in the levels of income from dairying and the household welfare, dairying improvement and farm diversification.

The proposed hypotheses are hereby tested and either accepted or rejected based on statistical significance. The chi-square (X^2) is an important extension of hypothesis testing and it will be used to compare the actual, observed distribution with the hypothesized or expected distribution.

5.2. Hypotheses.

The study hypotheses were as follows:

(a) The collapse of KCC has motivated farmers to diversify their farming activities.

(b) The collapse of KCC has affected the household welfare conditions and dairy farming improvement.

The null hypotheses will be respectively as follows:

(a) The collapse of KCC has not motivated farmers to diversify their farming activities.

(b) Both the household welfare conditions and dairy farming improvement have not been affected by the collapse of KCC.

5.3. Relationship between the factors of the study.

In hypothesis 1 the independent variable is the collapse of KCC while the dependent variable is farm diversification. Responses to questions on farm diversification were cross tabulated with the dairy income levels. The chi-square value obtained was 31.9. This was found to be greater than the table value of 5.991 at the 5% level of significance for two degrees of freedom. For this reason we reject the null hypothesis and accept that there is a connection between the levels of dairy incomes and farm diversification.

The second hypothesis comprises two variables. These are the household welfare conditions and dairy farming improvement or intensification. Collapse of KCC is the independent variable. The testing of this hypothesis was done on two levels. First is the effect of collapse of KCC on household welfare conditions and secondly on dairy farming improvement.

Sample data on the effect of the level of dairy incomes on the household welfare conditions were cross tabulated and the chi-square value calculated was 46.2. At the 5% level of significance and for two degrees of freedom the table value of X^2 is 5.991. This is much lower than the calculated value of 46.2 and therefore the null hypothesis is rejected. It can then be concluded that the collapse of KCC has indeed affected the household welfare conditions.

The second dependent variable for the hypothesis was dairy farm improvement. Sampled data on this aspect were cross tabulated with the levels of income. The X^2 value obtained was 88.5. At 5% level of significance for 1 degree of freedom the X^2 is 3.841. This value being lower than the calculated value, the implication is that there is a relationship between the dairy income levels and dairying improvement. It is on the basis of this that we reject the null hypothesis.

Based on the outcomes of the chi-square tests on the hypotheses it can conclusively be stated that the collapse of KCC has affected the household welfare conditions and dairy farming improvement. On a more positive note it has led to a diversification of farming activities.

In seeking for the association between the various variables, the collapse of KCC has been taken to imply reduced dairy incomes or none accruing to the farmers. However, it was noted from the study that there are a number of respondents whose dairy incomes have not changed much, implying that they still earn relatively high incomes despite the collapse of KCC.

Entrepreneurial dairy farmers have sought new markets for their outputs. Some of them deliver their milk to institutions like schools, business enterprises like hotels, those residing in trading centers and to the milk hawkers in Eldoret town. This is the group of dairy farmers whose dairy incomes have remained high and may not have suffered greatly as they are, the farmers who have depended only on deliveries to the milk processors.

CHAPTER 6

6.0 CONCLUSIONS AND RECOMMENDATIONS.

6.1.Conclusion.

The study was intended to study the effects of the collapse of KCC on the smallholder dairy farmers. It affected the levels of income for majority of the farmers and as postulated this was prone to impact on the welfare and farming activities.

Conclusions are made based on the analyzed data and tested hypotheses concerning the various variables of the study.

6.1.1. Intensification.

Intensification or improvement of dairy farming can only be feasible if the venture is rewarding. From the outcomes of the study it can be conclusively stated that the collapse of KCC has impacted negatively on farmers attempts to intensify. Pingali et al (1987) asserts to this when he notes that for a given population density, improved market access caused further intensification of the farming system on a study in Sub Saharan Africa. Input prices have also risen against the background of low dairy incomes further thwarting any efforts by farmers to intensify.

Conclusions based on the several aspects of intensification are discussed below as it relates to the collapse of KCC.

Breeding.

The method of breeding determines the quality of future generation of dairy cows. Artificial insemination is the most appropriate but a proportionate number of farmers now use bulls. Farmers may still use good quality bulls to get exotic or crossbreed heifers but these are susceptible to disease than the zebu breeds. Given the low dairy outputs the farmers prefer to use the low quality bulls to reduce the risks of diseases on their herd. It is easier managing the Zebu cows compared to the exotic or crossbreeds. The collapse of KCC has impacted negatively on adoption of better breeding methods and in the long run the quality of dairy cows in Chepkorio Division may be compromised if the issue of milk marketing is not rectified.

Feeding.

Well-fed animals produce better yields. Questions to respondents indicated that 48.7% had changed the feeding methods. Both inadequate dairy earnings and high fodder prices occasioned this. It is for these reasons that some of the farmers are unable to buy fodder as they used to in the past. Majority of them have opted to grow their own, as it is cheaper than purchasing. However, this is limited by the farmers desire to grow more of other crops for sale and only small portions of the farms are planted with fodder.

In managing the grazing fields some of the farmers could no longer undertake proper fencing and find it extremely hard to take proper maintenance of the existing fences. They attributed this predicament to less income accruing from dairying with which they used to undertake proper paddocking.

Some previous farm-level studies according to ILRI (1997) have shown that adopting cross-bred cows and the associated package of improved feeding and management strategies increases milk production and household income. From the study, field results shows that the farmers no longer have the motivation to improve on feeding systems because of shortage of incomes.

The collapse of KCC has negatively affected the management of grazing fields, feeding methods and use of fodder and other supplementary feeds. This is detrimental to the growth of the dairy industry.

Dipping.

Hand spraying of cattle was found to be the most common method of parasite (tick) control in Chepkorio Division. Majority of the farmers responded to having used this method even before the collapse of KCC because the cattle dips were inefficient and poorly managed. The exotic and the cross breeds are the source of most of the marketed milk. Their susceptibility to tick borne diseases necessitates their frequent dipping.

The frequency of dipping the animals was found to have changed in some households. To them they could not afford to purchase the acaricides on weekly basis as afforded earlier when dairy incomes were guaranteed.

The greatest effect of less dairy income on dipping has been on its frequency. It has not affected much on the change of the dipping method.

6.1.2 Farm diversification.

Excessive specialization according to de Wilde (1967) exposes farmers to risks of market price uncertainty. Market failure is also one of the risks farmers face. It can be concluded from this study that more efforts by the farmers are directed towards arable activities as opposed to dairying. In a way this is a coping mechanism meant to stabilize the incomes. Adopting a more diversified range of agricultural activities enhances the chances of increased farm incomes thus reducing the suffering farmers may go through when markets for certain farm outputs fail.

The collapse of KCC seems to have awakened the majority of the dairy farmers. Farmers in the study area affirmed to grow crops not earlier grown, others have increased the acreage and others still have started new farm ventures. This should be a continuous process to avoid future risks associated with over dependency on one activity.

6.1.3 Household welfare conditions.

The aspects of welfare investigated in the study were food security and education. Importance of dairying on the welfare has been discussed in the previous chapters and from the research findings it was found out that reduced dairy earnings has led to deteriorating household conditions.

In terms of food availability some households (44.7%) have stopped the purchase of some food items because of less dairy incomes. A number of farmers, who have opted to grow some food crops in their farms, do so to minimize the costs incurred in

purchasing the same from the shops. This was also occasioned by the less dairy incomes accruing to the farmers.

On the other hand, farmers sell their food commodities to supplement their low dairy incomes leading to dwindling stock levels. This is a major threat to food security as households may run out of stock before the beginning of the next harvesting season. 69.7% affirmed that they now sale more of their food crops than in 1992. Households, once self sufficient in food may be faced with severe shortages.

Huss-Ashmore (1992) in the study of Coast Province found out that undernourishment is prevalent in children, but better nutritional status was associated with smaller household size, higher incomes and steady income such as wage employment or dairying. The effect of the collapse of KCC and the resulting reduced incomes is a threat to the household welfare conditions. The prevalent high rates of poverty in Kenya make this even worse.

Research findings showed that dairy income was a major source of financing education to 26% of the households in 1992. However, this changed drastically compared to other sources by 2003. The households are still able to finance education of its members through a combination of a variety of sources of income. Even though the negative impact of less dairy earnings has not been felt on education, it is the other family needs that have been reduced to be able to meet the required fees. The obligation to educate its members by the household has been at the expense of other family needs. The impact of less dairy income on education may be felt in the near future if the dairy industry remains in turmoil.

6.2 Recommendations.

The government policy on the dairy sector was to have it more intensified and output increased by facilitating access to appropriate production technologies and inputs. However, the collapse of KCC negated this vision. Liberalization of the sector having been achieved, the priority of the government is to reorganize KCC to be able to respond to the present needs of the dairy industry. The most qualified and experienced personnel should manage the New KCC2000. Its vast distribution of factories and cooling plants requires prudent managers to win back membership of dairy farmers and to be able to compete perfectly well with the new entrants. This should be the beginning to alleviating the problems of the dairy farmers and putting back the giant organization to its feet.

The dairy industry was once a very vibrant sector and it empowered the farmers economically. Apart from reviving KCC the government should give incentives to the new milk processing and marketing companies for them to be able to establish themselves in all milk producing areas. This will provide stiff competition to the participants, which may ultimately benefit the farmers. The government should do this, for example by giving tax concessions to the establishment of factories and cooling plants. It may also assist in giving grants for expansion with the assistance of its development partners.

Production of milk should not be geared only for the local market. Currently a lot of milk goes to waste during the flush periods. The milk processors should be able to absorb excess milk during the high production season by drying it into powder for

reconstitution during the dry spells. There are readily available markets for powder milk in confectionary manufacturing companies and also for export as KCC did before its collapse. In attempt to reach a wider market the milk processors should be able to diversify its range of milk products. By doing so they will be able to take all the milk delivered to them by the farmers and the price will not fluctuate to the detriment of the farmer.

Production costs should be reduced so that the milk processors may have a competitive edge over processors from other countries like Zimbabwe whose products are relatively cheap. In the past, the problem has been that of highly priced products occasioned by high production costs. In attempts to revive the sector the government should assist in alleviating some of the bottlenecks responsible for high production costs.

Farmers are very vulnerable to market failures as evidenced by the collapse of KCC. They should therefore be educated on the need to diversify their farm activities and spread out the risks they are likely to face. Some of the activities have the potential to yield high incomes but may have been neglected. The Ministry of Agriculture should embark on creating awareness among the farmers through various forums.

The local co-operative societies should too diversify their range of services offered to the farmers. This may include the marketing of other farm products and not only milk. They may also provide credit facilities, for example loaning out inputs such as fertilizers, seeds and herbicides. This will help them not only to have an added source of income but will also enhance the farmers ability to diversify, intensify enabling them to earn more from the farm.

Further studies should be done on the informal marketing channels. Apart from creating employment it has been the best option through which farmers market their milk when the formal markets are depressed. Both the informal and the formal markets should be harmonized so that the sector can thrive.

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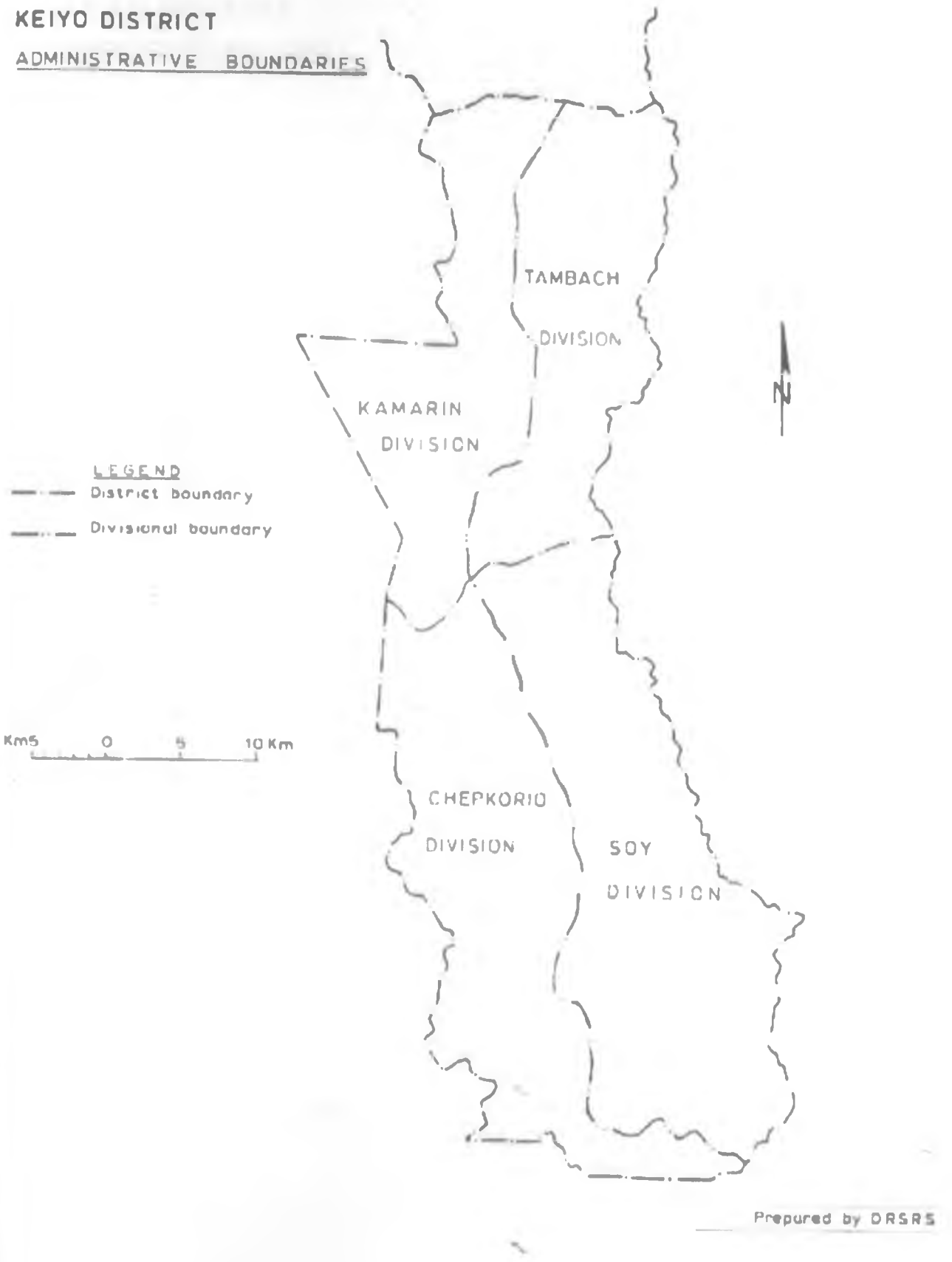
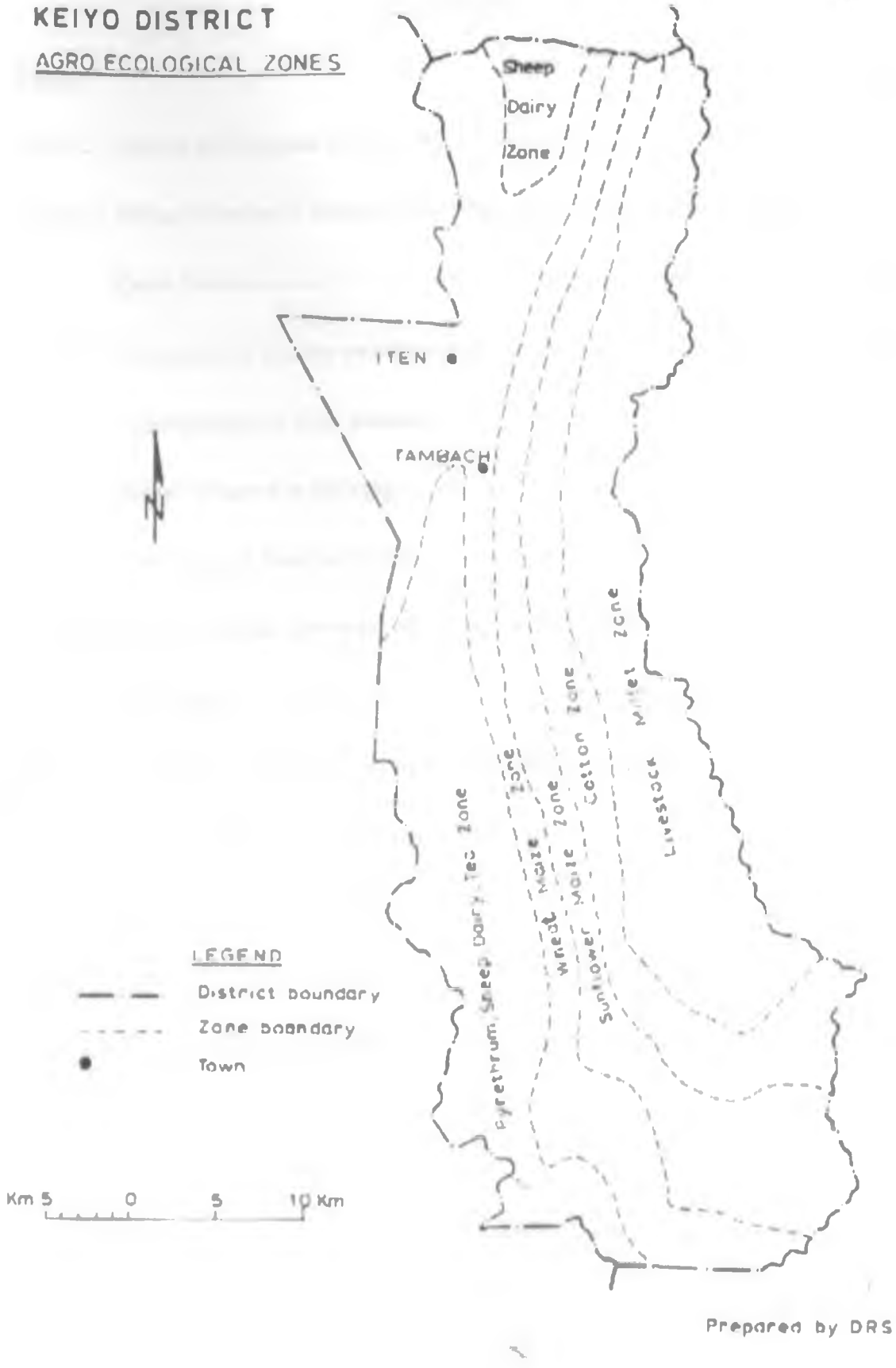
Map 1


KEIYO DISTRICT
ADMINISTRATIVE BOUNDARIES
TAMBACH
DIVISION
KAMARIN
DIVISION
CHEPKORIO
DIVISION
SOY
DIVISION
N
LEGEND
District boundary
Divisional boundary
Kms 0 5 10 Km
Prepared by DRSRS

Map 2


KEIYO DISTRICT
AGRO ECOLOGICAL ZONES
Sheep
Dairy
Zone
ITEN
TAMBACH
N
Pyrethrum Sheep Dairy Tea Zone
Zone
Wheat Maize Zone
Maize Cotton Zone
Sunflower
Millet Zone
Livestock
LEGEND
District boundary
Zone boundary
Town
Km 5 0 5 10 Km
Prepared by DRS

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UNIVERSITY OF NAIROBI

DEPARMENT OF SOCIOLOGY

RESEARCH ON THE IMPACT OF THE COLLAPSE OF KCC ON SMALLHOLDER DAIRY FARMERS IN CHEPKORIO DIVISION.

FARMER INTERVIEW SCHEDULE

PERSONAL CHARACTERISTICS.

1. a) Name _____

   b) Sex: Male ☐ Female ☐

   c) Age _____

   d) Marital status _____

   e) Education _____

   f) Occupation:

      (i) Self _____

      (ii) Spouse(s) _____

   g) Household size _____

2. What are your other sources of income? _____

3. What is the estimated amount of income earned last year (2002)? Ksh._____

4. How many acres of land do you own? _____

ARABLE ACTIVITIES

5. Of the acreage used on cropping indicate acreage and crop planted each year.

	Acreage	Crop	Income
a)	_____	_____	_____
b)	_____	_____	_____
c)	_____	_____	_____
d)	_____	_____	_____
e)	_____	_____	_____

6. Which improvements have you made in your farm in the last 2-5 years? _____

7. In relation to question 6 how do you rate improvement in your farm, if any?

1) Very high 2) High 3) Average 4) Low 5) Very Low

8. How much do you rate diversification of farming activities since the collapse of KCC?

1) Very high 2) High 3) Average 4) Low 5) Very low

DAIRYING

9. In terms of income earned, at what position did/do you rank dairy earnings?

	1992	2003
a) First	☐	☐
b) Second	☐	☐
c) Third	☐	☐
d) Fourth	☐	☐

10. In which activity do you apportion much of the dairy income?

a) Investments on dairying ☐

b) Household immediate expenditures ☐

c) Investment on other farm activities ☐

d) Others (mention) ☐ _____

11. Which of the following livestock do you have and what are their numbers?

a) Cattle

i) Dairy cows ☐

ii) Others ☐

b) Sheep ☐

c) Goats ☐

d) Others (specify) ☐

12. Which inputs do you incur in dairying and what are their respective prices?

a) Dipping ☐ _____

b) Salt ☐ _____

c) Vaccinations ☐ _____

d) Deworming ☐ _____

e) Labour ☐ _____

f) Others (Specify) ☐ _____

_____

13. How did /do you finance dairying activities in the farm?

	1992	2003
a) Loans	☐	☐
b) Own income from dairying	☐	☐
c) Income from other farm activities	☐	☐
d) Others (Specify)	☐	☐

14. How do you agree that the collapse of KCC has affected the financing of dairying activities in the farm?

1) Strongly agree 2) Agree 3) Don't Know 4) Disagree 5) Strongly disagree.

15. a) What milk yield do you get each month in litres? _____

b) What is the approximate income from milk sales? Ksh._____

16. Has the above changed? Yes No

17. If yes, how?

a) Increased

b) Decreased

18. Were you a member of KCC? Yes ☐ No ☐

19. If yes are you still a member? Yes ☐ No ☐

20. If No, why? _____

EDUCATION

21. How many school/college going children do you have? _____

22. What was/is the major source for financing their education?

	1992	2003
a) Dairy income	☐	☐
b) Sale of livestock	☐	☐
c) Crop sales	☐	☐
d) Others (Specify)	☐	☐ _____

23.If the source of financing education is different for the two periods, how do you agree that this is due to less dairy income?

1) Strongly agree 2) Agree 3) Don't Know 4) Disagree 4) Strongly disagree

24. How has the collapse of KCC affected the financing of education?

1) Very highly 2) High 3) Not Affected 4) Little 5) Very little

FOOD SECURITY

25. Which foodstuffs do you buy that are not produced by the household?

a) Maize ☐
b) Beans ☐
c) Wheat flour ☐
d) Rice ☐
e) Sugar ☐
f) Others (Mention) ☐ _____

26. Since the collapse of KCC are there any food commodities you stopped purchasing?

a) Yes ☐

b) No ☐

27. If yes what are the reasons?

a) Financial limitations ☐

b) Production of some by the household ☐

c) Others (Specify) ☐ _____

28. Overall, how much has the collapse of KCC affected your household welfare condition?

1) Very highly 2) Highly 3) Little 4) Very little 5) Not Affected

29. How much do you now sell your food crops compared to 1992?

a) More than 1992 b) No change c) Less than in 1992

DAIRY INTENSIFICATION/ IMPROVEMENT

30. How do you feed your dairy animals?

a) Grazing ☐

b) Fodder ☐

c) Both ☐

d) Others (Mention) ☐

_____

31. If the method of feeding now is different from 1992, what reasons do you give?

a) High fodder prices ☐

b) Inadequate dairy earnings to purchase feeds ☐

c) Others (Mention) ☐ _____

32. How much has the method of feeding changed since the collapse of KCC?

1) Very highly 2) Highly 3) Less 4) Very little 5) Not Changed

33. How do you obtain your fodder?

a) Grow ☐

b) Buy ☐

c) Both ☐

d) Others (mention) ☐ _____

34. Explain if different from 1992 _____

_____

35. How do you manage your grazing fields?

a) Paddocking ☐

b) Free grazing ☐

c) Others (specify) ☐ _____

36. Has the collapse of KCC affected the way you manage it now?

a) Yes ☐

b) No ☐

37. If yes, how? _____

38. How do you breed your dairy cows?

a) Artificial insemination ☐

b) Bulls ☐

c) Others (specify) ☐ _____

39. If the method is different from 1992, what reasons do you give?

a) High cost of initial method ☐

b) Inadequate dairy earnings ☐

c) Others (specify) ☐ _____

40. How do you agree that less dairy income has affected your breeding method?

1) Strongly agree 2) Agree 3) Don't Know 4) Disagree 5) Strongly disagree

41. How did /do you control ticks from your herd?

	1992	2003	
a) Cattle Dip	☐	☐	
b) Spraying at Home	☐	☐	
c) Others (mention)	☐	☐	_____

42. If the methods are different for the two periods, what reasons do you give?

a) Lack of/or drop in dairy income ☐

b) Inefficiency of the initial method ☐

c) High costs of the initial method ☐

d) Others (Mention) ☐ _____

43. How often did /do you dip or spray your animals?

	1992	2003	
a) Once a week	☐	☐	
b) Once in two weeks	☐	☐	
c) Once in a month	☐	☐	
d) Others (Mention)	☐	☐	_____

44.If there is a variation for the two periods, what were the reasons?

a) Increased spraying/dipping costs ☐

b) Lack of enough dairy income to meet the costs ☐

c) Others (specify) ☐ _____

45. How do you rate the effect of collapse of KCC on the management of parasites in your herd?

1) Very highly 2) High 3) Little 4) Very little 5) Not affected

46. How did / do you often immunize your cattle against diseases?

a) 1992 _____

b) 2003 _____

47. Explain any existing changes. _____

_____

48. What has been the greatest effect of the collapse of KCC? _____

_____

_____

_____

_____

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DEPARTMENT OF SOCIOLOGY

RESEARCH ON THE IMPACT OF THE COLLAPSE OF KCC ON SMALLHOLDER DAIRY FARMERS IN CHEPKORIO DIVISION

INTERVIEW SCHEDULE FOR THE KEY INFORMANTS (OFFICIALS OF THE DAIRY CO-OPERATIVE SOCIETIES).

1. a) Name_____

   b) Sex. Male ☐ Female ☐

   c) Age _____

   d) Marital status_____

   e) Occupation _____

2. What services do your co-operative society provide to the members?

   a) Milk transportation ☐

   b) Provision of credit ☐

   c) Retailing of farm inputs ☐

   d) Others (Mention) ☐ _____

3. What was / is the major source of income for the co-operative?

	1992	2003
a) Transportation	☐	☐
b) Interest from credit	☐	☐
c) Retailing in farm inputs	☐	☐
d) Others (Mention)	☐	☐

_____

4. How much did/do you charge the farmer for the milk transport? (Per litre)

a) 1992. _____

b) 2003. _____

5. How many litres did/ do you handle per month on average?

a) 1992 _____

b) 2003 _____

6. If there are any changes what can you attribute them to?

a) Collapse of KCC ☐

b) Drought ☐

c) Competition from other co-operative societies ☐

d) Low milk prices ☐

7. Where did/do you market the milk delivered to you by the farmers?

	1992	2003
a) KCC	☐	☐
b) New milk processors	☐	☐
c) Institutions (schools/hospitals)	☐	☐
d) Others (Mention)	☐	☐

8. If there are any changes, what can they be attributed to?

a) Collapse of KCC ☐

b) Better prices by the new milk processors ☐

c) Better prices by the institutions ☐

d) Others (mention) ☐

9. If you supply milk to the new milk processors, are there any limitations on the quantities supplied by your co-operative society?

a) Yes ☐

b) No ☐

10. If yes what are the limitations? _____

_____

_____

11. How many members do you have? _____

12.Can you explain the difference if any since 1992. _____

_____

13. What major problems do you face as a co-operative society?

a) Inefficient markets ☐

b) Financial ☐

c) Mismanagement ☐

d) Others (mention) ☐ _____

14. Do you have any difficulties in paying farmers their milk deliveries?

a) Yes ☐

b) No ☐

15. If yes what is the major reason?

a) Non payment by the milk processors ☐

b) Delay in payment by the milk processors ☐

c) Mismanagement ☐

d) Others (mention) ☐

16. In your opinion, what has been the impact of the collapse of KCC on smallholder dairy farmers? _____

_____

_____

_____