

MEKELLE UNIVERSITY
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DETERMINANTS, CHALLENGES AND PROSPECTS
OF DAIRY PRODUCTION AND MARKETING IN MEKELLE CITY

By

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Mekelle, Ethiopia

CERTIFICATION

This is to certify that this thesis entitled “Determinants, Challenges and prospects of Dairy production and Marketing in Mekelle City.” submitted in partial fulfillment of the requirements for the award of the degree of Masters in Development Studies to the College of Business and Economics, Mekelle University, through the Department of Management, done by Ms. Nardos Eshetu , Id.No CBE/PR0060/01 is an authentic work carried out by her under my guidance. The matter embodied in this thesis work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

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DECLARATION

I, Nardos Eshetu, here by declare that the research thesis work entitled “Determinants, Challenges and Prospects of Dairy Production and Marketing:” submitted by me for the award of the Degree of Masters of art in Development studies of Mekelle University. It is my original work and it has not been presented for the award of any other Degree, Diploma, Fellowship or other similar titles of any other University or institution.

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Abstract

The study aims at analyzing determinants, challenges and prospects of dairy production and marketing in Mekelle city. The study was conducted in seven purposely selected local administration of Mekelle city: Semen, Hawlti, Hadnet, Kedamay-weyane, Adi-haqi, Ayder and Quhia. Dairy Farmers from each local administration were selected using Proportional Probability to Size (PPS). Data were collected from 200 dairy producing households and cooperative using structured questionnaire, focused group discussion and in depth interview with key informants. Survey data collected from seven local administrations was analyzed by using descriptive and econometric model analysis. The Ordinary least square econometric estimation technique was employed to identify determinants that affect dairy production. The model result showed that dairy production was strongly and significantly affected by use of improved feed, demand for milk, number of cross breed milking cows, frequency of getting training, access for credit, and education of the household heads. Shortage of feed & its high price, access for credit, seasonality of demand particularly in fasting time and absence of processing industry were the major challenges of dairy production and marketing in the area. Milk was the most important dairy products marketed in the areas. Dairy producers, retailers, farms, cooperatives were found to be the main milk market channel of the study areas. The dairy market in the study area uses informal marketing system, which shows the under development of dairy marketing. Thus, dairy development interventions should be aimed at addressing both dairy production technological gaps and marketing problems. The study shows that there is a high demand for dairy products. Therefore, dairy processing industries establishment, support for dairy producers and cooperatives, and improving access to services should receive due attention in order to improve dairy production and marketing in the study area by all dairy development stake holders.

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Acronyms

ANRS	Amhara National regional state
AI	Artificial insemination
BOFED	Bureau of Finance and Economic Development
CSA	Central Statistical Authority
DDE	Dairy Development Enterprise
FAO	Food and Agricultural Organization of the United Nations
GDP	Gross Domestic Product
HHs	Household Heads
ETB	Ethiopian Birr
ILRI	International Livestock research institute
ILCA	International Livestock Research Center for Africa
NGOs	Non-Governmental Organizations
OLS	Ordinary Least Squares
REST	Relief of society of Tigray
SPSS	Statistical Package for Social Science
TDA	Tigray development association
UNDP/RRC	United Nation Development Programme /Relief and Rehabilitation Commission
USD	United State Dollar

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CHAPTER- I

INTRODUCTION

1.1 BACK GROUND

Agriculture dominates the economies of most African countries, providing jobs, income and exports. The sector employs about 60 percent of the population and contributes 20 percent of the continent's export earnings from agricultural activities. A stronger performing agricultural sector is fundamental for Africa's overall economic growth. A constantly growing agricultural sector is crucial for addressing hunger, poverty and inequality. More than 70 percent of the total population and the majority of the extreme poor and undernourished live in rural areas. A healthy agriculture sector means more jobs, more income and more food for the poor (FAO Report on State of Food and Agriculture in Africa, 2003).

Improving agricultural performance generates income in both rural and urban areas. As incomes increase, households save more and spend more, stimulating growth and investment in other sectors. Agriculture provides tax revenues and supplies a wide range of raw materials to agriculturally-based local manufacturers (FAO's report on State of Food and Agriculture in Africa 2003).

In the late 1980s, agriculture in Ethiopia contributed about 45% of national GDP while the live stock sector contributed about 40% of agricultural GDP(18% national GDP) and 30% of agricultural employment, dairy output accounted for about half of live stock sector. (Feleke and Geda, 2001).

Over the last 30 years, national and per capital production and consumption of live stock products decline (Ayele et al., 2003). During 1993-2001, per capita income remains at about USD 100. Live stock production increased by much less than the production increase for the agricultural sector as a whole, so relative share of live stock to agricultural GDP declined. During this period,

per capita live stock output fell by 5% while crop, food and agriculture grew at 14, 7 and 6%, respectively (Halderman, 2004).

Ethiopia holds large potential for dairy development due to its large livestock population; the favorable climate to improve, and the relatively disease free environment for live stock. Given the considerable potential for smallholder income and employment generation from high-value dairy products, development of the dairy industry in Ethiopia can contribute significantly to poverty alleviation and increased employment opportunity in the country. Like other sectors of the economy, the dairy sector in Ethiopia has passed through three phases these include the imperial regime, characterized by almost a free market economic system and the emergence of modern commercial dairying(1960-1974), the socialist Dergue regime that emphasized central economic system and state farms (1994-1991), and the current phase under the structural adjustment program and market liberalization 1991 to present), following the economic and political policy in the country. In the most recent phase, characterized by the transition towards market Oriented economy, the dairy sector appears to be moving towards a takeoff stage.

Mekelle is one of the growing city in the size of population as the other urban city so that the demand for dairy products is increasing. The population census of Mekelle is 215,546 (CSA, 2007). Total number of cattle in Mekelle is 36,516; from this 25,369 are cows and 9,014 are milking cows (Urban Agriculture Development of Mekelle, 2009). Recently there is one dairy processing factory established in 2010 by the union called as zemen milk processing factory. The researcher find through literature most development and research projects in dairy were conducted with in and around Addis Ababa, but not in Mekelle, so that this study fill the gap of the lack of knowledge about dairy sector in the study area.

In Mekelle, dairying is practiced by dairy operators – smallholders, farms and dairy cooperatives, in small amount. There is a government office of urban agriculture development which undertakes the dairy development and other agricultural sector.

1.2 STATEMENT OF THE PROBLEM

Urban populations are growing in many developing countries. According to(FAO, 2004), by the year 2030, the current percentage of urban population will swell from 75% to 83% in Latin America and Caribbean, from 37% to 53% in Asia and Pacific and from 38% to 55% in Africa.

The population growth, urbanization and income growth that fuelled the increase in milk consumption during the last two decades are expected to continue in the future, creating a veritable livestock revolution. This revolution presents new and expanding market opportunities for small holder livestock producers (Delgado et al., 1999).

By the year 2025, the population of Sub-Saharan Africa is projected to reach 1294 million (Winrock, 1992). More daunting, perhaps, is the estimation that half of these people will be living in urban areas. Such increases in urban populations will greatly increase pressures on rural populations to produce more food. Although this increased demand for food represents new market opportunities for smallholder farmers, to meet this demand will require significant increases in the productivity of present farming systems. For most smallholders, this increase in production will only come about through intensification. Livestock production, and in particular, dairying can make a significant contribution to increasing productivity of smallholder farms by taking advantage of under-exploited crop-livestock-soil interactions, increasing household income and food consumption, and generating rural employment.

Countries that are currently enjoying the highest standard of living are those that have a well developed animal agriculture as demand for animal products increases with economic development. In Ethiopian context, despite the huge potential the country has to produce milk, there is a chronic shortage of the product in most part of the country. This arises mainly from insufficient production coupled with inhibitive cultural taboos related to consumption and absence of proper processing and marketing (Zegeye, 2003). Therefore, improving livestock productivity and their respective marketing activities may improve the sector's contribution to the GDP.

There is a large demand supply variance for milk and milk products in Ethiopia indicating the untapped potential for development of dairy production systems in urban and pre-urban like the study area. Market-oriented urban and pre-urban dairy production systems have tremendous potential for development and play a significant role in minimizing the acute shortage of milk and dairy products in urban centers (Azage et al, 2000).

One of the major food requirements in urban areas like Mekkele is milk and milk products. In Ethiopia, dairy production is mainly of subsistent type largely based on indigenous breeds of cattle. Milk production from this system is low to support the demand for the continuously increasing number of population, particularly in urban centers. (Azage and Alemu, 1997).

The major constraints to increasing the welfare of smallholders are their inability to access markets. Enhancing the ability of poor smallholder farmers to reach markets and actively engage in them is one of the most pressing development challenges.

In spite of dairy development potential of positive contributions to the economy, Mekelle dairy sector is not well developed. The growing demand for processed dairy products is not being satisfied with the current production level by smallholder farmers or domestically.

To close the gap between the domestic demand and supply of dairy products, it is imperative to increase domestic production level. Dairy production level could be increase by improving the capacity of smallholder farmers and work on dairy development in general.

While policy makers favorably view development, meaning commercialization, of the dairy sector, it should be understood in the context of the contribution of livestock production to livelihoods and income generation for smallholder farmers through the production of higher-value products compared to most crops.

In particular, the study tries to investigate the major determinants of dairy production, challenges and opportunities in order to satisfy the demand for dairy products by the population. In order to design relevant dairy development strategy in the area, there is a need for smallholder farmers to be aware of the most efficient combination of roughages and concentrates and to assess the existing dairy production. Assessment of existing dairy producers and identifying the challenges and opportunities for the success of the milk enterprises in the area is also crucial.

Moreover, the study tries to investigate dairy product marketing: dairy product channels challenges and opportunity. The study is essential to provide vital and valid information on the operation and efficiency of dairy marketing and production system for effective planning and policy formulation.

This study therefore conducted to contribute in filling the demand and supply gap of dairy products by investigating the dairy production, marketing, and determinants that affecting dairy production in Mekelle city, Ethiopia.

1.3 OBJECTIVES OF THE STUDY

General objective

The general objective of the study is to analyze dairy production and marketing system of Mekelle city dairy producers.

Specific objective

1. To analyze dairy production system: feeding system, animal health care, breeding system and processing system of dairy producers in Mekelle.
2. To analyze marketing channels of dairy products in Mekelle city.
3. To identify the constraints and opportunities of dairy production and marketing.
4. To identify the factors affecting the dairy production in the study area

1.4 RESEARCH QUESTION

- 1 How is the dairy production going in Mekelle city?
- 2 How the marketing channels are organized?
- 3 What are the major constraints and prospects for dairy production and marketing?
- 4 What are the factors affecting dairy production?

1.5 SIGNIFICANCE OF THE STUDY

This study attempted to describe dairy production and marketing and identify determinants of dairy production, major constraints and prospects of dairy production and marketing. Besides, the study identify the factors that affect dairy production significantly which will be an important input for designing appropriate intervention policy and strategies in order to satisfy the demand for dairy products. The study tries to generate valuable information on dairy marketing and production that would assist policymakers in designing appropriate policies for intervention.

Governmental and nongovernmental organizations that are engaged in the development of livestock sub-sector would benefit from the results of this study.

The findings of this study are also believed to be useful to dairy producers, investors and marketing agents to make informed decisions. The work also serves as a reference document for researchers to embark on studies of the same or related kinds in other parts of the country. Therefore, it is hoped that, results from this study would have practical use mainly to this area and similar to other areas and can serve as a base for any further studies to be conducted in other areas in this line of study

1.6 SCOPE AND LIMITATIONS OF THE STUDY

1.6.1 Scope of the Study

The study is restricted to Mekelle city, which is found in Tigray National Regional State of Ethiopia. Mekelle has seven local administrations namely, Semen, Hawlti, Hadnet, Kedamay weyane, Ayder, Adi-Haqi and Quhia. This study conducted on small holder dairy farmers as well as dairy cooperatives and other farms from all local administrations in Mekelle. These areas are involved in dairy production and have potential to supply dairy products to the consumers of the city. The study has focused on this area to describe dairy production and marketing system and to identify factors, challenges and prospects of dairy production and marketing system in Mekelle city.

1.6.2 Limitations of the Study

The distribution of dairy producers are skewed with in the local administration and make the researcher to limit the sample size only 200 as a result of limited time. The researcher is limited only on the actual dairy producers not the potential entrants to dairy production.

This study does not investigate the specific preference for dairy products and the purchasing ability of the consumers concerning to marketing system of dairy products. The study could reflect a great importance if it would study in all parts of Tigray region but due to limited finance and time resource it focused only in Mekelle.

The researcher tries to identify only the major variables that affect dairy production not every factor which possibly affect the dairy production.

1.7. ORGANIZATION OF THE STUDY

The thesis is organized into five chapters. In chapter two, review of theoretical and empirical works related to the study are presented. Chapter three discusses the research methodology used in the study. Results and discussions are presented in chapter four. Chapter five summarizes and concludes on the findings of the study and state recommendation based on the findings.

CHAPTER II

REVIEW OF RELATED LITRATUER

2.1. Milk Production Systems in Ethiopia

In the highland areas, agricultural production system is predominantly smallholder mixed farming, with crop and livestock husbandry typically practiced within same management unit. Among the systems, milk production system is the most biologically efficient system that converts large quantities of roughage, the most abundant feed in the tropics, to milk, the most nutritious food known to man (Belete, 2006).

Milk production systems in Ethiopia may be classified into two broad categories viz: commercial system which produces milk mainly for market and subsistence systems which produce milk mainly to meet household needs for milk products (Azage et al., 2003). The commercial system generally operates in urban and peri-urban areas with or without holdings of land for feed production. Whereas, the rural milk production system is part of the subsistence farming system and includes pastoralists, agro pastoralists, and mixed crop-livestock producers. Specifically, they are classified into four major systems. These are pastoralist, the highland smallholder, urban and peri-urban and intensive milk production systems.

Pastoralist milk production system is a system mainly operating in the rangelands where the peoples involved follow animal-based life styles which requires them to move from place to place seasonally based on feed and water availability. Even though information on both absolute numbers and distribution vary, it is estimated that about 30% of the livestock populations are found in the pastoral areas (Belete, 2006). The pastoralist livestock production system, which supports an estimated 10% of the human population, covers 50- 60% of the total area mostly lying at altitudes ranging from below 1500 m above sea level.

Pastoralism is the major system of milk production in the lowland areas. However, because of the rainfall pattern and related shortage of feed availability, milk production is low and highly seasonal and range condition dependent (Zegeye, 2003; Ketema and Tsehay, 2004). Pastoralists typically rely on milk for food and also use animals to save wealth. This system is not market oriented and most of the milk produced in this system is retained for home consumption. The

level of milk surplus is determined by the demand for milk by the household and its neighbors, the potential to produce milk in terms of herd size, production season, and access to a nearby market (Getachew, 2003). The surplus is mainly processed using traditional technologies and the processed milk products such as butter, ghee, cottage cheese and sour milk are usually marketed through the informal market channel after the households satisfy their needs (Tsehay, 2001).

The highland smallholder milk production is found in the central part of Ethiopia where milking is nearly part of subsistence, smallholder mixed crop and livestock farming (Sintayehu et al. 2008). The smallholder milk production system is dominated by subsistence farming (Belete, 2006 and Asaminew, 2007). In this system, all feed requirement is derived from native pasture and a balance comes from crop residues and stubble grazing. Cattle are the main source of milk even though they are kept primarily as draught power source with very little or no consideration given to improving their milk production capabilities (Zegeye, 2003). About 93% of the total milk production in Ethiopia is produced by the smallholder milk farmers living in the villages and exercising, in most instances, traditional milking (Tsehay, 1998).

Urban and peri-urban milk farming system is concentrated in and around major cities, and towns characterized by a high demand for milk. This system has been developed in response to the fast growing demand for milk and milk products around urban centers (Asaminew, 2007). The system is estimated to consist of 5,167 small, medium and large milk farms, with about 71% of the producers selling milk directly to consumers (Tsehay, 2001).

The peri-urban milk production system includes most of the improved milk stocks (Ahmed et al., 2003). In urban and peri-urban milk production system, the main feed resources are agro-industrial by-products. The total milk production from this system accounts to 34.649 million litres /annum. Of this total, 73% is sold, 10% is left for household consumption, 9.4% goes to calves and 7.6% is processed mainly into butter and ayib (Azage and Alemu, 1998).

The most specialized and high-tech system is intensive milk production system. It is practiced by state sector and very few individuals on commercial basis. These are concentrated in and around Addis Ababa. Urban, peri-urban and intensive systems account 2% of the total milk production of the country (Belete, 2006).

2.1.1. Urban Milk production System

This system is developed in major cities and regional towns, which have a high demand for milk, and they are a largest source of milk producer. A total of about 5167 small-medium and large-scale dairy exist in and around Addis Ababa. Total milk production from these dairy farmers amounts to 34.649 million liters per annum. Of this total 73% is sold, 10 % is left for household consumption, 94% goes to calves and 7.2 % is processed, mainly in to butter and Ayib (cottage cheese) (Azage and Alemu, 1998). Producers deliver milk to consumer or consumers may collect it at the producer's gate. Payment to producers is generally on the monthly bases. The milk marketed in this system is of questionable quality, it is not pasteurized, and there is a possibility of adulteration. Moreover, price is high even when quality is low. No standardize quality control mechanisms or dairy policy exists to safeguard consumers (Tsehay, 2002).

2.1.2. Per-urban Milk production

This system includes smallholder and commercial dairy farmers near Addis Ababa and other regional towns (Ahmed et al., 2003). Most of the improved dairy stock is used for this type of dairy production. Currently small holder farmers' milk marketing units, the DDE (Dairy Development Enterprise), Mama agro-industry, and private dairy farmers in and around Addis Ababa are supplying dairy products to the city market (Tsehay, 2002). Generally, the primary objective of this milk production system is to sale milk as a means of additional cash income (Tsehay and Ketema, 1994).

2.1.3. Crop and livestock integrated production system

According to Janke (1982) the crop and livestock production integrated farming systems can further be divided in to two broad sub-divisions namely: crop-livestock and livestock –crop systems. In the crop/livestock system, cropping is primary and the more important farming activity, while livestock is secondary. In the livestock/crop system, the livestock is the primary activity and cropping takes secondary position in terms of farming importance.

The second production system is available in most of the lowlands of Ethiopia. In the lowlands, livestock are important than cropping due to the rainfall limitation in the area.

Drought has been found to be eliciting at least a temporary reliance on the cultivation by pastoralists until livestock productivity and numbers recover. Under recent condition of restricted resources, farming can persist in a pastoral society because a mixed system has greater proven flexibility and reliance (Jonsen et al., 1989). Opportunistic cultivation is one of the few alternatives that pastoralists have to partially compensate for such a long-term trend.

2.2 Importance of Livestock

Keeping different species of animals can reflect management objectives. Mixed species production increases the likelihood of meeting basic consumption needs particularly in terms of milk in pastoral areas (ILCA, 1990). The first and the most important purpose of dairy cattle production are to provide milk for family use and for sale. In pastoral systems, the major product is milk, and the main function of the livestock is subsistence through social and cultural functions are also important (Jahnke, 1982).

The demand for animal products in sub-Sahara Africa and generally in the developing countries is likely to rise significantly as the result of population growth, urbanization and rising income in the face of relatively low level of consumption at present. Increase the demand for livestock products raises profound implications for food security, poverty alleviation and the environment. By the year 2025 it is projected that the demand for meat and milk will exceed 19 million tons. This level of production requires a 4 % annual rate of increase of livestock productivity compared with the estimate current rate of 2.5 % (Dalgado et al., 1999). In the developing world, by the year, 2020 the demand for livestock products will have a direct and dramatic effect on demand for cereals used as a food (Smith, 2000).

In India, dairying is interwoven with socio-economic fabric of the rural people. Traditionally dairying animals have performed multiple functions of producing milk for household consumption, male animals as a source of draught power in agricultural operations. Besides, dairy animals have often performed an important function of saving bank account with offspring as interest. Animals generate a continuous flow of income and act as a cushion against income shocks arising due to crop failure. Milk is a 'cash crop' for smallholders; converting low value agriculture by products and crop residues and using family labour in to a value added market commodity (Taneja and Birthal, 2005).

2.2.1 Dairy animals as a source of food

A pastoral herd tends to have as many cows as possible to produce milk for human consumption. Cattle and camels are the two important species in the pastoral areas due to their ability to provide more milk to the family consumption, while sheep and goats have fewer acceptances. Most of the pastoralists keep cattle, sheep, goats, and camel principally for milk production as a mainstay of their diet (IPS, 2000). In most of the lowlands in Ethiopia with the exception of very few agro-pastoralists that produce crop through opportunistic farming, almost all of the populations are livestock raisers whose food security is highly associated to their livestock (Beruk and Tafesse, 2000).

Livestock products especially milk can offer unique contribution to human nutrition to the poor in the developing countries by providing micronutrient such as vitamin A, in addition to carbohydrate, protein and calcium. Poor smallholder dairy producer meet trade expensive calories (milk and meat) for the cheap calories (cereals), thereby, improving total food consumption (Alderman, 1987).

2.2.2. Dairy animals as a source of income

The proportional importance of livestock to household income differs from one culture to another and within production system. For instance, mixed crop livestock farmers have opportunities for obtaining income from a variety of sources, thus, income from livestock probably contributes a smaller proportion to their household food. By contrast, most pastoralists depend on livestock for a large proportion of their income although this is changing (Thornton et al., 2002). In the Borana plateau, roughly 40 % of gross revenue is derived from milk and the remainder from live animals and meat. Nearly all of the food and income for pastoralist is ultimately derived from livestock (Coppock, 1994).

In certain occasions in the lowlands when the need arises for the purchase of items, the common practices are to sale animals. For this purpose small ruminants are the immediate income generating animal sources in the herd. Most of the time, the pastoral society who depends on livestock resources, income is used to purchase food grains, clothes and other household items. Other sources of income include sale of animals and products and hiring of drought animals to the highlanders (Beruk and Tefesse, 2000; Jean Pagot, 1992).

Despite the lower absolute volume of dairy sales, income from dairy sale provided 37 % of the annual income of poor pastoral households that are close to market, for the wealthy this was 22 %. The poor with few animals, to sale with out endangering their herd capital, had no variable alternative to sell milk in order to get money. Compared to animal sales, dairy sale permits purchasing of quantities of grain that are more convenient to handle by the household (Coppock, 1994). The Borana pastoralists obtain greater than 80 % of their incomes from livestock sales. Cash from the sale of livestock is the most important means of financing household expenditure. Livestock make an important contribution to most economies (Desta, 1999).

The overall pattern of livestock use during drought suggests that animals were not held for quick disposal or sale during times of stress. Instead, they appear to be assets which are held as long as possible in anticipation that conditions will soon improve. Families are apparently willing to undergo great hardship before they are forced to sell animals. This behavior has large implications for exacerbating drought impacts on the population (Coppock, 1993).

2.2.3. Dairy animals as a social value

The notion that pastoralists have an irrational propensity to expand their holdings of livestock beyond the carrying capacity of the range, resulting for overstocking, is not true. There are wide varieties of economic and non-economic reason for individual owners to attempt to expand their cattle holding which include prestige, bride price, and the like (Sere et al., 1996).

The accumulation of livestock in pastoral areas is also considered as a means of wealth indicator of statues in societal hierarchy. Thus, livestock are used to cover social expenses, including weddings, funerals, human and animal health care etc. weave a web of obligations of dependent relationships, of subordination, which assume the cohesion of families and a social groups and form a hierarchies between different groups (Belachew, 2003; Pagot, 1992). The Borana seek to accumulate animals to promote prestige and protect themselves from perturbations have been long recognized as important elements of pastoral behavior. That the Borana attempt to avoid cattle sale by diversification in to small ruminants and cultivation to help them endure increasing population pressure is another important side effect of their behavior with implications for system transformation.

2.3. Productivity of Milk Cattle in Ethiopia

Average milk production of indigenous cattle per cow is very low. Milk production potential of indigenous cattle such as Boran, Barca, Arsi and Fogera is low and it ranges from 494-809 kg per lactation (Mukasa-Mugerwa, 1989). For instance, average milk production per cow in Western Gojam Zone is about 1 litre per day, resulting in an estimated milk production of 46,710,335 litres per lactation for all lactating cows (CSA, 2005). Total milk production is further affected by relatively short lactation length, and extended postpartum anoestrus period resulting in lower reproductive efficiency (Ibid).

This is basically due to the fact that these animals have been selected primarily for survival and possess well-established adaptive traits to the environment in which they are expected to survive and produce. In general, the reproductive efficiency of a breeding cow is determined by factors like age at first calving, calving interval and number of services per-conception.

2.3.1. Reproductive Performance

The reproductive performance of the breeding female is probably the single most important factor that is a prerequisite for sustainable dairy production system and influencing herd/flock productivity due to, all forms of out put, milk, meat, traction, fuel as well as provision of replacement animals. Reproductive performance is influenced by feed, genetics, diseases and a huge variety of management practices (ILCA, 1990; Perera, 1999).

Reproductive performance is one of the major factors other than milk production that affect productivity and profitability of a dairy herd. Reproductive performance is a biologically crucial phenomenon, which determines the efficiency of animal production. The production of milk and reproductive stock is not possible unless the cow reproduces. It has been indicated that genetic improvement virtually of all traits of economic importance is closely related to reproduction rate (Kiwuwa, 1983). Poor reproductive performance is caused by failure of the cow to become pregnant primarily due to anoestrus (pre- pubertal or post-partum); failure of the cow to maintain the pregnancy; and calf losses (Mukasa-Mugrwa, 1989; Perera, 1999).

This causes delays in age at first calving and long calving interval. Most of the research in Ethiopia is on cattle reproductive performance and there is limited information on camels.

Moreover most of the work done on camels is undertaken in Jijiga and Shinile Zones of Somalia region in Eastern Ethiopia (Zelege, 1998).

2.3.2 Factors Affecting Milk Yield and Composition

Milk composition and production are the interaction of many elements within the cow and her external environments (O'Connor, 1994). High milk yield of satisfactory composition is the most important factor ensuring high economic returns. If the composition of milk varies widely, its implication is that nutritive value and its availability as a raw material will also vary. Chemical composition of milk is variable and influenced by intrinsic factors like breed, species, parity, stage of lactation; external factors like environmental stress, changes in feeding, etc. However, it is generally accepted that the milkman can alter many of these factors to achieve milk production and increase profit. The major factors affecting milk composition are discussed hereunder.

Breeds of milk cattle show obvious differences in their milk composition and yield. Differences among individuals among a breed are often greater than differences within breeds (O'Connor, 1994) such differences are due to partly genetic and partly to environmental factors. For instance, Jersey breed gives milk of higher fat content than Friesian cattle, while Zebu cows can give milk containing up to 7% fat (O' Mahony, 1988). The milk from indigenous cows contains 6.1% fat, 3.3% protein, 4.5% lactose and 0.7% ash (Alganesh, 2002).

Nutrition has also major effect on milk composition. According to O'Connor (1993), underfeeding reduces the amount milk production, the fat and solids-not-fat (SNF) contents of milk produced. As a general rule, any ration that increases milk production usually reduces the fat percentage of milk. It is also believed that the fat content is influenced more by roughage (fibre) intake and the SNF content can fall if the cow is fed a low energy diet, but it is not greatly influenced by protein deficiency, unless the deficiency is acute (O'Connor, 1994).

2.3.3 Constraints in Milk Production

The traditional smallholder dairy system makes up the largest characterized mode of milk production, and uses low input feeding and management requirement and the indigenous genotypes (Jabbar et al., 1997). The characteristics of the improved dairy production system vary

substantially in terms of intensification, management systems; genotype used, type and method of marketing and processing of milk and dairy products.

The major technical constraints in this sector include poor animal health, improper feed and nutrition, and poor breeding stock. However, the Government has aggressively targeted these issues in recent years. In addition, the Government has created an extensive network of animal clinics with heavily subsidized services to help address these problems. Research into feed and nutrition technology has been prioritized as has the increased use of productive breeds. Although problems still exist, recent improvements are noticeable (Bryant Cannon 2009).

2.3.3.1 Shortage of feed

Availability, quality and quantity of feed vary among various production systems. Cattle largely depend on rangeland grazing or crop residues that are of poor nutritive value. Feed is not uniformly supplied and the quality is poor (Ibrahim and Ololaku, 2000). Natural pasture, browse and bushes accounts to the major food sources of livestock owned by pastoralists. Seasonal fluctuation in the availability and quality of feed has been a common phenomenon, inflicting serious changes in livestock production (Alemayehu, 1998). The feed shortage mostly happens in dry season of the year (Ibrahim and Ololaku, 2000). In contrast, under normal circumstances in lowlands when there is sufficient feed for cow, milk tends to be adequate for home consumption as well as for market (Beruk and Tafesse, 2000).

Constraints facing production in the Mekelle area include a lack of preferred crop types grown locally. Waste products from oilseeds are the preferred ingredients for feed concentrates and these crops are primarily grown in western Tigray. Limited exposure feed concentrate production technology also presents a minor barrier (Bryant Cannon 2009).

Locally owned and operated animal feed processing: Currently, several community associations in Tigray are using traditional feeding practices that collect dried chaff waste after the harvest. The eventual goal for several of these associations to develop processed feed using animal and plant waste materials. However, even a modestly-sized plant can cost up to US\$ 500,000 and obtaining financing for such a project could be very challenging because of collateral requirements. It's important to note, however, that business models that incorporate cooperatives

or community associations are given preference for land and technical assistance by the Government.

2.3.3.2 Shortage of water

Since rainfall rather than livestock density determines net primary production and vegetation cover, its variability is the most important climatic factors determining the state of the natural resources base. Hence, rainfall variability and net primarily productivity of the vegetation correspondingly determines livestock production (Sere et al., 1996).

Ruminates require water to maintain the water content of the body, and water availability affects voluntary feed intake; less water leads to inadequate intake of dry matter. For animals kept under pastoral production system, the frequency of watering is very important. During the dry season water is available only from wells and some lakes and streams (Ibrahim and Olaloku, 2002). This leads to over grazing around watering points. Water intake increases as watering frequency is decreased and feed conversions efficiency becomes lower as watering interval increase (Ibrahim and Olaloku, 2002).

One unusual feature of the Borana is the high degree of water restriction of cattle during the dry seasons such that animals may be watered once every three, two, or four days (Coppock,1994). This practice is permitted probably, in part, by the relatively cool ambient temperatures, which help cattle conserve body water otherwise used for thermo-regulation.

Restricted watering is a long-held practice by the Borana that has positive attributes in terms of saving human labour, extending grazing radii from water points and increasing water-use efficiency (Coppock, 1994).

2.3.3.3 Animal health care

Animal health care and improved health management is also one of the major constraints of dairy development in Ethiopia, which caused poor performance across the production system.

Many of the problems result from the interaction among the technical and non-technical constraints themselves. For instance, poorly fed animals have low disease resistance, fertility problems, partly because the animal health care system relies heavily on veterinary measures.

Animal health inhibits dairy development in Ethiopia because poorly fed animals develop low disease resistance and fertility problems. The lack of veterinary services makes these problems difficult to address.

Moreover, poor grazing management systems continue to cause high mortality and morbidity (e.g. internal parasites), many of the diseases constraints which effect supply are also a consequence of the non-technical constraints, for example, insufficient money to purchase drugs or vaccines (Ibrahim and Olaloku, 2002).

Contact of livestock brought from varies localities through the use of communal pastures and watering as well as marketing places play an important role in the transmission of economically significant infectious and parasite diseases. Such livestock movements could be the cause of direct or indirect transmission of varies economically important livestock diseases (Zinash, 2004). The low veterinary service performance in the lowlands is the outcome of the government-monopolized services. Government veterinary staffs are few in number and can not cover such a vast area to adequately address the veterinary needs of livestock keepers. Besides government staffs need adequate mobile facilities, for which currently the government does not have the capacity to provide (Tafesse, 2001).

2.3.3.4 Lack of productive breeds

The livestock genetic resources of Ethiopia's have involved largely as a result of natural selection influenced by environmental factors. This has made the stock better conditioned to withstand feed and water shortages, diseases challenges and harsh climates. But the capacity for the high level of production has remained low (IPS, 2000).

The consequence of the low genetic potential of indigenous breed for productive traits makes total national milk production to be low (Mukasa-Mugerwa, 1989). The indigenous Zebu breed produces about 400-680 kg of milk/cow per lactation compared to grade animals that have the potential to produce 1120-2500 liters over 279 day lactation. In most of the highlands of Ethiopia, milk production per head is low as compared to the highlands of Kenya due to the wide adoption of upgrading the indigenous breeds through cross breeding (Perera,1999).

Ethiopia's livestock has evolved in a challenging environment, and much of the stock has become better conditioned to withstand feed and water shortages, disease, and harsh climates. However, these factors also limit dairy production (Bryant Cannon 2009).

2.4. Milk Marketing Systems in Ethiopia

2.4.1. Milk Marketing

Market refers to a set of buyers and sellers who interact and influence price. However, the existence of the market by itself does not ensure an exchange to take place. There should be a channel. In pastoral area milk production is seasonal while consumption is throughout the season (IPS, 2000). Moreover, there is no preservation and processing techniques, and physical infrastructure, like roads and market facilities are limited (Ketema and Tsehay 1995; Jabbar et al., 1997). However, where there is access to market, dairying is preferred to meat production since it makes more efficient use of feed resources and provides regular income to the producer (De Leeuw, 1999).

2.4.2. Basic concepts

Marketing channel: Formally, a marketing channel is a business structure of interdependent organizations that reach from the point of product origin to the consumer with the purpose of moving products to their final consumption destination (Kotler et al., 2003). This channel may be short or long depending on kind and quality of the product marketed, available marketing services, and prevailing social and physical environment (Islam et al., 2001).

A marketing chain: Defines the flow of commodities from producers to consumers that brings into place economic agents who perform complementary functions with the aim of satisfying both producers and consumers (Islam et al., 2001). A marketing chain may link both formal and informal market agents. A marketing chain may connect one or more milk or dairy sheds.

Milk shed: Is an area where milk production is a major activity. Milk shed may serve one or more consumption centers or cities. In addition, a consumption center may be served by more than one milk shed. For example, in Addis Ababa, raw milk comes from the Addis Ababa milk shed

comprising about 100 km radius around Addis, but butter in Addis market comes from several milk sheds located up to 600 km away (Tsehay, 2001).

Marketable and Marketed Surplus: Marketable surplus is the quantity of the produce left out after meeting the farmers' consumption and utilization requirements for kind payments and other obligations such as gifts, donation, charity, etc. Thus, marketable surplus shows the quantity left out for sale in the market. The marketed surplus shows the quantity actually sold after accounting for losses and retention by the farmers, if any and adding the previous stock left out for sale. Thus, marketed surplus may be equal to marketable surplus, it may be less if the entire marketable surplus is not sold out and the farmers retain some stock and if losses are incurred at the farm or during transit (Thakur et al., 1997).

The importance of marketed and marketable surplus has greatly increased owing to the recent changes in agricultural technology as well as social pattern. In order to maintain the balance between demand for and supply of agricultural commodities with rapid increase in demand due to higher growth in population, urbanization, industrialization and over all economic development, accurate knowledge on marketed/marketable surplus is essential in the process of proper planning for the procurement, distribution, export and import of agricultural products (Malik et al., 1993).

According to Winrock (1989), marketing includes all activities performed in moving commodities from the producer to the consumer. It also includes all the exchange activities of buying and selling; all the physical activities performed to give the commodity increased utility; and all the auxiliary activities such as financing, risk bearing and disseminating information to participants in the marketing process. It involves the transfer of ownership of products through buying, selling, pricing, and renting and physical movement as well as transformation of the commodity into more usable forms through transportation, handling, storage, processing and packaging. Therefore, marketing involves sales, locations, sellers, buyers and transactions (Sintayehu et al, 2008). A marketing system includes all activities involved in the flow of goods from the point of initial production to the ultimate consumer. It involves processing raw materials into final products and then distributing them to the consumer (Winrock, 1989).

2.4.3 Formal versus informal milk marketing systems

Milk marketing is an incentive for farmers to improve production. It stimulates production, raise milk farmers' income and living standards and create employment in rural areas (Asaminew, 2007). Provision of improved and sustainable milk marketing arrangements in villages is therefore important in the aspiration for advancement of the sector. The Ethiopian milk marketing system is not well developed. This can be reflected from the fact that only 5% of milk produced in rural areas is marketed as liquid milk. This has resulted in difficulties of marketing of fresh milk where infrastructure especially transportation facilities are extremely limited and market channels have not been developed. In the absence of an organized rural fresh milk market, marketing in any volume is restricted to the urban and peri-urban areas (Getachew, 2003).

Mohamed et al. (2004) reported that milk products in Ethiopia are channeled to consumers through both formal and informal milk marketing systems. The informal market involves direct delivery of fresh milk by producers to consumers in the immediate neighborhood and sale to itinerant traders or individuals in nearby towns (Debrah and Berhanu, 1991). In the informal market, milk may pass from producers to consumers directly or it may pass through two or more market agents. The informal system is characterized by no licensing requirement to operate, low cost of operations, high producer price compared to formal market and no regulation of operations. The term 'informal' is often used to describe marketing systems in which governments do not intervene substantially in marketing.

In Ethiopia, fresh milk sales by smallholder farmers are important only when they are close to formal milk marketing facilities such as government enterprises or dairy cooperatives (Holloway et al., 2000). Farmers far from such formal marketing outlets instead prefer to produce other milk products such as cooking butter and cottage cheese. In fact, the vast majority of milk produced outside urban centers in Ethiopia is processed into products by the farm household and sold to traders or other households in local markets (Ibid).

2.4.4. Dairy marketing channels and outlets

Marketing channels are routes through which products pass as they are moved from the farm to the consumer (Winrock, 1989). In any marketing system, various actors participate in marketing of commodities and process of transactions made. These include itinerate /mobile traders, semi-

whole sellers, retailers, cooperatives and consumers. Itinerate/mobile traders purchase commodities from nearby market points and sell at business site or residences. Whereas, retailers are market intermediaries such as supper markets, small and large –scale retailers who perform the function of retailing. Semi-whole sellers are important commodity market intermediaries who perform the function of both retailing and whole selling depending on the market conditions. Cooperatives are common form of collective group of producers. They are milk outlets that are potential catalysts in markets by providing bulking and bargaining services, increase outlet market access and help farmers avoid the hazards of being encumbered with a perishable product with no rural demand. In short, participatory cooperatives are very helpful in overcoming access barriers to assets, information, services, and indeed, to the markets within which smallholders wish to produce high value items (Holloway et al., 2000). Cooperative marketing is based on the premise that a group of producers can achieve better results by combining their efforts and resources than operating separately. The final/destination link in any commodity marketing chain is consumer.

Terms related to marketing outlets, marketing channels, and marketing chains are important to describe milk marketing systems (Sintayehu et al, 2008). Marketing outlet is the final market place to deliver the milk product, where it may pass through various channels. A network (combination) of market channels gives rise to the market chain.

2.4.5. Demand for milk and milk products in Ethiopia

According to Mohamed et al. (2004), the milk sector in Ethiopia is expected to continue growing over the next one to two decades given the large potential for milk development in the country, the expected growth in income, increased urbanization, and improved policy environment. Human population in Ethiopia is estimated to grow at 2.9% per year, while the urban population increases at a rate of 4.4%. Therefore, increase in population growth and consumer income in the future is expected to increase liquid milk consumption.

A report by ILCA (1993) showed that if demand for fluid milk alone is to be met, production should grow by 4% until the year 2025. This increasing demand for milk and milk products offers great opportunity and potential for the smallholder milk producer and for the development of milk production and processing industry in the country. Under current situation, the milk

production level in the country is not sufficient to meet the existing demand of the rapidly growing population. It can be said that the production of milk does not keep pace with the growing population and the per capita consumption of milk over the years is declining in Ethiopia (Ketema and Tsehay, 2004). Therefore, the potential of small scale milk farmers and organizations in meeting current and future consumer needs is recognized as vital to the development of milking in Ethiopia.

The milk industry needs to be optimized through organizing milk production, processing, preservation and marketing in a well coordinated way to increase the quantity and quality of milk and milk products being offered to consumers (Getachew and Gashaw, 2001). With the increasing demand for diverse and quality animal products, prices are bound to escalate unless production increases proportionally. Bridging the wide gap between demand-supply calls for the designing of appropriate and sustainable milk development strategies based on the specific agro- ecology and felt needs of smallholder farmers.

2.4.6 Consumption and Utilization of Milk Products in Ethiopia

Milk and milk products form part of the diet of many Ethiopians. They consume milk products either fresh or fermented or soured form. Getachew and Gashaw (2001) estimated that 68% of the total milk produced is used for human consumption in the form of fresh milk, butter, cheese and yoghurt. The balance is given to calves and/or wasted in the process. The consumption of milk and milk products varies geographically between the highlands and the lowlands and the level of urbanization (Ahmed et al., 2004). In the lowlands, all segments of the population consume milk products, while in the highlands major consumers primarily include children and some vulnerable groups of women. In general, various literatures indicated that the per capita consumption of milk in the country and even in ANRS is very low. The per capita milk consumption in Ethiopia is 18.9 kg per year, which is considerably lower than the average of 29.5 kg per year for sub-Saharan Africa (FAO, 2001). Milk and milk products have other additional functions besides their nutritional value.

Fresh whole milk and butter are considered to neutralize toxins. Women anoint their head with butter which is assumed to have dual functions as hairdressing and to cure headaches (Zelalem and Ledin, 2001).

2.5 Market constraints

Enhancing the development of smallholder farmers to reach markets and engage them in marketing activities poses a pressing development challenge. Difficulty in market access restricts opportunities for income generation. Remoteness results in reduced farm gate prices increased input costs and lower returns to labor and capital. This in turn, reduces incentives to participate in economic transaction and results in subsistent rather than market oriented production systems (Ahmed et al., 2003).

In Ethiopia milk marketing system is not well developed (Ahmed et al., 2003) especially, market access in pastoral production system is a critical factor (Tsehay, 2002). This has resulted in difficulties of marketing fresh milk where infrastructures are extremely limited and market channel has not been developed. In the absence of organization rural fresh milk market, marketing in any volume is restricted to peri-urban areas. Milk being perishable and demand being high for urban consumption, efficiency in collection and transportation of this bulk from widely scattered rural sources, requires a well-defined method of preservation and distribution. This would impact on the amount that would be available for consumption through losses in quality (Ahmed et al., 2003).

Dairy product marketing is limited by the distance of the market from producers, lack of transport facility, and seasonal variation in the volume of milk production which leads to seasonal fluctuation in prices. The scattered nature of the production units, the poor communication system, the low rate of urbanization and its concomitant low infrastructure to road facilities may also not warrant the establishment of processing plants (IPS, 2000).

A pastoral community depends mainly on milk and milk products for its survival and therefore, these items are not perceived to be for commercial purposes. Thus it's only the households who are in a walking distance from the urban centers who sell milk and milk products to urban consumers (IPS, 2000). In few cases, however, small assemblers go to water points and buy directly from the pastoralist and sell to the next urban areas. They use donkey as a means of transport to carry milk from the water points to the urban center. In general, in pastoral and agro-pastoral area of Somalia region, milk is the main diet to households and also it is affected by season of the year, and even during the rainy season this production system is affected by the absence of transport facilities to markets (IPS, 2000).

- Limited temperature-controlled supply chain (cold chain).
- Limited packaging choices (imported packaging is very expensive).
- Limited consumer buying power.
- Inadequate distribution systems.
- Religious holidays (such as Orthodox Christian fasting days) during which milk consumption is prohibited (although the effect is uncertain due to partial observance of fasting periods) (Bryant Cannon 2009).

2.6 Opportunities

2.6.1. Spectral selection criteria and analysis

The main opportunities for investment in Mekelle and the surrounding districts include livestock (and related industries), apiculture, agro-processing (including vegetables and oilseeds), high value/low volume agricultural niche products, tourism (in particular, hotels and other support services), and manufacturing and mining. It is important to note that the specific opportunities described below are meant to be illustrative and these are by no means the only opportunities for investment in Mekelle. (Tigray, Ethiopia: Tigray Investment Office, 2008).

2.6.2 Livestock

The livestock population of Ethiopia is the largest in Africa and the 10th largest in the world. According to a 2008 survey, the country possesses 47.5 million cattle, 47.8 million sheep and goats, 8.7 million pack animals, and 39.6 million poultry. Reports indicate that these numbers are increasing, and the livestock sector currently accounts for about 30 percent of the agricultural GDP and about 16 percent of the total GDP of Ethiopia. This sector is primarily driven by the hide and skin industry, but livestock is also a major source of food, with an annual per capita production of 24 liters of milk, 10 kg of meat, and 40 eggs.

Currently, Tigray is estimated to have nearly 4 million cattle, 2 million sheep, and 2 million goats, accounting for 11 percent of the country's total livestock population. Although livestock populations are large, farmers in the region use traditional animal husbandry methods and, as a

result, there are significant opportunities to increase efficiency and facilitate sector growth. Numerous investment opportunities exist to introduce commercial practices in livestock breeding, meat and leather production, and milk, egg, and animal feed processing.

Livestock and livestock products are Ethiopia's fifth most valuable export and accounted for US\$ 66 million in earnings during 2007.³² Annual production of livestock products includes 288,000 tons of meat, 938,000 tons of milk, and 16.7 million hides and skins. The sector nevertheless remains underdeveloped and the Ethiopian Government and African Development Bank have partnered to devise a 20-year livestock development plan to be introduced in 2009 (Bryant Cannon 2009).

2.6.3 Milk products

Processed milk goods present a lucrative opportunity for a value-added product. A 2008 government-sponsored agricultural survey indicated that milk production was about 3.22 billion liters in 2008 with an average price of \$ 0.50 per liter. Milk is widely consumed in Ethiopia, but is commercially unavailable in most stores outside Addis Ababa. Dried milk powder and fresh milk purchased locally from households with surplus production fills some of the supply gap. Demand, however, remains high due to the prominence of milk and dairy products in the local cuisine. Unfortunately, dairy production remains underdeveloped despite large livestock populations. Butter and cheese are consumed more commonly in Ethiopia than in other East African countries. Traditional butter is used for cooking and as a condiment, and traditional cheese is used during most meals. The high price and limited availability of milk are the major factors restricting greater usage in Ethiopia.

Potential intervention points include:

- Improve dairy products through cross-breeding cows and providing complementary feed to ensure higher quality products.
- Support raw milk producers (including small farmers) with training and organizational skills.
- Introduce milk collection centers with appropriate storage facilities to increase milk supply and reduce price fluctuation.
- Improve the packaging technology and quality of the finished product.

- Market/brand yogurt and cheese products based on local tastes.

2.6.4 Dairy investments

2.6.4.1 Millennium Villages Dairy

The Millennium Villages Project (MVP) is exploring dairy collection as an area for increased commercialization, in order to build stronger linkages with urban markets. Currently, the Koraro village cluster in Tigray State has a dairy production center that utilizes cows from 50 farmers. This center will soon begin production of cheese and cream products as well. As production expanded in 2008, the MVP formulated its regional production and distribution system to maximize its market share. In addition, the Food and Agriculture Organization (FAO) maintains a number of milk collection centers near Mekelle and there are plans to establish several large-scale production centers in the city itself. The Relief Society of Tigray (REST), a leading regional NGO, has made efforts to establish a share company to manage rural production and ensure fair trade practices (Bryant Cannon 2009).

2.6.4.2 Investment story: Land O'Lakes Dairy

Land O'Lakes is operating a non-profit campaign against hunger partially funded by the United States Agency for International Development (USAID). The NGO has a presence in 32 countries, including 11 in Africa. The NGO organizes the region into "milk sheds" in order to evaluate its dairy potential, including three in Ethiopia in Mekelle-Adigrat, Lake Tana (near Bahir Dar) and Addis Ababa. In the Mekelle milk shed, Land O'Lakes has helped establish 20 cooperatives. The cooperatives jointly own 60 percent of the 4,500 crossbred dairy cows in the Mekelle milk shed. Land O'Lakes also operates a processing center with a capacity of 5,000 liters per day and is actively securing long-term contracts with restaurants and cafés. The center began operations in August 2008 and employs a staff of 15. Sources: Interview with Millennium Villages Project Business Development Coordinator, (May 28, 2008).

2.6.5. Animal feeds prospect

Modern livestock and poultry production requires concentrated feedstuffs in order to increase the value chain and ensure high dairy and meat output. Several medium and large concentrated feed producers are currently beginning production in Tigray in 2009.

At present there is very little concentrated feed supply in the country. Since meat is sold primarily to Middle Eastern markets, it must adhere to Islamic dietary law, thus preventing the use of animal-based animal feeds.

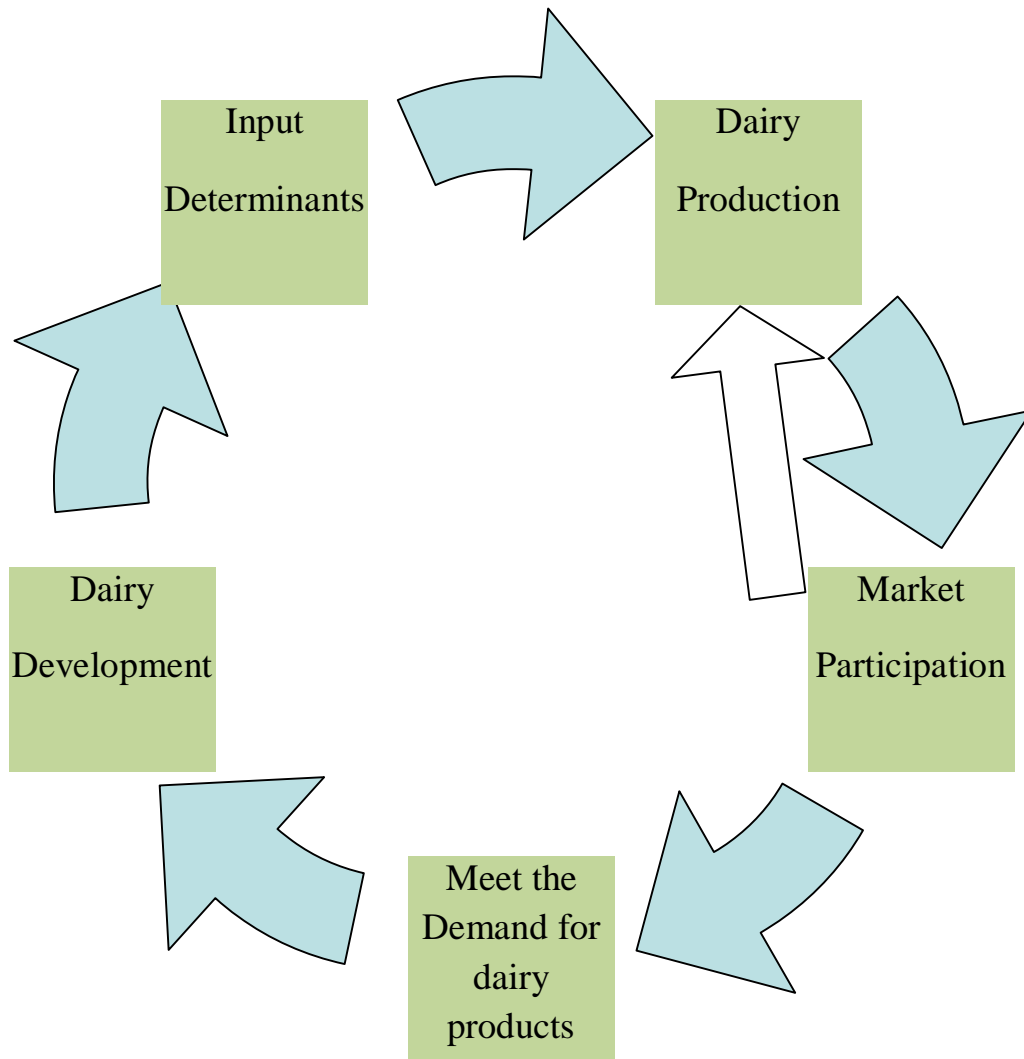
Since the major ingredients in concentrated feed come from locally available materials, this represents a prime investment opportunity. However, it must be noted that the lack of concentrated feed in Ethiopia is the primary factor limiting the viability of large-scale dairy and poultry production.

Animal feed processing: The Abergelle feed factory was expected to be completed in 2008. It will produce finished concentrated feed, composed of oil cakes, molasses, urea, salt, vitamins and minerals. The feed will be available in pellet form and powder. This factory will function as a sister company to Abergelle Slaughterhouse, but it will also sell to the general market and likely have a strong impact on the livestock industry in Tigray and throughout Ethiopia.

2.7 Conceptual Framework

The study assumed that input determinants have an influence on the dairy production, and dairy production has an influence on the marketing participation, then if there is good market participation in formal or informal marketing system, the current demand for dairy products can be satisfied and these leads to dairy development and market participation are interwoven each other. production and market The determinants (independent variables) in the conceptual frame work were selected after extensive literature review which depicted that out of many other factors that affect dairy production these were the most important and relevant ones in the study. The frame work assumes that dairy production is a net result of the positive and negative effects exerted by all the explanatory variables on the dependent variable (Dairy production). Econometrics method used in order to regress the variables and to measure the significance level (See fig 1).

Fig 1 Diagram on conceptual frame work



CHAPTER III

RESEARCH METHEDODOLOGY

3.1 Description of the study area

Mekelle is one of the ancient cities of Ethiopia. Its historical development is based on oral tradition. According to this oral tradition, the formation of the city of Mekelle goes as far back as to the medieval periods. However, there are different versions of these accounts of the past that are transmitted orally from generation to generation.

Mekelle is located between 13^o 32' north latitude and 39^o 28' and east longitude and elevation between 2000 to 2270 meters above sea level. Mekelle, a rapidly developing city in northern Ethiopia, is located about 780 km from the capital, Addis Ababa, Established nearly 150 years ago by Emperor Yohanne 4th. It is located in the northern high lands of Ethiopia, covering an area of 3500 hectares.

It is important to note that Mekelle is the primary economic hub in the Tigray region. Within a 100 km radius of the city, there are rich and fertile farmlands to the south, significant mineral deposits to the east and west, and over one hundred rock-hewn churches throughout the region that serve as important tourist destinations. Mekelle is also home to a number of top universities, including Mekelle University and the Mekelle Institute of Technology. The Mekelle markets are reputed to be the largest vendors of livestock and salt in Ethiopia. The city's international airport, completed in 2003, provides daily flights to Addis Ababa and other Ethiopian cities. Its international cargo service is due to expand in the near future, now that the airport has received its international certification in 2008.

The region is known for its superior quality of its leather, produced from local sheep and goats. It has played a robust role in livestock-related industries, on which investors are eager to capitalize. Additionally, numerous readily available source materials have enabled the rapid growth of the city's industrial sector, which includes the largest cement plant in Ethiopia. Mekelle is now building what will become one of the country's largest metal re-processors, a project due to be completed in 2009.

In recent years, Mekelle has experienced increased agricultural production due to improved farming techniques and a transition from subsistence to cash crop farming. This growth has improved agro-processing opportunities for fruits and vegetables. The region is also a notable producer of high quality honey, and high value/low volume items such as spices, natural gum, and color additives. In addition, Mekelle maintains a reserve area for floriculture that should help attract greater investment into the city. Mekelle, a vibrant and confident community, is located in the geographical center of the regional state of Tigray (Bryant canon,2009).

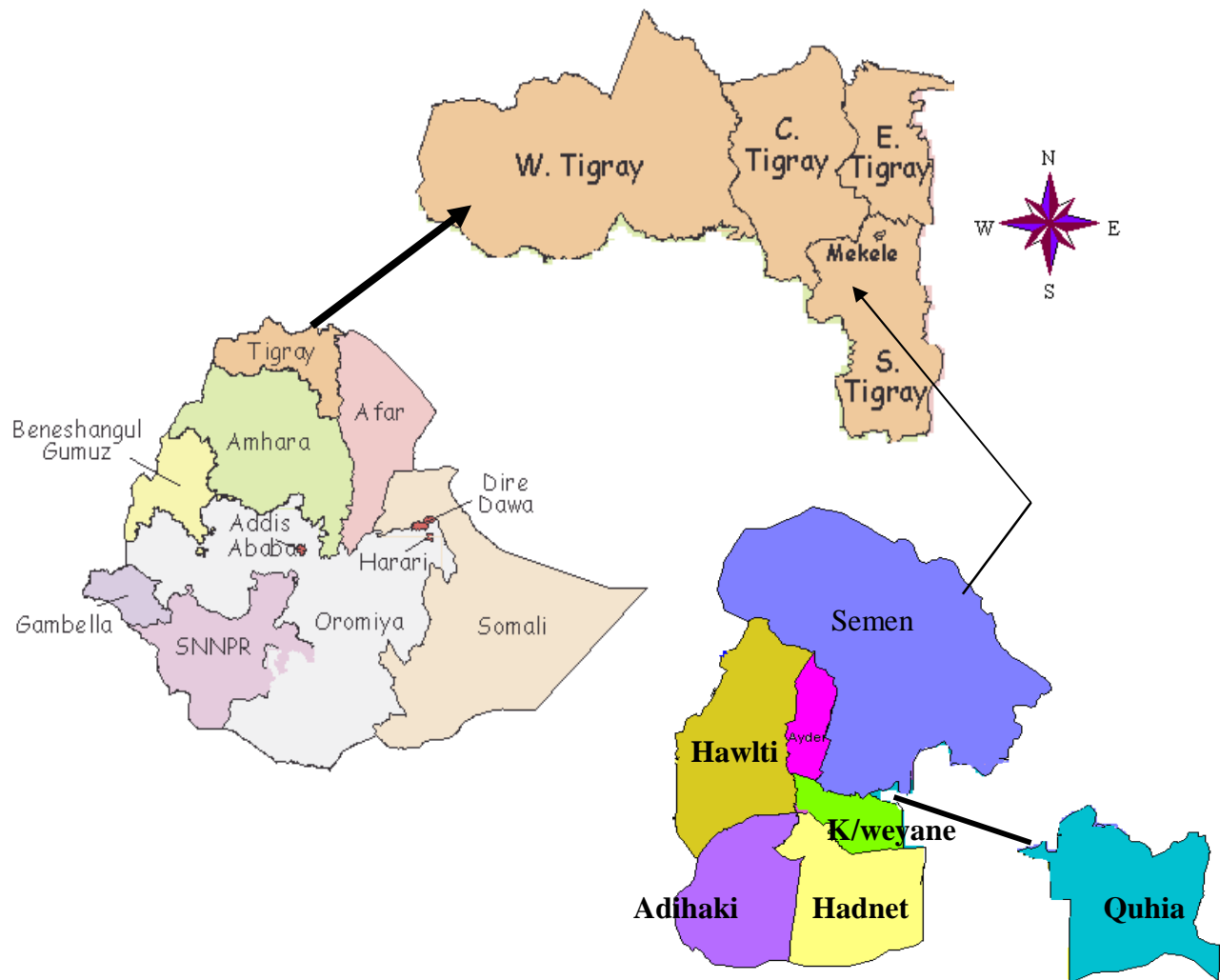
With a population of 215,546,2 Mekelle is one of Ethiopia’s largest cities and among the closest to the ports of Djibouti, which are used for nearly all of Ethiopia’s import and export trade on the Red Sea (Addis Ababa: Central Statistical Agency, 2008). There are numerous opportunities for investment in and around Mekelle. One area of particular interest is agriculture and agro-processing. The region is known for its livestock and honey, and a wide variety of fruits and vegetables. Livestock-based agro-processing can provide a myriad of opportunities for investors in the dairy, meat and leather industries. Total number of cattle in Mekelle is 36,516; from this 25,369 are female cows and 9,014 are milking cows (Table 1). Mekelle divided in seven local administrations namely Adi-haki, semen, kedamy- weyane, Hadnet, Quia, Hawelti, and Aider.

Table 1 population of cattle and estimated annual milk yield in Mekelle

Types of breed	Total population	N ⁰ of female cattle	N ⁰ of milking cows	Daily average milk yield	Estimated annual milk yield/litre
Raya	1,696	1,068	352	2Lit/day	126,813
Begait	136	85	28	5Lit/day	29,659
Arado	21,566	19,771	5275	1.75Lit/day	2,053,248
Cross breed	13,118	10,419	3,359	8.5Lit/day	7,278,540
Total	36,516	25,369	9,014	—	9,488,260

Source, Urban agriculture development bureau (2008)

Fig 2: Geographical location for Mekelle, Tigray



Source: Tigray BoFED, GIS Department (Adopted from Tsega.G, 2009)

3.2 Sampling Technique

3.2.1 Dairy Production and Marketing Systems Survey

To assess the milk production and marketing of the study area, preliminary visits were made prior to questionnaire development which is pertinent to the objectives of the study. The questionnaire contained many open-ended questions that allowed the respondents to express their opinions on various issues that are presented in descriptive statistics. Both secondary and primary data sources were used. Seven local administration namely, Semen, Hawlti, Ayder, Kedamay weyane, Adihaqi, Hadnet, Quhia were selected purposively based on their practice of milk production. The target sampling population was defined as all households, dairy cooperatives and dairy farms in the study area that owned milk cows and involve in production. 10 % (180) out of the total population size (1800) households were selected conveniently from the proportionate size of households of the respective local administration and 20 cooperatives out of 53 were selected using random sampling technique. (See Table 2).

Data was gathered from smallholder milk farmers, middle and large farm and milk cooperatives of the area using semi-structured questionnaire. The main themes of the study, is cattle type, number, feeds, feeding, reproduction and management; artificial insemination; health and breed improvement practices and challenges, milk and milking practices processing, consumption and marketing of milk and milk products and major constraints and opportunities for milk production and marketing systems were addressed in the questionnaire.

In the study smallholder farmers, cooperatives, dairy farms from seven local were selected, because there is a good potential for dairy production in these particular areas. The number of farmers from each local administration determined using proportional probability to size (PPS) approach, because the number of household in different local administration is different, so that to be more representative PPS is appropriate.

Table2. Total number of household heads and number of sample households from each sampled local administration

No	Local administration	Total household Heads	Sample household Heads
1	Semen	450	45
2	Aider	288	29
3	Hawlti	450	43
4	Kedamay weyane	108	11
5	Hadnet	288	29
6	Adihaqi	36	5
7	Quiha	180	18
	Total population	1,800	180

Source: Bureau of Urban Agriculture Development of Mekelle, 2008.

3.3 Data Collection procedures and Sources

For this study, both primary and secondary data has been used. Primary data collected through structured questioner, two focus group discussion with in dairy cooperatives and in depth interview with experts in office of Urban Agriculture development of Mekelle to have important information about the dairy production, marketing, Challenges and prospects in general. Farmer households, dairy cooperatives interviewed using a structured questionnaire which was pre-tested. Enumerators has recruited and trained before the data collection implemented.

3.4 Method of data analysis

Two types of data analysis, namely descriptive statistics and econometric analysis were used for analyzing the data collected from dairy producers of the study areas.

3.4.1. Descriptive statistics

Statistical Package for Social Science (SPSS) Version 16 was used to analyze the Dairy production and marketing data and to prioritize challenges and prospects of it. This method of data analysis refers to the use of ratios, percentages, means, and standard deviations.

3.4.2. Econometric Model

It is assumed that independent variables are expected to have immediate effect on dairy production resulting in larger production. To be specific, educated household head, households having frequent training service, user of improved feed, high demand for milk products, access for credit, and having larger number of cross breed cows households, will affect dairy production. Thus the dairy production analysis in this study has been done following the regression technique in linear form. The following multiple regression model Ordinary least square (OLS) was employed to estimate the determinants of dairy production. Logarithmic functions were used to help in mitigating heteroscedasticity and to avoid effect of outliers on coefficients' estimate. The econometric analysis for the Ordinary least square estimation procedures was performed using STATA version 9.

The general linear regression model with k explanatory variables is written in the form:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + U_i$$

Where $(i = 1, 2, 3, \dots, n)$ and β_0 = the intercept, β_1 to β_k = partial slope coefficients U = stochastic disturbance term and $i = i^{\text{th}}$ observation, 'n' being the size of the observation. Since i represent the i^{th} observation, we shall have 'n' number of equations with 'n' number of observations on each variable $X_1, X_2, X_3, \dots, X_n$ = Explanatory variables

The final version of the model estimated is indicated as below.

$$\ln Y_i = B_0 + B_1 (\text{SEX})_i + B_2 (\text{AGE})_i + B_3 (\text{ELHH})_i + B_4 (\text{LSIZ})_i + B_5 (\text{NMC})_i + B_6 (\text{ACCR})_i + B_7 (\text{FVEXT})_i + B_8 (\text{DEFM})_i + B_9 (\text{UIF})_i + U_i$$

Where Y_i = Dairy production volume (DPV)

- SEX = the sex of the household head (HHs)
- AGE = the age of the HHs
- ELHH = the educational level of HHs
- LSIZ = the land size holding of the HHs
- NCMC = the number of cross breed milking cows
- ACCR = access for credit
- FVEXT = frequency of extension worker visit
- DEFM = Demand for milk
- UIF =Use of improved feed

3.4.3 Hypothesis test and Variable Definition

In order to explain dairy production, continuous and discrete variables were identified based on economic theories , general guide lines for dairy farming project Gupta (1997), and the findings of different empirical studies. Accordingly, in order to investigate the research questions of this study, the following variables are identified:

Dependent variables

Dairy production (DP): is a contentious dependent variable regressed in Ordinary least square, it is measured by litter that represents the amount of Milk produced by the dairy farmers.

Independent (Explanatory) Variables

Age of the household head (AGE): It is a continuous variable and measured in years. Age is a proxy measure of production capacity of household and it is expected to have a positive effect on dairy production. Aged households are believed to be wise in resource use, and it is expected to have a positive effect on dairy production. Tshiunza et al. (2001) identified age as the major

farms' characteristics that significantly affected the proportion of cooking banana planted for market.

Sex of the household head (SEX): This is dummy variable that takes a value of one if the household head is male and zero otherwise. The variable is expected to have a positive relation with Dairy production.

In mixed farming system, both men and women take part in livestock management. Generally, women contribute more labor input in area of feeding, cleaning of barns, milking, butter and cheese making and sale of milk and other dairy products. However, obstacles such as lack of capital, and access to institutional credit and extension service, may affect women's participation and efficiency in ruminant livestock production (Tanga et al., 2000). Further, study conducted by Gizachew (2005) indicated negative relation between sale volume of milk and male-headed household. However, in this specific study, being male household head is expected to affect milk production positively.

Education Level of the Household Head (ELHH): It is continuous variable and is measured in years of formal schooling of the household head. Education plays an important role in the adoption of innovations/new technologies. Further, education is believed to improve the readiness of the household to accept new idea and innovations, to maximize dairy production and get updated demand and supply price information which in turn enhances producers' willingness to produce more and increase milk market entry decision and volume of sale. Therefore, in this specific study, formal education is hypothesized to affect dairy production positively.

Number of Cross breed milking cows (NCMC): it is a continuous variable and measured in number. Total production of milk assumed to be positively influenced by the number of milking cows owned. Breeds of milk cattle show obvious differences in their milk composition and yield. Differences among individuals among a breed are often greater than differences within breeds (O'Connor, 1994) such differences are due to partly genetic and partly to environmental factors.

Access to credit (ACCR): Access to credit is measured as a dummy variable taking a value of one if the household has access to credit and zero otherwise. This variable is expected to influence the milk production positively on the assumption that access to credit improves the financial capacity of dairy households to buy more improved breed dairy cows, there by increasing milk production would be achieved.

Visit frequency of extension service (VFEXT): This variable is continuous variable and measured in number. It is expected that extension service widens the household's knowledge with regard to the use of improved dairy production technologies and has positive impact on milk production. Number of extension visits improves the household's intellectual capitals, which improves dairy production and divert dairy production resources. Rehima, (2006) identified that extension visit was positively related to pepper marketed pepper volume. Therefore, number of extension visits is hypothesized to impact dairy household milk production positively.

Demand for milk (DEFM): This variable is measured as a dummy variable taking a value of one if the dairy household has high demand to sale all their milk to the market and zero if there is low demand to sell all their milk. High Demand for dairy products or good access to market has a positive impact on increment on dairy production. Availability of a round the year urban milk market for the entire milk of the project preferably in the vicinity of the dairy project on day to day basis is a must. Gupta (1997)

Use for improved feed (UIF):This variable is measured as dummy variable taking a value of one if they use improved feed like Concentrate,AlfaAlfa besides to Furshea, Hay and roughage and 0 if they use non improved feed only Fursca, Hay, roughage. Improved feed has positive influence on dairy production improvement.

Land size (LSIZ):it is continuous variable and measured by meter square. Large land size has positive influence on preparation of improved feed, increment of number of cows therefore land size positive impact on dairy production.

4.4.5 Estimation Procedure

It is statistically desirable to sort out problem of multicollinearity among the continuous variables and check the association among discrete variables before estimating a model.

Multicollinearity is essentially a sample regression phenomenon in the sense that even if the X variables are not linearly related in the population (i.e, population regression function), they can be so related in particular sample. When we postulate the population regression function (PRF), we believe that all X variables included in the model have a separate or independent effect on the dependent variable Y. But it can happen that in any given sample that is used to estimate the PRF some or all X variables are so highly collinear that we cannot isolate their individual influences

on Y. For all these reasons, the fact that OLS estimators are best linear unbiased estimators (BLUE) despite (imperfect) multicollinearity is of little help in practice to consider that the estimation and hypothesis testing are free from flaws (Gujarati, 1999).

CHAPTER IV

RESULTS AND DISCUSSION

4.1. Socio-Economic Characteristics of Households

4.1.1. Household Characteristics

Out of the sample dairy cattle producers, 80.2 % were male headed and 19.8% female headed households (Table1). This shows males are more involved in dairy production than female this might be as a result of males are risk takers in making a business, getting better opportunity, independent financially and having power to make a decision than females.

The marital status of the sample respondents were married 81.9%, widow 7.3%, divorced 4.5%, and single 6.2%. The small percentage of single respondents indicate that singles may not get their own land for dairy production to involve in dairying, singles are more of dependent in their families financially and in decision making to involve in some kind of business. Married are involved in dairy production more than the other as they are doing things together and generate different ideas to involve in various businesses.

The age of the respondents are between, 20-39 (22.6%), 40-59 (53.6%), and above 60 (23.7%). The average age of the respondents was between 40-50 years. This indicates majority of dairy producers are in the age of 40-50 years, even though they are not young these age could also be productive in dairying.

Table 3 socio-economic behavior of the respondents

		Frequency	Percent (%)
Sex of HHs	Male	142	80.2
	Female	35	19.8
	Total	177	100
Marital status Of HHs	Married	145	81.9
	Single	11	6.2
	Widow	13	7.3
	Divorced	8	4.5
	Total	177	100
Age of HHs	20-39	40	22.6
	40-59	95	53.6
	>60	42	23.7
	Total	177	100

Source: survey result, 2010.

With respect to educational status of the household head, the majority of urban dairy producers was read and writes only (Table 4). The overall proportion of illiterate farmers was 18.1%, about 33.3% are in a category of read and write only, 30.5%, 18.1 are primary and secondary school respectively. Education is an important entry point for empowerment of urban and pre-urban communities and an instrument to sustain development, the Ordinary least square (OLS) regression technique (see table 17) shows that education has positive and significant impact on dairy production. The study results in general indicate those dairy cattle owners are mainly those who are able to read and write, primary and secondary school; these indicate that when the household head more educated they became willing in involving in dairy production and more productive as a result of adoption of technologies in feed preparation, milk handling, animal health care, and marketing system and dairy management in general. The role of education is obvious in affecting household income, adopting technologies, demography, health, and as a whole the socio-economic status of the family as well (Kerealem, 2005).

Table 4 Education status of the respondents

		Frequency	Percent (%)
Educational status of Household heads	Illiterate	32	18.1
	Read and Write	59	33.3
	Primary school	54	30.5
	Secondary school	32	18.1
	Total	177	100

Source: survey result, 2010.

4.2. Milk Production Systems

From this study, milk production system can be categorized in to two namely, urban milk production system and pre urban milk production system. However, urban dairy production system dominates in Mekelle city.

4.2.1 Pre-urban Milk production system

This system was mainly predominant in area of small towns of Mekelle city namely, some part of Ayder , Hawlti, Hadenet and Quiha, local administrations. It contributes 33.5 % of the total milk production in the city this may be as a result of lesser number of cross breed (Table 5).

4.2.2. Urban Milk production system

The urban dairy production system was identified in the six local administrations, namely Semen, Hawlti, Ayder, Hadenet, Kedamay weyane, Adi-haqi. Dairy producers in this production system Contribute 66.5% of milk production in urban dairying, like most urban dairying of Ethiopia and other east African countries, is characterized by market orientation and by the types of inputs used particularly feeds (Table 5). The feeds are of purchased concentrates and roughages of conventional and non-conventional ones. The production system in the seven local administrations is not based on crop production. Most dairy producers found in the six local administrations are smallholders with relatively to pre-urban parts higher composition of Holstein crosses.

Table5 Milk contribution by sampled location.

Local administration	Milk contribution	
	Litre/day	Percentage (%)
Semen	1345	24.4
Hawlti	1048	19
Ayder	766	13.8
K/weyane	115	2.1
Adihaqi	233	4.2
Hadnet	1130	20
Quhia	874	15.8
Total	5511	100

Source: survey result, 2010.

4.2.3. Land holding and land use pattern

The average land holding size of the respondents is 0.0892 hectare (ha) which is less than the national average land holding size of 2.5 ha. This has negative implications on the household income and dairy production (Table 6).

This study also revealed that the average land allocated for improved forage production, cattle management in general was negligible (0.0892ha) which notifies further works in creating awareness in forage and improved feed development in the area. Land holding has positive contribution in feed preparation, good management of cattle, and waste treatment. To increase the number of cows land holding is important factor to be addressed in order to maximize milk production.

Table 6 Land holding size of Respondents

Variable	Land holding (ha)				
	N ^o of respondents	Min	Max	Mean	SD
Dairy farm size	200	0.0175	1	0.0892	0.1196

Source: Survey result, 2010.

Land is one of the important pre requisites for any farming activity including dairy farming. One of the big challenges of both pre urban and urban dairy producer in the area is the small land size holding for the dairy production expansion. From the total sample size 57% of respondents said no increment in their land size holding through time, 27% and 16% of the respondents said decreasing and increasing their land holding respectively. Dairy production might be limited by their land size holding, those who have large land size has an opportunity to enlarge the number of milking cows, this leads to higher production.

Because of rapid urbanization in the area, producers do not have extra land to develop improved animal feed with minimum cost and high quality. Due to this problem they may not used improved feed from their own but they will purchase it with high cost, this has a negative impact on their profitability of their dairy production, if they are not profitable their production may decline and discouraged to continue in dairy production. These indicate that land size is among the main constraints for expanding their dairy farming.

4.2.4 Trends in dairy activity

The average duration of work experience in dairy production of the respondent in the study area is with a minimum and maximum duration of 6 and 10 years, respectively. This indicates dairy production starts to expand within ten years, so we may not get a long history about dairying in the study area. It seems that, the tradition to produce dairy products in the study area was less developed; this might be as a result of lack of awareness to produce dairy products in urban area, due to less demand, and due to less availability of cross breed cows which is appropriate for urban dairying. Production and marketing system of the respondents determined by their knowledge through experience there for, it has a positive relationship with productivity.

The majority (51.5%) of dairy farm was established about 6-10 years ago, 12.5% of proportion of farms established during the last 11 and above years and 36 % of proportion was flourished within 5 years in the study area (Table 7). This result shows that dairy producer has been encouraged to engage in dairy activity recently and urban dairy farming is a recent development in the area. Urbanization with population growth may be one of major encouragement to engage in dairying activities, as a result of demand increment.

Table 7 Dairy farming experience of the household head

		Frequency	Percent (%)
Work experience of the HHs	< 5 years	72	36
	6-10 years	103	51.5
	11-15 years	17	8.5
	>15	8	4
	Total	200	100

Source: Survey result, 2010.

4.3 Cattle size and Composition

The average numbers of local and cross breed cows were 2 and 7 per household, respectively. With respect to cow breed composition the proportion of cross breeds 1368(83%) was more than the local breed 217(16.5%) from total sampled respondents. This leads to production increment due to the cross breed has long lactation time and higher amount of milk per cow relative to local breed and it indicate that high production will occur if there is high number of cross breed as they are giving on average 13 liter per day per cow, where as local breed give 3 liter per day per cow.

Dairy producer in the study area are doing milk production with a purpose of selling with (96 %) proportion, and there are only few producer (4%) use their product for home consumption. This indicates that there is milk demand in the study area and producers are engaged to generate income and to fill the gap of milk demand (Table 8).

Table 8. Respondents purpose for dairy production.

Types of products	Purpose	N ^o of respondent's	Percent
Milk	For sale	193	96
Butter	Home consumption	5	3
Yoghurt and cheese	Home consumption	2	1
Total		200	100

Source: survey result, 2010.

Majority (83%) of the respondents were involved primarily in dairy production only 17% were involved animal fattening besides dairying. As it is discussed above the study area production system does not based on the crop production, they are not involved in other agricultural production mainly.

4.4 Labor use and cattle husbandry

In Mekelle city, hired labor is mainly responsible for cleaning and feeding of milk cattle (Table 9). Milking is done mainly by female 52.6%, while processing and sale of milk products are mainly the jobs of women followed by female children. This finding is in similar to the findings of Kedija (2008) who found in Meiso district that milking is primarily undertaken by women. Feed purchasing and breeding decisions are undertaken mostly by men 85.5% and 83 % respectively. This result showed that both male and female participate in dairy production with different responsibility. Hence, dairying might result good production as it is run by whole family members with minimum cost and it contribute for better profit.

However, 142 (80.2%) of dairy producer from total respondents are male headed and only 35(19.8)% are female headed Therefore, this result indicated, the necessity of gender education and training about dairying in the area is so important and women can be empowered in involving in every aspect of dairy production.

Table 9. Share of responsibilities in cattle husbandry among family members.

Activities	Percent of responsible family members				
	Male	Female	Male children	Female children	Hired labor
Cleaning sheds	10.5	16.8	20.9	12.1	39.7
Feeding	17.6	15.8	16.2	4.0	46.4
Milking	26.7	52.6	8.1	4.1	8.5
Processing	0.6	79.8	2.6	14.8	2.0
Selling products	6.5	69.9	7.1	10.6	6.1
Breeding decision	83.0	12.5	2.3	1.2	1.0
Purchasing feed	85.5	9.5	1.0	0.0	4.0

Source: survey result 2010

4.4.1 Feed and feeding system

Animal feed and feeding is the major input in any dairy activity. The major feed resource of the dairy producer is by purchasing from the crop farmers and different sources. The majority 75% of the households uses different types of feed namely, part of concentrate (Furshca), Crop-residue(Hay),roughage and non conventional feed like Attela, kitchen fruit wastes as main feed stuff for their milking cows and only 25% of households uses improved feed like concentrate, alfalfa besides Furshca, roughage, and Hay. According to 76.4% of the respondents, there is feed shortage mainly during January to June. Shortage of feed happened due to many reasons, it might be lack of raw materials or ingredients (like maize, Fagulo, boon and meet, vitamin premix) for preparation of concentrate and also lack of enough rain fade as Ethiopia's agricultural system is based on rain fade. Majority 82.5% of the respondents said the cost of feed is very expensive in general as it is stated above. This situation might be major constraint for dairy production that might get attention in order to increase dairy production. According to OLS model the use of improved feed affect dairy production positively and significantly in the study area (table 17).

Generally crop residues are the major source of feeds for most Africa countries as reported by Aregheore and Chimwanu (1992) in Zambia; Boiturelo and Mahable (1992) in Botswana. In this

system crop farming is highly integrated with livestock production, particularly with dairy farming.

4.4.2 Housing system

Most of the households 77% kept their cattle separate shelter but in their own residence compound and 23% especially dairy cooperative and large farms kept their cows out of their own residence compound. The respondents who kept out of their residence compound has large number of cows, the shelter constructed in a modern way relatively and it is convenient for cleaning, watering, feeding ,waste management and other activities can be easily handled. Hence, majority of dairy producers keep their cattle in a traditional way, this may be difficult for cattle management in general, and this might be due to lack of enough space to keep them out of their residence compound.

4.4.3 Lactation length and average milk yield of local and crossbred cows

The overall average lactation lengths of local and crossbred cows were 3 and 7 months, respectively (Table 10). This result was less than the average lactation length of local cows (7.29 months) at Meiso district (Kedija, 2008). The lactation length of the indigenous cows observed in this study is less than the national average (7 months) (CSA, 2005), while the lactation length in crossbred cows observed in this study is also shorter than the lactation length of 11.7 months reported for crossbred cows in the Central Highlands of Ethiopia (Zelalem and Ledin, 2001).

The overall mean milk yields per cow per day of local and crossbred cows were 2.5 and 13 liters, respectively. The mean of milk yields per cow per day determine on the types of breed and types and quality of feed and amount. The results indicate that the cross breed milk yield is lesser from what is expected from them scientifically, this might be as a result of feed shortage. Besides, the respondents said that our cow give us milk based on what we feed to her even though the cow is cross breed.

Table 10 Reported daily milk yield and lactation length of cow

Breed of cow	Average milk Yield per day/liter	Lactation length in month
Local breed	2.5	3
Cross breed	13	7

Source: survey result, 2010

4.4.4 Breeding practice and health service

Out of the sample size 34% of the respondents used Artificial insemination for mating, 31.5% of the respondents used natural mating bull with cross breed blood and 34% of the respondents used a combination of AI and cross breed bull (Table 11). This indicates a producer has enough option for their cows breeding system which is positive contribution for the dairy production. According to the respondents, access for getting AI service is high 95% of respondents does not have a problem of getting AI service but, only 5 % of the respondents face a problem in accessing AI service, this might be longer distance from the service giver and communication problem between producer and service giver.

According to the response of the respondents, the government gives the service with minimum cost this may help in expansion of good breed. Provision of genetically good breeding services as per capability of government Agricultural bureau is one of the pre requisite for the development of dairying in the study area. As discussed earlier there is a marked difference in milk productivity between local and cross breed in the study area .The profitability of urban dairying as well as future prospects to improve urban dairying largely depend on the productivity of the animals in this case AI is critical.

Table 11. Breeding system preferred by the respondents

Breeding system	N	percent (%)
AI	68	34
Natural bull	63	31.5
Both method	69	34.5

Source: survey result,2010.

Majority (75%) of the respondents have an access to animal health from the Government (62%) and privatively (13%) with minimum and average cost respectively. This shows government has contribute a lot in giving genetic improvement and animal health. However 10.5% and 14.5% of respondents faces lack of access and high cost to get a animal health service respectively (Table 12). There is good opportunity and future prospect to animal health which is important for productivity of milking cows. The government gave attention in order to improve the urban dairy production by making veterinary service available with affordable price.

Table 12. Major constraints for Animal health

Problem of health service	Percent
Lack of access	10.5
High cost to get the service	14.5
Total	25%

Source: survey result, 2010.

4.4.5 Waste management

From the interviewed dairy producers 87% used animal dung primarily for sale and house hold consumption. The study shows that there is no as such problem in waste management system as expected in urban dairying. This may be as a result of the temperature condition which is dry and sunny throughout the year except three or two months, this help to dry the dung and other waste of cow quickly. The rest 13% of the respondents spend extra money to dispose animal dung out of the town, this was because of small size land holding to administer the waste. Manure and

urine must be properly cleaned from the dairy farm to ensure good and hygienic working condition.

4.4.6 Milk Utilization and Processing

The overall dairy production per day per respondents ranged from 0 to 700 liters and on average 28.0 liter. Majority of producers 96% sell all of their milk products and 4% uses for home consumption only, however, the production could not cover the demand in the market. This shows that their production is less relatively to the market demand. As they are selling most of their products, the study revealed that they are market oriented in the study area. Due to the presence of high demand for milk in the area, the producers did not process the milk in to another form such as butter except during fasting time when the whole milk was not sold.

Although there is high utilization demand of dairy products in the study area is, there are respondents who face a problem of less demand in fasting season. Out of the respondents 153(76.5%) of the respondents face less demand and 47(23.5%) did not face less demand problem during fasting time. During fasting time producers would have surplus milk so they will processes traditionally in to butter or sell the milk with lesser price (Table 13).

In other way the study tries to identify whether the dairy producers face any spoilage of milk and its frequency, and 93 (46.5%) of the respondents did not face such kind of problem, 90(45%) face some times and very few 17(8.5%) of them face frequently the spoilage during fasting. The difference between the respondents in facing the spoilage problem lies in their mechanism to cope with the problem such as churning to butter and the amount of milk they produce. This indicates that the need for processing factory in the area is important to minimize the spoilage problem by increasing the shelf life of the milk.

Table 13 Milk Market problem in different season

Types of problem	Number respondents	of percentage
Fasting time	153	76.5
Non-fasting time	47	23.5
Total	200	100

Source: survey result, 2010

4.5 Availability of credits

Access to credit for financing investment and dairy farm operations is crucial to the commercialization of smallholder agriculture. However, the survey result highlighted that producers' willingness or need for credit and use of credit for milk production was high in the surveyed local administration. In this respect, 65.5% of the respondents have access to credit particularly; dairy cooperatives are the main user of credit in the study area. The main credit sources of the sample respondents were DEDEBIT Micro finance, TDA, and REST and other source. The respondents who lack access, not willing to access credit, lack of awareness are 21.5%, 8.5%, 4.5% respectively (Table 14). This indicate that respondents might be limited to engaged fully in dairy production in order to increase production due to their lack of awareness and lack of access mainly.

Finance is very important factor in dairy production expansion, so that credit is one of the source to finance the business, in the OLS regression model it is clearly seen the significance and positive relationship between the access to credit and dairy production (See table 17).

Table 14. Percent distribution of access to credit service and reasons for not having of sample respondents

Access for credit	Frequency	Percent (%)
Have access	131	65.5
Lack of access	43	21.5
Not willing to access credit	17	8.5
Lack of awareness	9	4.5
Total	200	100

Source: survey result 2010.

4.5.1 Milk Production Training

With regard to milk production training, extension workers are the one who are providing the service appointed by Bureau of urban agricultural development of Mekelle, the result of this study revealed that the contact of development agents with milk producers was frequent and regular. In this regard 65.5% of the respondents had access to extension service frequently, once in a month (Table 15). Producers have got various information types concerning dairy production; these include how to manage milk cows properly, improvement of cow breeds, and use of artificial insemination, improved feeding and preparation, health care and market opportunity. The study revealed the role of government is great in providing training and technical support; therefore dairy producers have opportunities to use extension service and apply in their dairy farm to be more productive.

Table 15. Major sources of information for dairy production

Sources	N ⁰ respondents	Percent (%)
Extension agents and their experience	131	65.5
Their own experience	38	19
NGOs	31	15.5
Total	200	100

Source, survey result 2010

4.6 Dairy Marketing Systems

4.6.1 Involvement of Producers in Dairy Marketing

In the study area the majority (96%) of dairy farmers produced whole milk as the predominant dairy product for sale while 4% of households produce butter for home consumption and sale. This indicate that fresh milk has greater demand in the market ,so producer may not have surplus milk to go further for processing to butter, yoghurt and cheese even though it has demand in the market, so that the higher amount of income generated from the sale of whole milk was than sale of butter, cheese and yogurt .

Out of the interviewed producers in the urban production system the majority of households (96 %) were market oriented. The dairy marketing system found in the studied areas was dominantly informal marketing. Milk was sold mainly on contract basis and in cash to consumers directly in different price. This is because of there is only very few formal dairy products shops in formal and common market place with fixed price. Currently there is one processing factory that started to distribute pasteurized milk, butter, yoghurt and cheese for supermarkets and mini super markets by the union of different cooperatives named as zemen milk and milk products processing union in Nov 2010. Even though it is started very soon, it is an emerging formal market system in the study area.

4.6.1.1 Channels of Dairy Products

The majority of respondents sell their products to individual and cafeterias at farmers gate or delivered out let (Table 16). This practice shows the dairy marketing is informal dominantly. The consumer may not get dairy products easily in the current marketing system rather by going to the producers' home which is uncomfortable and might lack information on where the producers' house is found even if there is a demand.

Dairy marketing channels were established by individual producers, dairy cooperatives, dairy farms, traders and consumers and there is less formal marketing system. Majority of the respondent's 77 (38%) sell their milk directly to the consumers and cafeterias either at the producer and consumer gates, as their selling out lets (Table 16).

Individual consumers or traders usually buy milk and delivered in their home, milk selling points as well as at the farm gates. The least recipients of milk from producers are different organizations is 3% proportion in the study area. Majority (53%) of producers uses cash payment mode during selling of their products.

Table 16 Marketing channels of Milk and mode of payment.

Buyer type	Frequency	Percent (%)
Individuals	54	27
Individuals and cafeterias	77	38
Only cafeterias	66	33
Different organizations	3	1.5
Total	200	100
Sales outlets		
Farm gate	58	29
Farm gate and delivery	37	18.5
Delivery to buyer	98	49
At milk shops	7	3.5
Total	200	100
Mode Payment		
Cash	106	53
Cash in advance(contract)	36	18
Credit	22	11
Cash and credit	36	18
Total	200	100

Source: survey result, 2010

The dairy marketing systems identified in the study area is similar to the previous findings reported for other African countries and within Ethiopia. Staal and Shapiro (1996) reported that about 90% of the milk marketed in sub-Saharan Africa is delivered informally to consumers. Similarly, 75% of dairy producers in Addis Ababa milk shed are sold directly to consumers, while 15% of the households supplied their milk to catering institutions and the rest marketed through retailers and farm shops. Staal and Shapiro (1996) also showed 44 and 27% of the farms in and around Addis Ababa sold their milk directly to individuals and institutions, respectively. Although there was high seasonality for the demand in dairy products in the study areas, the 63% and 37% of dairy producers said there is very high and high demand respectively and they could

not satisfy their customers. As a matter of fact, this figure has some implication towards dairy development in the area. Dairy producers encouraged and became willing to continue in dairying in order to optimize milk production for the ever increasing population in the urban centers. However Producers were found mentioning many problems and constraints (specially feed availability and its price) that limit them not to produce as per the demand.

4.6.2 Pricing of dairy products

The price of milk varies based on season mainly, and the milk demand around the local area. During fasting time the price of milk was on average six birr per litter and during non fasting time on average seven per liter. This indicates there is fluctuation of milk price in the market which may discouraged the producers. The absence of milk market group may aggravate the informal milk marketing system, actually the reason for the absence of milk market group may be the smaller amount milk produced by individual dairy producers, cooperatives and dairy farms which could not be over pass beyond their few customers.

Dairy producers are the ones who fix price of milk and other dairy products when selling their product to consumers and through negotiated prices when selling to traders. The government does not substantially intervene, in any way, through regulation or trade of dairy products in the area.

Marketable dairy products in the study areas predominantly (96%) are whole milk, and 4% manually processed butter, yoghurt and cheese for home consumption. The price of milk varies in season, particularly in fasting time, For example, the price of whole milk ranged from ETB 6 to 7 per liters and the price of butter ranged from ETB 100 to 120 per kg in the study area.

In general, prices of dairy products varied greatly among and within each local administration since informal dairy marketing was the dominant means of marketing in the area. The study revealed that the major factors affecting the prices and demands of dairy products in the studied areas included fasting and non-fasting days (followers of the Orthodox Christian church), and closeness to potential consumers with in specific area. As fresh milk could not be kept for long hours before consumed or processed, distance from the potential consumers was a major factor that determines the price within the study areas.

Although the study delimited to study the purchasing ability of the buyer, the rapid urbanization and population growth of the study area, has led to increased consumption of dairy products. In general, the low level of supply as compared to the demand may result in increased prices of dairy products in the studied area.

4.6.3 Quality and sources of dairy products

The researcher observes imported dairy products from abroad and Addis Ababa milk processing area. Availability of feed is based on the crop production on different season, during dry season feed like Hay and Roughage are very scarce and high price. With regard to roughage feeds of animals, Hay and roughage collected during October to November, from the surrounding suburban and rural areas was seen in Mekelle markets as animal feed. Prices of concentrate feeds were among the major problem dairy producers could not cope with, in the study area.

4.7 Constraints, opportunities and prospects

Dairy production and marketing in the milk shed was found to be constrained by a number of factors related to production and marketing.

4.7.1. Dairy production constraints

In the discussion part, it was indicated that only 34.5% of the sampled dairy producers were not accessed to various credit sources. This highlights that shortage of finance was found to be one of the critical problems in dairy production for sampled dairy producers. These might be because of credit service was given by few organization, limited access for individual and others.

According to the respondents, there were different challenges in dairy production and marketing system and prioritized the major problems and constraints as: shortage of feed, high costs of feeds, lack of raw materials(ingredients like maize boon and meat, vitamin premix,) for concentrate preparation , milk demand seasonality, lack of formal marketing systems, limitations of land for sustainable dairy development, shortage of animal drug and high price, knowledge gap regarding improved dairying and access for credit for expansion. The extent and significance of the problems and constraints differed between producers in the studied areas.

4.7.2 Availability and cost of feed

Feed, usually based on fodder and grass, were either not available in sufficient quantities due to fluctuating weather conditions or when it is available, it would be in a position of poor nutritional quality. These constraints result in low milk production, longer parturition intervals, and low animal weights.

Out of the total respondents 112(56%) proportion putted shortage of feed and high cost of feed as a number one problem in the study area. Shortage of feed happened due to many reasons, mainly due to less provision of crop production and dependency on rain fade agricultural system. Crop production availability is based on the season, during dry season animal feed like Hay and roughage are very scarce and with high price, this crop products are mainly collected during October to November, from the surrounding pre-urban and rural areas was experienced in Mekelle animal feed market. Therefore, roughage for animals might be scarce and expensive for the rest of seasons.

On the other side their was lack of concentrates feed due to less availability of raw materials or ingredients for preparation of concentrate feed in the feed factory. During the survey animal feed composers or factory was not available in the study area, so dairy producers' uses only some part of concentrate for their cows these leads to less production of cow.

Problems of seasonal availability of roughage feeds can be minimized through conventional feed conservation practices like hay making, silage making and straw treatment so that sustainable supply of roughage feeds can be ensured throughout the year. Similarly, the availability and affordability of concentrate feeds can be improved by formation of collective groups or planting feed composer factory near to the producers.

4.7.3 Seasonality of marketing systems

Seasonality in demand for milk and milk products was identified as one of the major problems 153(76.5%) of the urban dairy producers. Seasonality of milk demand occurred due to fasting and non fasting time of Orthodox Christian religion followers which is not allowed to consume animal fat for almost 200 days per year. During fasting the respondents face a problem to sale their milk as it is less demanded by the market, the price also decrease at this time. As it is discussed above spoilage problem happened in some dairy producers at this time and discouraged for the loss of milk. If they are not profitable in their dairy farm they might not afford to purchase inputs for their farm.

Due to limited formal market respondents face challenge for less milk demand as they have small number of customers informally, but if there is formal market in the study area they would have an opportunity to sale to milk market shops, milk market groups.

The absence of private or government dairy processing plant in the areas which can absorb excessive milk production during the weak demand for milk, absence of licensed dairy products traders to ensure achievement of minimum hygiene and quality standards, were found to be the vital dairy marketing as well as production problems of the study areas. These were the cases for the study areas to partly depend on imported dairy products being sold in supper markets.

For the seasonality in demand for milk and milk products, processing technologies which could extend the shelf-life of dairy products may remedy the problem. For potential dairy areas, where there is no market access, a milk collection scheme through establishment of milk marketing groups may alleviate the problem.

4.7.4 Limitations of land

The other constraints that the respondents ranked was less access to farm land that can hindered dairy development in the area. 57% of dairy producer households identified small farm land size as a serious problem and as constraints for expansion of draying. As it is discussed in the above section of land holding of respondents, when the number of cows increases the demand for land increment will increase. Besides, land is important to prepare improved feed by planting different

types of grass like alfa alfa, elephant grass, for milk production increment and minimize cost of feed to be purchased.

Most urban producers (62.5%) keep their cattle within their own residence compound, which is not usually more than 175–500 meter square. Even if dairy producers are interested to expand their dairy farm, the land size may not allow most of them to do so. As land size increases more and more facilities become inevitable that take-up space other than the animal barn.

4.7.5 Access for credit

Access to credit for financing investment and farm operations is crucial to the commercialization of smallholder agriculture. However, the survey result highlighted that producers' knowledge of issue related to dairy production credit and access for it was found to be limited in the area.

In the discussion part, it was indicated that only 65.5% of the sampled dairy producers were accessed to various credit sources. This highlights that shortage of finance was found to be one of the critical problems in dairy production for sampled dairy producers. More over, the credit system was not well developed in the study areas.

Access for credit is one of the ways in order to finance and expand any business like dairy business. From the respondents 43 (21.5%) did not have access for credit and limited their production by having only few number of cross breed cows. These respondents have wished to add more cows if they get access credit to finance their dairy farm.

4.7.6 Milk Cooperatives

In commercial agriculture, the private sector is expected to take a lead to be involved in the business transaction. To this effect, cooperatives are becoming essential organizations to enhance bargaining power and enable the smallholder farmers fully benefit from the market transaction. They are giving service in agricultural input supply, product marketing and credit service for the farmers hence they do have considerable contribution in food security activities by increasing agricultural outputs and efficiency among the rural society (BoFED, 2006).

Despite this fact, in the study area, there is no single milk cooperative that collect milk from other small holder producer to achieve marketing problem and supply dairy farming input. How ever there are 53 dairy cooperatives established with minimum 10 members each for the purpose of

dairy production by them selves and sell only what they produce which is different from the above. Therefore cooperative that accomplish collection of milk from individual farmers and supply of agricultural input like concentrate feed for the producers and increase the bargaining power of the small holders are very important in the study area.

In general absence of such kind of cooperatives or milk group could be one of constraint for dairy marketing and production.

4.7.7 Other Constraints

Animal health services was limited by few government veterinary services, lack of skills in different aspects of dairy activities were among the other problems encountered in the studied areas. Poor milk cattle management system had negative impact on milk production system of the area. Even though there is an access for extension service, particularly to urban dairy producers, there is an application problem among the producers this might be the way of giving training and it needs further training should be given for more clarification of like dairy farm management, milk handling and hygiene, marketing, feed preparation entrepreneurial skills development, sound market opportunity and linkage.

4.8 Opportunities for dairy developments

Milk production provides the opportunity for small holder farmers to use land, labor, and feed resources and generate regular income. In this respect, support services in terms of accessing adequate land, organizing input supplies (improved genetic material, feeds, AI, drugs), provision of credit, extension and training services, production and entrepreneurial skills development, sound market opportunity and linkage are the key elements of success for the milk industry (Sintyehu et al., 2008).

Although many problems and constraints that may hinder the development of the dairy sector were identified in the area, the majority of dairy producers (95.5%) in the study area were willing to continue, expand and/or involve in dairy farm in the future. The rest 4.5% of the producers were not willing to expand dairy farm in the future for various reasons.

Generally the respondents in the study areas were more willing to continue and expand dairy farm due to market opportunities in urban areas. Because of the rapid urbanization, substantial

population growth and change in the living standard by urban societies in the area, the demand for good quality and quantity of dairy products are increasing. Every producer in the study area sell whatever amount they produced as it is discussed earlier, this indicated that there is a high demand for milk and milk products in the town and they are not in a position to fulfill the demand.

There is also an opportunity to do dairying in group or by forming dairy cooperatives the government encouraged such kind of system by giving land and credit based on the putted requirement, therefore dairy development can grow quickly even more than doing it individually.

Dairying provides the opportunity for smallholder farmers to use land, labor and feed resources and generate regular income. Although it might be enough for sustainable dairy development, there is also an opportunity for smallholder dairy producers and other individuals and investors regarding to support services in terms of accessing adequate land for dairy cooperatives, organizing input supplies (improved genetic material, feeds, AI, drugs), provision of credit, extension and training services.

4.9 Econometric Results and Discussion of Factors Affecting Dairy production

Dairy products are produced for both market and household consumption in Mekelle. Various variables are assumed to affect the dairy production through searching many literature and researches done before.

Prior to the analysis of the data, it was found important to look into the problem of multicollinearity or linear association among the hypothesized variables. Pairwise correlation test were used to check the multicollinearity problem in continuous variables and for dummy variables. Besides normality test has done and the data are distributed normally. According to the test results, multicollinearity was not a serious problem both among the continuous and discrete variables except between size of age and age square (appendix I). As a result, the age square of the household head variable was not considered for the model analysis. In order to identify variables influencing the dairy production, the Ordinary least square model (linear regression) was used.

Finally the five potential continuous and the four discrete variables were entered into the linear regression analysis. In the course of analysis, enter method of variable selection was employed.

R^2 shows the fitness of the model for the dependent variable which is expressed by the independent variables at 69.3% which is good.

4.9.1 Explanation of the significant variables influencing dairy production

In the model, 5 potential continuous and 4 discrete variables were entered. Out of the total of nine explanatory (predictors) variables only 6 variables of which 3 were continuous and 3 were dummies found to be significantly influencing dairy production. Variables found to be significant included; education of the household head (EDHH), use of improved feed (UIMF), access for credit (ACCR), which was found to be significant at 5%. Number of cross breed milking cows (NCBMC), access for training (ACCTR) and demand for milk (DEFM), which were found to be significant at 1% significant level. (Table 17). With the above brief background, the effect of the significant explanatory variables on the dairy production was discussed below.

Education level of the household head: Education has positive effect on probability of dairy household milk market participation decision and is significant at 5% probability level. The positive and significant relationship indicates that education improves the dairy household capacity to produce more and process production in an effective way. Education helps in doing dairying in a modern way by minimizing labor cost. The marginal effect indicates that addition of one-year formal schooling leads the probability of dairy production to rise by about 2.2%.

Number of cross breed milking cows: As it was expected, this variable has positive relationship with household dairy production and was statistically significant at 1% significant level. The positive and significant relation between the variables indicates that as the number of cross breed milking cow increases, milk production per dairy household also increases which in turn increases percentage share of sale volume of milk per day per household. The marginal effect of the variable also confirms that a unit increase in cross breed dairy milking cow leads the probability of dairy household milk production to rise by 1.6%. Moreover, the result designates that increasing number of quality cross breeds dairy cows is an important variable in stimulating the smallholder to produce more milk and benefit from economic transaction.

Use of improved feed: The result shows that use of improved feed has a positive and significant at less than 5% significant level. Using improved feed is very essential factor for daily production of milk in the household. Different types of feed has its own contribution on milk production,

therefore dairy house hold used feed which is appropriate for milking cows the result will be high milk production. The marginal effect of the variable also confirm that using improved feed makes the producers to increase their milk production by 19.2% than those who does not improved feed. Beside, the result shows that feed is basic factor for milk secretion of cow what ever the breeding system.

Access for credit: the result shows that access for credit has positive relation with the dairy production as it is expected and significant at 5% significant level. Getting an access for credit makes the milk producer to produce more by 31.3 % than those households who have no access for credit. This shows dairy production improvement significantly affected by the finance that the house holds gain. One of the mechanisms to maximize dairy farm or any business is availability of credit from different sources.

Financial income from different sources has significant effect on production volume. The result designate the relation between the variable indicates that any additional financial income enables the dairy household to purchase more number of improved breed dairy cows which can contribute to increased milk production per household per day.

Frequency of getting training about dairy farm: The model result shows that this variable has positive relation with the dairy production as expected and statistically significant at 1% probability. Training given by the extension service and others are explained in the descriptive part has many contribution on the respondents in a way of awareness creation about dairying, technical skill, animal health care, feeding system and market information through theoretical and practical lesson. In every additional one day training for dairy producer, the dairy production rate on average increase by 4.9%. New technology of dairying transferred through extension service workers and by other organizations in order to help the house hold and to adopt dairy production technology and be more productive.

Demand for dairy products: the result shows the demand for milk has positively and statistically significant with the dairy production as it is expected at 1% significant level. Having a demand for dairy products makes the household to produce more by 116 %. Therefore, demand is very important factor for house hold head in order to produce more and gain more income to reinvest in to his/her business for expansion of dairy farm. As discussed in the descriptive part

there is a high demand for milk that will initiate the house hold head to produce more to satisfy the demand.

Table 17. Estimation result of the OLS technique

Lnpro	Coef.	Std. Err	P> t
AGE	.0020813	.0055714	0.709
EDUCATION	.0227948**	.0115595	0.050
LAND SIZE	.000023	.0000367	0.532
N ⁰ OF MIL COWS	.0165689***	.0037399	0.000
TRAINING	.0492953***	.0093199	0.000
SEX	.0038588	.0932757	0.967
FEED	.1922738**	.082228	0.020
ACC FOR CREDIT	.3136207***	.1195623	0.009
DEM FOR MILK	1.16501***	.1343327	0.000
CONS	.7182488	.3246611	0.028

** =significant at 5% ***=significant at 1% F (9, 190) = 25.57 R-squared = 0.6935

CHAPTER V

CONCLUSIONS AND RECOMENDATION

5.1. Conclusion

This study was conducted with the objective to assess Dairy production and marketing in Mekelle city of Tigray Region. The study was undertaken in the seven purposely selected local administration of Mekelle city; namely Semen, Hawlti, Ayder, Hadenet, Adi haki, Qhia and K/weyane. Farmers from each local administration were selected using Proportional Probability to Size (PPS) approach for each local administration. A total of 200 farmers were selected based on the number of households in each local administration.

Dairy production level and marketing are found to be the basic elements in the study of Dairy production and marketing. The Ordinary regression analysis was used in order to capture the selectivity bias and get the impact on Dairy production per day per household. Dairy production is continues variable, the maximum likelihood estimation procedure of ordinary least square regression analysis model was used in the study.

The maximum likelihood OLS model analysis revealed that educational level of the household, frequency of getting training of the household, Household access for credit, demand for dairy production in the market, household use of improved feed and number of cross breed milking cow owned were found to exert significant impact on the households dairy production. However, the OLS result identified sex of the household, age of the household, and land holding size has a positive relationship with dairy production. The selection equation result depicts that about 69.3 % of the variation in dairy production is explained by the independent variables used in the analysis.

Focusing on the estimates of the models, the models predicts that the addition of one cross breed milking cow causes dairy production to rise by about 16.5 % per day.

The model predicts that the additional one person in demand of dairy products causes dairy production to rise by about 116% per day.

Turning to the knowledge accumulation variables of the study, education has significant impact on dairy production the model shows education has important and significant impact on dairy production.

Two major dairy production systems, namely the urban and pre-urban–livestock systems, were identified and assessed. Dairying was found as a good source of income for urban and pre urban producers as they are selling their dairy products primarily. Milk was the dominant marketable products in the study area. Family labor was the major source of dairy activities where milk related activities and control-over were the responsibility of male in both systems.

The major feed resources identified in the area included, hay and purchased roughage grass (Durka), concentrate (furshca), and nonconventional feeds like atella, kitchen and fruit wastes. The majority (34.5%) of producers used natural mating by local bulls, while 31.5% of the producers used AI as sole source of breeding improvement and 34% of producer use both method alternatively. Milking tow times a day was the predominant frequency of milking urban production systems. Animal dung was used primarily as home fuel consumption and selling purpose, and there are few producers (13%) pay extra money to dispose it out of the respective towns.

The survey result identified that 5,574 liters of milk per day per sampled milk producers were found to be marketed through different marketing channels that were being identified during the survey period. The most important marketing type for both butter and milk was informal marketing. The majority of urban producers (96%) produce milk for sale. Unless there was some problem like less demand for milk in the market producers do not use to churn milk.

Marketable dairy commodities in the area included whole milk, butter, yoghurt (fermented whole milk), and cheese. However, Whole milk in the study area production systems was the major dairy products sold.

Informal dairy marketing was the pre dominant means of marketing system in the study area and there is only one milk processing plant in the city. The primary selling outlet of milk was direct sell to consumers and cafeteria. Price of dairy commodities were determined by different factors such as season, access to potential buyers around the area, fasting and non-fasting days, level of supply, and quality of dairy products.

From the study it was noted that the existing milk production systems (mainly extensive) & marketing (mainly informal) systems are interwoven by many constraints. The major constraints for dairy development in the area includes shortage and high costs of feeds, shortage of farm land, lack of milk marketing group, lack of processing factory, seasonality of milk demand, lack of improved breed animals with affordable price, less awareness and willingness to access credit and knowledge gap on improved dairy production, processing and marketing. The rapid urbanization of the regional capital city Mekelle, with that of human population increase is an opportunity for the development of dairy in the area. Dairy development in the studied areas can be improved by encouraging private investors and cooperatives to establish dairy processing plant, and thereby pre-urban and urban producers could be encouraged to enter into milk collection schemes. Moreover, household dairy producers should be supported through services related to feed supply, veterinary, AI, credit, extension and training besides, establishment of formal marketing systems enhanced.

5.2 Recommendation

On the basis of the results of this study, the following policy implication are recommended so as to be considered in the future intervention strategies which are aimed at the promotion of dairy production and marketing in the study area in particular and in the country in general.

- As it was seen in the analysis, number of cross breed cow has strong positive and significant impact on dairy production per day, government and other existing and potential dairy sector development partners of the study area are required to give due attention for integrating cross breed cows to the household dairy sector of the study areas in particular and of the region in general.
- As smallholders will likely continue dominating the sector, government should also promote integration of crossbred cattle into the smallholder sector through improving their access to improved cattle breeds, AI service, veterinary service, and credit.
- The result shows that the demand for milk was positive and significantly affects dairy production. This positive impact of the variable indicates that high milk market demand leads to high production. Thus, government should encourage private investors, individuals, cooperatives to involve in dairy production and processing by providing land for dairy farm, access for credit with appropriate control.
- Increasing milk market outlets should be encouraged to meet the demand of people through formal marketing system.
- Further, the result has shown that dairy household production positively and significantly affected by having frequent training and marketing about dairying and improves the readiness of the dairy household to accept new idea and innovations, and get updated demand and supply information which in turn enhances their willingness to produce more, and thus increase dairy production. Thus, government and other dairy sector development partners should emphasis on capacity building of the dairy smallholders through short and intermediate practical based training.
- The study revealed that access for credit or money source of dairy household was found to affect the dairy production positively. The positively related value of the variable

suggests that through improving financial capacity of the household through giving credit makes the household to improve more milk products through expanding dairy farms. Therefore, increasing the dimension of access to well functioning formal financial systems is critical in influencing dairy production per dairy household.

- Potentially, formal producer groups like dairy cooperatives are assumed to play important role in improving the production capacity of the dairy producers and creating employment opportunities, to be in dairy cooperatives increase power to do dairying more than doing individually, merging skill and create market opportunity than the individuals. Thus, care must take before formation of the new dairy cooperatives and government should follow and measure their performance and their problems and it should give capacity building in management system of dairy production and marketing and provide access to credit.
- Abandoning the cooperative is not economical, but enabling them to diversify their operations by processing whole milk into skim milk, butter, cheese and soured buttermilk and others depending on market demand and resource availability in order to explore economies of scale is fundamental.
- As seasonal fluctuation of demand for milk and butter associated with their perishable nature was vital problems of dairy marketing of the study area, development and promotion of small scale processing technologies were critical to increasing smallholder producer's dairy production and dairy products market participations. The seasonal glut in milk production and the mismatch between seasonal production and demand in the study area identify the need for processing facilities that would produce storable dairy products such as long life milk, butter or hard cheeses. Adding capacity to produce stored dairy products could improve the profitability of the industry and enhance food security in the milk shed in particular and in the country in general.
- The survey result indicated that the overall milk marketing system was found to be traditional and under developed, fragmented and informal. Thus, milk market group should be established in order to start the way to make the market formalized and to maximize the quality of the product. Small dairy shops should be opened on main streets of with hygienic and standard cooling temperature.

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7. APPENDICES

Appendix I

pwcorr AGE EDU LAND No MIL co TRAINING SEX FEED ACC CRED DEMD MILK **AGE2**

| AGE EDU LA.SZ NCMC TRN SEX FEED

-----+-----

AGE		1.0000						
EDUCATION		-0.0115	1.0000					
LAND SIZE		0.0267	0.2330	1.0000				
No MIL co		0.0543	0.2307	0.5079	1.0000			
TRAINING		-0.0866	0.2447	0.1051	0.1332	1.0000		
SEX		-0.0483	0.0167	0.1829	0.0799	0.1106	1.0000	
FEED		0.0439	0.2482	0.2588	0.1899	0.3637	-0.0866	1.0000
ACC CRED		-0.0301	0.1425	0.1061	0.0593	0.2676	0.0787	0.2450
DEMD MILK		-0.1226	0.1996	0.0252	0.1021	0.4165	-0.0532	0.3943
AGE2		0.9983	-0.0084	0.0240	0.0526	-0.0817	-0.0404	0.0457

| ACC CR DEMD MILK **AGE2**

-----+-----

ACC CRED		1.0000		
DEMD MILK		0.4180	1.0000	
AGE2		-0.0248	-0.1209	1.0000

Appendix II.

Linear regression

Number of obs = 200
 F(9, 190) = 25.57
 Prob > F = 0.0000
 R-squared = 0.6935
 Root MSE = .55739

	Robust					
lnpro	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
AGE	.0020813	.0055714	0.37	0.709	-.0089085	.013071
EDUCATION	.0227948	.0115595	1.97	0.050	-6.72e-06	.0455963
LAND SIZE	.000023	.0000367	0.63	0.532	-.0000495	.0000955
No MIL cows	.0165689	.0037399	4.43	0.000	.0091919	.0239459
TRAINING	.0492953	.0093199	5.29	0.000	.0309115	.067679
SEX	.0038588	.0932757	0.04	0.967	-.1801302	.1878478
FEED	.1922738	.082228	2.34	0.020	.0300768	.3544709
ACC CRED	.3136207	.1195623	2.62	0.009	.0777808	.5494606
DEMAND MILK	1.16501	.1343327	8.67	0.000	.9000352	1.429985
_cons	.7182488	.3246611	2.21	0.028	.0778455	1.358652

Appendix III.

Questionnaire on dairy production and marketing: Determinants, challenges and opportunities.

GENERAL

Questionnaire number _____

Local administration (sub city) _____

Date _____

Enumerator name _____ Signature _____

I-Farm household Characteristics

1. Number of years lived in this area _____ (years)
2. Sex of household head 1-Male -2 Female
3. Marital status 1. Married – 2. Single – 3 Widow –4 Divorced - 5 Not relevant
4. Age of the household head _____ (yrs)
5. Educational level of the household
 - a. Illiterate b. Read and Write c. Elementary school d. High school e. Diploma and above

II- Resource Endowment and Uses

1. Land ownership and use
 - 1-Total dairy farm size (ha /‘Geisha’/ other local unit (specify) _____
2. Does your land diminishing, expanding, or no change through time? _____

III. Dairy Production Systems and Handling System

1. What is your production system?

a. urban dairy cattle production system b. Mixed crop livestock production system.

2. What are your major livestock activities?

a. Milk production b. Crop production c. poultry production

3. How long have you engaged in milk production?

a. With in last 5 years b.6-10 years c. before 15 years ago d.other (specify)

4. Livestock ownership

1. Local cows _____ 2. Crossbred cows _____

5. How much litter milk do you get from one cow per day? _____

IV Feeds and Feeding

1. Could you mention major of feeds you are using for milk cows? _____

2. Is there a problem of feed shortage for milk cows? 1. Yes 2. No

3. If yes, when? _____

4. What are the main problems in the area for feed availability for milk cows? _____

V. Housing, Facilities and Management

1. Where do you keep milking cows?

1. Own residence compound 2. ditached from own house

2. What do you do by cows waste?

1. Fertilizer 2 fuel for cooking 3.for nothing 4. For sale 4 other _____

3. Do you have record keeping practice? 1. Yes 2. No

VI. Breed, Breeding and Reproduction

1. Do you keep crossbred milk cow/s? 1. Yes 2.No

2. Source of crossbred heifer(s): 1. Government ranches 2. NGOs 3. Private (Market)
4. Which breed of milk cows do you like to keep in the future? 1. Local 2. Crossbred
5. What is the average lactation length for milking cows (in months)?
1. Local ____ 2. Crossbred _____
6. What type of breeding practices do you use for milk cows?
1. Natural (bull service) 2. Artificial insemination (AI) 3. Both
7. If you use AI, what is the source of it?
1. Government recruited technicians' 2. NGO's 3. Private 4. Others (specify) _____
8. Is there a problem of AI? 1. Yes 2. No
9. If yes, what is? 1. No access 2. Unwillingness of AI technicians' 3. Shortage of liquid nitrogen and semen 4. Others (specify) _____
10. Do you have access to veterinary services? 1. Yes 2. No
11. If yes, from where do you get this service?
1. Government 2. Private 3. NGOs 4. others
12. If No, what is the problem mention _____?
13. Do you get animal medicine services? 1. Yes 2. No
14. How is the cost? 1. expensive 2. not expensive 3. average

VII. External input services for milk producers

1. Is there a need for credit services for your dairy farm? 1. Yes 2. No
2. If yes, do you have access for credit? 1. Yes 2. No

3. If yes, from where did you get? _____
4. If you get credit access do you think your production will increase? 1. Yes 2. No
5. Have you ever participated on milk production training? 1. Yes 2. No
6. If yes, specify the training type and the institution which organized the training _____
7. Is there any extension service given for livestock especially milk development?
1. Yes 2. No
8. If yes, source and frequency of visit in the last 12 months?
1. Source _____ 2. Frequency _____
9. Do you think that there is a need for external input (assistance) which helps the Milk production? _____

VIII. Milk production, consumption, processing and marketing

1. The average milk yield and frequency of milking for milk cows
1. Cross breed _____ 2. Local _____.
2. What methods do you use to increase the shelf life of milk and milk products?
- Methods: 1. Smoking of containers 2. Boiling before collection 3. Salting 4. Others (specify)
3. Milk and milk product obtained, consumed and sold

Type of milk cow	No of lactating cows last year	milk yield/day/cow		% used for home consumption	% used for calf feeding	% of Milk Sold	% of Milk processed
		Minimum (when in months)	Maximum (when in months)				
Local							
Cross							

4. How many kg of butter and Cottage cheese you get from one churning?
- _____

5. How much butter, yogurt and cheese produced per week (In kg)? (Please underline

What you have chosen)

Produced	used for home consumption	Sold
Butter _____	_____	_____
Cheese _____	_____	_____
Yogurt _____	_____	_____

6. At which season/month(s) do you fetch the maximum and minimum price from the Sale of milk and milk products?

Products	Minimum		Maximum	
	price (birr)	Season and/months	price (birr)	Season and/months
Milk				
Butter				
Cottage Cheese				
Yoghurt				

7. What factors affect the price of milk and milk products? _____

8. Marketing channels of dairy products

Description	High price season
	Outlet (14)
Raw milk	
Buyer type 15	
Qty/day or week	
Price/unit	
Mode of payment 16	
Distance travelled/day in km	

Butter/yoguhrt	
Buyer type	
Qty/day or week	
Price/unit	
Mode of payment	
Distance travelled/day in km	

14. Codes for sales outlet: a. Farm gate (homestead) b. Market place c. Delivery to buyer

15 . Codes for buyer type: a. Consumer b. Trader c. Catering shop d. Organization

(Hospital/ school/ hostel), e. Collection point of Coop enterprise f. Others

16. Code for mode of payment: a. Cash b. Cash in advance c. Credit d. Others

9. Is there any period that you have problem of marketing your milk products?

1. Yes 2. No

10. If yes, which months? a. Fasting month's b. In any month of the year, specify

11. If you face problem any months what do you think the problem is? _____

12. Have you ever experienced spoilage of milk and milk products due to lack of market? 1. Yes

2. NO

13 If yes, what is the frequency? 1. Frequently 2.some times

14. How is the demand for milk?

15 From your all products which is more saleable (have market)? _____

16. Do you satisfy the market by your products? 1. Yes 2.No

17. What are the major problems with respect to milk production, processing and

Marketing of milk products? (Prioritize) _____

18. Are you willing to continue in dairying and expanding? 1. Yes 2.No

19. If no why? _____

9. Gender and labor source

1. Which gender plays a great role in milk production? 1. Male 2. Female 3. Both almost equally

2. Rank (19) the responsibility of the household for the following activities

Activities	Adult male	Adult Female	Children Male	Children Female	Other family members	Hired Labor
Cleaning sheds						
Feeding and watering						
Milking						
Milk processing						
Selling products						
Breeding decisions						
Feed Purchasing						
Health care						

19 Ranks: a. More b. Medium c. Low d. Not at all

Check list for Focused group discussion

- 1 Discuss the major challenges for milk production and marketing?
2. What kind of services do you get and what type you could not get?
3. Discuss the opportunities to continue in dairy production in the future?
4. How do you see the benefit of getting dairying training for your production?
5. What is your future plan regarding to dairy production?
6. What are the advantages to work dairying in cooperative?
7. Discuss the challenges faced in your dairy cooperative?
8. What do you recommend in order to provide a solution for current challenges?

Tigrigna Version of the Questioner on dairy production and marketing

ጠቅላላ

ዕለት _____

ከባቢያዊ ምምሕዳር _____ ስም መንደር _____

ናይ ተጠያቂ ስም _____ ዕድመ _____ ያታ _____

ናይ ጠያቂ ስም _____ ፊርማ _____

1. ስም መራሐ. ስድራ _____
2. ያታ መራሐ. ስድራ _____ ሀ. ተባዕታይ ለ. አንስታይ
3. ከ-ነታት ሓዳር ሀ. ባዓል ሓዳር ለ. ወንደላጤ (ዘይተመረዘወ) ሐ. መበለት
መ. ዝተፈትሐ ሰ. አየድልንረ
4. ዕድመ መራሐ. ስድራ _____
5. ደረጃ ትምህርቲ መራሐ. ስድራ ቤት
ሀ. ዘይተማህረ ለ. ምዕሓፍን ምንባብን ዝክእል ሐ. ቀዳማይ ደረጃ
መ. 2ይ ደረጃ ሰ. ዲፕሎማን ልዕሊ. ኡን .

I. ትሕዝቶ መሬትን አጠቓቕምኡን

1. ትሕዝቶ መሬት

ጠቅላላ ትሕዝቶ መሬት ሕርሻ ፀባ ኻፍቲ (ብሄክርታ ብጋኣ ወዘተ) _____

2. ናይ ሕርሻ መሬትኩም ትሕዝትኡ ካብ ሕሉፍ፡- ሀ. ወሲኹይ ለ. ቀኒሱ ሐ. ለውጢ
የብሉን

II. ከይዲ ምህርቲ ፀባን አተሓሕዝኡን

1. ዓይነት ምህርቲ ሕርሻኩም

ሀ. ብፀባ ክፍቲ ብታ ለ. ብፀባ ክፍቲን ምህግርን፣ ብኻልኦት ተተሓሓዘቲ ስራሕቲ ሕርሻን

2. ምህርቲ ፀባ ክፍቲ ካብትጅምሩ ክንደይ ዓመት ጌርኩም

ሀ. ካብ ውሽጢ ዝሓለፈ 5 ዓመታት ለ. ካብ 6-10 ዓመታት ሓ. ቅድሚያ 15 ዓመታት መ. ልዕሊኡን

3. ናይ ክብቲ ዝርከር ኩነታት

ዓይነት ክፍቲ	በዝሒ
ናይ ሓበሻሳ ላሕሚ	
ድቃላ ላሕሚ	

4. ብመዓልቲ ካብ ሓንቲ ላም ክንደይ ሊትር ጠባ ትርኽቡ _____

III. መኖን ስርዓት አመጋግባን

1. እትጥቀምሉ ዓይነት መኖ

ጥቅሱ _____

2. ናይ መኖ ሕፅረት አለኩምዶ? ሀ. እወ ለ. የብልናን

3. መልስኩም እወ እንተኾይኑ ቀንዲ ችግርኩም እንታይ እዩ _____

IV. አተሓሕዛ መንበሪ ክፍቲ

1. መንበሪ ላሕምኩም አብምንታይ እዩ? ሀ. አብ ጎሲ መንበሪ ዝዛና ለ. ካብ መንበሪ ዝዛና ርክቕ ኢሉ

2. ናይ አላሕምኩም ዒባ ንምንታይ ትጥቀሙሉ? ሀ. ንማደበርያ ለ. ንመንደዲ ሓ. ንመሸጣ መ. ንምንም

3. እንተድኣ ትሸጥዎ ኩንኩም ብወርሒ ክንደይ አታዊ ትረክቡ?

4. ኩነታት አላሕምኩም አብዝገበ ትምዝግቡዎዶ? ሀ. እወ ለ. ኣይ

V. ዓሌት

1. ናይ ፈረንጂ ድቃላ (ስታላ) ላሕሚ አለኩምዶ? ሀ. እወ ለ. የብልናን

4. ንመጻኢ አየናይ ዓይነት ዘርኢ ክተፅንሑ ትደል ሀ. ናይ ሓበሻ ላሕሚ ለ. ናይ ፈረንጂ ድቃላ ላሕሚ

3. ብማእከላይ ዝሕለባሉ ግዜ ክንደይ እዩ? (ብወርሒ ሀ. ናይ ሓበሻ ላሕሚ _____ ለ. ናይ ፈረንጂ ድቃላ __
4. እንታይ ዓይነት ናይ ምርባሕ ስርሓት ትጥቀሙ? ሀ. ብተፈጥሮ (ብምስራር) ለ. ብመርፍእ ሒ. ብክልቲኦ
5. ብመርፍእ እንተኾይኑ እቲ ኣገልግት ካበይ ትረክቡዎ? ሀ. ካብ መንግስቲ ለ. ካብ ናይ ግለሰብ ሒ. መንግስታዊ ካብ ዘይኮኑ ትካላት
6. ኣብናይ መርፍእ ኣገልግሎት ሽግር ኣለኩምዶ? ሀ. እወ ለ. የብልናን
7. መልሶም እወ እንተድኣኮይኑ ብኸመይ? ሀ. ኣገልግሎት-ስለዘየለ ለ. ኣገልግሎት ወሃብቲ ፍቓድኛታት ስለዘይኮኑ ሒ. ሕፅረት ዘርኢ መ. ካልእሽግር እንተሎ
8. ኣላምሕኩም እንተድኣ ሓሚመን እንታይ ዓይነት ስጉምቲ ትወስዱ? _____
9. ኣገልግሎት ሕክምና እንስሳት ትረክቡዶ? ሀ. እወ ለ. ኣይንረክብን
10. መልሶም እወ እንተኮይኑ ኣገልግሎት ከባይ ይርክቡ?
ሀ. ካብ መንግስቲ ለ. መንግስታዊ ካብዘይኮኑ ተካላት ሒ. ካብ ግለ ሰብ
11. መልሶም ኣይንረክብን እንተኮይኑ ችግሮም ይናገሩ _____
12. ናይ እንስሳት መድሓኒት ትረክቡዶ? ሀ. እወ ለ. ኣይንረክብን
13. ሕክምናን ናይ ክትብት ኣገልግሎትን ንምርካብ ክንደይ ትኸፍሉ? _____
14. ዋግኡ ከመይ ትርእይዎ? ሀ. ክባር እዩ ለ. ሕሱር እዩ ሒ. ማእከላይ እዩ

VI. ደጋዊ ኣቅርቦት ንናይ ፀባ መምረት/ቲ

1. ንናይ ፀባ ምህርትኹም ናይ ልቃሕ ኣገልግሎት የድሊዮኩምዶ? ሀ. እወ ለ. ኣይድለየናን
2. መልሶም እወ እንተኮይኑ ልቓሕ ትረክቡዶ? ሀ. እወ ለ. ኣይንረክብን
3. እንተድኣ ትረክቡ ኮንኩም ከበይ ትረክቡ? _____

4. ልቃሕ እንተትረክቡ ኔርኩም ምህርቲ ፀባኩም ምውሳኸዶ ነይሩ? ሀ. እወ ለ. አይምወስክን
5. ብምህርቲ ፀባ ስልጠና ረኺብኩም ትፈልጡ'ዶ? ሀ. እወ ለ. አይንፈልጥን
6. መልሶም እወ እንተኮይኑ መንደ ዘስልጠነኩም? ብኸመይ ዓይነት? _____
7. ንዕብየት ምህርቲ ፀባ ናይ ቢዓል ሞያ (ኢክስቴሽን) አገልግሎት ትረክቡዶ? ሀ. እወ ለ. አይነረክብን
8. መልሱ እወ እንተኮይኑ ከበይ ይመፁ? ብዓመትክ ክሳብ ክንደይ ግዜ ይመዑ? _____
9. ንዕብየ ምህርቲ ፀባ ናይ ኢክስቴንሽን አገልግሎት ዘድሊያኩም ይመስለኩም'ዶ 1. እወ 2. አይመስለንን
10. አብ ናይ ፀባ ሕብረት ስራሕ ማሕበር አባል ዲኩም? ሀ. እወ ለ. አይኮንናን
11. መልሱ እወ እንተኮይኑ እንታይ ዓይነት ጥቕሚ ተረኽቡ? ሀ. ናይ ልቃሕ አገልግሎት ለ. ንምህርቲ ዝሕግዙ አታዊታት ሐ. ዕድል ዕዳጋ ምርኅብ ሙ. ካልእ እንተሎ
12. መልሱ አባል አይኮንናን እንትኾይኑ ንምንታይ? _____
13. ብአባልነት ምቕጻልክ ትድልዩ'ዶ? ሀ. እወ ለ. አይንደልን
14. መልሱ አይንደልን እንትኾይኑ ንምንታይ? _____

VII. ምህርቲ ፀባ፣ አጠቃቕምኡ፣ ከይዲን ኩነታት ዕዳጋን

1. በዝሒ ምህርቲ ፀባን አለኹም ዝሕለባሉ ግዜን ምረፁ
2. ፀባ አተቐምጥሉ አቓሓ ንምሕፃብ እንታይ ዓይነት መሕፀቢ ትጥቀሙ? ሀ. ዝሒ ማይ ለ. ውዑይ ማይ ሐ. ውዑይ ማይን ሳሙናን ሙ. ካልእ እንተሎ
3. እቲ ፀባ ከይተበላሸወ ንነዊሕ ግዜ ንክፀንሕ እንታይ ትገብሩ? _____
4. ብዝሒ ፀባን፣ ንባዕሎም ዝጥቀምዎን፣ ዝሸጥዎን _____

5. ምህርቲ ፀባ፣ አጠቃቕምኡ

ዓይነት ምህርቲ ንውልቆም ዘውዕልዎ (ገንዛ) ብሊትሮ/Kg ንመሸጣ ዝውዕል ብሊትሮ/kg

ጠስሚ _____

ፀባ _____

6. ስርጭት ዕዳጋ ምህርቲ ዋጋ

ዝርዝር	ዝተሓተ ናይ ዋጋ ወቅቲ
	መሸጢ ቦታ/14/
ፀባ	
ዓይነት ዓማዊል/15/	
መጠን ብመዓልቲ	
ንሓደ ዋጋ ብሊትሮ	
ኩነታት ኣከፋፍላ/16/	
ዝጎዓዘሉ ርሕቀት	
ጠስሚ/ርግኦ	
ዓይነት ዓማዊል/15/	
መጠን ብመዓልቲ	
ንሓደ ዋጋ ብሊትሮ	
ኩነታት ኣከፋፍላ	
ዝጎዓዘሉ ርሕቀት	

/14/. መሸጢ ቦታ : 1. ኣብ ገዛ መምረቲ ኣካል 2. ናይ ዕዳጋ ቦታ 3. ናብ ዓሚል ብምውሳድ

/15/. ዓይነት ዓሚል 1. ግለ ሰብ 2. ነጋዴ 3. ካፍተርያታት 4. ትካላት /ሆስፒታል፣ ት/ቤት/
5. ሕብረት ስራሕ ማሕበር 6. ካልኦት እንተለዉ _____

/16/. ኩነታት ኣከፋፍላ: 1. ብጥረ ገንዘብ 2. ብቅድመ ክፍሊት 3. ብልቃሕ 4. ካልኦትን

7. ካብ መሸጣ ትረክብዎ ኣታዊ ንምንታይ ተውዕልዎ? 1. ንመግዘኢ ጥረ ኣቅሓ 2. ንመግዘኢ ምግቢ
3. ንመምሃሪ ቆልዑ
8. ክትሸጡ እንክለኩም ንመዓልቲ ክንደይ ብር ተውዕኩ? _____
9. ምህርቲ ፀባኩም እንትሸጡ ዘሸግርኩም ወቅትታት ኣለዉ? 1. እወ 2. የለውን
10. መልሱ እወ እነተኮይኑ ኣብ ኣየኖት ወቅትታት እየም? 1. ኣብ ናይ ፆም ወቅቲ 2. ኣብ ኩሎም ወቅትታት
11. መልስኩም ኣብ ኩሎም ወቅትታት እንተኮይኑ ሽግሩ እንታይ ይመስለኩም? _____
12. ዕዳጋ ስኢ ንኩም ፀባኩም ተባላሽይኩም ይፈልጥ? 1. እወ 2. ኣይፈልጥን
13. መልሱ እወ እነተኮይኑ ክንደይ ግዜ ተባላሽይኩም ይፈልጥ? 1. ብተደጋጋሚ ግዜ 2. ሕልፍ ሕልፍ ኢሉ
14. ተጠላብነት /ተደላይነት/ ፀባ ክንደይ ናይ? _____
15. ካብ ምህርትኩም ብብዘሒ ዝሸየጠልኩም ኣየናይ? _____
16. ምህርትኩም ንጠለብ ዕዳጋ ይሸፍን? 1. እወ 2. ኣይሸፍንን
17. ብምዳይ ምህርቲ ፀባን ብኹነታት ዕዳጋን ዝገጠመኩም ሽግራት ዘርዘር?
 1. _____
 2. _____
18. ኣብ ዝሓለፉ ዓመታት ኩነታት ምህርቲ ፀባ ክመይ ነይሩ? 1. ወሲኡ 2. ቀኒሱ 3. ለውጢ የብሉን
19. መንግስቲ ኣብ ምህርቲ ፀባ ድጋፍ ገርልኩም? 1. እወ 2. ኣይገበረልናን
20. መልስኩም እወ እንተይኑ እንታይ ዓይነት ድጋፍ ገርልኩም? ክዘርዘርዎ ምካኣሉ? _____
21. ንመጻኢ ስራሕ ምህርቲ ፀባ ንምቕጻልን ምስፍሕፋሕን ድልት ኣለዎም? 1. እወ 2. ድሌት የብለይን

22. መልሶም ድሌት የብለይን እንተኮይኑ ንምንታየ? _____

9. የታን ምንጩ ሓይሊ ሰብን

1. ንምህርቲ ፀባ ዝለዓለ ኣስተቃዕኦ ዘለዎ የታ መንደ? 1. ወዲ ታባዕታይ 2. ንል ኣንስተይቲ
3. ክልቲኦም ማዕረፊዮም

2. ናይ ቤተሰብ ናይ ስራሕ ሓላፍነት ዝርዝር ደረጃ (19)

ስራሕ	ንግቕመ ኣዳም ዝበዕሕ ወዲ	ንግቕመ ሄዋን ዝበዕዕት ንል	ቆልዓ ወድተባዕታይ	ቆልዓ ንል ኣንስተይቲ	ካልኦት ኣባላት ስድራቤት	ዝተቆፀረ(ት) ስራሕተኛ
ፀራጊ						
መቐረቢ መኖን ማይን						
ሓላቢ						
መካየዲ ስራሕ ክይዲ ፀባ						
ሸያጢ						
ያን ምስራር ወቕቲ ዝቆጻፀር						
መኖ ዝዕድግ						
ኩነታት ጥዕና ዝቆጻፀር						

ደረጃ (19) 1. ዝለዓለ 2. ማእከላይ 3. ዝተሓተ 4. ኣስተዋዕኢ

