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Feasibility Study to Establish Milk Collection Centres In Bahir Dar District, Ethiopia

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Abstract*: This study has been carried out to develop a milk-marketing infrastructure to create opportunities to farmers to sell their milk with special reference to Bahir Dar District, Ethiopia. It has been done basically on the survey study. Background information of Ethiopia as well the region and related literature review has been used as supplementary materials. Bahir Dar District is found along the main road at four directions and as same time it is a capital city of Amhara Regional State, where farmers from both directions are able to bring their milk to the milk collection unit. In this district 7.3 million litres of milk per year is produced where the milk density is 3,587 litres per km^2. The study employs both qualitative and quantitative research methodology. Based on the finding from the total amount of milk produced 41% remain at home for consumption and processing. The balance 59% is brought to market for sale. This shows raw milk marketing is affected by mainly lack of milk collection centres and far distance of market, and high transport cost. These problems affect farmers' household income, compete with farmers working time, and create fluctuation of milk market. As indicated from the finding the demand of raw milk in Bahir Dar City is high and it has a deficit of 2.5 million litres per year considering of the population less than 15 years old. To overcome these and other related dairy marketing problems, establishment of milk collection centres to create a linkage between rural production areas with urban consumers is needed and feasible, and this will help to promote dairy development in the study area. Based on the above findings discussion and recommendations were made. Discussion was made on the feasibility of establishing milk collection centres in the area based on points that are essential for establishment of milk collection centres: these are high demand of milk and production (morning and evening milk). Lack of milk collection centres is the real problem of farmers; there is hydroelectric power, road in all seasons at four directions. Considering these, establishing collection centres is feasible in the district. And according to this study, recommendations are summarized as follows: A secured market and establishing of milk collection system, efficient processing and product marketing structure, marketing information system, input supply and services, and conducive environment for dairy policy should be taken in to consideration to solve the raw milk marketing problem in the study area. And issues for further study also drawn are that comprehensive policy recommendations require a more detailed study of the structure and determinations of transaction costs and their impacts on the behaviour of economic agents.*

Keywords*: Ethiopia; Amhara; Milk collection center; Productivity; Farmers*

INTRODUCTION

1.1 Research Theory

Ethiopia has the largest livestock population in Africa estimated at about 35 million TLU. However, milk production is very low and is estimated at about 1.5 million tons per annum growing at a rate of 1.4% for milk produced from indigenous stock and 3.5% for milk production from improved stock (MOA, 2001). On the other hand, the human population of Ethiopia is estimated at about 71,066 million growing at a rate of 2.7% per annum (CSA, 2004). To this effect per capita consumption of milk is 19kg/year, which is lower than the most Africa and world per capita average 27kg (ILRI open day 1996) and 100kg/year respectively. The role of livestock in food security is significant.

Milk plays a very important role in feeding the rural and urban population of Ethiopia. Rural milk accounts for over 97% of the total national milk production. Milk is daily produced, sold for cash or readily processed. It is a cash crop in the milk-shed areas that enables families to buy other foodstuffs and significantly contributing to household food security. Given the long tradition of using milk and milk products by Ethiopia society, there is no doubt that increasing smallholder dairy production and productivity would bring about a conspicuous impact on improving the welfare of women, children and the nation's population at large (MOA, 1998).

In the Amhara region, which is the highland production system, livestock is an integral part of agriculture. And they are major source of draft power and nutrient cycle to maintain the variability and environmental sustainability of crop production; are live bank, source of cash and empower their owners with purchasing power. They are important producers of food and path of agricultural intensification, contributing to the overall sustainability of agriculture.

The trends of the recent past milk consumption show that the production of milk did not keep pace with the growing population as witnessed by the declining figures of the per capita consumption over the year. Understandably, the major production constraints are under-nutrition, poor genetic potential, disease challenge, unsatisfactory management and absence of appropriate marketing structure (MOA, 1998). Thus, this has become the basis for initiating to study milk marketing situations of Bahir Dar District, which will generate data and recommendations to the government that enables to establish raw milk collection centres and later milk processing plant. So that milk in excess of household consumption could be channelled to market where highest demand for milk is available and improves the income of the farmers.

1.2 Problem Statement

Bahir Dar District (BDD) is found in Amhara region with a total cattle population of 176,000 head. The majority of cattle in the district are of indigenous Fogera breed. This breed originates from the area around Lake Tana in Gonder and Gojjam administrative zones (Amhara Region Agricultural Bureau, 2003). In the district mixed farming is a common agricultural practice.
In the rural areas of the district, milk is the most important livestock product and used for feeding young stock, home consumption and the rest of raw milk is delivered to the market. Based on the indigenous cattle population, the milk for the market (59%) is 4 million litres per year from 23,000 milking cows.

However the marketing of this milk is a major challenge for farmers. There is a potential market in the main city of the region (Bahir Dar), but farmers have to transport it for long distances of up to 30 km by either donkeys, public means or on foot into the city. Due to this far distance farmers are unable to sell their raw milk to Bahir Dar City. Instead they locally process fresh milk into butter, and cheese which increases its shelf life and this is transported to the traditional market channels. These channels are inter-household sales, exchange and rural trading centres, common weekly or bi-weekly market days. But local processing of milk decreases its quality and commercial value to the rural farmers. Butter is made by churning of sour milk and the utensils are washed by smoking which changes the odor and test of the butter. In the majority of the cases, women who process, market and control the proceeds of milk are the main losers.

The human population in the capital city is estimated at 153,000 people (CSA, 2004). Considering only population under the age 15 years old (56,767) of Bahir Dar City, a rate of consumption is taken to be 0.2 litres or a cup of milk/day or 73 litres/annum (Amhara Region Agricultural Bureau, 2003). Then a minimum total of 3 million litres will be required per year to satisfy the demand. Production in Bahir Dar District can satisfy this demand but there is a strong need to connect the milk producers in rural centres with the urban consuming areas through establishment of milk collection centres with cooling facility. In addition to this milk collection centres will promote also milk industry in the area. In principle, to produce good quality milk and butter, milk collection centres with cooling facilities are is required. Moreover, shelf life increases or the milk keeping quality is better and they can easily be distributed over large areas (Van den Berg, 1990). With this hindsight, to obtain optimum advantage from rural milk production and to address the problem of marketing, the possibility of establishing milk collection centres in the district was assessed.

1.3 Objective of the study

The overall objective of this thesis is to assess the possibility of establishing milk collection centres to address the milk market problem(s) of the farmers in Bahir Dar District.

1.4 Research Questions

Main research questions

1. What are the major problems of the farmers marketing their raw milk in the district?

2 What are the strategies required to address the raw milk marketing problems of farmers through milk collection centers in Bahir Dar District?

Sub questions

1. What are the major means of transporting raw milk to the market?

2. What is the existing and near-future market demand of raw milk in district?

3. What is the milk production potential of the district?

4. To what extent do raw milk marketing problems affect farmer's income?

5. What is the structure of milk marketing in the area?

6. How will the establishment of milk collection centres have positive impact to solve fresh milk marketing problems in the district?
7. What enables farmers to solve their milk marketing problems?

8. What are farmers' opinions about milk collection centres?

1.5. Research Methodology

The overall framework of the study is survey research. This study has been carried out on a qualitative and quantitative approach on the basis of surveys and literature. The data was collected through semi-structured questionnaires from two surveys in Bahir Dar District. The library and the Internet were the main sources of literature. Local reports found in Bahir Dar District, national/province policy documents were also used. The survey data collection was divided into two. One entirely focused with farmers views, whereas the second dealt with experts. The survey methodology is outlined in detail in chapter 6.2.

Moreover based on the results this research finally will yield recommendations to the Regional Agricultural Bureau of Animal Husbandry Department, on how the establishment of milk collection centres can address the raw milk marketing problems of farmers in Bahir Dar. The recommendations will also include what simple quality control measures that can be put in place in such milk collection centres to avoid hygienic and adulteration problems associated with milk production in this district.

1.6 Scope of the Study

This study has been limited to the Bahir Dar District of Amhara Region, Ethiopia.

Focus was mainly on the assessment of milk marketing problems of Bahir Dar District smallholder farmers, and also on the possibility of establishing raw milk marketing in the district.

1.7 Significance of the study

In areas where intensive dairying is well developed and there is easy access to formal milk marketing facilities, raw milk sales by smallholder farmers are common (Dearah and Berhanu, 1991). However, farmers far from such formal marketing outlets suffer from constraints including poor access to markets, low durability of products, absence of structured marketing system, and unattractive prices to producers. The creation of a linkage between rural areas, towns, and urban consumers, strengthening rural milk and marketing units are of paramount importance to an incentive-driven in milk production (MOA, 1998). There are no raw milk marketing structures in Bahir Dar District. Thus, this study which focuses on the establishment of milk collection centers in the district is of paramount importance to solve milk market problems in the area.

1.8 Organization of the Thesis

This chapter deals with the structure of the thesis. The first chapter provides the physical setting for this study. It includes the research theory, problem statement, and research questions, the general methodology employed, the scope of the study, and the significance of the study. The second and third chapters present the general background information of the country, Amhara Region, and a description of the study area. The fourth chapter deals with the milk collection centers to solve the marketing problems of small dairy farmers. Chapter five presents the establishment and management of milk collection centers. Chapters six presents the selection of the farmers, the methods of the data collection and analysis of data, finally the survey results. Chapter seven presents the discussion of this thesis based on the survey results and the literature facts. Chapter eight presents a synthesis of the survey study. Finally, the chapter gives recommendations to the government and closes the thesis by presenting issues for further study

2 LITERATURE REVIEW

2.1. COUNTRY BACKGROUND

2.1.1. Demography

Ethiopia has a population of 71 million people (CSA, 2004). The average growth rate is 2.7%. Ethiopia's population is highly diverse. Most of its people speak a Semitic or Cushitic language. The Oromo, Amhara, and Tigreans make up more than three-fourths of the population, but there are more than 77 different ethnic groups with their own distinct language within Ethiopia. Ethnic group estimated: Oromo 35%, Amhara 30%, Tigre 6.3%, Somali 6%, Sidama 6%, Gurage 4%, Wolaita 4%, Afar 2%, and other nationalities 6.7%. By religion: Ethiopian Orthodox Christian 45%, Sunni Muslim 40-45%, Protestant 5%, remainder indigenous beliefs. Education attendance (elementary) is 57%, Literacy 35 % (CSA, 2004).

2.1.2. Economy

Real GDP (2003) was $6.1 billion, annual growth rate (2003) –3.8%, and per capital income (2003) $92. Agriculture contributes 45% to the GDP (CSA, 2004). The contribution of livestock to the agricultural economy is significant accounting for 40%, furthermore, livestock is closely linked to the social and cultural lives of several million resource-poor farmers for whom animal ownership ensures varying degrees of livelihoods, sustainable farming, and economic viability. At the household level livestock enhances income, provides food security and social status. See Table 2.1 number of householders owning livestock in the country.

Table 2. 1 Number of holders by sex of holder and type of holding, 2001/2002

Sex of holder	With crop only	%	With livestock only	%	With crop & livestock	%	total number of holders	%
Male	1,485,256	16.3	444,417	4.9	7,156,997	78.8	9,086,670	100.0
Female	497,729	24.3	340,772	16.6	1,213,760	59.1	2,052,261	100.0
Total	1,982,985	17.8	785,189	7.0	8,370,757	75.1	11,138,931	100.0

Excluding nomadic areas

Source: Central Statistic Authority, 2004, Addis Ababa.

2.1.3. Dairy Sector in Ethiopia

Livestock is raised in all of the farming systems of Ethiopia by pastoralists, agro-pastoralists, and crop-livestock farmers. Milk production systems can be broadly categorized into urban, peri-urban, and rural milk production systems based on location (Table2.2). Both the urban and peri-urban systems are located near or in the proximity of Addis Ababa and regional towns and take the advantage of the urban markets.

The urban milk system consists of 5,167 small, medium, and large dairy farms producing about 35 million liters of milk annually. Of the total urban milk production, 73 % is sold, 10% is left for household consumption, 9.4 % goes to calves and 7.6 % is processed into butter and ayib (cheese). In terms of marketing, 71% of the producers sell milk directly to consumers (http://www.ifpri.org/events/conferences/2003/.pdf.06/07/04).

The peri-urban milk system includes smallholder and commercial dairy farmers in the proximity of Addis Ababa and other regional towns. This sector controls most of the country's improved dairy stock. The rural dairy system is part of the subsistence farming system and includes pastoralists, agro-pastoralist, and mixed crop-livestock producers mainly in the highland areas. The

system is non-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 the herd size and production season, and access to a nearby market. The surplus is mainly processed using traditional technologies and processed milk products such as butter, ghee, ayib, and sour milk are usually marketed through the informal market after the households satisfy their needs.

The dairy sector in Ethiopia can also be categorized based on market-orientation, scale, and production intensity. Doing so identifies three major production systems: traditional smallholders, privatized state farms, and urban and peri-urban systems (Gebre Wold, et al.2000) in (http://www.ifpri.org/events/conferences/2003/6.pdf.06/07/04). The traditional smallholder system, roughly corresponding to the rural milk production system described above, produces 97 percent of the total national milk production and 75 percent of the commercial milk production. This sector is largely dependent on indigenous breeds of low productivity native zebu cattle, which produce about 400-680 kg of milk /cow per lactation period. The state dairy farms, now being privatized or in the process of privatization, use grade animals (those with more than 87.5% exotic blood) and are concentrated within a 100 km distance around Addis Ababa.

The urban and peri-urban milk production system, the third production system, includes small and large private farms in urban and peri-urban areas concentrated in the central highland plateaus. This sector is commercial and mainly based on the use of grade and crossbred animals that have the potential to produce 1120-2500 liters over 279-day lactation. This production system is now expanding in the highlands among mixed crop-livestock farmers, such as those found in Selale and Holetta, and serves as the major milk supplier to the urban market.

According to RDPS (2001) with the downfall of the Derg regime in 1991, Ethiopia has embarked on policy reforms that aim to bring about free-market-oriented economic system. Several macro-economic policy changes were implemented. The exchange rate policy was altered from a fixed-rate system to a more market determined system. The former systems of price controls have been discarded, leaving market forces to set prices while other restrictions, which had served as barriers to entry into the market, have been abolished. Although no clearly defined dairy development policy existed. It was envisaged that the dairy policy would move increasingly towards private sector-led development. The private sector has begun to enter the dairy market as an important actor.

Table 2. 2 Structure of demand for milk production in Ethiopia, 2000

	Households			
Milk products	Rural	Per-urban	Urban	total
Raw milk consumed by calves	32%	13%	9%	32%
Raw milk consumed by humans	15%	8%	10%	15%
Farm household	2%	59%	61%	4%
Marketed				
Butter	41%			40%
Cheese	9%	20%	8%	9%
Pasteurized milk	1%	0%	12%	1%
Total milk %	100%	100%	100%	100%
Million of litres	1115	15	20	1135

Source: (http://www.ifpri.org/events/conferences/2003/6.pdf.06/07/04)

2.4 Dairy Marketing System in Ethiopia

In Ethiopia, most milk and dairy marketing occurs through the informal sector. Almost 88% of all urban milk is supplied as raw milk through the informal market, largely by small producers. Few large farms or collective marketing organizations existed (http://www.ilri.cgiar.org/research/proj6/pol-br06-cfm.06/07/04).

As is common in other African countries (e.g., Kenya and Uganda), dairy products in Ethiopia are channeled to consumers through both formal and informal dairy marketing systems (Annex 2). Until 1991, the formal market of cold chain, pasteurized milk was exclusively dominated by DDE, which supplied 12 percent of the total fresh milk in the Addis Ababa area. Recently, however, private businesses have begun collecting, processing, packing and distributing milk and other dairy products. Still, the proportion of total production being marketed through the formal markets remains small. Formal milk markets are particularly limited to peri-urban areas and to Addis Ababa. However, unlike the early phases, the formal market appears to be expanding during the last decade with the private sector entering the dairy processing industry in Addis Ababa and Dire Dawa in the eastern part of the country.

The DDE remains only the parastatal enterprise involved in processing and marketing dairy products. The DDE collects milk for processing from different sources, including large commercial farms, collection centres that receive milk from smallholder producers. The enterprise at present operates 25 collection centres located around Addis Ababa, 13 of them near Selale, 5 near Holetta and 7 around Debre Brehane. The state dairy farms were the dependable source of milk for the enterprise supplying more than 45 percent of the total milk for processing between 1983 and 1991. In addition to DDE, several private milk-processing plants have been established in Addis Ababa, two of which Sebeta Agro-industry and Dinsho dairy industries have already started marketing their products.

Although, their share of the market is still small compared to DDE's. The entry of private firms in the formal milk market is a significant development indicating the profitability and potential of private investment in dairy in Ethiopia and that the policy environment is facilitating such entry. In recent years, promotional efforts have focused on dairy marketing. Milk marketing co-operatives have been established by the SDDP with the support of Finnish International Development Association. These groups buy milk from both members and non-members, process it and sell products to traders and local consumers.

The informal market involves direct delivery of fresh milk by producers to consumers in the immediate neighbourhood and sale to itinerant traders or individuals in nearby towns. 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 relative share and growth of the formal and informal market in the three phases was different. In all three phases, the informal (traditional) market has remained dominant in Ethiopia. The traditional processing and trade of dairy products, especially traditional soured butter, dominate the Ethiopian dairy sector. Of the total milk produced only 5 percent is marketed as liquid milk due to under development of infrastructures in rural areas (http://www.ifpri.org/events/conferences/6.pdf.06/07/04).

2.5 Dairy Breeding Policy

There was a policy proposal, prepared by the ministry of agriculture in 1985 for Government decision. The proposal was to conduct an inventory of the livestock situation in the country and set priorities regarding the types of livestock productions that are suitable for the different agro-ecological zones in the country. Due to access of feed the proposal recommended practicing pure-breeding of Friesian cattle in urban dairy systems and large-scale government farms and the selection of superior sires for AI. The proposal also suggested producing and maintaining Friesian and Jersey crossbred (50% -75%) with indigenous cows and their distribution to smallholder farmers. The proposal suggested the Friesian and Jersey breeds to be linked with feed availability and the potential market for liquid milk. The policy recommends Jersey cross for areas where milk had to be processed before reaching market and where the feed availability is less promising. In addition, the proposal gave also significant consideration to the indigenous breeds and recommended their development for crossbreeding programmes and preservation.

Furthermore, the policy proposal indicated that the National AI Scheme should adopt a strong and functional organization that can win the farmers' confidence and also the necessity of a well-organized national dairy recording scheme that works in close co-operation with the National AI Scheme. Recently, a draft proposal for a new livestock breeding policy has been prepared by the Ethiopia Agricultural Research Organization with the general objective of attaining sustainable increase in cattle productivity and socio-economic development. Achievement of self-sufficiency in milk and milk products in both quality and quantity is one of the specific objectives of the draft policy.

It has been indicated in the policy that cattle breeding program in Ethiopia shall take into account the different agro-ecological zones and shall be implemented in accordance with socio-economic conditions prevailing in the areas. The policy promotes the developed use of indigenous and exotic animal breeds, having superior production traits that are relatively more tolerant to diseases, environmental stress and sub-optimal nutritional conditions. It also emphasizes the need for conservation of indigenous genetic resources (MOA-draft, 2001).

According to this draft policy in Ethiopia, different breeding research centres in different ecological zones are established and they are trying to crossbreed the Friesian dairy breed to the best local adapted breeds. The breed, which is produced by crossbreeding, is disseminated to the farmers by long term credits but the problems are no follow up feedback mechanism whether they are producing as like on station or not and the policy also not clearly underlying the milk collection centres. In practical the milk collection center is only practiced near to the capital city of Ethiopia, and the draft policy official should be supported or approved. Except these the draft policy is already designed on the basic points such as it indicates breeding zones based on the current distribution of breeds, objectives of livestock keeping, the physical environment, socio-economic conditions, prevailing farming system and availability of infrastructure (MOA-draft, 2001).

Conclusions

It can be concluded that due to poor infrastructure, concentration of milk producers in rural areas, and perishability of milk, development and promotion of small-scale processing technologies is critical to increasing smallholder producers' participation in the dairy market. In addition, enhancing the ability of poor smallholder farmers to reach markets, and actively engage in them, is one of the most pressing development challenges. Milk groups and co-operatives increase the participation of smallholder in fluid milk markets in the Ethiopian highlands. Due to lack of formal marketing system in Ethiopia the informal (traditional) market has remained still dominant.

The review of the development of dairy sector in Ethiopia indicates that there is a need to focus interventions more coherently. Development interventions should be aimed at addressing both technological gaps and marketing problems. If the appropriate producer price incentives are in place and input markets are allowed to operate freely, dairy production may respond positively. As it has been clearly mentioned in the chapter 2.5 dairy breeding policy is not clearly indicated about the milk collection centres except that the draft policy mentioned the basic elements to be considered when the breeding zones is established, like physical environment, socio-economic conditions, prevailing farming system and availability of infrastructure.

3. AMHARA REGION BACKGROUND INFORMATION

This chapter provides the background information of the Amhara region as well as Bahir Dar District in particular. It also deals with the description and features of the district. Consequently, it also discusses the farming system of the district.

3.1 Background Information of the Region

The Amhara National Regional State (ANRS) is located in the north central and north western part of Ethiopia, approximately between $9^0$21' to $14^0$0'N latitude and $36^0$20' to $40^0$20'E longitude (ANRSRHSEBS, 2003). ANRS has eleven administrative zones with 113 districts. One of the districts is Bahir Dar District (BDD). The population of the ANRS is urban 1.9 million and rural population is 15.7 million total 18 million. From the total population of the region 89% live in rural area and also means of subsistence is depending on agricultural activities. The region is an agricultural area with diversified agro-climatic conditions and has a total area of 159,173.66km^2. The altitude, annual rainfall, and the mean temperature range 500-4620.meters above sea level, 200-1600 millimetre and 10-25 degree centigrade respectively (CSA, 2004).

Based on the diverse agro-ecological conditions prevalent, various agricultural activities are practiced with unwise management of the natural resources, which results a tremendous loss of topsoil, attribute to low productivity of crop and livestock.

The region has large numbers of livestock, with population the estimated to be 22.5 million. Its density of human and livestock is 111 and 141 per km^2 respectively. At present 24.43% of human 40% of the national livestock is found in Amhara region where over 85% human and 60% of livestock of the total is distributed in the medium and highland areas (ANRSBOA, 2002). The region is broadly divided into two major parts, wet western (51%) and dry eastern (49%) on the basis of the amount and

distribution of the annual rainfall influenced by agro-climatic conditions (CSA, 2004). The region's economy and social progress depends largely on agriculture. Agriculture is the main occupation, mixed crop and livestock farming system is the basic economic activity especially in the medium and highland areas (ANRSRDB, 2003).

3.2 Food Security

Among the different goals, the Agricultural development Led Industrialization (ADLI) aims at ensuring food security at household level (RDPS, 2001). Out of the 106 rural districts in the region, 52 were categorized as food insecure. The food poverty line that provides the minimum food requirement per adult per annum was very low in the country in general and Amhara Region in particular. Food insecurity is more prevalent in rural areas, where the majority of the population lives than urban centres. The economy of the region is highly dependent on agriculture and an estimated 90 percent of the population gains its livelihood directly or indirectly from agricultural production. The region is one of the surplus crop producing areas of the country. However, the situation at the household level is quite different and most rural households are facing severe food shortage problems throughout the year. Due to this, the region is suffering from both chronic and acute food insecurity problems. This is mainly caused by insufficient and scarce agricultural productivity, severe land degradation and poor soil fertility, erratic rainfall, lack of alternative off-and non-farm income, lack of appropriate technology, and absence of marketing and credit facilities (Rural Development Bureau, 2003).

3.3 Description of the Study Area

3.3.1 Location

Bahir Dar District is located in the western part of Amhara National Regional State, found at the surrounding of the capital city of the ANRS called Bahir Dar City. And also located between latitudes from$11^0$36'N to $37^0$25'E longitudes. The total land area is 2062.62km^2. The area is varied with altitude ranging 1500 to 2300 meters above sea level (CSA, 2004).

3.3.2 Topography

Almost all (60%) part of the district is characterized by plain area, and the rest is 11% mountainous and 29% covered by water. Deforestation is the main challenge of the area. Due to smallholdings of arable land, farmers use and cultivate very sloppy areas for crop production (BDDRDO, 2003).

3.3.3 Climate and Soil

The areas are varied with average annual rainfall and mean temperature ranging from 800-1250mm and 13.4-27.9^{0}c respectively. The rainfall is seasonal from early June to mid-October. The soil type and texture varies from place to place. In most part of the area, the soil is black (56%), red (34%) and brown (10%) (BDDRDO, 2003).

3.3.4 Infrastructure

The district has four direction of road to the main capital city of the region. These are all weather roads, electricity and telephone line. The city of Amhara region (Bahir Dar) is also the capital city of the district as well, and it is accessed the entire infrastructure from the capital city.

3.3.5 Land Use

Based on the physical condition of the area the land use system is classified as follows.

Table 3.1Land uses system

Land classification	Hectare	percentage
Arable land	64777	39
Grazing land	21823	13
Bushes and shrubs	13099	8

Water body	47751	29
Waste land and residential area	18172	11
Total	165622	100

Source: District Rural Development Annual Report, Bahir Dar, 2003

3.3.6 Human Population

The human population of the district is estimated at about 256,901 from this 244,189 live in rural area and 12,712 urban. And its density per km^2 is calculated to be 125 (CSA, 2004).

3.3.7 Livestock Population

In the district numerically there is large number of livestock population. According to the data from the district office of Agricultural development the livestock number is estimated to be 199,682 head (District Agricultural Office, 2002). Livestock production is part of a mixed subsistence farming system. Among the livestock population the number of cattle is estimated to be 176,075 head. The dominant cattle are Fogera breed. This breed originates from the area around Lake Tana in Gonder and Gojjame administrative zones. The Fogera animals are used as a source of draught power, meat and milk. They are generally of large size, being tall animals with long legs. Their hair coat colour varies; white with black spots or pure white being the two most commonly found. Most of their characteristics (small horns, very large dewlap and pendulous naval flap) indicate the cattle as being zebu (Alberro and Solomon, 1982).

3.3.8 Milk Marketing

The success of agricultural development depends among other institution, on the existence of an efficient marketing system. Therefore, agricultural marketing must be treated as one of the major elements for the development of agricultural systems.

In the district and around the capital city of the region there are no milk collection centres and there is no specific infrastructure for milk marketing. Milk marketing is done by informal ways, farmers in the morning; carry their milk and move house to house selling their milk. According to Amhara Rural Development Bureau households' socio-economic baseline survey (2003) the price of milk and butter varies in season, when in dry season and holiday time the price is increased, where as in fasting time and rainy season the price goes down. The average buying and selling price information collected from the traders and consumers is shown in table 3.2

Table 3.2. Traders and consumers information on dairy marketing

Location	Type of dairy product	Average buying price	Average selling price	Profit	Main consumers
Bahir Dar city	Milk	1.75	3	1.25	consumers
	butter	21.5	22.5	1	traders

Source rural development bureau (2003) socio-economic baseline survey

3.3.9 Farming System

In Bahir Dar District mixed farming system exists, crop residues are the livestock feed and is increasingly becoming the basal feed source. This is more manifested with the expanded encroachment of crop farming on to grazing and marginal lands triggered by the rapid increase in population and the resulting shortage in arable land. However, the optimal utilization of crop residues and crop aftermath are constrained by their low quality particularly in protein content and the level of digestibility. This thesis mainly focuses on mixed farming system in Bahir Dar District (see annex-3)

3.3.9.1 Household

Concerning household-size, on average each household has about 4 persons. However, the household-size ranges from a single-person household to household hosting more than 8 persons. The single person household ranges 4% up to 7%. Members of the households are engaged in different activities. Of the total population aged 7 years and over, 34 percent are farmers, 13 percent are cattle herders and 4 percent of them are engaged in different activities, including petty trade and the informal sectors. While the remaining 49 percent of the population-aged 7 years and older are not economically active, they are homemakers, students or disabled. Moreover, significant gender difference is noted in the distribution of primary activities. As expected, the majority of male population's (65%) engaged in farming, while only 8% of females are farmers (ANRSBPED, 1999).

3.3.9.2 Crop Production

Average holding size is a little over 2.5 ha. The land belongs to the state. They can rent, sharecrop or lend out land. The process of fragmentation and diminishing farm size negatively affects efficient use of land. Fallowing has become impossible owing to high population pressure as reflected by the decline of farm size. Teff, maize, barley and Africa finger millet are the dominants of the cropping pattern. Maize and teff shared the largest percentage, cover 35%and 25%respectively. And other cereal crops and pulses, oilseeds are also cultivated occupy 40% of the arable land. Crop residuals are mostly used for livestock feed during the dry season.

3.3.9.3 Agricultural Labour

Small holders rely mainly on family labour to undertake farming activities. Supplementary source of labour comes from labour exchange and hired labour. Labour exchange in the form of "Debbo"[1] and "Wonfel"[2] is respectively 15.4% and 38.6% of the farmers (ANRSRHHSES, 2003). The use of hiring labour is limited due to the smallness of the farm size and the subsistence nature of the production process[1]. The role of women to be much important in weeding, planting, harvesting and transporting than in land preparation, mowing or threshing.

Decision-making - the decision making structure of men and women in rural household in mainly on how much of the harvest to sell, on what to purchase, on saving and expenditure, on division of labour. Of these 75% both make decision jointly except labour allocation this mainly done by men.

3.3.9.4 Use of Fertilizer and Manure

The extent of fertilizer use is different according the type of crops, for teff 88% use fertilizer and for maize 95%of the total cultivated area. And the rate of application varies in relation to the soil, crop types. The use of manure is very limited. Only 9.2% 0f the households used manure.

3.3.9.5 Use of improved seeds and chemicals

Improved seeds are widely used for maize and teff specially, maize 75%and teff 48% of the growers. Access to improved seeds is gained through the extension program and most of the farmers believed to be participants. Very few farmers use chemicals.

3.3.9.6 Livestock

Livestock constitute an important component in the subsistence farming systems of the area. Livestock used as source of income, food and means of production. Local breeds farmers own on average 1.37 cows, 1.58 oxen, 3.03 sheep, 4.6 goats, 2.66 chickens, 1.33 heifers, 2.96 beehives, 1.36 calves and 1.26 donkeys (ANRSBPED, 2000). Farmers buy and /or sell animals depending on the stock available and their needs. The largest animals bought and sold are sheep and chickens. The major problems in livestock are lack of grazing land/feed (40%) and lack of veterinary services/diseases (9.7%). The first-rank source of feeds for farmers is grazing land/native pasture (67.6%); the second and the third important source of feeds are crop residue (25.2%) and hay (7.2%). Eggs, hides and milk are the sources of incomes (ANRSRDB, 2000). In the district there is dairy cattle breeding centre and also near by the district one cattle breeding ranch to supply heifer, heifers are facilities to improve the genetic make-up of cattle at the required level and can directly contribute to dairy development.

3.3.9.7 Livestock health

[1] "Debboo" refers to labour in which several farmers jointly work for one particular farmer who serves food and drinks.
[2] "Wonfel" involves agreement among close farmers (often two or three) to work together on their respective plots.

Livestock diseases are serious constraints in the district and limit the production through increased mortality rate and negative effects on fertility, growth, meat and milk production. Diseases also limit the contribution of exotic breeds to livestock development. The major diseases in the area are Anthrax, Blackleg, Pasteurallosis, Foot and Mouth disease, and internal and external parasites.

3.3.9.8 Extension

Agricultural extension has been given due attention to disseminate new idea to rural people and as a policy instrument. Farmers and their formal and informal institutions, as part of the main actors in development activity had been addressed in the extension service, although the degree of addressing these actors (farmers, and their organization) was not as intended. Hence, there is still gap between the extension services given to farmers and the actual situation in rural areas. This gap has brought a negative impact on the outcome of the planned extension programme due to the fact that farmers' participation was not taken as a precondition for the success of the extension service. There was a common thinking that farmers are ignorant and do not know anything. The common extension approach was also known as transfer of technology which means technology was generated somewhere in the research area and then transferred to farmers by assuming that they will accept it easily.

Nowadays, the approach has changed and every concerned institutions have begun to think that farmers have knowledge too that could solve their problems. Development planners, researchers, extension workers etc., have started to bring farmers at center stage to ensure success of any rural development activities. The current extension service given by Bureau of Agriculture is trying to sensitize the feeling of farmers and to understand the gap in the production system. Every regular time field visits have been conducted to assess the farmers' problems and workshops have been organized by inviting the target groups to listen their perception.

In general extension service enables farmers to adopt new methods of farming; about 80%of the households receive information on modern farming from extension workers. The second important source of information for farmers is other farmers. The system is participatory approach.

3.3.9.9 Co-operatives

Farmers' co-operatives are one of the many institutional mechanisms through which farmers receive different services. The numbers of farmers who are members of service co-operatives are about 85%. The co-operatives provide the farmers consumer goods (20%), input (75%), and grain mill service goods (5%). Regional government through service co-operatives offers credit especially for seed and fertilizer. Farmers are required to make down payments and pay interest on the loans for seed and fertilize. In Bahir Dar District at present there are 11 basic service farmers' co-operatives, moreover these and from other districts basic service co-operatives form one union in Bahir Dar City. Out of these co-operatives no one engaged in processing and marketing activities of animal products (dairy products).

4. MILK COLLECTION CENTRES TO SOLVE MARKETING PROBLEMS OF SMALLHOLDER DAIRY FARMERS

4.1 Introduction

In this chapter, special focus is given to problems of milk marketing in the developing countries, how milk collection centres are organized by other countries and who are involved in milk collection system. In addition to this the importance of milk collection centres and limitations of local marketing of milk will be discussed. Finally the experience from other countries will summarize for analysis of the result.

4.2 Marketing Problems of Small Dairy Farmers in Developing Countries

Dairying provides one of the most cost-effective methods of converting crude animal feed resources into high-quality protein rich food for human consumption. However, the daily production of a perishable commodity with high water content demands special consideration to ensure that it reaches the market in an acceptable condition. An infrastructure to collect, process and market milk is an essential prerequisite for the development of dairy. This is particularly important in developing countries where the absence of a system to collect, process and market milk has been one of the key constraints to the development of dairy.

Agrawal (1987) also mentioned that in the second half of this century, dairying in developed countries has undergone a rapid concentration process. Essential prerequisites for this process were: ready availability of cheap milk chilling facilities on the farms and in the milk collection centres, an excellent transport infrastructure and high cost of labour. In developing countries, on the other hand, lack of rural electrification, deficient roads and far distance, lack of organized milk collection centres. And also high cost transportation, collection and distribution are the key problems of milk of milk marketing. As far as the milk marketing is concerned, it is only possible if a quality based milk collection set up is introduced for rural community at village level (http://:www.worldvet.org/display article 1186.html.13/07/04)

Most of the animals in developing countries are in the hands of small producers who have limited access to markets. This must adopt the integrated approach to develop links between the rural producer and the urban consumer. This will involve the establishment of an infrastructure in collection, processing, transport, storage and distribution. Agrawal (1987) indicated that in Europe and to a lesser extent North America, producers have organized themselves in co-operatives to provide cost-effective inputs and service to enhance production and have developed processing and distribution system and the linkages between producers and urban markets have been developed.

The dairy industry in New Zealand is vertically integrated through farmers' co-operatives and links with national and global markets for milk and milk products. Operation flood in India is perhaps the best known example of producers' involvement increasing marketing links between the rural smallholder and sometimes landless milk producer with the urban markets (Phelan, 1993).

4.3 Milk Collection Centres

A common feature of dairy in developing countries is that milk production areas are situated long distances from the centres of consumption. In areas lacking infrastructure, poor road structures make collection costs inordinately high in proportion to the value of the milk. Where quality or cost considerations limit direct access to liquid milk markets, village milk collection units should be established. These village units are the basic activity cells of the milk marketing.

According to Barron del Castillo (1990) in areas where infrastructures are not well developed dairy market can be achieved by the organization of a system for milk collection centres. The milk collection centres, located in a rural area, become a point at which producers come together daily for a common purpose and often exchange ideas on matters of common interest. They share a common aim of obtaining a fair price for their product.

4.3.1 Objectives of Milk Collection Centres

Milk collection schemes are described as ways of increasing off-take and of stimulating increased production. And the advantages of milk collection centres organization are:

- Producers are regularly paid and given an incentive for quality production
- Milk is collected economically and transported to the plant efficiently
- The milk is not adulterated and is clean and of good keeping quality
- The supplying producers' deliveries are accurately measured

As Schulthess (1990) mentioned that milk can be easily adulterated and lose its quality quickly and so, well organized and well controlled collection system in the interests of all involve-producer, processor and consumer- gives advantage to control the problem.

In addition to the above objectives milk collection centres have additional function in terms of one yield control of dairy cattle. Milk records of individual lactation's of cows are usually maintained and this helps to identify the promising dairy cows for further use for breeding. The second function is co-ordination of breeding services with milk collection centres. In most developing countries the decentralized use of breeding bulls is replaced by artificial insemination (A.I.) with the dual purpose of making best use of particularly valuable sires and of avoiding the spread of breeding diseases.

The third function is control of mastitis; most managers of milk collection centres in developing countries pay little or no attention to the mastitis problems. In many cases, the occurrence of mastitis is first detected through observation of milk clots or blood clots on the milk sieve at the collection centres or points. This implies that the prohibition of milk sieving by the

producer himself is strictly enforced. In the best interest of milk quality assurance and of the producer himself, such observation of milk clots or blood clots calls for the control of each animals.

Azage (2002) also support the above ideas by suggesting that through establishment of milk collection centres in the district, particularly in remote rural area communities, the socio-economic benefits to the farmers as well as the country will increase. This is due to that milk collection centres ensure urban-rural linkage for dairy development in the district, assist farmers to form milk units and establish milk union at district level and increase production and productivity of dairy farms and improve the overall incomes of the farmers.

According to Richard (1993) to encourage farmers in increasing milk production the provision of guaranteed market, transport and storage facilities should be fulfilled. However, collection in itself does not increase production, but facilitates milk off-take. A necessary condition for increased milk production is the provision of assured marketing outlets that are sufficiently remunerative to producers.

4.3.2 Milk Collection and Marketing System

Milk collection can be done by the consumer, in such a way that consumers directly collect milk from the farm, trader or by collection networks of the producers or processors. Milk processing may be done at the farm, village, regional or national level. Milk marketing can be direct from producer to consumer or at increasing costs through organizing channels of traders, processors, wholesalers, retailers, shopkeepers, milk bar operators and supermarkets.

Milk is bulk, heavy, and highly perishable containing more than 80% water and it is difficult to transport (Richard, 1993), and is produced by large numbers of small farmer families, requiring an agile system of transport to the consumer or transformation into products with a long shelf life (butter, ghee, sour milk, cheese, pasteurized or sterilized milk, condensed milk or milk powder) (Rijk de Jong, 1996).

The farmers can take milk to the dairy plant themselves or the plant at the farm or certain collection points can pick it up. Farmers who bring their milk to the plant obtain a higher price than farmers whose milk is picked up, because the plant spared the expense and problems of collection. In some areas sometimes, one farmer undertakes his neighbors' milk together with his own milk to the dairy plant.

Van den Berg (1990) mentioned in his book that the organization of milk collection centres by the dairy plant itself has the advantage that the plant has full control of running the collection according to a certain time schedule.

According to Empson and Bachmann (1990) milk collection systems in use throughout the world can broadly be divided into five main types based on their internal facilities and their capacity.

- Small-scale, local marketing with dealer system
- Small-scale, distance marketing from rural processing plant
- Small-scale, distance marketing with raw milk transport
- Large-scale, organized marketing system with a milk procurement system consisting of collection points and collection-cum-chilling centres, supplying processing plants.
- Large-scale production and marketing systems

4.3.2.1 Small-Scale, Local Marketing with Dealer System

This basic system was to be found in Europe a century ago and is still in general use throughout all developing countries. The producer is a small holder owning only a cow or two. The milk is produced for the farmer's family and the surplus is sold locally or converted into a storable secondary product.

In these circumstances, a dealer system usually arises in which a middleman collects the surplus milk, carries it to a market in near-by villages or towns and then sells it on to the consumers. The dealer may also manufacture simple dairy products as a means of utilizing surpluses and storing milk. It is very simple, flexible system. It is economical with low costs using "bicycle boys". Milk is sold "loose" without added cost for a container. The price gap between producer and consumer is thus kept quite

narrow. There are several disadvantages of this system. The first is a lack of formal quality control. Empson and Bachmann (1990) stated that in this system adulteration is common practiced and a further disadvantage of this very simple system is that the distance over which milk can be marketed is rather limited.

4.3.2.2 Small-Scale, Distance Marketing from Rural Processing Plants

This system has been and is still in use in several European countries. It has even seen a comeback in the form of small farm-type cheese factories in countries (e.g. Holland, England etc.) where centralized milk processing in huge dairy plants has been the rule for the last few decades. Small-scale, distance marketing with rural processing units has also been introduced into a number of developing countries. Cases in point are e.g. Nepal, Afghanistan, Peru, Ecuador etc (Empson and Bachmann, 1990)

The relative short distance between milk producer and processor has several advantages. The processor is in daily contact with the milk suppliers. Quality control can be performed in the presence of the suppliers' advice on animal husbandry, milk hygiene; feeding etc. reaches the suppliers immediately. Adulterations can be dealt with in the presence of the suppliers. The relative nearness and personal contact between producers and processor is an excellent precondition for the organization of local dairy co-operatives. Decentralized rural milk processing in many small units has additional advantage of creating many additional jobs in the countryside, which counteracts rural exodus. Disadvantage of the system may be lack of electricity, a safe water supply and modern means of communication.

4.3.2.3 Small- Scale, Distant Marketing with Organized System

Without physical (cooling and/or heating) or chemical treatment

Village collection centres are established under the control of the plant management, dealers, co-operatives or producer associations. Under the better run schemes, milk is collected both morning and evening and rapidly transported to the cooling and/or processing depot. This prevents the problem of preserving evening milk overnight. The producers carry their milk to the village collection point where it is measured and tested for payment. The best known example of this is India. It is termed the "Anand Model", based on the co-operatives organized in the Anand area of Gujarat (see Figure 4.1).

With Physical (Cooling and/or Heating) or Chemical Treatment

An advance on the above system is that bulk storage vats (for refrigeration or other treatment) are used, and coupled with them, tankers are used for transport instead of churns. Heating to a temperature between 60 and 70^{o}c, combined with cooling (tap water), is an alternative to chilling. Cooling to tap water temperatures is much cheaper than mechanical refrigeration. Furthermore, milk treated in such a way is of better hygienic quality than chilling milk since practically all pathogenic micro-organisms which might be present and over 90% of the microbial flora are eliminated. In a system of this kind, milk can be held for a period and, in certain circumstances, alternate day collection by tanker can be arranged. The bulk storage vat takes on the additional role of a bulking and storage unit. Refrigerated storage vats are incorporated into the collection systems of a number of developing countries of which China, Kenya, and Uganda represent examples (Empson and Bachmann, 1990).

4.3.2.4 Large-scale Organized Marketing

Where there are large towns or cities, their need for milk extends the supply area well beyond their immediate vicinity. This can provide an opportunity in a dairy development scheme for many small producers over a wide geographical area to participate in a new and growing market. In such cases a three-stage procurement system is necessary. The first stage is a village collection point to which the producers carry their supplies morning and evening. The milk is the carried in churns to an intermediary assembly point. Carriage in this case may be undertaken by cart or by motor vehicle. A producer cooperative or association will usually be organized at each collection point or a dealer may organize it.

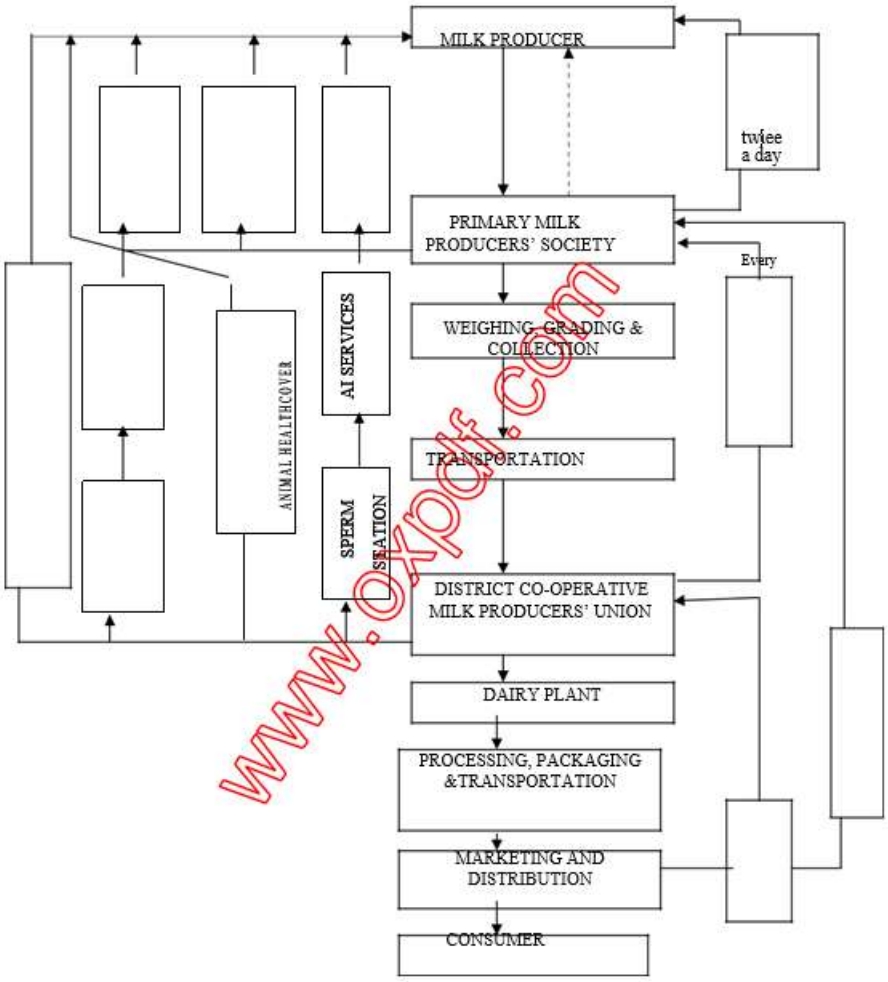
At this second stage the milk is bulked and chilled. The unit may consist of a refrigerated bulk tank, acting both as the means of storage and cooling, from which supplies are collected by tanker and carried on to the city plant. Large-scale units may be designed as comprehensive milk depots.

At the third stage, the city plant, supplies from a number of associated country depots are processed for sale to the public. A dairy company or a parastatal organization may operate this plant. This three-stage structure is becoming more widely adopted. Kenya, Malawi, Uganda and Sudan are examples in Africa. India, Sri Lanka and China are cases in point in Asia. The largest

and most highly developed example is India (Empson and Bachmann, 1990). It has been built up under the "Operation Flood" programme over the last 20 years. The three level structures that are used in India are shown in *Figure 4.1*.

4.3.2.5 Large- Scale Production and Marketing System

Production units of 50 milking cows or more may be placed in the large-scale unit category. Each of such units would be equipped with a refrigerated bulk vat. This could now be regarded as the typical or usual situation in developed countries, including much of Europe, North America and Australia. The milk is collected every other day and transported directly to a plant for processing or manufacture. Samples for testing are taken at the farm and measure is dipstick or meter.



Source: International dairy federation special issue no 9002

Figure 4.1 Co-operative milk producers' organization and pattern

Based on the above systems, there are certain marketing principles to be considered when establishing a milk collection system. They are determined by the basic characteristics of milk as a product, size of the production units, density of milk production and distance to and type of market. These lead to a variety of systems incorporating different measuring and testing arrangements. Careful consideration of all these factors is necessary against the background of the particular case under consideration.

4.4 Experiences with Raw Milk Collection Centres

In order to encourage the production of milk and earn income from milk, the small-scale producer needs a secured outlet and some assurance of price. To achieve these two requirements, there is a need, as a foundation, for organization in the marketing

of milk at two levels. The first is at the initial collection stage where the producer needs the certainty of the secure outlet of a well-organized milk reception system. The second is at, what might be termed the national level, where an organized link is required with potential imports and the world dairy produce market so as to ensure that the domestic producer can secure a competitive place in the market and an assurety of price.

The aim of a milk collection organization is to provide a secure outlet for producers and to obtain a sufficient of supply for local selling and a simple processing unit or for dispatch to a central processing plant. An association or co-operative of local farmers, usually based on a village, is established as the organization base. A carefully planned routine has to be instituted by which supplies are measured, tested and recorded with payment being made at agreed intervals. The collection centres can also form a focus for other activities such as the sale of feed and chemicals, artificial insemination services and the dissemination of technical information.

India is a country where the concept of the village milk co-operative has been most highly developed both in numbers and in scale of organization. It is a country well suited to this development with a well-defined village structure, intensive areas of production, a preponderance of small village producers and a high appreciation of the value of milk. 'Operation Flood', the scheme for the development of milk production in India, can be regarded as a model of this type of organization (John, 1992). The co-operative genuinely managed by the farmers themselves, they demanded inputs required to increase production such as concentrates, veterinary services and breeding services. These were provided to them by their own organization, which today has emerged as the largest dairy co-operative in India.

The village producers' co-operative or association is, however, basic to dairy development generally. Turning to Africa, village co-operatives form the link in Kenya between smallholder production and Kenya co-operative creameries, the central processing organization. In Malawi, farmer associations, known as 'bulking group', form the foundation of the supply network of, again, the central processing organization, Malawi Milk Industries. In the north of Tanzania, in Kilimanjaro region village co-operatives undertake simple packaging and link the outlying districts to the urban milk markets. Empson and Bachmann (1990) mentioned that general milk collection centres organized under three forms of business structure: government or parastatal organization, private companies or individual businesses and co-operatives or organizations of producers.

Market access poses a key bottleneck to the expansion of smallholder milk production and processing. Milk group and co-operatives increase the participation of smallholders in fluid milk markets in the Ethiopian highlands. Milk groups are a simple example of an agro-industrial innovation, but they are only a necessary first step in the process of developing more sophisticated co-operative organizations. The survival of the milk groups will depend on their continued ability to capture value-added dairy processing and retain that value-added for their members. Milk groups, when developed further, could serve as basis for development of producer-oriented processing. Boxes 4.1 and 4. 2 present two illustrative cases of milk groups.

Box: 4.1. A Dairy Marketing Association

The Adaa Liben Woreda Dairy and Dairy Products Marketing Association were founded in September 1999 in Debre Zeit town, 50 km southeast of Addis Ababa. It has 34 founding members with a single share of 100 Birr. The initial capital of the association was thus only 3,400 Birr. The amount of milk collected from founding members was 308 litres per day or about 24,319 litres per month. The association, although informally established in 1997, got its legal certificate of registration from the Oromiya State in September 2000. Over the last few years, the association has grown significantly, and by June 2002, full membership had increased to a total of 426 members, composed of 245 male and 183 female dairy farmers. The total number of dairy cattle owned by members is 1,716. In addition, 181 non-member dairy farmers also supply milk to the association. The current capital of the association has increased to 500,000 Birr. Milk collections have reached 174,360 litters per month in 2002; there are seven milk collection sites in and around Debre Zeit town.

Note that 1Dollar is equal to 8.57 Birr

Box 4.2: Addis Ababa Dairy Co-operative

> The Addis Ababa Dairy co-operative is the pioneer co-operative in Addis Ababa and its surrounding area. The co-operative was first established in December 1992 with the aim of facilitating the supply of feed for urban dairy producers. By 2002, the number of members in the co-operative reached 171, almost half of them (85) women. The current capital of the co-operative amounts to 61,497.35 Birr and each member on average own 10 dairy cattle. Currently, the average milk collection per member is 20- 30 litters per day or about 102,600 to 153,900 litters per month.

Source: http://www.ifpri.org/events/conferences/2003/6.pdf.06/07/04

Numbers of financing institutions and collaborators have contributed to the establishment and development of the association. The Bureau of Co-operatives has been instrumental in the establishment and legalization of the co-operative. Oromya Agriculture Bureau has provided technical assistance. The International Livestock Research Institute (ILRI)'s, Debre Zeit Research Station has played an important role in the project preparation and general advice on organization of the association. ILRI has also contributed in training, particularly in dairy cattle management including feeding strategies, animal health, milk handling, milk hygiene and milk processing. The major sources of financing for the association have been from sale of shares and profits from sale of milk and milk products. The government has provided land for free to implement the planned project for establishment of a dairy plant.

Especially for Adaa liben dairy market association shortages of funding and access to credit have been limiting factors. Volunteers in Overseas Co-operative Assistance (VOCA) - Ethiopia, an NGO, have financed the training programme so far. Another NGO from the Netherlands, known as Genesis Farms, has been instrumental in provision of long term loans with an interest rate of about 8% for the purchase of a mini truck and cooling tanks(http://www.ifpri.org/events/conferences/2003/6.pdf.06/07/04).

Conclusions

This can be concluded that with specific reference to the above countries in dairy development, milk collection represents the major constraint to the reliability of small farmer development. Mechanisms involving government through incentives to the private sector need to be defined whereby milk collection could be improved and at minimum cost through a network of strategically located milk collection centres. Assist the improvement of the linkage infrastructure between small producers and processors or consumers, with a view that large producers could also benefit from these improvements, such as roads etc. Particular attention should be paid to collection points, since this would ensure the viability of small producers by creating low cost for transportation's and volumes of milk more easily marketed. Facilitating the way for involvement of the different organizations either private or association in milk collection system is the basic issue to solve milk marketing problem.

The development of effective infrastructure for collection of milk has played a very important role in the development of dairy industry and means of getting income to farmers. This was made possible by the above mentioned countries by providing guaranteed market for smallholder's milk. However, as indicated from the background information of Ethiopia the major parastatal enterprise engaged in collection and processing of milk from smallholders and private farms is DDE, is operating below full capacity and it has not played a comparably significant role as market outlet or buyer of last resort. Hence, the enterprise needs to increase its efficiency and increase its milk collection network. The milk co-operatives also are given enough technical and financial support as they are serving as an important market outlet for smallholder producers. Currently, only a few milk processing and collecting industries operate, and these are only in the capital city and nearby towns. Hence, the private sectors or co-operatives should be promoted to engage in dairy processing and marketing as it gives opportunity for smallholders to market their milk.

5. ESTABLISHMENT AND MANAGEMENT OF MILK COLLECTION CENTRES

5.1 Introduction

This chapter gives general information about establishment and management of milk collection centres with the reference of key stages of organization of milk collection centres. And the essential elements of feasibility study of milk marketing and processing.

5.2 Five Key Stages in the Organization of Milk Collection Centres

There are five stages or steps to be considered when organizing a good milk collection system (Empson and Bachmann, 1990). The first is surveying the potential milk field to establish its potential and locate possible collection centres. The second is to establish the collection centres, acquire sites, erect necessary buildings and install the equipment, and also decision of organizational structure. The third is to set up a management organization to be responsible overall and to appoint the staff who will run the system. The fourth stage is to set out the operating procedures at a centre, including measurement, quality testing, recording, onward transportation and payment. The fifth key stage is to decide on the supervision and control of the centres, which will include supervisory visits, check measurement and check testing, and audit.

5.2.1 Milk Survey

Two type of survey are required when establishing a milk collection system the first is abroad milk shed survey with the aim of defining the likely overall potential of the milk shed area, the possible general location of collection centres and the likely routing for collection vehicles. Such a survey would take into account information on cattle numbers and agricultural systems, the main village centres and likely concentrations of milk production. The second type of survey is a more detailed village survey. Having decided the likely location of a collection point, it is necessary to carry out a comprehensive investigation to ensure that the establishment of such a point will be worthwhile. Such a survey is best undertaken in co-operation with the village headmen or local political chiefs. And the current milk production and the use made of it will be estimated. The likely potential, in association with other agricultural activities, will be assessed.

5.2.2 The Establishment of Collection Centre

The collection point could be established at a convenient location; central to the potential suppliers. At the same time, it could be in close proximity to the road system for the onward transportation of milk to the consumers or to the plant. Access and appropriate road systems are thus important and a water supply of some sort is essential. Careful thought on the establishment of a collection point is necessary. The best precept to advocate initially is to start small and simple and then build as things develop, rather than to invest too much in too complex arrangements (http://www.fao.org/ag/again 16/07/04). And also decision should be made on the number and sites of collection centres that are needed in the area covered by the farmers. Mainly this is influenced by number of milk producers, milk volume of each producer, total volume, and distance from the farmers to the collection centre and distance from the collection centres to the market.

5.2.3 Management Organization

Management organization has inevitably to be regarded at two levels:

Overall management control and collection centre management and staffing.

The overall management control will depend upon and is directly related to the management of the central plant. This, as already stated, may be run by government or an appointed parastatal dairy authority, a private company or by a producer co-operative. The overall management authority of the collection system, whatever its type, will supervise the collection points, organize the transport for them, give services and management back-up, provide regular payment and organize production requisites and extension service- generally supporting the collection points.

In the case of collection centre management and staffing the organization within a collecting centre is a function of its size. At its simplest level, a small village society may consist of a management committee of the co-operative with a chairman and secretary. At collection times, they would receive and record the milk collected and carry out simple testing.

5.2.4 Operating Procedures

The operating stages at a collection centre include first reception with the milk supplied by each producer being measured and the quantity recorded, each producer having a passbook and a duplicate record. The centre records should be carefully kept in duplicate with the totals checked at the dairy and any discrepancy carefully investigated. The milk is tested for adulteration and to ensure a good keeping quality.

5.2.5 Supervision and Controls

Normally, the field supervisor will visit each centre unannounced at least two or three times a month. The supervisor will supervise a daily collection, review procedures, check stocks, ensure records are properly kept and check any cash and account. Milk is a difficult product to market; constant supervision and attention to detail is vital to ensure an honest, fair and efficient operation.

5.3 The essential elements of feasibility study of milk marketing and processing

Development initiatives will only succeed if the plans are technically and economically, as well as socially, politically and environmentally feasible. And based on these the essential elements of a feasibility study of milk collection centres should include:

- Establish the amount of milk produced, both in the morning and evening, at the proposed site throughout the year
- Identify the current market outlets available for milk products in the area
- Test various product sample for taste to determine acceptable products being produced in the proposed area
- Determine the average fresh milk price and Demand of milk should be identified
- Locate the source of energy

AFRICA NOW (1989) also suggested that draw up a clear business plan that will establish the viability of the proposed milk marketing before one decides to invest in milk marketing one should carry out the above points or take into consideration.

Conclusions

In general this can be summarized; that the development of effective infrastructure for collection of milk has played a very important role in the development of dairy industry and means of getting income to farmers. On the organization of milk collection center, the importance of producer participation must be stressed and in the establishment of milk collection centres socially, politically and environmentally feasible should be considered. A producer association or co-operative is the best type of organization to run a center and resolve their problems. The producers then are, in effect, organizing them-selves to buy and then to sell their own milk. In addition to this management and staffing of the organization within a collecting center is indispensable. As mentioned in chapter 3.3.9.9 farmers co-operatives in Bahir Dar District could be the bases for running the milk collection centres in addition to providing service to the farmers.

6. SURVEY ON THE ESTABLISHMENT OF MILK COLLECTION CENTRES IN BAHIR DAR DISTRICT

6.1 Introduction

This chapter presents the overview of the field of materials and methods used, findings of the surveys and analyzes of the data gather from the survey questionnaire conducted in Bahir Dar District. It presents the milk marketing constraints of the farmers in that area and it also presents the importance of milk collection centres in alleviating rural household milk marketing problems. Consequently, it focuses on the possibility of establishing collection centres in the district in relation to the demand and supply of the milk, and the production potential of the area.

6.2 Materials and Methods

In this topic especial focus is given for methods of data collection, selection of the interviewees and also methods used for data analysis.

6.2.1 Methods of data collection

Data were collected from the Bahir Dar District. The information was collected from two surveys and other official documents available in the country found in the district.

The first survey was carried out at BDD at four directions of the main roads from the district capital city to the target groups. In each direction the survey was done in three strata of a distance (far -20-30 km, medium -10- 15 km and nearby 5 km) from Bahir Dar City. Total twenty farmers with more than 2 cows were randomly selected and interviewed. At far distance two farmers, medium distance also two farmers and nearby one farmer were selected (see Annex 7).

The interviews were focus on the factors that affect milk marketing in their area, transport of milk and as well as the possibility of establishing milk collection centres to address problems of milk marketing.

Bahir Dar agricultural livestock officers, one for each direction, who are at diploma level, were conducted this survey by a prepared questionnaire related to the sub questions. These questionnaires were sent by e-mail (see Annex 4).

The second survey was carried out in BDD agricultural office of four livestock experts in the department of animal husbandry. The interview was focused on the demand of fresh milk in the area, solution for alleviating the market problems of the farmers as well as the possibility of establishing milk collection centres to address the milk marketing problems. Bahir Dar agricultural office has conducted this survey by prepared questionnaires related to the sub questions and these questionnaires were sent by email .

6.2.2 Analysis of Data

The study has finally analysed qualitatively and quantitatively based on the basis of data collected from the field. And three different strata have also been analysed and consolidated graphs and tables were used to present and analyzed data. The cornerstone for the analysis was the importance of establishing milk collection centres to address fresh milk marketing problems. Conclusions will be given and Comparisons will be also done with literature facts.

6.3 Results

As indicated from above materials and methodology part the respondents of the survey are twenty farmers who have dairy cows more than two within a range of 5 up 30-km distance from Bahir Dar City. In addition to this the survey also includes four animal husbandry specialists to know technical data and problems in the area besides the respondents (see Table 6.1, 6.2 and Table 6.3).

Table 6.1 Profile of the respondents

Distance from Bahir Dar city	**Number of respondents**		
	Sex of respondents		
	Female	Male	Total
5 km	1	3	4
10-15km	-	8	8
20-30km	3	5	8

Among the respondents 20% are females and 80% are males. And also from the total females respondents 75% of the females are living far from the district capital by 20-30 km (see Table 6.1). The responses gathered from the respondents represent the view of the district farmers as a whole.

Table 6.2 Number of cows of the respondents

	Number of cows/ farmers							
cows	2	3	5	6	7	8	9	**Total**
Farmers	3	7	5	2	1	1	1	20

In the survey seven farmers have three cows and one farmer maximum has 9 cows.

According to the data collected from the district, 20 farmers have totally 40 cows.

Average 2 cows see Table 6.2.

Table 6.3. Profile of animal husbandry specialist

Profession	Level of education	Number
Head of rural development office	Bachelor degree	1
Department head of animal husbandry	Masters	1
Animal husbandry expert	Bachelor degree	1
Forage technician	Diploma	1
Total		4

6.3.1 Means of Raw Milk Transport to the Market

The study shows that Bahir Dar district farmers produce milk for market (see Table 6.5). And they used different means of transportation system to transport their milk to the market. According to the study result the transport means in the district are public transport, farmers carry on foot, using donkey, truck and bicycle. Of all types of transport means the most frequent used of transports are public transport and carrying on foot, and they weight 48 and 47 respectively (see Table 6.4).

Table 6.4 Weighted score of farmers' reflection on means of milk transport

	Responses				
Means of transports	Less frequent	Moderately frequent	Highly frequent	Most frequent	Total weight value
Public transport	3	6	15	24	48
Carrying on foot	5	4	6	32	47
Donkey	2	4	6	0	12
Truck	1	8	0	6	15
Bicycle	1	4	0	12	17

NB. 1 less frequent, 2 moderately frequent, 3 highly frequent, 4 most frequent

6.3.2 Supply and Demand Relationships of Milk in Bahir Dar District and Bahir Dar City

Based on the data collected from the district, the district and Bahir Dar city supply and demand relationship is found as follows.

6.3.2.1 Milk Production at District Level and Bahir Dar City

The demand and supply relation in the district is competing. The total population (Table 6.5) less than 15 years old is 176,165 including Bahir Dar City and the total milk production is calculated using the following approach. Supply and demand is calculated using population less than 15 years old only for this study.

As indicated in Table 6.6 total local milking cows are 24,660 and crossbreed milk cows are 34 this is excluding Bahir Dar City cows. From these milking cows the study shows the total milk production is 7.4 million litres/year (Table 6.5).

Table 6.5 Supply and demand relationship

Locations	Milk yield in liter / annum	Population less than 15 years old	Demand in litres	Deficit in litres
Bahir Dar District	7.4 million	110,467	8.1 million	0.7 million
Bahir Dar city	2.3 million	65,698	4.8 million	2.5 million
Total	9.7 million	176,165	12.9million	3.2 million

Table 6.6 Milk production potential of the district including Bahir Dar City

Milk yield and utilization	Bahir Dar City	Bahir Dar District
Number of local cows	1,172	24,660
Number of cross breed cows	803	34
Average milk yield of local cows/day in litre	2	1.5
Average milk yield of cross breed cows/day in litre	8.5	7
Household milk utilization %		
Sale	90	59
Process	3	26
Consumption	7	15
Total milk for sale	2.1 million	4.4 million
Total milk for processing	0.07 million	2 million
Total milk for consumption	0.2 million	1.1 million

Note. Lactation length of local cows is 200 day whereas for cross breed 265 days

6.3.2.2 Supply and Demand Relationship in Bahir Dar District

As indicated on the above result (Table 6.5), the supply and demand relationship in the district is presented. Based on the population less than 15 years old the demand of milk is 8.1 million litres/year and the supply is 7.4 million litres/year. Thus the result shows in the district 0.07 million litres/year is deficit to satisfy only population less than 15 years old. The study shows in the district and in Bahir Dar City raw milk demand is high to satisfy the population. Based on the findings including Bahir Dar City 55% and 25% of the respondents explain the extent of milk demand as very high and high respectively.

As shown in Table 6.6 marketable milk is 6.5 million litres/year (66.3%) milk for process 2 million litres/year (20.6%) and milk for household raw milk consumption is 1.3 million litres/year (13.1%) from the total milk produced per year including Bahir Dar city. The average milk yield/cow/day (Table 6.6) is obtained from the data collected from the district for both Bahir Dar District and Bahir Dar City. The average milk yield/cow/day is 1.5 litres in rural and 2 litres in urban for local breed and for cross breeds 8.5 litres and 7 litres urban and rural areas respectively.

6.3.2.3 Demand and Supply Relationship in Bahir Dar City

Raw milk demand and supply relationship in Bahir Dar City is competing. Using the data collected the numbers of cows 1,172 and 803 local breed and cross breed respectively is found (Table 6.6). And the population less than 15 years old is 65,698. The total milk yield from both local breed cows and cross breed cows is 2.3 million litres/year and the demand of milk based on the population less than 15 years old is 4.8 million litres/year where as there is a deficit of 2.5 million litres/year see Table 6.5.

According to demand and supply relationship in the Bahir Dar City and Bahir Dar District, the comparison shows that there is a shortage of milk yield supply. Depending on the data, the total marketable milk including Bahir Dar City per year is 6.5 million litres/year (Table 6.6). On the other side the deficit including Bahir Dar City 3.2 million litres/year (Table 6.5).

6.3.3 Household Milk Utilization

The household milk utilization in Bahir Dar District and Bahir Dar City as the data collected from the district are quite different (Table 6.6). Based on the survey marketable milk in Bahir Dar City is higher in percentage (90%) than from the share of milk for process and raw milk for households' consumption and also from marketable percentage of Bahir Dar District.

6.3.4 Marketable Milk

Based on the result of the data indicated on Table 6.6; marketable milk is 66.3%, from the total milk production of both Bahir Dar District and Bahir Dar City. In general using the data collected from the district the total milk utilization for market is 6.5 million litres/year. From the total marketable milk, milk produced from Bahir Dar City is 2.1 million litres/year that is 31.95% account from the total marketable milk.

Dairy product price assessment shows that at different seasons and occasions was estimated at district level by Animal Husbandry Specialists. Based on this maximum average milk price 2.1 Birr/liter was recorded at Bahir Dar City during dry season and the minimum price 1.56 Birr/ liter was at Bahir Dar District in rainy season. The average maximum butter price 30 Birr/kg was both at Bahir Dar City and Bahir Dar District during the holiday and the average minimum price was 15 Birr/kg at Bahir Dar District (see Table 6.7)

Table 6.7 Average farmers selling price of dairy products in Ethiopian Birr

Location	Average raw milk price					Average butter price				
	R	D	F	H	Average	R	D	F	H	average
Bahir Dar city	1.80	2.1	2	2	1.98	16	20	17.9	30	21
Bahir Dar district	1.56	1.75	1.51	1.75	1.64	15	20	17.9	30	21

Note; R =rain season D= dry season F=fasting time H= holiday 1USA Dollar equal to 8.57 Birr

6.3.5 Structure of Milk Marketing

As indicated in the survey results, the highest amount of milk produced from the farmers is sold to the local market. The result also shows next to local market channel the milk produced by the farmers' goes to butter making and a small, which is really to Bahir Dar market. In general the survey shows that farmer dairy product is channelled in four directions. Hence, they are channelled to local market, butter making, Bahir Dar market and household consumption in decreasing order.

6.3.6 Problems Affect Raw Milk Marketing

The result of the survey indicated farmers of Bahir Dar district have problems to sell their raw milk to the place where there is high market demand to raw milk, like to the capital city of Amhara regional state Bahir Dar City. Majority of respondents confirmed that lack of milk collection centres in their area is the most significant problem to sell their product to the appropriate market. Next to lack of milk collection centres the other problems to market their milk in decreasing order of their effects are far distance to the market and price of the transport see Table 6.8.

Table 6.8 Weighted scores reflecting farmers' problem of raw milk marketing

	Responses(weighted)				
Problems	**Low**	**Moderate**	**Fair**	**High**	**Total weighted value**
Lack of milk collection centres	1	12	3	72	88
Price of transport	4	8	15	16	43
Distance of market	2	12	12	24	50
Government support(e.g. extension, credit)	10	4	3	4	21

NB. Weighting 1-less problem, 2-moderate problem, 3-fair, 4-high problem

Table 6.9 Weighted score of highly affecting milk market among problems when it seen in a distance of respondents

	Problems			
Respondent distance from city	Lack of milk collection centres	Price of transport	Distance of market	Government support(extension, credit)
5km	8	4	4	0
10-15km	16	8	4	4
20-30km	20	0	12	0
Weighted value	44	12	20	4

NB. 1 less, 2 moderately, 3 high, 4 very high

Table 6.9 indicates the comparison between among different problems of farmer to access their milk market and the distance of the respondents. From this table the problems that are highly affect farmer to sell their milk are lack of milk collection centres and distance of market. Respondents far from Bahir Dar City by 20- 30 km respond the highest problem to them is distance of the market where as respondents far from Bahir Dar City by 10-15 km respond their highest problem is lack of milk collection centres. Totally they indicate problems of raw milk marketing in their areas summarizing by four, which are mentioned from Table 6.8 and Table 6.9.

The survey from the experts also shows that farmers' raw milk market problems are the same, which are mentioned from Table 6.8 and Table 6.9. Four of the interviewed experts revealed that farmers have problems of transport access, lack of market nearby (milk collection centres) to sell their raw milk in the area.

The survey from the farmers and experts indicates that the above problems have influences on the household income of the farmers. From the respondents 95% confirmed that milk marketing problems have influence on their household income.

The problems that affect farmers' household income confirmed by farmers and animal husbandry experts are due to: -

By competing farmers working time to sell milk, because lack of milk collection centres they only sell butter and butter-selling price is low, the selling price of milk is low in their area and the profit from this is low. They lose money for transportation and this leads less focus on improved cows and they don't want to feed their cows to get more milk.

The finding reveals that farmers sell raw milk from 3-7day per week to Bahir Dar City and to local market nearby their production areas and during these days they will get a minimum of 2.10 Birr per day and a maximum of 13 Birr per day. And also this is done by 50% by wives, 40% by husbands, and children do 10%. Farmers' milking their cows two-times a day and they take morning milk only to the market. According to the interviewees this is due to far distance of the market.

Table 6.10 the source of income for farmers and preference of the customers

products	Source of income responses		Preference of customers
	farmers	experts	
Raw milk	10	1	12
Butter	10	3	8
Cheese	0	0	0

As indicated from Table 6.10 the responses from farmers' shows that the income sources of their households are from sell of raw milk and butter where as experts indicates that farmers income source is mainly from sell of butter. It is also shows that (Table 6.10) according to the response of farmers the dairy product, which is preferred by consumers is raw milk (60%). According to the responses from farmers (80%) indicates that they sell their products to the consumers and 20% say to retailers.

Table 6.11 Suggested solutions to raw milk market problems by farmers

Suggested solutions	Responses
Establishing milk collection centres	10
Increase traditional market channels	3
Increase extension service	3
Involve middle-men	4

Half of the respondents (Table 6.11) suggested that establishment of milk collection centres to will solve the problem raw milk market their area and the rest 20%, 15% and 15% suggested involvement of middle-men, increase traditional market channels and increase extension services respectively. The study from animal husbandry expert also shows that to solve milk market problems in the area create market link between farmers and consumers through milk collection centres is required. And farmers are very much fond of getting milk market nearby them.

6.3.7 Advantage of Milk Collection Centres

According to the data collected both from the farmers and the experts revealed that if milk collection centres will establish in their area the advantage would be that, it will create market for dairy products and thereby increase their income, save farmers time, create constant price to raw milk. It can be a good opportunity to the farmers to sell morning and evening milk, increase dairy farms in the area and also it can be the bases for the formation of dairy industry in the region. The experts also indicated that it could create milk quality control in the Area and encourage farmers to produce quality milk. Farmers will also get market to sell their milk throughout the year.

For the society it creates market throughout the year with quality milk and alleviates shortage of raw milk in their areas.

6.3.8 The Role of Different Stakeholders

Information collected from the respondents and from the key informants groups indicated

that the major stakeholders having direct contact to farmers are government, co-operatives, agricultural office and also private companies. The study also revealed the main roles of each stakeholder in marketing of raw milk in the area. The roles of each stakeholder describes as follows:

Government should:

- Initiate the privates companies or investors to involve in the marketing of raw milk by establishing milk collection centres
- Establish milk collection centres nearby farmers production areas
- Give credit to farmers to develop dairy farm
- Develop infrastructure like market and transport
- Organize co-operatives to participate in milk marketing activities
- Create favourable policy to support raw milk marketing

Agriculture office should:

- Provide appropriate extension advise to the farmers to improve feeding of their animals specially dairy cows
- Study alternatives of market in the area
- Encourage the farmers to organize themselves and milk producers associations and market their products in well-organized way
- Provide AI services and provide market information's
- Give technical support to farmers to produce quality milk

Cooperative should:

- Participate in milk collection by organizing milk collection centres
- Provide credit, AI service, concentrate
- Solve milk market problems of the farmers
- Private companies should:
- Participate in establishing milk collection centres and marketing
- Establish dairy industry and support dairy production
- Establish concentrate factory

Farmers should:

- Co-operate to establish milk collection centres
- Construct roads
- Produce good quality product
- Increase milk production and number of dairy cows

6.3.9 Socio-Economic Impacts of Milk Collection Centres

The study indicated that Bahir Dar district farmers have problems of marketing their raw milk to Bahir Dar City this is due to far distance, high price of transportation cost and lack of milk collection centres nearby their production areas. Hence, establishment of milk collection centres in their area has both social and economic advantage to the farmers and the society by delivering milk throughout the year to the society and creating market to the farmers thereby increasing household incomes. Farmers will have a chance to sell raw milk and this will enhance expanding of dairy farm. This will also enhance the ability of poor smallholder farmers to reach markets and actively engage in them, poses a pressing development challenge. Difficult market access restricts opportunities for income generation. Remoteness results in reduced farm-gate prices, increase input costs and lowers returns to labour and capital. Thus, the action of pooling milk collection centres has the potential to mitigate costs, and sales milk to milk collection centres reduced the milk delivering time to the individual consumers in the city. Market access poses a key bottleneck to the expansion of smallholder milk production and processing. On the other hand the survey indicated that this would reduce the availability of butter for the society during the holidays.

7. DISCUSSIONS

This chapter attempts to bring the major findings of this study with the advantage of milk collection centres in Bahir Dar District farmers. In this chapter also discussed each sub-questions formulated in chapter 1: The discussions are made based on background information of the country, region, the findings, and my previous experience.

Focus of discussions are given to, the major means of raw milk transportation, Existing raw milk market demand, Milk production and utilization and Problems of raw milk marketing and how these problems affect on milk marketing in the area. The discussion also focuses on the Milk collection centres as a means of solving problem in Bahir Dar District.

To be reliable about data collections from the district the researcher used animal husbandry experts who are working in the Bahir Dar District agricultural office for this purpose. Therefore, the survey could give the relevant information's of the district for this study.

Major means of raw milk transport

Means of transport raw milk to market in Bahir Dar District according to the study results are presented in Table 6.4. According to the chapter 6.3.1 the most frequent used to transport raw milk to the market is by using public transport and carrying on foot.

As described in Table 6.1, the distance of market from the production area is far by 30 km. Due to this far distance farmers used to transport their milk to the market public transport and carrying on foot. As the result most farmers are unable to transport their raw milk to better market. Therefore they sell their milk in local market by low price.
This also create problem that farmers forced to sell only morning milk they don't have a chance to sell evening milk. And as a result farmers are not getting better income from dairy products. Chapter 4.2 also supports this fact.

> Opportunities for selling surplus milk production from far areas are likely to be limited by high transport costs relatively to the value of the product. High transport cost and low incomes from raw milk limit farmers' ability to improve their cows and produce more milk. Milk transport from the farm to the consumers should be as quick as possible to prevent spoilage of the milk but according to the district animal husbandry officers here due to far distance the quality of the milk is low this in turn affect the price of the product.

Existing raw milk market demand

According to Table 6.5 the demand of raw milk is very high to feed the population less than 15 years old. This implies that the demand of milk considering the total population in the district as well as in Bahir Dar City could be very high. As indicated in Table 6.5 considering only population less than 15 years old the demand of milk is both Bahir Dar district and Bahir Dar City is 13 million litres/year, whereas the production mentioned in the same Table is 9.7 million litres/year. This shows that there is a deficit of 3.2 million litres/year to satisfy the demand of less than 15 years old only. Thereby, in Bahir Dar City considering the total population there is high demand of raw milk .

Milk production and utilization

Based on the data (Table 6.6) the local cow population was 24,660 and cross breed 34. From these cows the total milk production is 7.4 million litres per year. Daily average milk production per local cow was 1.5 litres with in an average lactation period of 200 days. This indicated that cows reproductively were very low. As mentioned from chapter 1.2 that the breed type of this area

is fogera breed, which is having high potential of milk production. And the survey indicated that a number of dairy farmers have expressed their interests in expanding dairy activities, if the raw milk marketing problem is solved. As described in the back ground, with in the district and nearby there is dairy breeding center which enables to improve local cows and provide technical support to the farmers related to dairy development. Hence, this has advantage to improve milk production.

In Bahir Dar District milk production is potentially from the available indigenous cattle. Traditionally in Bahir Dar District milk selling is a common practiced as shown in figure 6.2 that milk is marketed to local market and to Bahir Dar City. And raw milk used as sources of income to the farmers see Table 6.10.

In the study area mixed farming is practiced as a common farming system and crop production is a dominant one, where size of arable land is a limiting factor for crop production, attempts to livestock production in general and dairy production in particularly can be help farmers. To keep dairy animals on the given patches of land and using cut and carry system feeding management which enables to sustain and even improved their hieing standard.

Based on the total milk production in the district per year the milk density is estimated to be 3587 litres per $km^{2.}$ According to chapter 6.3.2.1 in Table 6.6 from the total milk production in Bahir Dar District 41% of milk remains for home consumption and processing, the rest 59% of the total milk is brought for sale. Hence, the data indicates majority of milk produced in the area is channeled to market, which is 4.4 million litres per year.

According to chapter 6.3.5 the structures of milk marketing in the area are mainly four, household consumption, local market channel, used for butter making and marketed to Bahir Dar city. However the most common channel for milk marketing is local market. Hence, as the data indicated milk-marketing decreases as we go far from Bahir Dar City. This is because of lack of milk marketing structure and far distance to market. To increase the income of farmers and to encourage the dairy production in the area as well as in the region establishing milk marketing is found the predominant factor.

According to chapter 3.3.8 in Table 3.2 the average buying and selling price information shows that the average profit was higher from sell of milk than the profit of butter. In addition to make one kilo of butter needs a minimum of 5 litres of milk, therefore selling of raw milk gives more income to the farmers and the establishment of organized market will create the opportunity to shift the milk, which is channelled to process local butter. Chapter 6.3.4 in Table 6.7 also supports this, which is the price of raw milk higher in Bahir Dar City.

Problems of raw milk marketing

According to chapter 6.3.5, raw milk marketing is low in Bahir Dar City mainly due to lack of milk collection centres nearby their production area. In the district 7.4 million of milk per year is produced. From the total production 59% which is 4.4 million litres of milk brought to the market per year. The rest 3 million litres of milk per year remains at home for consumption and local processing of butter. This shows that 41% of raw milk production remains at home mainly due to lack of market. Even though, 59% of raw milk is marketed this is mainly to local market place with in low price and also this market is depend on season's see Table 6.7 and as indicated the structure of milk marketing in the district is mostly marketed to local market see figure 6.2.

Generally, lack of milk collection centres in the area has a high contribution to on affecting raw milk market. According to Table 6.9 the responses from farmers indicate that their major problem to market their dairy product is mainly lack of milk collection centres and far distance of market. This supported by also in chapter 4.2 in developing countries, lack of organized milk collection centres, deficient roads and far distance affect milk market in local areas (Agrawal, 1987). It is clear that respondents from different distances also explain lack of milk collection centres affect their market. As indicated in Table 6.9 50% Farmers, 50%and 63% farmers in 5km distance, 10-15km and 20-30 km respectively mentioned that lack of collection centres as their main problem. And also 25%, 25% and 38% of farmers live far from Bahir Dar City by 5km, 10-15km and 20-30km respectively indicated far distance of market as a problem.

Generally, both three different distance strata show that the highest problem is lack of milk collection centres. The large demand for milk on the other hand and the small supply of milk and milk products for Bahir Dar City on the other hand shows the untapped potentially for development of rural and urban dairy farms. Market-oriented dairy production systems have tremendous potential for the development and could play a significant role in minimizing the acute shortage of milk and milk products in Bahir Dar City in general urban centres as well as it increase farmers' household income.

According to chapter 2 and chapter 3 also to increasing smallholder producers' participation in the dairy market development and promotion of small-scale processing, poor infrastructure, concentration of milk producers in rural areas, and perishability of milk are critical problems. Hence, development interventions should be aimed at addressing both technological gaps and marketing problems.

According to Table 6.11 possible solution, which is suggested by both farmers and Bahir Dar District animal husbandry experts to alleviating milk, market problem is mainly establishing of milk collection centres. The creation of linkage between villages, cities and urban consumers by establishing and strengthening rural milk and marketing units are of paramount importance to increase the income of farmers and milk production in the district as well in the region.

According to chapter 6.3.6 problems of market nearby farmers' production area affect farmers' household income. They sell at far distance mostly butter and butter selling price is low and the selling price of raw milk in their area is also low these affect their income. Lack of market compete farmers working time and it discourage on the development of dairy farm. And also farmers are not able to sell evening milk.

Milk collection centres as a means of solving the problem

According to Bahir Dar District farmers who were participated in the interviews, lack of milk collection centre has brought significant problems in marketing their dairy products. This has effect on their household income. Moreover, this creates an impact on their working time by traveling a long distance. According to the findings, establishing collection centres enables to the sustainable market and also income. A establishing of milk collection centres can be a good market to the farmers to sell morning and evening milk and a base of milk processing plant. Due to far distance of market, concentration of milk producers in rural areas, seasonal fluctuation of price and demand of raw milk, and perishability of milk is critical to establish milk collection centres.

According chapter 4.4 milk collection represents the major constraint to the reliability of small farmer development. Mechanisms involving government through incentives to the private sector need to be defined whereby milk collection could be improved and at minimum cost through a network of strategically located milk collection centres.

According to chapter 4 and chapter 5 the lessons from other countries indicated that particular attention should be paid to milk collection points and facilitate the way for involvement of different organizations in milk collection system is basic issue to solve milk marketing problem.

According to chapter 6.3.7 establishing of milk collection centres give different advantages to the farmers, especially by creating market for their products and this is also supported by chapter 4.3.1. Consequently, establishment of milk collection centres in Bahir Dar District is feasible. As described in Table 6.5 the total milk production in the district is 7.4 million litres per year and the demand is very high in Bahir Dar City and also only from the district there is marketable milk about 4.4 million litres per year. Raw milk is now widely accepted by customers (Table 6.10) and it could be a good source of incomes. Lack of organized market is the real problems of Bahir Dar district farmers, which is also indicated by animal husbandry experts of the district. Milk collection centres will create linkage between urban consumers and rural producers and thereby farmers able to sell their milk. It is hoped that many rural dairy producers will join to form dairy producers associations thus, providing markets for their milk and milk products is required. Chapter 4.3 supports these issues.

According to chapter 6.3.2.2 there is high milk demand in Bahir Dar City to satisfy the growing population demand. Hence, this growing market for dairy products provides significant opportunities for small dairy farmers to enter market and increase their income. This will fill the large demand-supply gap for milk and milk products in Bahir Dar City, where consumption of milk and milk products is remarkable high.

As mentioned in chapter 6.3.8 and chapter 4.4 co-operatives are the basic structures for milk marketing and they are also basic for dairy development. According to chapter 6.3.8 the study reveals the roles of government, co-operatives and other stakeholders. Hence, the Government (Regional Agricultural Department) will take initiative to establish milk collection centres. In general the role of each stakeholder will be as it has been mentioned in chapter 6.3.8.

Based on the background information's of the region and the country is that establishing milk collection centre has policy support. The existing regional and federal governments have created a favourable political, security and economic environment for development. In the strategy of the regional government vision and five years strategic plan, improved food security and

household wealth is the overall regional objective. In the Amhara National Regional State, human population growth and low crop productivity increasing the demand on the livestock development has a sound indication for food security and poverty reduction. It is more practical in the dry-eastern part of the region. In the dry eastern part and around the capital city of the region, livestock development is part of the agriculture giving more emphasis to dairy development and fattening programme. This will thereby increase dairy production and promote the establishment of milk collection centres in the region.

8. CONCLUSION AND RECOMMENDATIONS

8.1 Conclusions

In this chapter, conclusions are made answering to the main research questions and the sub-questions in the chapter 1. Finally, based on discussions and conclusion recommendations will be made to answer the main research questions.

Despite the Bahir Dar District being endowed with large cattle population, its economical benefit has not been fully realized because of various problems. The survey has shown that a number of farmers are not getting benefit from their dairy products. This is due to far distance to the market, high price of transport, lack of organized markets (milk collection centres).

According to demand and supply relationship in the study area and Bahir Dar City, the comparison showed that there is a gap in limited supply of milk yield. Therefore, in order to satisfy Bahir Dar city and the district raw milk demand, milk collecting, processing and marketing to the consumer has to be implemented by establishing milk collection centres nearby the farmers' production areas.

Depending on the data estimated, the total marketable milk per year was 6.5 million litres. On the other hand the raw milk demand for age groups of less than 15 years old at Bahir Dar City and Bahir Dar District was estimated at 12.9 million litres/per year and the deficit including Bahir Dar City was 3.2 million litres/per year. Based on the above results it is possible to satisfy raw milk demand for both areas by developing infrastructures like establishing milk collection centres and road.

Considering Bahir Dar District only the milk production is 7.4 million litres per year and marketable milk is 4.4 million litres per year. This shows that 11,958 litres of milk per day brought to market. Therefore, to create organized market to the farmers', establishing milk collection centres in Bahir Dar District are feasible.

During training and fasting time, the prices of dairy products are low. This is due to that during rainy season comparably the availability of feed is high and this increase production in rural areas and during fasting time most Christians fast from dairy products, then the farmers will lose on price at this time.

Establishing milk collection centres in the area creates a linkage between the rural areas and urban consumers, thereby it enhances the farmers to sell their raw milk and increase household incomes, and save farmers' working time, which is spent during traveling to Bahir Dar City to look for milk market. In other words by establishing milk collection centres in the region the household income for those who are found in the milk collection shed area will increase and further this will contribute to the regional and national income, household level economy and food security will be enhanced. This will in addition promote dairy development in the region and increase household income financial sustainability. So when we look at it in terms of sustainability it is feasibility.

Establishing milk collection centres encourages dairy production in the area and also it could be the bases for the formation of the dairy industry. And it can be also a good opportunity to the farmers to sell morning and evening, milk there by increasing farmers' income and create market throughout the year.

In general this can be concluded that technically, politically, socially, economically, and environmentally and sustainable establishing milk collection centres in Bahir Dar District is feasible.

8 .2 Recommendations

- **A secured market and milk collection system**

With a secure market and a regular milk collection system, the farmers with a very perishable product to sell can supply more. This means there will be a strong linkage between the producers and the plant dealing a measure, quality and regular payment.

The Regional Agricultural Bureau of Animal Husbandry Department takes initiative to establishing milk collection centres as a pilot project and thereby collecting milk from the farmers and later on encourages the private companies, co-operatives to be involve in milk marketing activities and form farmers milk associations.

The existing situation in the area does not encourage farmers to sustain their dairy farms and operate profitably because they transport their milk and milk products to nearby markets at dissatisfying price and marketing conditions. On the other hand in Bahir Dar City milk demand is high and continuously increases following population growth. Therefore, for farmers or milk producers to get the best in marketing out of their products and although, to be motivated and continue to hold on to the dairy farm and the production of milk and milk product to keep pace with the fast growing Bahir Dar City population, milk collection centres, processing and marketing infrastructures have been proposed see Annex 6.

Based on the road accessibility, milk production potential, and distance from Bahir Dar City to the production areas 8-10-milk collection centres with a capacity of 1195.84 to 1494.8 litres per day could be established. It is advisable to have milk collection centres with cooling facilities. If collection centres don't have cooling facilities milk should be collected at milk collection centres soon after delivering but if it has cooling facilities milk can be collected every two days. At collection time the delivered milk should be subjected to field alcohol test for freshness and lactometer reading.

- **A good marketing structure**

A balance of sales outlets for the farmers, milk is next needed to give a good stable price and to ensure there is always a market.

- **In efficient processing and product marketing structure**

The Regional government should encourage the existing co-operatives to establish Dairy industries (milk processing plants) in the area by providing credit and other technical support like training and also the milk processing plant must be in a position always to accept milk and be planned to convert milk into the required consumer products, producing and marketing them efficiently.

- **Input supply and services**

A reliable and financially attractive marketing channel is a major prerequisite for stimulation of milk producers. Milk collection allows a one way traffic, this same organization structure with all its facilities can be used to provide the farmers with inputs and services required to improve milk production. Through milk collection centres a bull can be provided for a group of farmers. Regular exchange of bulls could be arranged, AI services could be organized, provided enough farmers will make use of services, semen and liquid nitrogen supply could be organized. Concentrate feed is one of the major inputs to the dairy production system. This could be sold at their milk collection centres, also mineral supplement and other dairy equipment's.

- **Marketing information system**

Information is required at all levels in the marketing channel. Before you decide to produce process and market any dairy product, it is important to know the potential market for each particular product. This is important to enable the producer, and processor to know which types and when, where and how much of each product to manufacture and market. It is very crucial because unless goods can be supplied in the right form, place and time, consumers may not be able to buy. Then this should require securing and utilizing market information. So the Amhara regional agricultural bureau provides marketing information system such as for each individual processor or through organization, to organize the gathering and dissemination of such information.

- **Price**

Dairy development can only take place if the farmers receive a satisfactory price for their milk and a protection against price fluctuation. Without a sound pricing system, farmers will not improve their dairy production and not supply raw milk, therefore this should be implemented in the region as well in the district.

- **Conducive policy environment**

Constraints facing smallholder dairy farmers in Amhara region, like other countries, mainly; lack of appropriate dairy development policy. Therefore, in order to improve dairy development Regional agricultural bureau could create conducive dairy policy.

- **Issues for further study**

Comprehensive policy recommendations require a more detailed study of the structure and determinations of transaction costs and their impacts on the behaviour of economic agents. Therefore, it is necessary for further study to analyse the economic advantage of establishing milk collection centres in the district.

REFERENCE

[1]. Africa Now (1989) Technical Manual for Establishing a Small-Scale Dairy Center and Cultured Milk Production, Harare, Zimbabwe.

[2]. Agrawal, C.R. (1987) Impact of Cattle Distribution from Government Livestock Farms on Smallholders in Sri Lanka, Berlin, and F.R. Germany.

[3]. Alberro, M. and Solomon, H. (1982). The Indigenous Cattle of Ethiopia. Part 1.Worl Anim.Rev.No.41.15-19

[4]. ANRSRHHSES (2003) Amhara National Regional State Rural Households Socio-Econmic Survey, Rural Households Socio-Econmic Baseline Survey of 56 Woredas, Vol.1, Bahir Dar, Ethiopia.

[5]. ANRSRHSEBS (2003) Amhara National Regional State Rural Households Socio-Econmic Baseline Survey, Rural Households Socio-Econmic Baseline Survey of 56 Woredas, Vol.8, Bahir Dar, Ethiopia.

[6]. ANRSBOA (2002) Amhara National Regional State Bureau of Agriculture, Annual Report, Bahir Dar, Ethiopia.

[7]. ANRSBPED (1999) Amhara National Regional State Bureau of Planning and Economic Development, Regional Economic Survey, Addis Ababa University, Ethiopia.

[8]. ANRSBPED (2000) Amhara National Regional State Bureau of Planning and Economic Development, Regional Economic Survey, Addis Ababa University, Ethiopia.

[9]. ANRSRDB (2003) Amhara National Regional State Bureau of Rural Development, Annual Report, Bahir Dar, Ethiopia.

[10]. ARAB (2003) Amhara Region Agricultural Bureau, Annual Report, Bahir Dar, Ethiopia.

[11]. Azage Tegegne (2002) Escape from Poverty: The Case of Ada'a-Liben Woreda Dairy and Dairy Products Marketing Association in Ethiopia. In International Workshop: Fostering Rural Economic Development through Agriculture-Based Enterprises and Services, Berlin, GTZ-Haus, Pp.20-22

[12]. Bahir Dar District agricultural office (2002) Annual Report, Bahir Dar, Ethiopia.

[13]. Bahir Dar District Rural Development Office (2003) Annual Report, Bahir Dar, Ethiopia.

[14]. Barron del Castillo, L. (1990) Milk Collection in Warm Developing Countries, International Dairy Federation, Special Issue No.9002. Brussels: IDF

[15]. CSA (2004) Central Statistic Authority, Statistical Abstract, Addis Ababa, Ethiopia.

[16]. Dearah, S. and Berhanu, A. (1991) Dairy Marketing in Ethiopia. In Proceeding a Market of First Sale and Producer's Marketing Patterns: ILCA Research Report 19. International Livestock Center For Africa, Addis Ababa, Ethiopia. PP.21

[17]. Empson, J.D. and Bachmann, M.R. (1990) Handbook on Milk Collection in Warm Developing Countries, International Dairy Federation, Special Issue No.9002. Brussels: IDF

[18]. ILRI open day (1996) Speech on Improving Milk Production through Research or the Benefit of Producers and Consumers, Debre Zeit, Ethiopia.

[19]. John, E. (1992) 0rganzation of Marketing and Processing of Milk. In CTA-Seminar Proceeding: Dairy Development in the Caribbean Region, Ocho Rios, Jamaica, 30 November-3 December, Pp.211-214

[20]. MOA (1998) The Role Village Dairy Co-Operations in Dairy Development: Prospects for Improving Dairy in Ethiopia, SDDP Publication, Addis Ababa, Ethiopia.

[21]. MOA (2001). The Ethiopian Dairy Development Policy. Draft Document, Addis Ababa, Ethiopia.

[22]. Phelan, J.A. (1993) Milk Supply Net Works for Urban Centres. In Seminar Proceedings: Dairy Development Policy and Implementation: Sharing of Experiences between Africa and Asia, Harare, Zimbabwe, 12-16 July, pp.239.

[23]. Richard, W.Matthewman (1993) Dairying, Macmillan Education Ltd.

[24]. Rijk de Jong (1996) Dairy Stock Development and Milk Production with Smallholders, Doctoral Thesis, Wageningen, Netherlands

[25]. RDPS (2001) Rural Development Policy and Strategies, Ministry of information, Addis Ababa, Ethiopia.

[26]. Schulthess, W. (1990) Handbook on Milk Collection in Warm Developing Countries, International Dairy Federation, Special Issue No.9002. Brussels: IDF

[27]. Van den Berg, J.C.T. (1990) Strategy for Dairy Development in the Tropics and Subtropics, Pudoc Wageningen.

Internet References

[28]. http://:www.ifpri.org/events/conferences/2003/120103/papers/paper6.pdf(Accessed 06/07/04)
[29]. http:// www.ilri.cgiar.org/research/proj6/pol.bro6-cfm (Accessed 06/07/04).
http://www.fao.org/ag/againfo/subjects/documents/LPS/DAIRY/dap/mpo/chap4-1.htm# chap4-1 top (Accessed 16/07/04).

[30]. http://www.worldvet.org /display article 1186.html (Accessed 13/07/04)