Thesis

Economic performance of Ethiopian dairy farmers

A study to explore the influences on the economical performances for dairy farmers in Ethiopia

By:
R.J. van Delden

Supervisor Van Hall Larenstein: J. Meinderts
Supervisor Wageningen UR Livestock Research: B. Wouters

Wageningen, July 2011

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A study to explore the influences on the economical performances for dairy farmers in Ethiopia

Thesis report in order to fulfil the Bachelor study: Animal Husbandry, with a major in Livestock Management:
Van Hall Larenstein, University of Applied Sciences, Wageningen, the Netherlands

By:
R.J. van Delden
Student number: 830503002

Supervisor Van Hall Larenstein: J. Meinderts
Supervisor Wageningen UR Livestock Research: B. Wouters

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- And all the translators for their time and patience during the interviews in the four different regions.

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Thank you very much!

I hope you will enjoy reading this report.

R.J. (Redmer) van Delden

Wageningen, July 2011

Preface

In developing countries, livestock and agriculture are two major income providers especially for people living in rural areas. Livestock is kept with several functions in mind, such as the provision of income by selling living animals and their products, „living bank account", human nutrition, the use of manure as organic fertilizer and as a status symbol. Development organizations design projects in order to stimulate, improve, and empower the livelihoods of rural farmers and stimulate the agricultural sector.

From March to July 2010, I have done my third year placement with an very commercial organization, Lely Industries, well known for their milking robots. I conducted a research among farmers about the costs of their milking robots. I liked the assignment and did well with it, the commercial setting was new to me but fitted me. Seeing, and being part a large worldwide operating organization, was great. There were contact all over the world, almost every day, international visitors came to see the factory. But I knew there is another side as well, the developing side of the agricultural sector.
As I am rather new to the dairy sector, I wanted to know if the other side of the agricultural sector would fit me as well.
I got this opportunity to go to Ethiopia and research the economic performance of dairy farmers of a developing country. I saw a challenge and accepted. It was a time with ups and downs personally and work wise, when in Africa one has to be flexible to the local circumstances and habits. Getting through to the farmers was sometimes difficult, communication was slow or very difficult. It was a great experience for me, and I am glad I took the challenge.

But still I hope this research shall make an effort in searching possibilities to improve the performance of Ethiopian dairy farming , under supervision of:

Johan Meinderts from Van Hall-Larenstein, University of applied sciences in Wageningen, the Netherlands and
Bram Wouters, researcher at the Livestock Research Department from the Wageningen University, Wageningen, the Netherlands.

Contents

1 Introduction

A well performing dairy farm can provide an economically healthy income for a whole family.
To obtain a healthy dairy farm, the farmers should be able to depend on a well-functioning value chain, there has to be a market to sell the produce and there has to be a good and steady supply of commodities.

Ethiopia holds a large potential for dairy development. The country has a total land area of about 1,2 million square kilometres. Currently the country has the largest livestock population in Africa, estimated at 29 million cattle, 24 million sheep and goats, 18 million camels, 1 million equines and 53 million poultry.

In addition, the country has diverse topographic and climatologic conditions. These consist of a high central plateau ranging from 1800 to 3000 metres above sea level, a rift valley that divided Ethiopia from the north to the south with altitudes ranging from 1000 to 1800 and lowlands plains of less than 1000 metres in altitude. These lowlands cover over 45% of the total land area. It is estimated that about 90% of the human population of Ethiopia lives in the highland areas. In the country milk is produced in all agro ecological zones from cows, goats, camel and sheep.

Over the last decade following the political changes in 1991, the dairy sector in Ethiopia has shown considerable but not high progress. Total milk production has grown at an estimated rate of 3% compared to 1,8% during the period from 1975-1990 (but consumption per capita fell, the rise in milk production could not keep up with the population growth). The progress of milk production is mainly due to the increase in demand for dairy products from the population growth and urbanization. Livestock production systems in Ethiopia are much more diverse than in most other African countries.

The success of dairy development in Kenya is also possible and expected in Ethiopia; given the high potential for dairy development. This includes the estimated three million hectares of potentially irrigable land.

The development and growth of the dairy sector is thus low. Milk production has evolved around traditional livestock production systems which use indigenous cattle breeds whose milk yields are low. Dairy production in Ethiopia is dominated by smallholder farmers and the level of commercialization is still limited.

It seems that there is too little information on profitability of milk production in Ethiopia and cost price of milk in various dairy production systems. Field data on economics of milk production is limited and the available information is often based on gross margin calculations. There is also limited information on the profitability of traditional milk processing.

The goal of this research is to obtain a better understanding of the economics of milk production and traditional milk processing under various conditions (systems, management practices) in Ethiopia and the main factors that are influencing the economics of milk production and traditional milk processing.

During this research project I carried out I tried to understand the process of decision making of the small scale dairy farmers in Ethiopia. In second chapter of this report, I will outline the major objective, research questions, scope and limitations of the project.

In order to find answers to the research questions, I have divided my project in three parts. The first part consists of a literature review. For this I have used several resources. The digital library of “Wageningen University Research” (WUR) gave me useful written material of the general background of the dairy sector in Ethiopia. Further information was found in scientific books and journals I found online or received from the Wageningen UR, Livestock Research department or SNV. This literature review comes mainly forward in chapter 3.

The second part of my research I did through an independent internship at the NGO Stichting Nederlandse Vrijwilligers (SNV) located in Addis Ababa, capital of Ethiopia. One of the current running programs within the organization is dedicated to milk value chain. They provide capacity developing services to local governments, NGOs, civil society and private sector organizations to support their fight against poverty.
In content of my thesis it was interesting to talk to the local farmers, about their way of farming. The results of the interviews were described in chapter 5.

Part three of the project involved cost calculations based on the collected data from local farmers. The data is used to generate standardised farms for cost price calculations and to see how improvements are working out, the results can be found in paragraph 5.7.

During the project I received consultations and feedback from my commissioner of whose research this study is part of, my local mentor at SNV Ethiopia, and my thesis supervisor.

2 The research

2.1 Objective

The objective of this study is;

> To identify the economic performance of dairy farmers in Ethiopia, in order to improve the bottlenecks as well as the opportunities influencing the economic situation.

An analysis will be made and the organizational and economic performance of large group of farmers in four different regions in Ethiopia, see paragraph 2.3.1 for details of the regions. From this analysis, recommendations will be made to be implemented by SNV and local cooperatives in order to develop and improve the farmers performance.

2.2 Research question

The objective will be accomplished through obtaining the answer to the following research questions:

- What are the characteristics of the dairy sector in Ethiopia and which players are involved?
- What tendencies and trends can be seen in the dairy value chain sector of Ethiopia?
- How is the current economic performance, on cash flow level, of different respondents?
- How can economic models be used in the development of the Ethiopian dairy farms?
- How can the economic performance of Ethiopian dairy farms be improved in practice?

2.3 Research method

Generally, all data of this project were collected using field surveying via an interview with a number of previously formulated questions.
Before the interviews were conducted a desk study was carried out to gain more knowledge about the dairy situation in Ethiopia.

Fifty farmers, selected by means of random sampling, have been interviewed. There were 11 farmers from Chancho, 14 from Shashemene, 11 farmers from Debre Zeit and 14 from Addis Ababa (see Annex 1). The major results of the interviews were entered in a SPSS-spread sheet.

With model calculations I will show how farms can be improved in their economic situation by changing different parameters.

2.3.1 Profile of the study areas

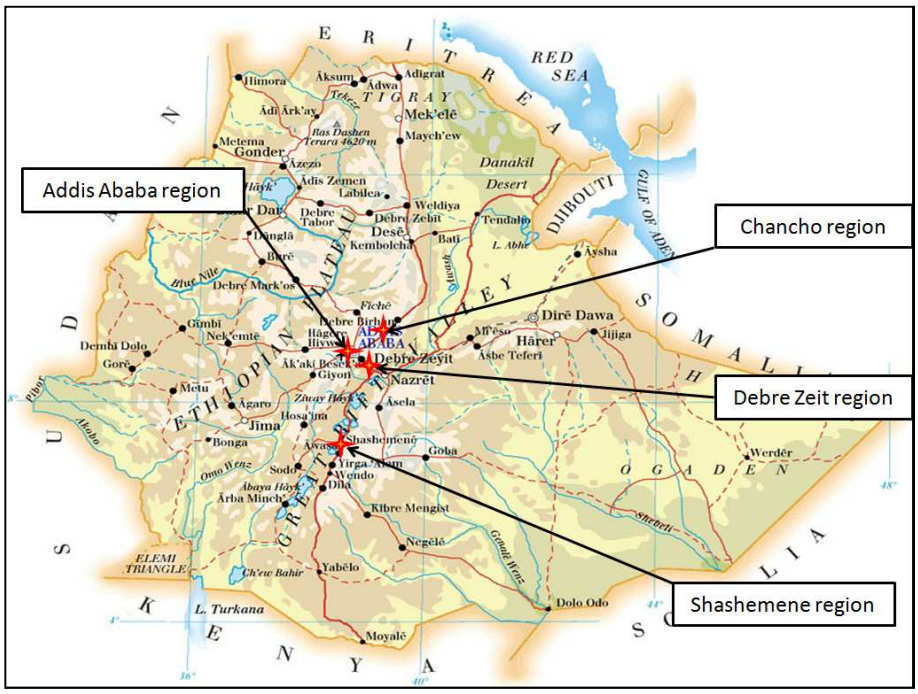

Figure 1 Interview regions

Sululta region

Chancho is located 40 kilometres north-west of Addis Ababa. This woreda/region is characterized by the Sululta plain, which is a wide, shallow valley with an elevation of 2500 meters above sea level, almost completely surrounded by mountains with numerous small rivers which drain into the Muger.

The plain is swampy with some quite large areas of open water in the rainy season, but it reverts to grazing land during the dry months.

Rainfall is determined by different altitudes but the average rainfall is between 800-1200 mm. The main rain season, June till October, accounts for 70-90% of the total rainfall in this area. Minor rains occur between March and May. Due to their nature, these rainfalls can be pronounced early.

Agriculture is based on mixed farming system with rain fed crops. Dairy farmers in the region own land and are able to let their livestock out to graze

Shashemene region

The Shashemene area is located 250 km south of Addis Ababa. The area is situated on an altitude between 1500 and 2000 meters. The total land area is 127.122 hectare. Most of the rainfall occurs between May and September. The average rainfall is on average 850 mm. Shashemene is located in the sub-tropical (monsoon) agro-climatical zone. The temperature varies from 25 to 30 degrees. The minimum temperature ranges between 10 and 20 degrees.

The agriculture in Shashemene is characterized by a mixed agricultural system. The visited farmers were urban farmers with their livestock in their backyards, and two rural farmers with opportunities for grazing.

Debre Zeit region

Debre Zeit is located forty kilometres south of Addis Ababa in the high potential livestock belt of the highlands. The area has mountains in the south-west and the north. The area is on an altitude between 1540 and 3100 meters. Six percent of this surface consists of highland (1500-2300 meters) and 94% of midland (500-1500 meters). The average temperature is 20 degrees with a minimum of 12 degrees and a maximum of 28 degrees. The average rainfall is 477 mm. Rainfall occurs irregular, with short rains in March to April and a long rains from June to August.

The agriculture is based on peri-urban farming and on the production of livestock and livestock products. Most of the farmers have no land to cultivate forage. Some farmers owned or rented some land to produce some forage crops like grasses.

Addis Ababa region

Addis Ababa lies at an altitude of 2,300 meters and is a grassland biome. Addis Ababa has a Subtropical highland climate. The city possesses a complex mix of highland climate zones, with temperature differences of up to 10 ℃, depending o n elevation and prevailing wind patterns. The high elevation moderates temperatures year-round, and the city's position near the equator means that temperatures are very constant from month to month.

Addis Ababa has a total population of 3,384,569 on a total land area of 530.14 km^2. The farming system is an urban system, without any grazing. The number of cows kept in Addis Ababa is lower than on farms in the other regions, due to lack of space. The farmers generally do not own or rent land for forage production.

2.4 Scope

The focus of this project is on the economic performance of dairy farming in Ethiopia. As the main costs on dairy farms are the feeding costs, special attention will go out to that part. The final recommendations and advice will mainly specify on feeding strategies and options to lower feeding costs.

The survey had a peripheral approach, it started in the Chancho region, next was the Shashemene region, followed by the Debre Zeit region, and finally the Addis Ababa region. For each region the set up was the same, first we approached a local dairy cooperative or cooperative union to acquire their cooperation for the interviews. Then with the help of the cooperatives the farmers were selected and visited with a translator to conduct the interviews.

2.5 Limitations

Conducting a research never goes as it is planned on forehand. By conducting this study, a number of limitations were encountered. The main limitations were as follows:

- Financial and logistical difficulties and legal implications (visa) reduced the assigned time necessary for conducting a full field research.
- Cultural differences between the Netherlands and Ethiopia made it sometimes difficult to interpret the information provided by the respondents.
- The availability of skilled translators was scarce. A lot of information went missing between respondents, translators and me.
- A lack of trust among the respondents, resulting in a lower credibility of their answers.
- Internet speed in Ethiopia was not fast and stable enough for a broad online research and the access to large documents.

3 Literature review

Ethiopia is believed to have the largest livestock population in Africa. The livestock population census of 2008 shows that Ethiopia has about 49.3 million heads of cattle, 21.9 million goats, 25.0 million sheep, 1.8 million horses, 5.4 million donkeys, 335 thousand mules, 760 thousand camels and 38.1 million poultry. This does not include livestock population of three zones of Afar and six zones of Somali regions.

Table 1 Livestock census Ethiopia (Source: FAOSTAT)

Item	2007		2008		2009	
Cattle	45000000	F	49297900	*	50884005	*
Goats	21709428		21884222	*	21960706	*
Sheep	26117272		25017220	*	25979919	*

* = Unofficial figure | [ ] = Official data | F = FAO estimate

Ethiopia holds large potential for dairy development mainly due to its large livestock population, the favourable climate for improved high-yielding animal breeds, and the relatively disease-free environment (Winrock International, 1992; Halloway *et al*., 2000).
In addition, the country has diverse topographic and climatic conditions and for this reason milk production, at different levels, takes place across all agro-ecological zones. In the highlands, milk is mainly produced by small scale mixed farmers, while in the lowlands, pastoralist production systems are predominant.
There are also some intensive and commercial dairy farms concentrated in and around major cities and towns of the country. (Gebre-Wold *et al*., 2000).

However, despite the large number of livestock resources in the country, its productivity is extremely low. For comparison; Kenya produced 4.2 Million tonnes of milk in 2007, Sudan 5.1 Million tonnes and Ethiopia produced only 1.8 Million tonnes of milk. See also paragraph 3.4 for a comparison.
The livestock sector in Ethiopia contributes 12% to the total GDP and 33% to the agricultural GDP of Ethiopia (Ayele *et al*., 2003).
Ethiopians consume less dairy products than other African countries and far less than the world consumption. The present national average capita consumption of milk is 19 kg/year as compared to 27 kg for other African countries and 100 kg to the world per capita consumption. The recommended per capita milk consumption is 200 kg/year(FAO, 2003). This low consumption pattern has also to do with the large amount of fasting days, see paragraph 3.3.2.
On the other hand, they regularly consume other dairy products such as butter, ayib (cottage cheese) and fermented milk.

According to the Central Statistics Authority (CSA, 2005) only 15.4% of the milk produced is sold in the market where as 54.7% milk produced is consumed at home. The remaining, 29.5% of the milk produced, is converted into butter and cottage cheese or ayib using traditional processing technologies. It is to be expected that these proportions would start to change as collection infrastructures improve across the country.
In recent years cooperatives have been founded to stimulate the central collection and marketing of milk for local dairy farmers. The cooperatives collect the milk for a certain region and take care of the transport and selling to a larger processor. This ensures a more steady marketing of raw milk and with that a steady income for the farmers. More details on the marketing of milk can be found in paragraph 3.3.

The total number of dairy farms is 5.26 million. At the time of the survey in 2007, see Table 2, the majority of the farms have 3-9 dairy cows followed by 1-2 dairy cows of cattle per farm. (IFCN Dairy Report, 2009)

Table 2 Farms by size of cattle in 2007 (source: IFCN Dairy Report, 2009)

Size	Number of farms	% of total
1-2	1.632.150	31,0%
3-9	3.106.350	59,0%
10-19	263.250	5,0%
20-29	78.975	1,5%
30-49	105.300	2,0%
50-99	52.650	1,0%
>100	26.325	0,5%
Total	**5.265.000**	**100,0%**

About 3.33 million tonnes of milk is produced over 2008 about, 50 million litres of milk produced is sold as raw milk, yet an estimated 285 million litres are processed into butter or cheese. Raw milk is mainly taken from own production and home consumption accounts for about 370 million litres. Cheese, or ayib, accounts for 9% of the total milk produced (ILRI, 2005).

3.1 Dairy sector

The dairy sector is further characterized by an insufficient and a highly fluctuating supply; a highly variable, yet usually not satisfied demand; the lowest milk and milk products consumption in the Eastern African region; the lowest percentage of milk reaching the formal market, again in the regional context, and the lowest level of organization. Land O'Lakes estimated the potential demand at 250 million litres per year, the current supply according to their impressions is 56 million litres. Current supply figures to collections centres and processing plants are not known. Moreover, a large percentage of the milk delivered to collections centres, is immediately sold again to consumers on the spot. At least 95% of the milk produced does not enter the processing chain. Of this milk, 2/3 is used for home consumption as fresh milk and the rest is processed into local cheese and butter (*Vernooij,2007*).

In terms of marketing, the large scale formal processors include the state dairy enterprise and few large private dairy farms dominate. They mainly produce for deliveries to formal shops that are supplied by state farms and a number of large private dairy farms.

3.2 Dairy chain

There are improvements in the dairy chain but it is still weak. Dairy processors are trying to collect more milk of good quality. Cooling facilities are still limited. Also the milk price for a farm is not high, for more details see paragraph 3.3.1. The price of milk in the rural areas during the rainy season would come down to nearly 50% of the prices in the dry seasons. The price differential is a result of large amounts produced by farmers as well as expenditures on milk collection.
SNV Ethiopia conducted a study to expose current and future dairy investment opportunities in Ethiopia. The study was conducted as a desk study supplemented with interviews with practitioners and officials from the dairy sector, public institutions and non-governmental organisations. The study shows an overview from the dairy chain from the farmer to the consumer. The results from this study about the first steps in the dairy chain, production and marketing, will be used to explain the dairy chain in Ethiopia in this review.

Figure 2 shows the share of the costs among various inputs for a farmer. It shows that feed and animal health care contributed more than half (51%) of the production costs and that for the average farmer, dairying activities provided only 14% margins of the total cost. This suggests that interventions that reduce the cost of production would lead to increased margins by farmers. Important is also the feeding and animal health care as priority areas in reducing production costs. (Dairy Investment Opportunities in Ethiopia, 2006)

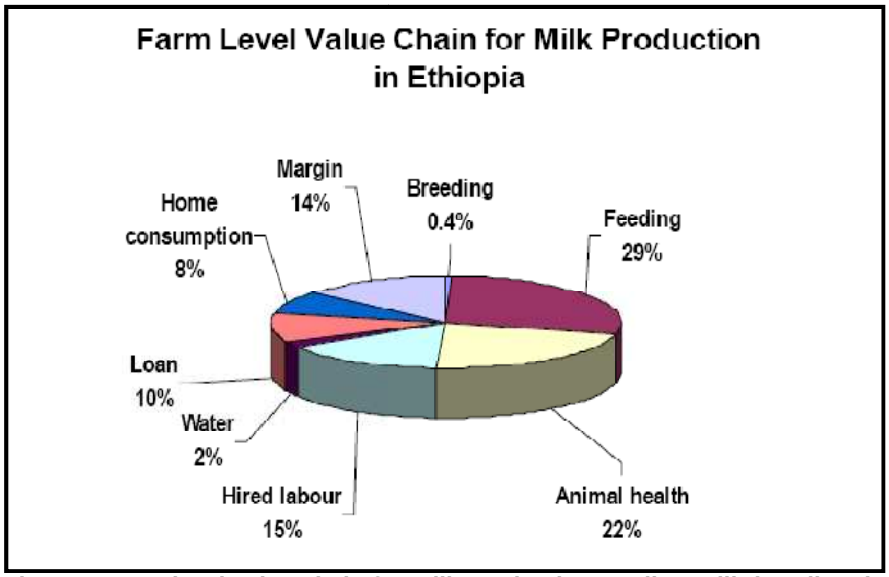

Figure 2 Farm level value chain for milk production per litre milk (small and medium scale) (Source: SNV, 2006)

The ultimate goal of the intervention in the dairy industry in general and Milk Value Chain in particular is to increase rural incomes by increasing the number of rural households deriving their livelihood from dairy business through managing high productivity enterprises, while delivering quality and affordable dairy products to the market.

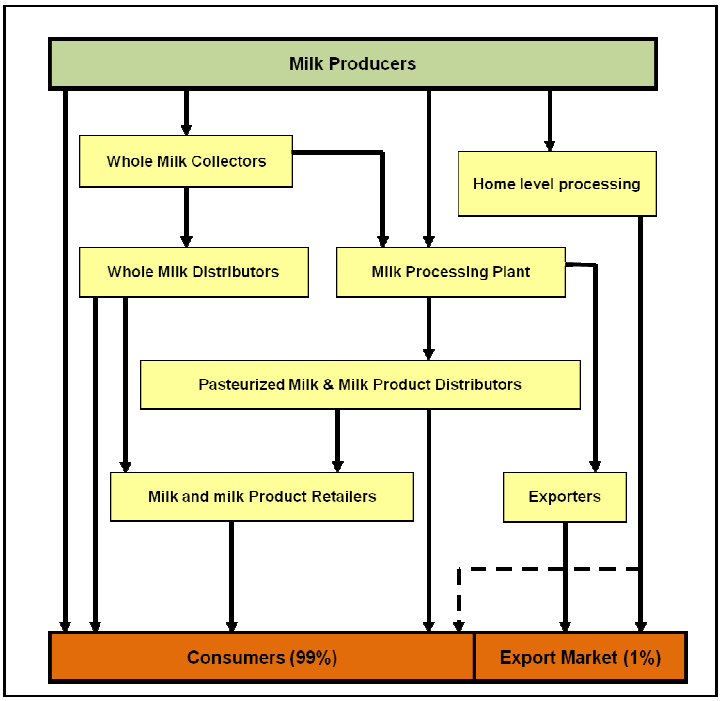

Figure 3 Dairy value chain Ethiopia (source; SNV Ethiopia, 2006)

To build a successful and sustainable dairy industry, all parts of possible entry points across the milk value chain have to be identified and addressed; from cow to consumer. Different parts of the value chain need different kinds of support and intervention where the situation of course requires various case to case interventions.
Farmers need support and training to increase milk production in yields and quality. Dairies might need assistance in evaluating the feasibility of investments and financing for investment in equipment. The dairy industry that relies on a good milk supply and collection systems need to be put in place. Distributors and retailers to reach out to customers are also needed in sufficient number. Finally consumers need information on what the dairies offer and on the benefits of drinking good quality milk. Figure 3 summarise the milk value chain from a 'cow to consumer' as a model for sustainable dairy development.

3.3 Milk marketing

Estimates of specific contributions of the dairy sector to output, income and employment are not readily available. Four main dairy production systems can be identified in the country: smallholder mixed farming systems in the highlands using indigenous breeds; small urban/peri-urban systems raising cross-bred or both cross-bred and local cattle; a small commercial sector consisting of large private and state farms; and pastoral/agropastoral system in the lowlands. Reliable figures on the relative importance of these different systems in terms of number of farms/herds, dairy population or share of milk produced are not available.
The most important categories for this research are the smallholders and urban and peri-urban farmers. These are further explained below, defined by (Haile, 2009)

Smallholders
Majority of smallholder producers may be excluded from the emerging value chain due to capacity limitations. Small producers lack the necessary technological, organizational and institutional capacity for successful participation in the value chain. They are less organized and distant from market, lack economies of scale, face higher transaction costs and lack institutions for risk management.

Urban and peri-urban holders
Urban and peri-urban smallholders are the main supplier of raw milk to the dairy industry in Ethiopia. Most of milk processors do not have their own dairy farms. Even those who have their own farms are souring mainly from small holders. For example, Sebeta Agro industry, the first private dairy processor, is collecting 99% of raw milk from outside source though it has its own farm.

Employment and income from the dairy sector will vary between and within production systems because of differences in feed sources, management, herd sizes, form of milk and disposal patterns, amongst others.

The cooperatives
Politicization of cooperatives mainly in the socialist regime has created the bad impression among many. Recently cooperatives are playing important roles in ensuring sustainable supply of raw milk to the industry by coordinating the flow of the milk from their members and assisting of members by supplying inputs to the dairy farms. Many cooperatives are established since 1991 for marketing of raw milks of small holders in the urban and per-urban areas. The most successful cooperatives are, Ada Dairy cooperative and some cooperatives in Selale area (all in the radius of 100 km from Addis Ababa). Ada Dairy Cooperative has its own processing plant. Another cooperative in Northern part of Ethiopia, has recently established a processing plant targeting the consumers at Mekele town. A project on livestock/dairy had helped a dairy coop to be organized in Gondar.

Unions
Unions are the next highest stage of cooperatives. Cooperatives are forming unions for better marketing capabilities and better bargaining power. Selale Union is among the active union which is doing well. Some milk marketing cooperatives in the process of forming unions to challenge mainly unfair market transactions with collectors and processors. Unions are supplying to different private collectors and processors.

Commercial processors
Commercial processors are those adopting modern technologies and with a majority of their output as pasteurised and packed milk. Currently there are about seven dairy processors operating in Addis Ababa and nearby towns.
One of the oldest state owned dairy processing enterprise formerly called DDE or Shola, which is privatised in the year 2008 and named as Lame Dairy Plc (Table 3 Source of milk and processing capacity of major processors in Ethiopia).

Ada Dairy initially has attempted to produce packed milk, but has stopped the process of packed milk production and currently is supplying its pasteurised milk mainly to Lame. Genesis Farm is producing cheese, butter and yogurts. Other processors, like Lema, also buy raw milk for processing.

Table 3 Source of milk and processing capacity of major processors in Ethiopia (source: Haile G. , 2009)

	Name of the processing Enterprise	Year of Establishment	Source of raw milk		Daily production capacity in litres	Current attained average capacity
			Own Farm	Out Growers		
1	Lame Dairy	2008		Yes	30.000	20.000
2	Sebeta Agro Industry	1998		Yes	40.000	29.000
3	MB Plc	2003	Yes	Yes	10.000	5.000
4	ADA Dairy cooperatives			Members	15.000	7.500
5	Genesis Farm	2001	Yes			
6	Lema Dairy	2004		Yes	10.000	3.000
7	Bora	2008		Yes	2.500	1.000

Small scale processors and other
Small scale processors are those who are limited them to small scale niche market like *ayib* (a certain type of cheese) and butter. Small scale processors are directly buying raw milks from unions, cooperatives and individuals.
There are large number of cafe's, kiosks and restaurants in all towns. Hot milk and macchiato (mix of coffee and milk) are the famous drinks which triggers the demand for milk by cafes and restaurants. Kiosks, shops and supermarkets are selling packed milks to household buyers. Butter, cheese and yoghurts are solely sold at supermarkets. During eve of holidays soft cheeses are often sold at shops. Some cafes and restaurants are using powder milk for hot milk and macchiato, which are not often chosen by consumers.

3.3.1 Pricing

Farm gate prices vary widely from area to area. Small-dairy farmers with mixed-farming units, who do not have direct access to urban markets, sell their milk to local dairy processors like MAMA Dairy at fixed prices. On the other hand, the urban dairy-farmers who have their own marketing arrangements and by-pass the DDE and MAMA Dairy, usually sell their milk at higher prices, depending on supply and demand (*GRM, 2007*).

Factory products are supplied to the market following the regular distribution channels starting from the factory gates and ending at the consumer. Within this channel, wholesalers and retailers have an intermediary function between the factory and the shops and between the shop and the customer's home. Nearly every food processing industry in Ethiopia follows this distribution channel. But there are companies who supply directly to their own retail shops. But this method is an exception.

Over the years, the selling price of milk is at an increasing rate. The factory gate price increased by 200% between the year 2004 and 2009, raw milk prices also increased but not as much as the factory milk.
For comparison the inflation in these years fluctuated between 2.4% and 44.4% (CIA World Factbook, 2009). The general prices of food items also increased drastically over these 5 years, as can be seen from Table 4 .

Table 4 Food price inflation (source: EUSS 1997 – 2009)

	Average annual price changes	
Food items	1997 – 2004	2004 - 2009
Teff	0.06	0.25
Wheat	0.04	0.24
Maize	0.06	0.22
Animal Products	0.03	0.16
Fruits and vegetables	0.00	0.15
Other food items	0.03	0.14

The trends on average milk prices of packed pasteurised milk and raw milk from the past four years is indicated in Figure 4 below.

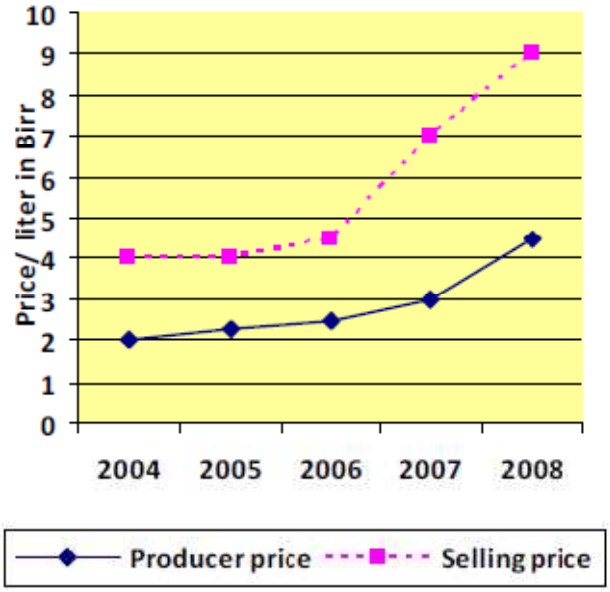

Figure 4 Trends in milk price (source: SNV, 2008)

From Figure 4 can be seen that the gap between the price a producer receives for a litre of milk and the price that has to be paid in the shop is getting bigger. The market selling prices are increasing faster than the farm gate prices.

3.3.2 Marketing challenges in the dairy sector

Cost of production
Due to severe shortages of animal feed supplies, the cost of running a dairy farm is becoming more and more expensive.

Ever increasing costs of feed is the primary reason that dairy processors have to shut down their dairy farm activities and continue with processing by buying the milk. Similarly some small holders in regional towns have also closed their farms because of the scarcity of feed supplies or excessive feed costs. Transportation costs is the other additional extra costs paid by farmers throughout Ethiopia, as they are buying the majority of their feeds from the fertile highlands around Addis Ababa and the Selale region.

Gross margin calculations are often used to evaluate of the economics of milk production. Gross margins are calculated by taking a milk cow producing a certain amount of milk and calculating the costs for producing this milk per cow. These calculations do not take into account costs of replacements, requirements of non-producing animals etc. A whole farm cost analysis provides better information on the total costs and revenues of milk production.
However, the economic evaluation using the whole farm cost analysis can be carried out by means of collecting actual farm data or by model calculations. The method using actual farm data reflect the actual situation based on the average management level applied by farmers. As farm management particularly feeding management on most Ethiopian farms is not optimal, economic calculations based on field data will reflect the cost price of milk when poor management practices are applied. As feeding costs represent often more than 60% of total costs, poor feeding management can distort the results considerably when cost price calculations are based on actual field data.

Demand side
Low consumption behaviour is blamed by many for the low level of demand pressure to the dairy sector as compared with neighbouring countries (Sudan and Kenya).
In addition, consumers prefer the traditional products than pasteurised and factory produced products.
Extended fasting days of the vast Ethiopian Orthodox community greatly affects the demand for milk. During fasting time most of the processors intake volume of raw milk declines, leaving the farmers no place to sell their produce. This results in lower income for the farmers, and a lot milk not used to the optimum.

3.4 A look around

The higher performance of Kenya's dairy sector offers some lessons to Ethiopia, whose dairy sector remains still in its infancy.
The most significant change came from the introduction of grade cattle to Kenya, this increased the cattle productivity. The development of an effective infrastructure for the collection and processing of milk in Kenya has also played a very important role in the development of the dairy sector in the country.
The actual success of the dairy sector in Kenya was created by an increase in demand for dairy products. So far, this has not happened in the case of Ethiopia. Therefore, stimulating the consumption of milk and milk products in the major cities and townships through increasing awareness is important for the sustainable development of the sector (Ahmed, et al. 2003).
Milk production and marketing systems are similar in Kenya and Ethiopia and smallholders dominate the dairy production in both countries. Both countries have a comparable formal and informal marketing system where the proportion of milk production marketed in the formal market constitutes a very small portion of the total milk produced (Muriuki and Thorpe 2002).
In Kenya, the proportion of marketed milk sold in the formal market is 15% compared to only 5% in Uganda and a negligible share in Ethiopia (Muriuki and Thorpe 2002). With agro-industrial development of the dairy sector in Ethiopia coming through private investment, the proportion of marketed milk sold in the formal market is increasing.

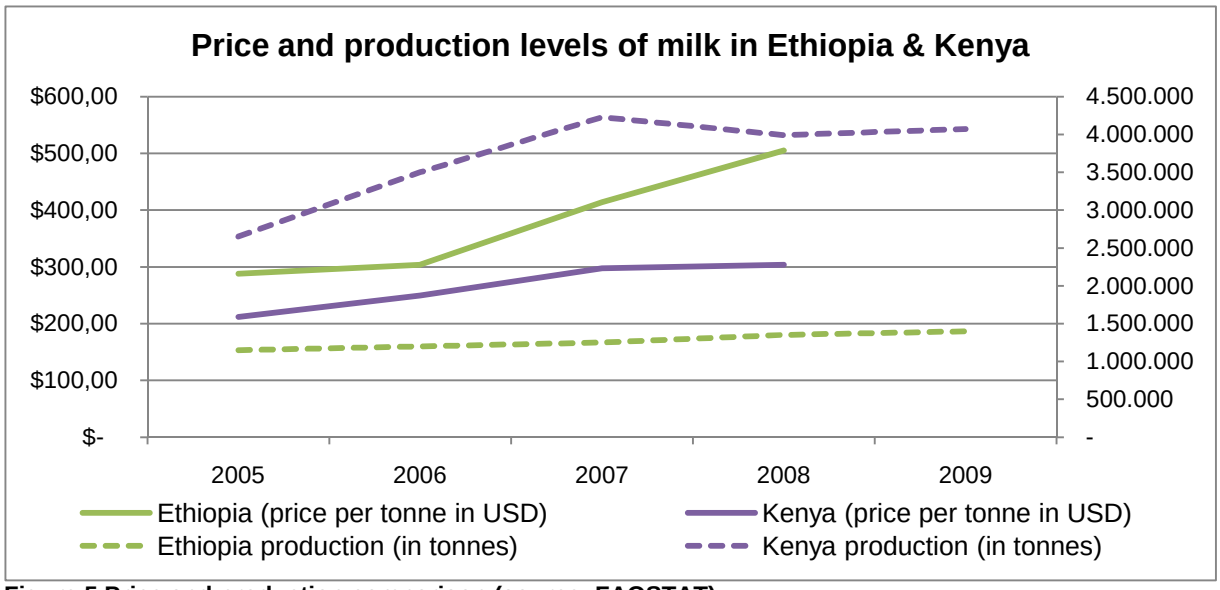

Figure 5 Price and production comparison (source: FAOSTAT)

Despite the agro-ecological similarities between Kenya and Ethiopia, the Kenyan highlands have higher and more evenly distributed rainfall and hence higher potential for feed and forage production. In Ethiopia, on-farm feed and forage production as well as industrial concentrate need to be emphasised (Ahmed, et al. 2003).

4 Method

4.1 Study design

To acquire sufficient and relevant data a questionnaire was set up (Annex 2). It is set up by the SNV, the WUR Livestock Research department and myself. It is based on an old checklist for farm visits that have been done in Ethiopia earlier.
It gives a structure to the interviews which makes the interview time more efficient.
The questionnaire consisted of two parts: the first part contained questions about general farm information of the respondents, such as number of animals and production data. Most of these questions were asked in closed form, unless specifications were required.
The second part contained questions about the financial situation of the farm, such as the monthly income and expenses and current market prices for feed stuffs. This second part also contained five questions about the farmers view on the dairy market, to identify the current opinion on the Ethiopian dairy market.

4.2 Data collection

The methods of data collection are clearly formulated in such a way that the methods can be repeated by someone else. Report describes (if appropriate):

- Sampling (method)
- Type(-s), number and method of observations; list of selected companies incl. motivation for this selection
- Questionnaire questions; Number of questionnaires (sample size, sampling)
- Interview questions, selection of interviewees; Number of interviewees

In order to be able to answer the research questions, two procedures of data collection were used and were done in a sequence of stages. At first a thorough literature study was undertaken in order to acquire insights into the:

- Ethiopian dairy value chain
- Current situation of the Ethiopian dairy industry

Secondly, in cooperation with four different dairy cooperatives or cooperative unions we agreed to conduct interviews within their members. In total 50 interviews were conducted based on a questionnaire that was compiled beforehand. This to ensure all the necessary information would be collected.

The farmers were picked from the cooperative's member list, mostly at random but on a level of production base. We tried to get a well spread mix of small scale to larger scale farmers. The farmers were not informed beforehand, we visited and asked to come in which we might have overwhelmed them.

Reliability
The collection of reliable data from farmers was difficult due to the language barrier, lack of knowledge with translators and a lot of other misunderstandings.
A lot of information went 'missing' between the farmer and translator or between translator and myself. Or information was misinterpreted or translated wrong, further questioning often revealed the true data but not always.
Further unreliable information was given by farmers, figures that just cannot be right, for instance heifers calving at 20 months is simply impossible in local circumstances. Most farmers do not keep any records of their animals, the only records they have are the amounts of milk they sold to the cooperative and how much they received for their milk.

The information provided by farmers that is impossible in local circumstances are left out of the data set to keep the data clean. Answers that are difficult to check(production levels, age of animals) are often kept in the data set.
Earlier researches that were done, on other topics as well, by SNV revealed that a relationship with the interviewees improves the credibility of the answers. This could also be a reason for the misleading answers during my interview sessions.

4.3 Data processing

The methods of data processing are clearly formulated including use of statistical methods, use of statistical tools like Excel, and SPSS. As the questionnaire focuses on the economic and technical data, a lot of figures and amounts were collected. These figures are easy the deal with in SPSS or in MS Excel to make calculation and averages. In addition, the answers could be converted into percentages enabling analysis and interpretation of the results.

4.3.1 Method of model calculations

The economic calculations will be partly based on actual figures (prices etc.) while model calculations are applied to define the optimum situation regarding feeding practices. Feeding costs are the major part of the costs. Reliable figures on amounts of feed fed are difficult to obtain. On many farms feeding practices are not optimal, measuring is not accurate and the quality of feedstuffs is low, they influence the level of milk production and cow fertility directly. Therefore in these calculations we choose to use normative figures to calculate optimum rations. Required quantities of feed to achieve a certain level of production are derived from normative figures based on literature. In these calculations the LivestockFeedModel developed by Paul Snijders, Wageningen UR Livestock Research is used.
Feeding values are derived from research results (reports Ethiopia, etc.) and other literature. Feed prices are collected during the survey and give an actual view on prices.
Other costs (AI, veterinary costs etc.) are averages based on information gathered from the survey.

5 Results of field study

5.1 Interviews

For this research a total of 50 dairy farmers have been interviewed in Chancho, Shashemene, Debre Zeit and Addis Ababa; most of them were small scale dairy farms. These regions were chosen because of their location in the main dairy production areas of Ethiopia.
The interview existed of a questionnaire with general to specific agriculture questions regarding the dairy farm of the respondent. The questionnaire is mainly focussing on the economic performance and the feed supply of the dairy farm.
The field research consisted of interviewing 4 or 5 farmers a day in the different regions, a translator provided by the local cooperative provided the translation. The farms were randomly selected from the members of the different cooperatives.

In the rest of this chapter the results from the interviews will be discussed and compared over the different regions. The analyses are based on the data received from the farmers, for more information see Paragraph 4.3

5.2 Farm setup

A total of 50 farms is interviewed distributed over 4 different regions, each with different geographical properties. There were 11 farmers from Chancho, 14 from Shashemene, 11 farmers from Debre Zeit and 14 from Addis Ababa (see Annex 1). Only two of the 50 farms are professionally operated businesses, the other 48 are family farms. Most farms however use some kind of hired labour on their farms, this can be for herding the cattle or only for milking the dairy cows.
The technology level on the farms is very low, no milking machines are used on any of the farms and most stables have only one light bulb for lighting. The rest of the equipment is also very basic, old car tyres are modified to be used as feeding troughs and oil jerry cans are used for milk storage and transport.

5.2.1 Herd size

The average farm size over all 50 farms is around 13 dairy animals(from calf to cow) per farm with a standard deviation of almost 8 animals. Most farms are small scaled farmers, which is the standard in Ethiopia.

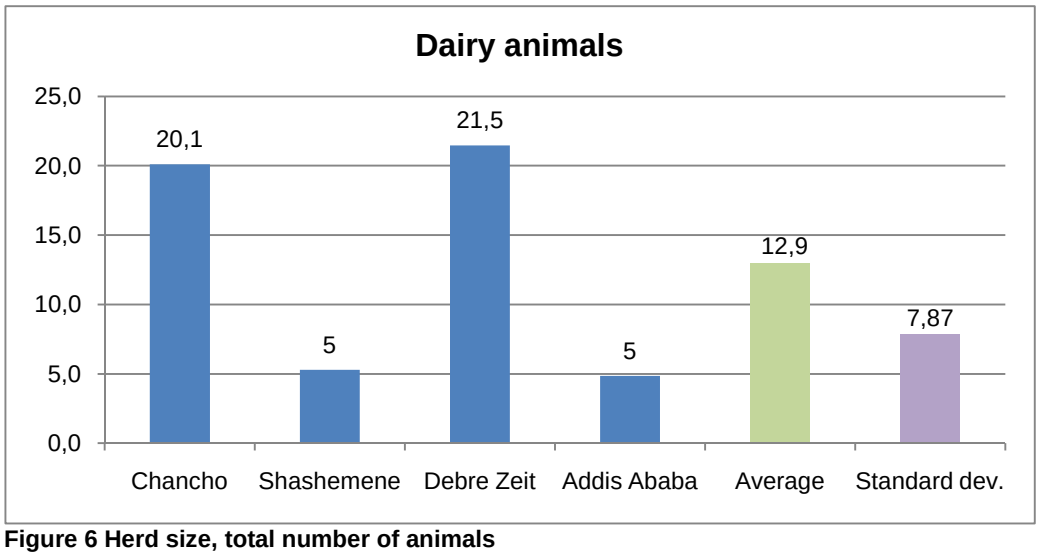

Figure 6 Herd size, total number of animals

Without the nr 26 farm the average number of dairy animals on the farm would be 10 instead of 13, see also Annex 1 Summary of respondents
The Chancho area has the largest average herd size, apart from the Debre Zeit where 2 large scale farms are included, and is also the only region were grazing is commonly applied. The rest of the farms had a zero grazing policy or were able to graze only for short periods per day. These farms were mostly situated in urban or peri-urban areas.

5.2.2 Herd composition

This paragraph shows the age distribution of the animals that are present on the farms of the respondents.
As most farmers focus mainly on their dairy production they will have no need for bulls or bull calves. This can be seen in the figures below which represent the herd composition. Lack of space plays an important role as well, in Chancho oxen are used for land work as well.

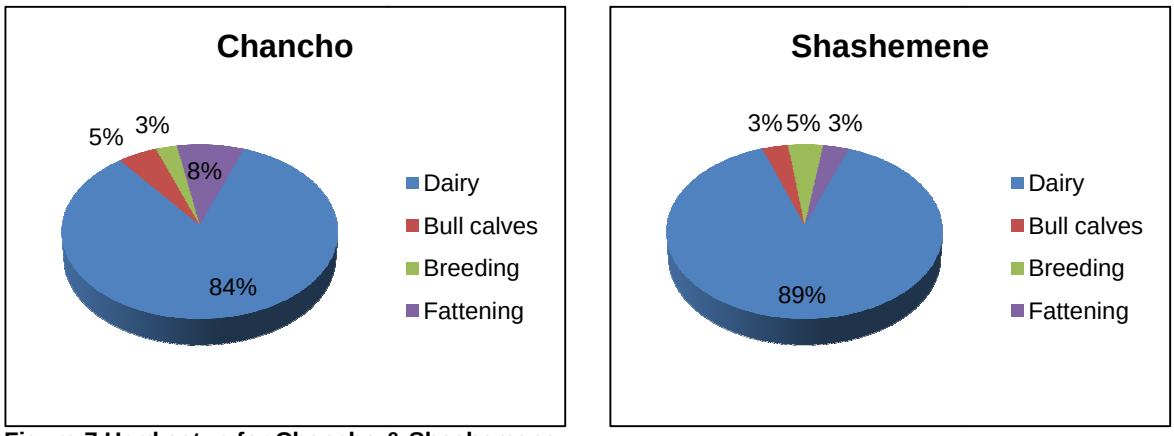

Figure 7 Herd setup for Chancho & Shashemene

Only in Chancho 8% of the animals are kept for fattening to gain extra income, farmers there have more space to keep their animals and can put them out for grazing.

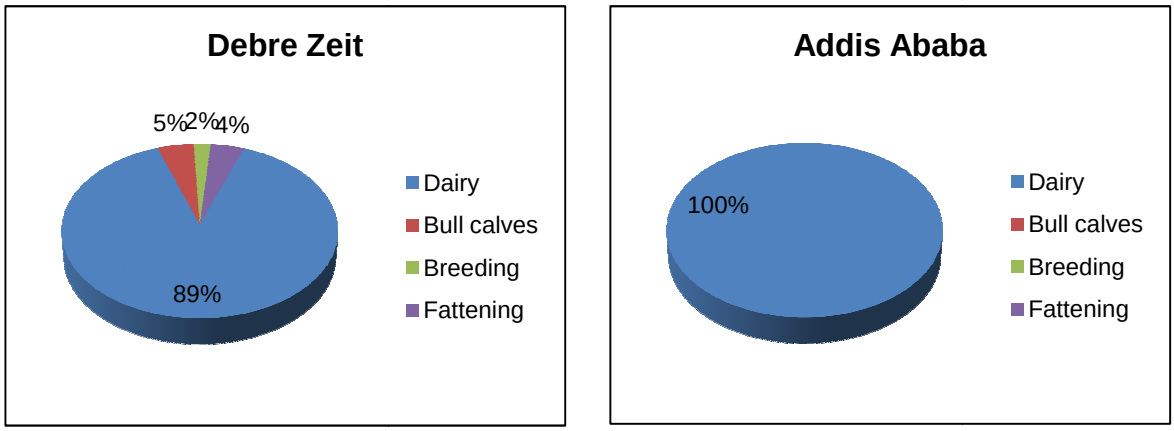

Figure 8 Herd setup for Debre Zeit & Addis Ababa

From Figure 8 can be seen that the farmers in the Addis Ababa region had no other animals than their dairy animals. Lack of space and problems with manure storage restricts them in keeping more animals.

Table 5 Number of bulls on farms

	Dairy cattle	Bull calves	Bulls for breeding	Bulls for fattening/work (oxen)
Mean	12,50	0,58	0,34	0,74
Std. Deviation	18,71	1,54	0,55	1,83

The table shows the average number of bulls on the total number of farms. This shows that there is no interest in keeping male animals on the farm. Only in Chancho bulls are kept on the farm, for breeding and fattening and for land work as oxen as well. In the other regions a lack of space makes it impossible to keep animals other than milk producing animals.

On average, the farmers have 39.1% lactating cows, 15.2% dry cows and 45.7% of young stock on their farms. Animals rated as young stock are animals from new-born calves to pregnant heifers.

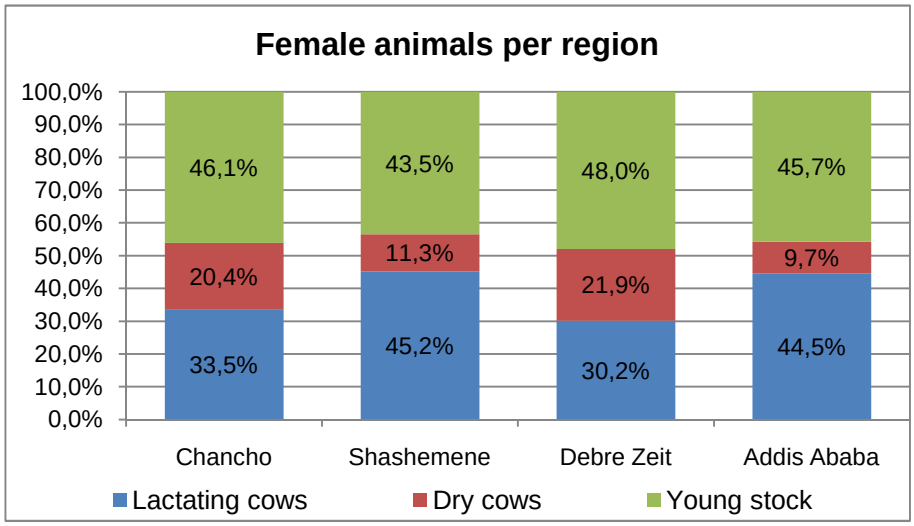

Figure 9 Dairy herd, female animals, variation per region

On average farmers own 4.53 lactating animals with a standard deviation of 6.60, they have 2.04 dry cows with a standard deviation of 3.13 and they have 4.66 young stock animals, with a standard deviation of 2.75.

The average number of young stock on farms is shown in Table 6.

Table 6 Young stock distribution

	Dairy cattle	Heifers >1 yr	Heifers 3-12 months	Heifers < 3 months	Bull calves
Mean	12,50	2,32	1,70	0,68	0,58
Std. Deviation	18,71	4,11	2,55	1,43	1,54

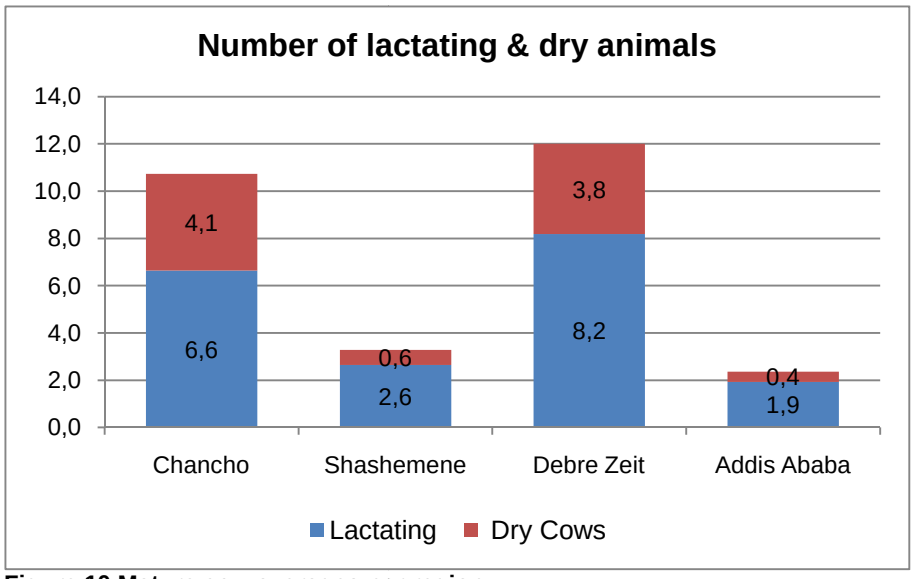

Figure 10 Mature cow averages per region

The distribution among the regions concerning the number of lactating and dry animals is quite big. This is mainly due to the amount of space available to keep animals. In Addis Ababa the number of animals was restricted because odour nuisance in the neighbourhood.

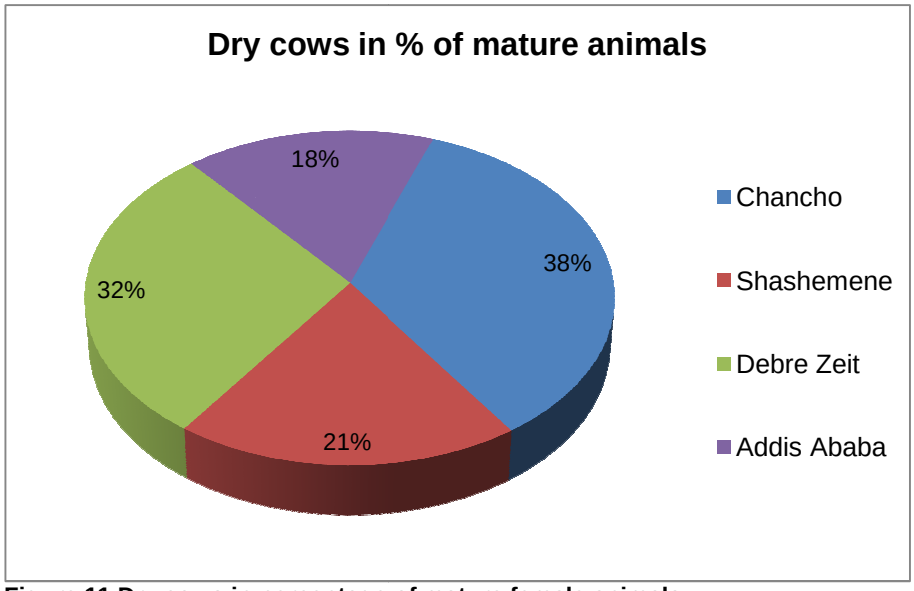

Figure 11 Dry cows in percentage of mature female animals

Figure 11 represents the percentage of dry cows in respect to the total number of mature female animals, excluding young stock. The figure shows that between a fifth and a third of the animals on the farms is a dried off animal.

The average number of animals that dies on the farms varies from 1 animal over the last year to almost 3, this includes young stock as well, see Figure 12.

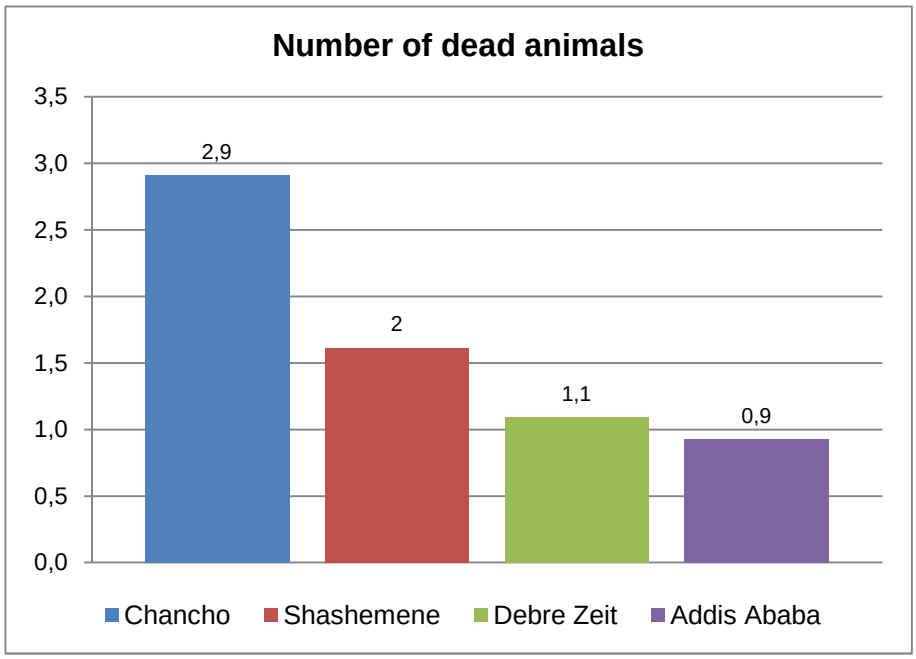

Figure 12 Average number of dead animals, over last year

In Chancho was one farmer that lost 15 animals over the past year due to an animal disease, this may give a distorted average. On average the mortality rate is 19%, with excesses from 5% to 75%. Calculated from the number of animals died divided by the total number of dairy animals, including young stock.

Table 7 Reasons of death

Main reason of death	Number of farms	Percent
No deaths	*17*	*34,0*
Accident	4	8,0
Died during/after delivery	11	22,0
Disease	13	26,0
Other	3	6,0
Unknown	2	4,0
Farms	**50**	**100,0**

Over the 50 farms the most frequent cause of death of animals was a disease, which diseases was not specified. Death during or shortly after birth came second place.
Only 17 farmers did not have to deal with dead animals.

5.2.3 Breeding

In Ethiopia there are three common ways for breeding cattle, first of all the original way of having and using an own breeding bull, second is the (local) bull-service, a local farmer with a good breeding bull and third is the Artificial Insemination service, which can be supported by the government or a private practice.

Table 8 Ways of breeding

Type of breeding	Nr of farms	Percent	Cumulative Percent
AI service (private/governmental)	26	52,0	52,0
Local bull-service	3	6,0	58,0
Own bull	8	16,0	74,0
AI & own bull/bull-service	12	24,0	98,0
Own bull & bull-service	1	2,0	100,0
Total of farms	50	100,0	

Most farmers use the AI service, either governmental or private. Complaints about the service is that the genetic improvement is low as there is no quality semen available, and often the service is poor, they are late or are too expensive.

5.3 Technical parameters

This paragraph shows the results of the questionnaire in the field of technical parameters on farm level. The farmers were asked about production levels, calving intervals etc. to see how their cow management is organised.

5.3.1 Milk production

The figures used in this table are derived from the answers of the farmers, and cannot always be seen as objective and reliable, as amounts are not measured officially.

Table 9 Overall production averages

		Average Milk Production / Cow / Day	Average Lactation Length	Calving Interval
N	Valid	48	49	46
	Missing	2	1	4
Mean		11,1 lt.	305 days / 10 months	483 days / 16 months
Std. Deviation		5 days	112 days / 3.75 months	145 days / 4.8 months

The average milk production from 48 farms is just above 11 litres a day per lactating animal, with a standard deviation of 4.99 litres. The lactation length is on average 305 days calculated from 49 farms. From 46 farms there are figures for the estimated calving interval which results in an average interval of almost 483 days or 16 months.

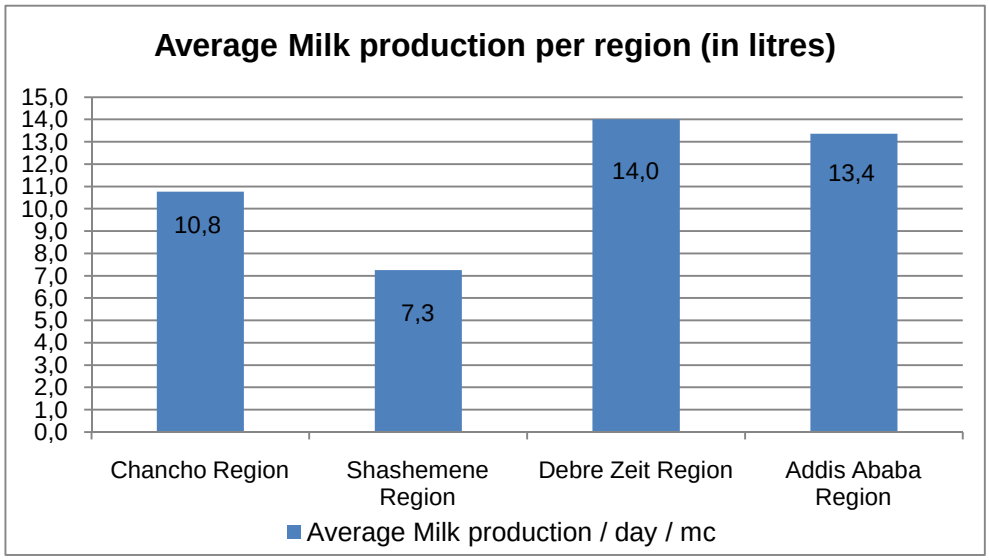

Figure 13 Average milk production per day per milking cow (in litres)

The figure above shows the average milk production per cow per day according to the farmers. Farmers were asked to tell the milk production per cow, which is not registered, some farmers had no idea others could give quite an accurate estimate.

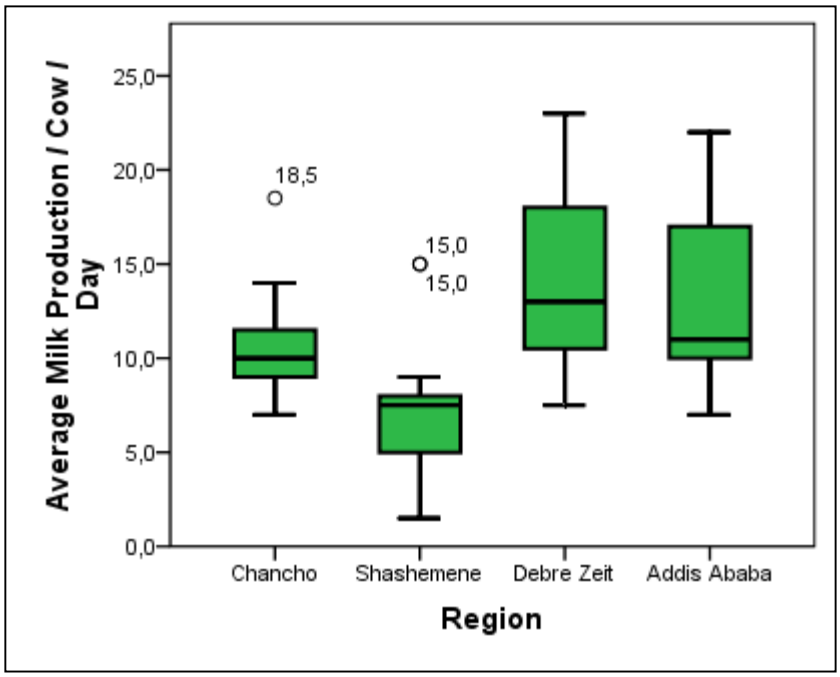

Figure 14 Distribution of milk production

Figure 14 shows the distribution in milk production between the different regions. It clearly shows that the Shashemene stays behind on production levels.
The production levels in the four different regions measure quite a difference. These figures are derived from the farmers, and cannot be interpreted as very accurately.

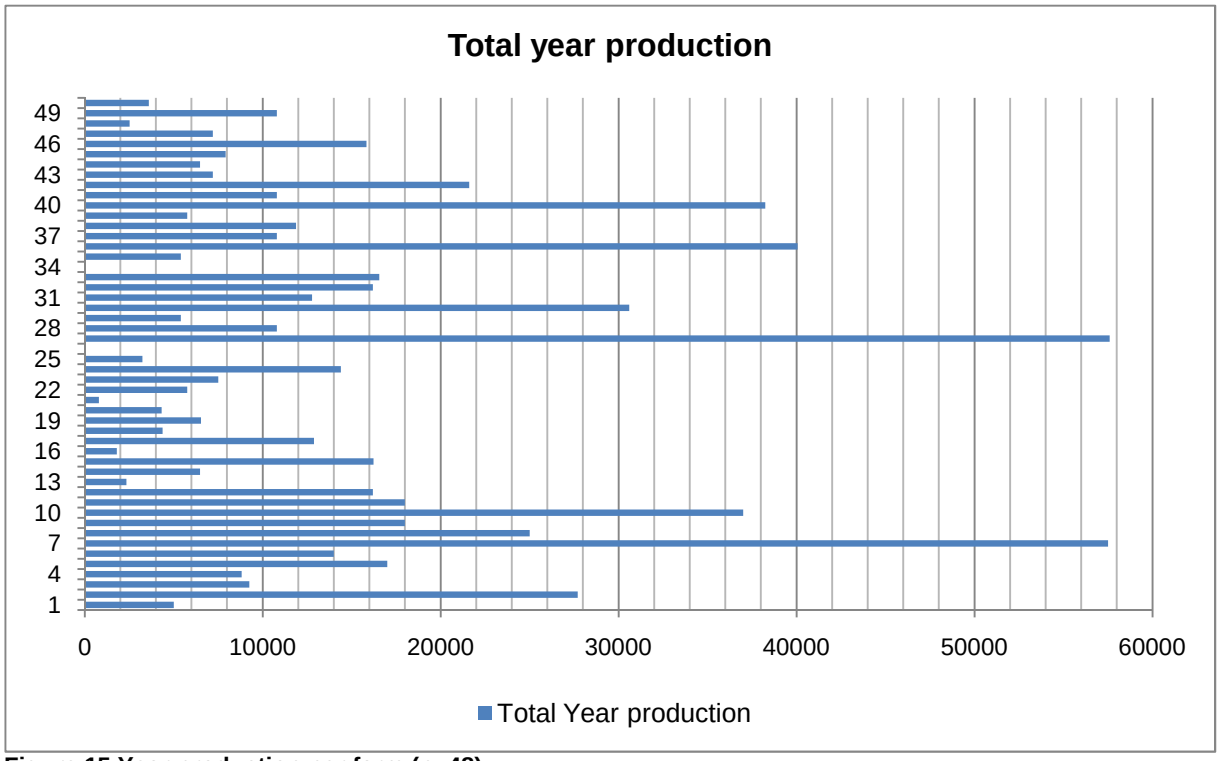

Figure 15 Year production per farm (n=48)

The total year production is based on the amounts of milk monthly delivered to the cooperatives by the individual farms.

5.3.2 Technical data

Figure 16 represents the average lactation length and calving interval for the four different regions.

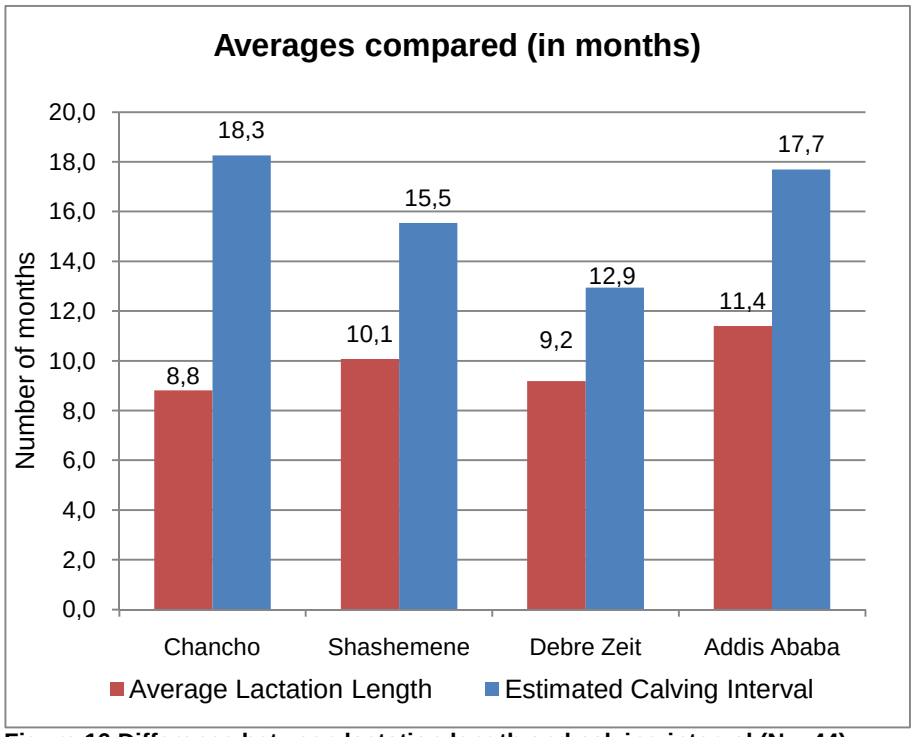

Figure 16 Difference between lactation length and calving interval (N = 44)

The figures for the calving interval were found not very accurate, therefore some of the answers have been left out of the calculations for Figure 16 to generate a more credible average. These inaccurate data are not plausible for the local circumstances, i.e. a calving interval of only 11 months, this would cause a major change in the average.
For Chancho N is 11, for Shashemene N is 11, for Debre Zeit N is 9 and for Addis Ababa N is13.

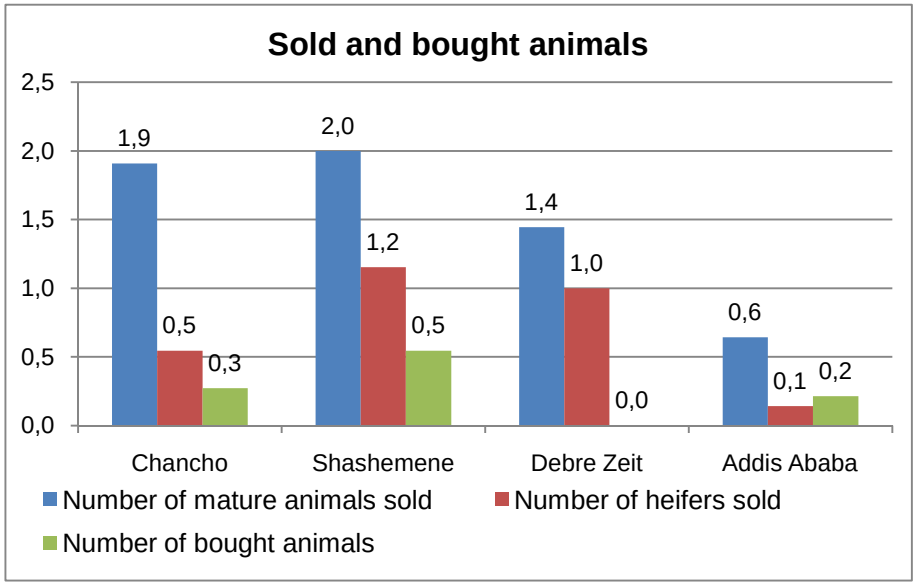

Figure 17 Number of culled/sold and bought animals, over the past year

The maximum number of animals bought by a farmer is 2, the maximum of animals sold is 8, mature animals and heifers.

Table 10 Main reason for culling/selling animals

Main reasons for culling/selling milking cows	Frequency	Percent
No sales	14	28,0
Age	6	12,0
Defect / disease	2	4,0
Feed shortage	7	14,0
Lack of land	5	10,0
Other	9	18,0
Lack of production	5	10,0
Reproductive disease	2	4,0
Total	**50**	**100,0**

Feed shortages are the main reason for selling animals. Age of the animals and a lack of land play an important role in the decisions to sell animals as well.

5.3.3 Milk marketing

Many cooperatives are established since 1991 for the marketing of raw milk of small holders in the urban and per-urban areas. The most successful cooperatives are, Ada Dairy cooperative and some cooperatives in Selale area (all in the radius of 100 km from Addis Ababa). Ada Dairy Cooperative has its own processing plant. Another cooperative in Northern part of Ethiopia, has recently established a processing plant targeting the consumers at Mekele town.

Table 11 Milk distribution

	Number of farms	Percent
Cooperative	36	72.0
Cooperative and Local	4	8.0
Cooperative and processing	5	10.0
Home processed and sold	2	4.0
Only home consumption	1	2.0
Local/Informal as raw milk	2	4.0
Total of farms	**50**	**100.0**

Almost 75% of the produced milk that is sold, is sold to a local dairy cooperative. Around 10% is sold to a cooperative and to a processor, another 8% is sold partially to a cooperative and locally. The remaining 10% of the produced milk is divided amongst home processing & selling, local sales or purely for home consumption.

5.3.3.1 Milk prices

The milk prices in Figure 18 come from the farmers themselves, it is the most recent prices they received for their delivered milk.

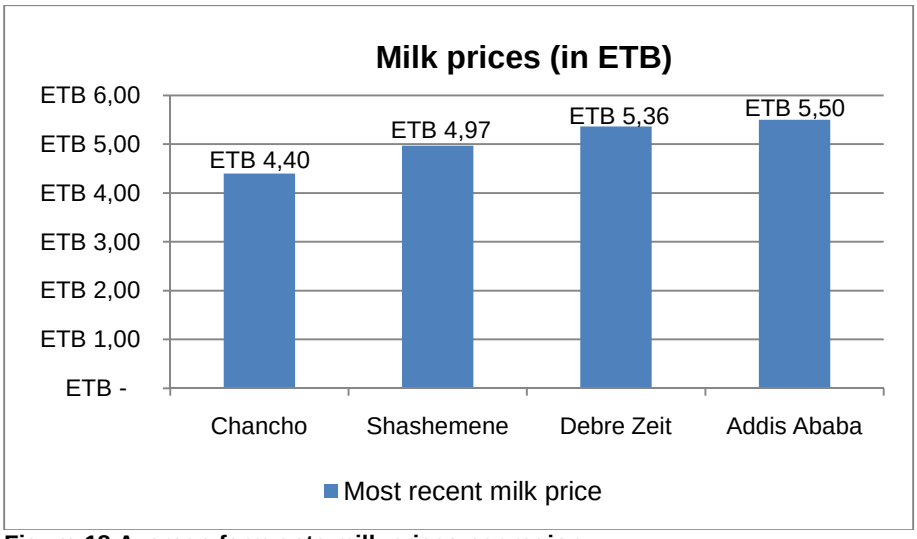

Figure 18 Average farm gate milk prices per region

The price difference over the past year, September 2009 – September 2010, fluctuated between 0,50 ETB and 1,00 ETB. Between the different regions there was some difference in what the cooperatives paid, the highest payment per litre of milk was in Addis Ababa with 5,50 ETB, the lowest in the Chancho region with 4,00 ETB. One of the farmers in Debre Zeit sold his milk also to a processor and received 7,50 ETB per litre for his produce, reason for this high pricing was not clear.

5.3.3.2 Milk usage

Figure 19 shows the different purposes for the milk that is produced on the farms. On average almost ¾ of the total monthly production is sold, either to cooperatives or locally. The rest of the produce is used for the younger animals or for home consumption.

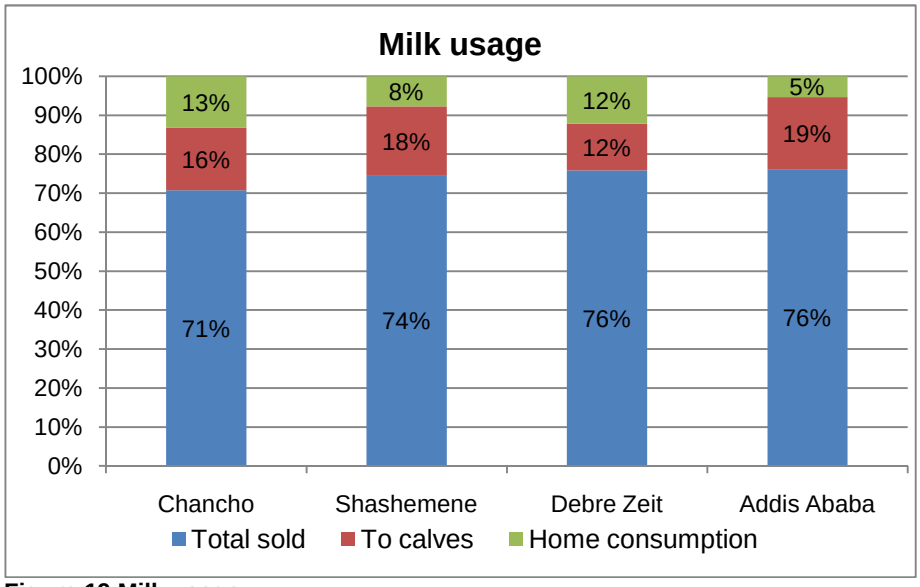

Figure 19 Milk usage

5.4 Revenues

5.4.1 Milk revenues

The average income from milk or homemade dairy products is ETB 4.730 per month calculated from 49 farmers.

Table 12 Income from milk sales (avg/month last year)

Region		Revenues from milk/products sales (avg/month last year)
Chancho	Mean	ETB 6.026
	N	11
Shashemene	Mean	ETB 2.892
	N	14
Debre Zeit	Mean	ETB 7.798
	N	10
Addis Ababa	Mean	ETB 3.358
	N	14
Total	Mean	ETB 4.730
	N	49

One of the farmers was excluded due to a very outlying income, because of a different farming scale than most of the farms.
The total monthly income from all farmers together is on average ETB 8.322, within a range of ETB 3.832 to ETB 16.1991 between the different regions.

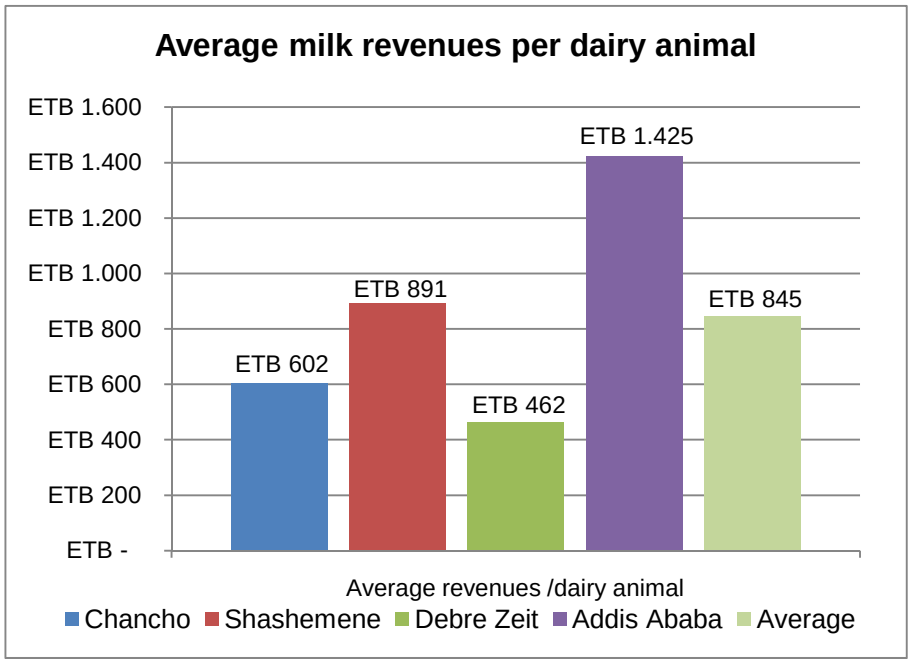

Figure 20 Average milk revenues per animal (lactating and dry) per month

The revenues from Figure 20 are purely calculated from the sales of milk. A lot of variance can be seen between the different regions, mostly due to a lower productivity or different milk price.

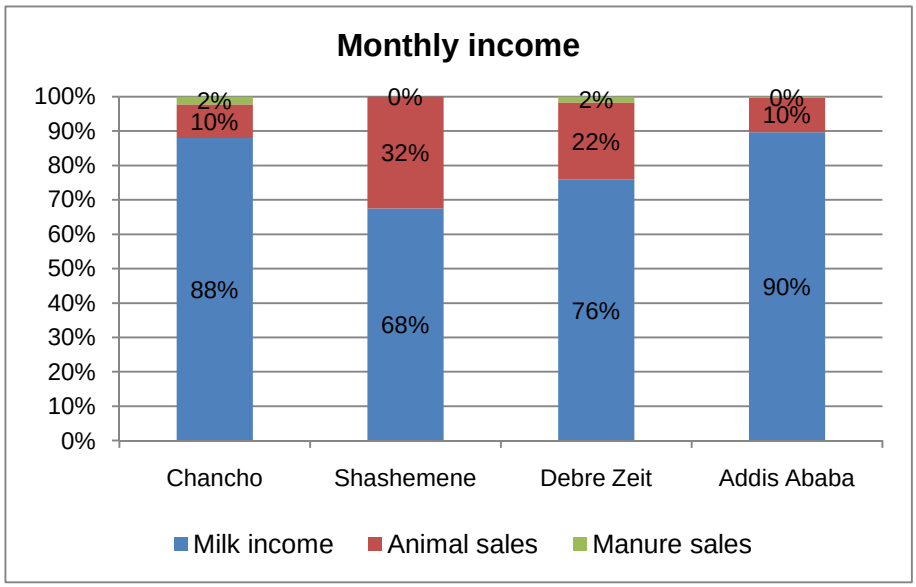

Figure 21 Monthly income split up

On average 80% of the farmers income is generated by the sale of raw milk or milk products. For some farmers the sale of animals is a considerable addition to their income, where the sale of manure is negligible.

5.4.2 Other revenues

Farmers tend to expand their income with other sources like the sale of animals and the sale of manure.

Table 13 Total revenues from milk and other sources (avg/month last year)

Region		Total revenues from milk, animals etc.
Chancho	Mean	ETB 11.596
	N	11
Shashemene	Mean	ETB 4.055
	N	14
Debre Zeit	Mean	ETB 16.191
	N	11
Addis Ababa	Mean	ETB 3.832
	N	14
Total	Mean	ETB 8.322
	N	50

The sale of cattle is mostly to generate more income when milk prices are low or milk production and demand is low. Only in the Chancho region farmers keep animals for fattening as extra source of income, the other regions sell their dairy animals (pregnant heifers, or old animals), mostly as backup.

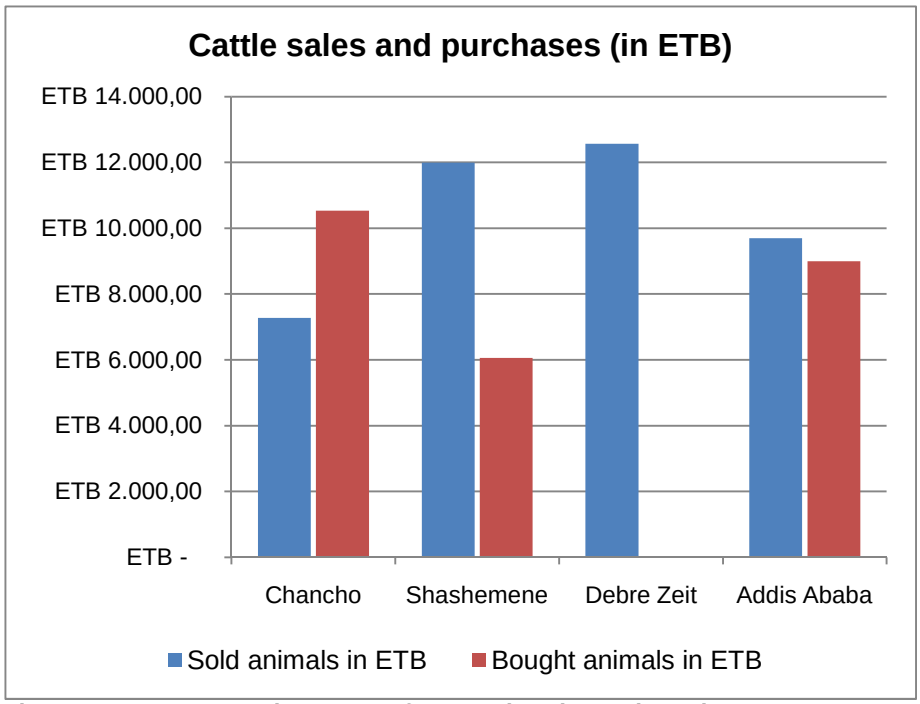

Figure 22 Revenues and expenses from cattle sales and purchases

Only few farmers buy animals to expand their herd. These are mostly bulls used for breeding or replacement cows for animals that have died recently.

Manure is sold as well as a fuel for cooking or heating. The cow manure is dried in the sun as round flat cakes, also known as ‘dung cake’. These cakes are sold to the neighbours and on markets by the women, therefore most farmers have no idea about the prices and the income. When farmers have people working for them they sometimes pay out with these ‘dung cakes’.
More in depth details about the manure sales are not known as many farmers did not know how much they sold or gave away.

5.5 Costs

5.5.1 Feed stuffs

Most farmers are depending on what the market is offering them in terms of feedstuffs. As Ethiopia has a wet and a dry season it can be hard and very expensive to buy the needed amounts of feedstuffs on the right moment.

Roughages
The feedstuffs are mostly bought from the local market or direct from farmers in the neighbourhood. In the Addis Ababa region the cooperative also supplied roughages for their members.

Table 14 Roughage preferences

Type of roughage in ration			
First Type		**Frequency**	**Percent**
	Grazing	2	4,0
	Hay	43	86,0
	Straw mix (oats, barley, wheat)	4	8,0
	Teff straw	1	2,0
	Total of farms	**50**	**100,0**
Second type		**Frequency**	**Percent**
	Grazing	9	18,0
	Hay	2	4,0
	Maize	1	2,0
	Napier/Sudan/Elephant grass	2	4,0
	Other	2	4,0
	Straw mix (oats, barley, wheat)	25	50,0
	Teff straw	3	6,0
	Not applicable	6	12,0
	Total of farms	**50**	**100,0**

Table 14 shows the two main sorts of roughage fed to the animals. As can be seen from the table hay is the most important roughage source, 90% of the interviewed farmers is feeding hay.

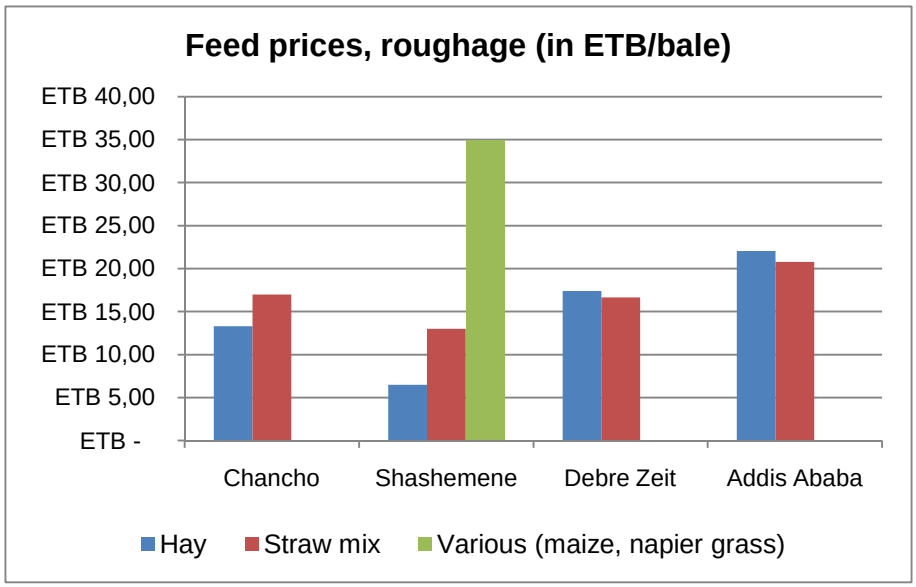

Figure 23 Roughage prices (in ETB/bale)

Prices for roughages are shown in Figure 23. The difficulty here was to calculate the price to a comparable unit as products are delivered in various sizes. Some farmers buy bale, others get their hay or straw delivered on a big pile. The estimated amount of product and price is calculated to bales.

Concentrates and other feedstuffs

The vast majority of respondents are using a combination of ingredients to make their concentrates for their lactating animals, only two farmers do not use any concentrate. A lot of farmers also feed concentrates to their dry cows and their young stock but in a lesser extent.

Table 15 Concentrate usage for lactating cows

Number of types		1 Type		2 Types		3 Types		4 Types	
N	Valid	49	98.0%	35	70.0%	18	36%	4	8%
	Missing	1		15		32		46	

The most common used by-products for dairy farmers is wheat bran, this is the outer layer of a wheat kernel an is a by-product from the milling industry. Wheat bran is mainly a source of energy and contains around 16-17% crude protein (ILRI[1]).

The nough cake is the second most used concentrate among dairy farmers in Ethiopia. Nough cake is a waste-product from the oil seed industry, the remains of the seeds are pressed together as a cake. It contains on average 31% crude protein

A third ingredient is only used by 36% of all the farmers, and a fourth type is only used by 8% of the farmers. The products that are used as a third or fourth ingredient are mostly brewers waste, chicken litter, a grain mix or ready-made compound mix all, some of the farmers uses even a different local product.

For all ingredients mentioned above counts that farmers feed them in a large bowl mixed with water, like a porridge or soup. This is also done to stimulate the water intake of the animals.

[1] Ethiopian Feed Composition Database: http://192.156.137.110/ethfeed/Feedthree.asp?FTID=1

Table 16 Concentrate usage for dry cows

		1 Type	% of famers	2 Types	% of famers	3 Types	% of famers
N	Valid	29	58.0%	18	36.0%	9	18.0%
	Missing	21		32		41	

For their dry cows 58% of the farmers uses 1 or more types of concentrates, 36% uses 2 or more types and 9% uses 3 or more types.

In Figure 24 are the average prices shown per kg of concentrate.

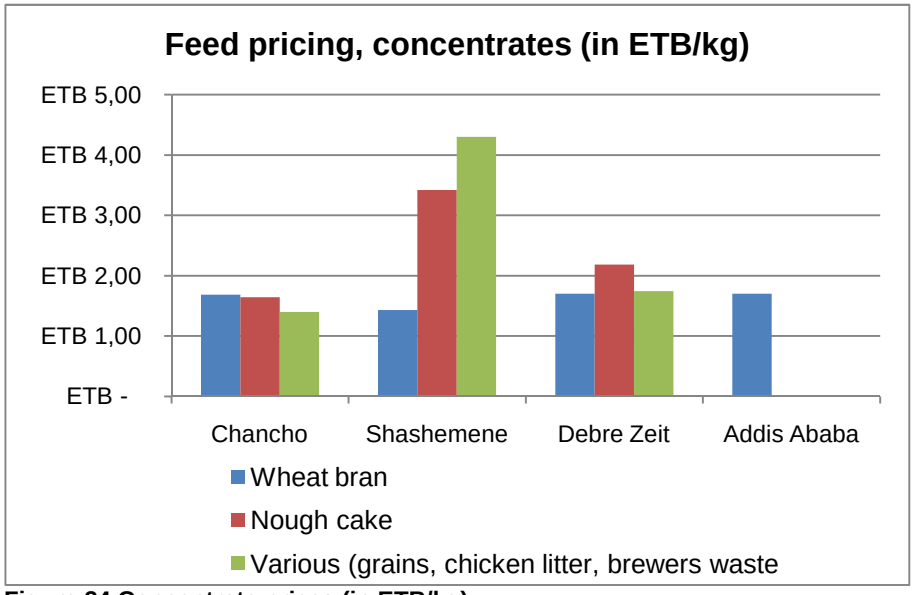

Figure 24 Concentrate prices (in ETB/kg)

In Addis Ababa only wheat bran was used by the farmers so no other prices were available. The big difference between the prices in Shashemene and the other regions can be explained by the transport costs that are needed to get the products there.

5.5.2 Feed costs

The table underneath shows the overall average feed costs. The costs are divided by concentrates, roughages, minerals and other feed stuffs.

Table 17 Average feed costs

	N	Mean	Std. Deviation
Average costs of purchase of concentrates per month	50	1.881 ETB	2.487 ETB
Average costs of purchase roughages per month	50	624 ETB	872 ETB
Costs of minerals	50	55 ETB	49 ETB
Costs of other feed related products	50	22 ETB	31 ETB
Valid N	50		

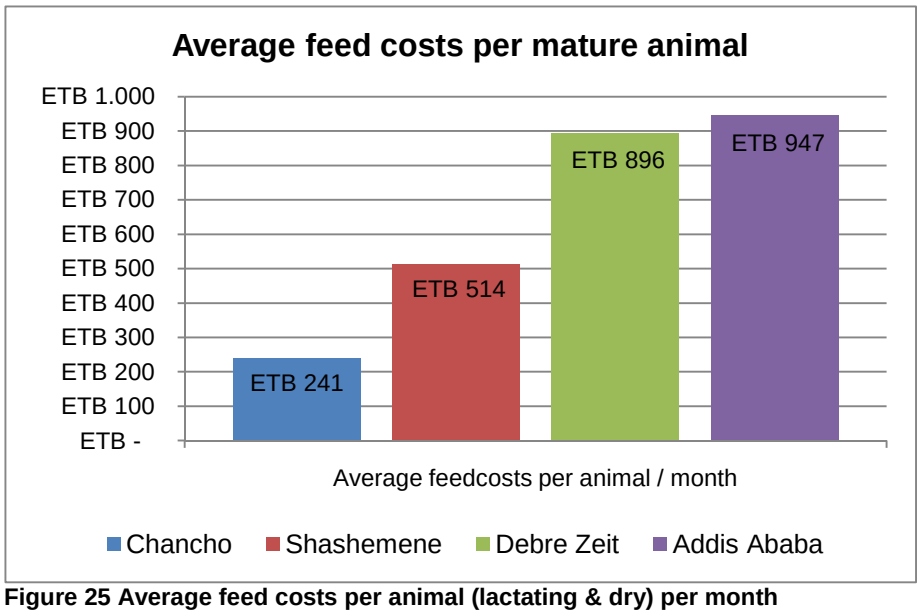

Figure 25 Average feed costs per animal (lactating & dry) per month

The feed costs per lactating animal vary from ETB 240 to ETB 950 per month. It is obvious that Chancho has the lowest feed costs, reason for this is that farmers have the opportunity to let their cattle graze, and they own land to grow crops, like teff and use the straw as cattle feed.

Table 18 Feed costs per animal

	Feed costs per mature animal	Feed costs per present animal
Chancho	ETB 241	ETB 139
Shashemene	ETB 514	ETB 278
Debre Zeit	ETB 896	ETB 445
Addis Ababa	ETB 947	ETB 488

Table 18 shows the feed costs per animal, split up between lactating and dry animals and all present animals on the farm.

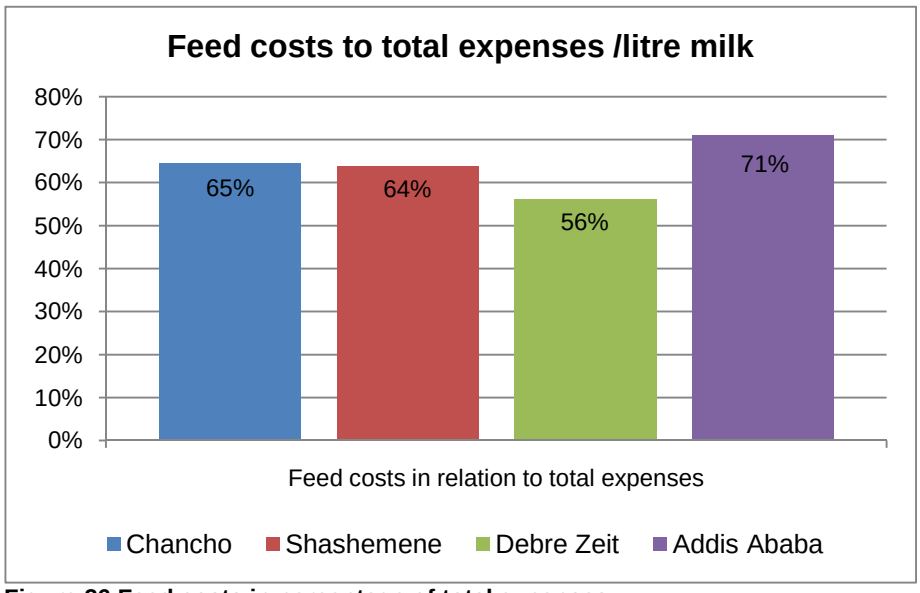

Figure 26 Feed costs in percentage of total expenses

On average more than 60% of the costs for a litre of milk are spent on feed.

5.5.3 Animal costs

The animal costs consists of two parts, the breeding costs and the veterinary costs.

Table 19 Average animal costs

	N	Mean	Std. Deviation
Total veterinarian costs per month	48	558 ETB	844 ETB
Total costs spent on breeding per month	50	557 ETB	2.050 ETB

For the veterinarian costs two farms were taken out of the calculation to prevent extremely high costs which are not representative for the whole group.

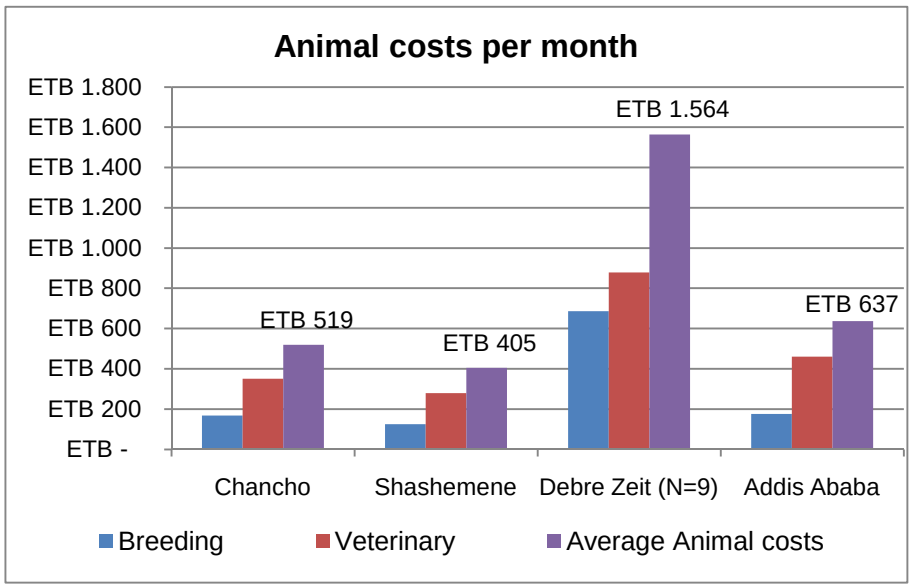

Figure 27 Animal costs per month

The peak in Debre Zeit is not due to one particular case, overall the costs for breeding and veterinary services are much higher compared to the other regions.

5.5.4 Fixed costs

The fixed costs consist of various costs that are paid regularly but calculated back to a monthly amount for comparison.

- The different parts of the fixed costs are, costs for:
- Utilities (water, electricity)
- Land use (per hectare, long and short term or per harvest)
- Transport
- Labour (regular and day workers)
- Maintenance

The average fixed costs, calculated over 48 farms, come to ETB 560 per farm per month. These figures differ heavily from farm to farm, also noticeable in Figure 28.

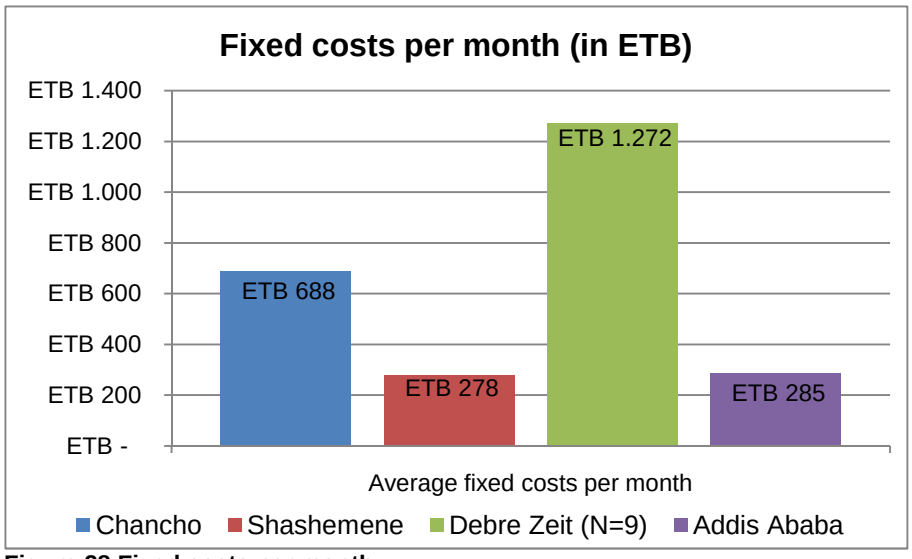

Figure 28 Fixed costs per month

Reasons for the variation in fixed costs between the regions are mainly due to the amount of hired labour which adds a lot to the operating costs for a farm.

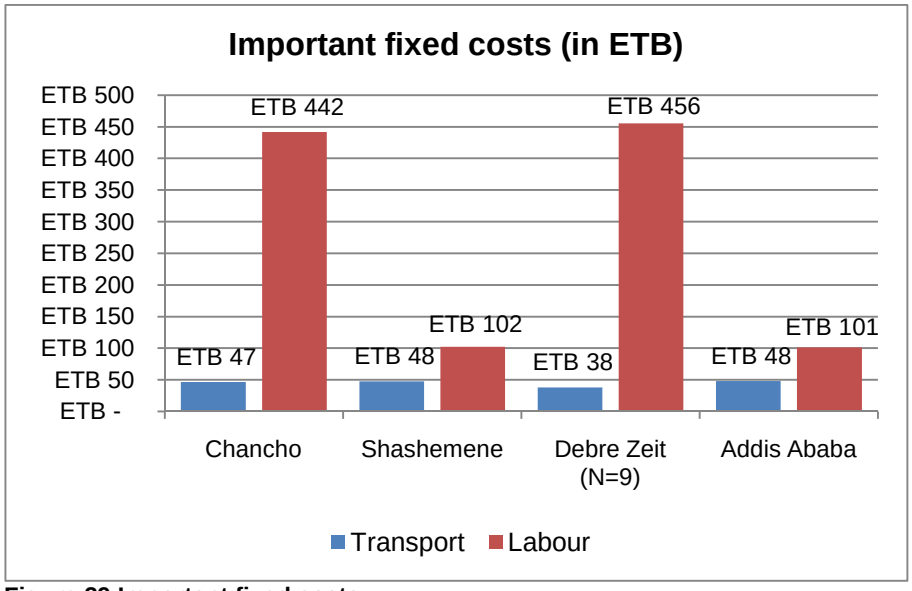

Figure 29 Important fixed costs

The fixed costs consist mainly of transport and labour. Not every farmer uses labour from outside though. The transport costs are for the transportation of milk and feed stuffs.

5.5.5 Cost price milk

Costs included in the cost price involve feed costs, animal costs (breeding and veterinary) and fixed costs, cattle purchases are excluded.

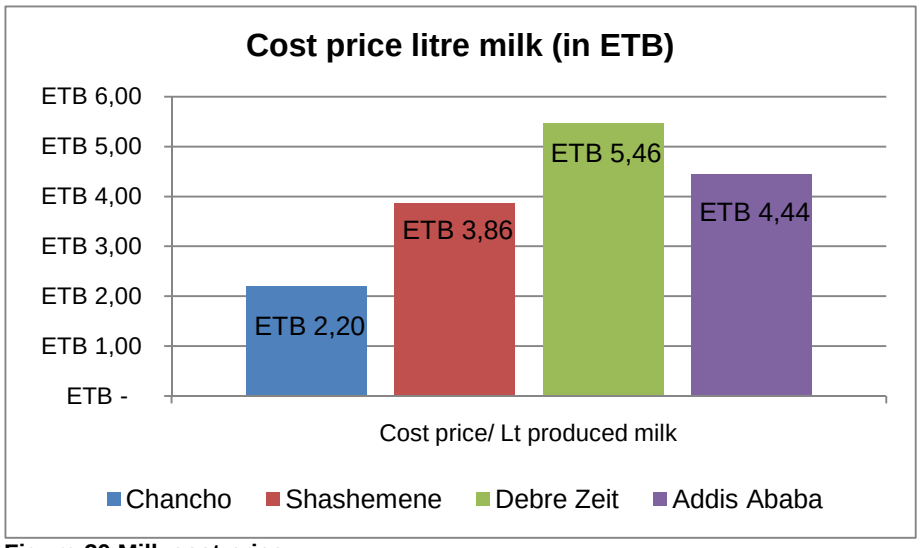

Figure 30 Milk cost price

Among the farmers is a great variation in the cost price for a litre of milk, from ETB 2.20 to ETB 5.46.

5.5.6 Gross margin

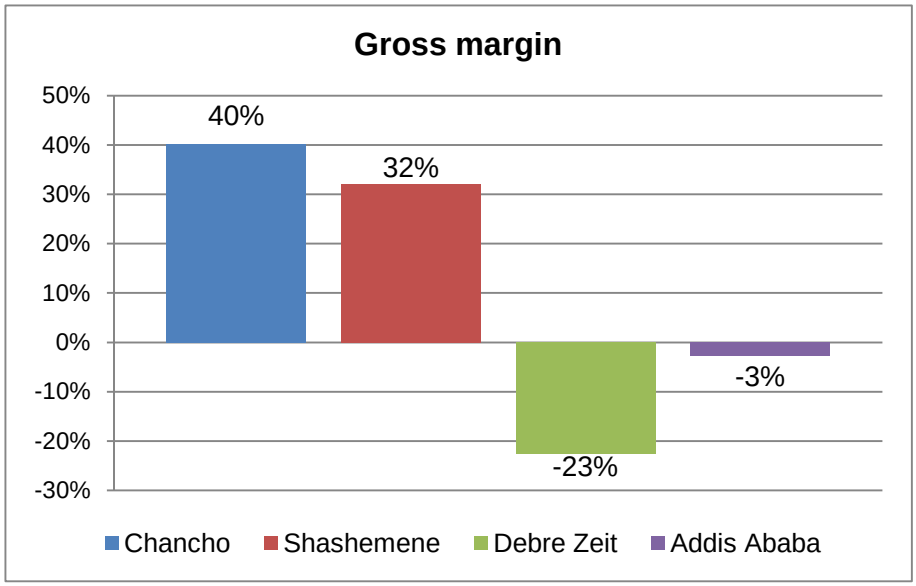

Figure 31 Gross margin (milk income – feed & animal costs / milk income)

The gross margin represents the percent of total sales revenue that the farm retains after incurring the direct costs associated with producing the raw milk and services sold by a company. The higher the percentage, the more the farm retains on each dollar of sales to service its other costs and obligations.

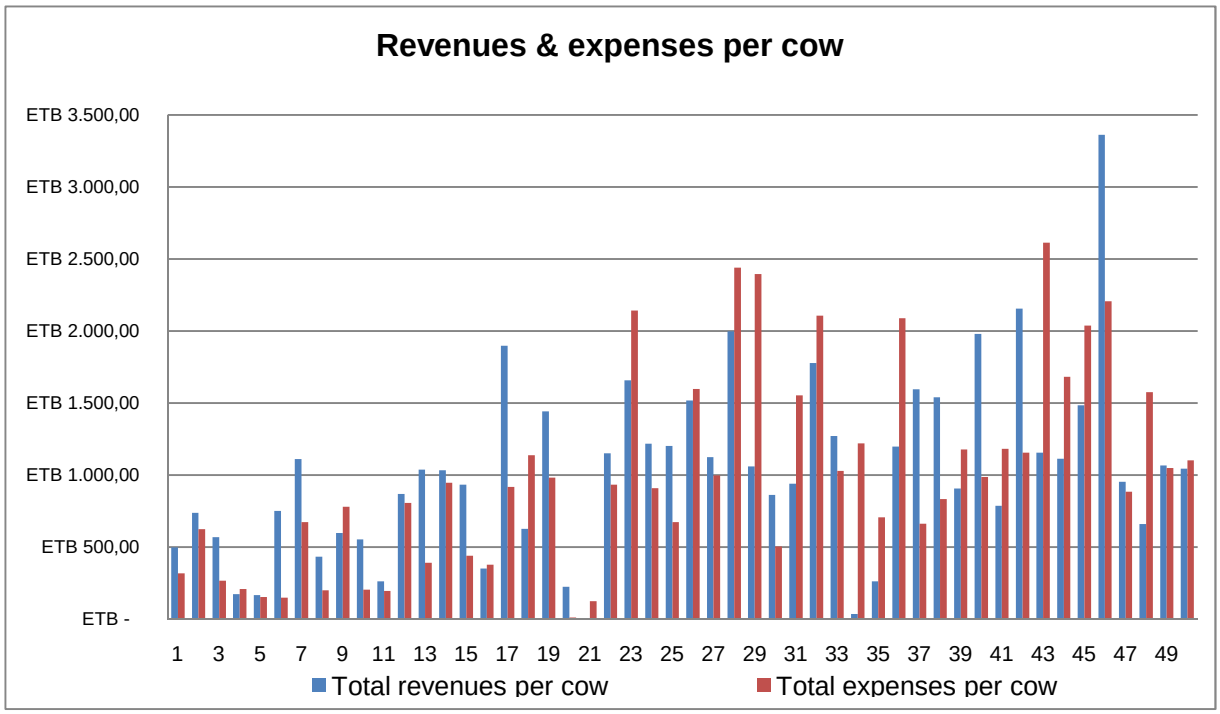

Figure 32 Revenues & expenses per cow(lactating & dry) per farm

Figure 32 shows the revenues (including cattle sales) and expenses (including cattle purchase) as a cow average for all 50 farms .

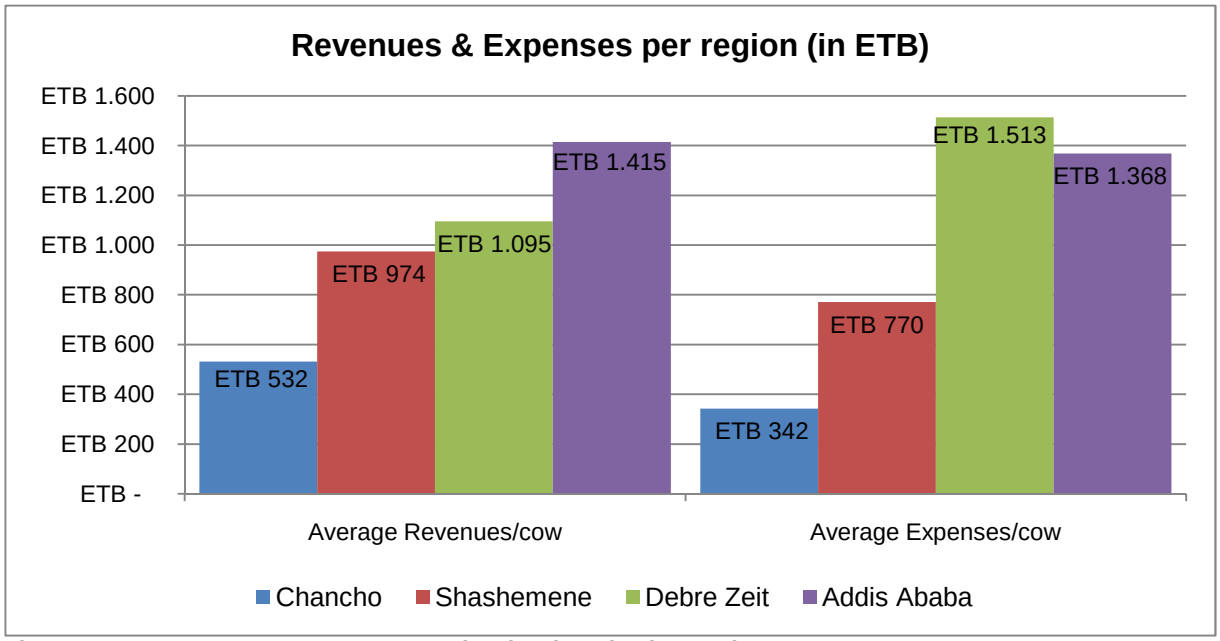

Figure 33 Revenues & Expenses per region (excl cattle changes)

From Figure 33 can be seen that there are substantial differences in revenues per animal as well as in expenses per animal.

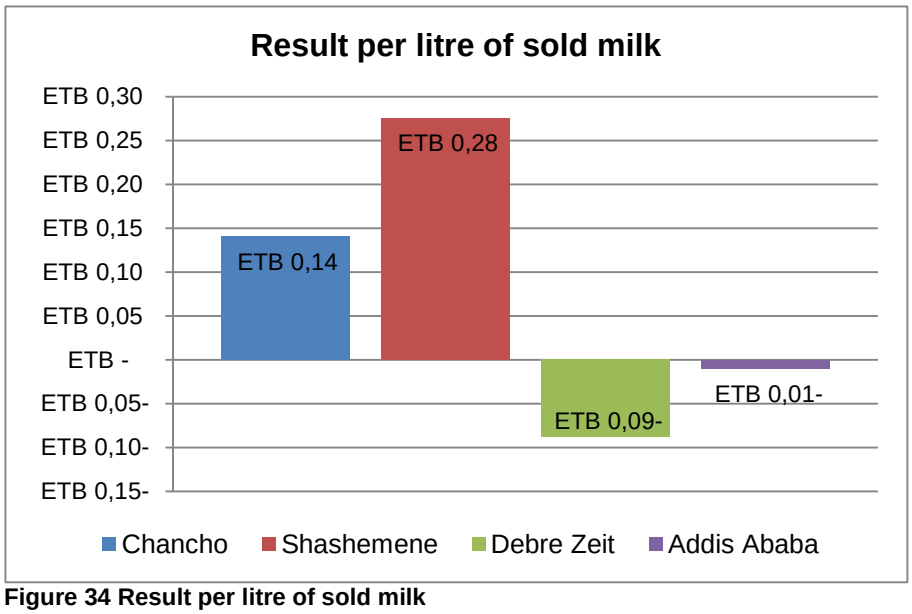

Figure 34 Result per litre of sold milk

Debre Zeit and Addis Ababa show a negative result per litre of sold milk. This is mainly due to high cow- and feed costs on the farm.

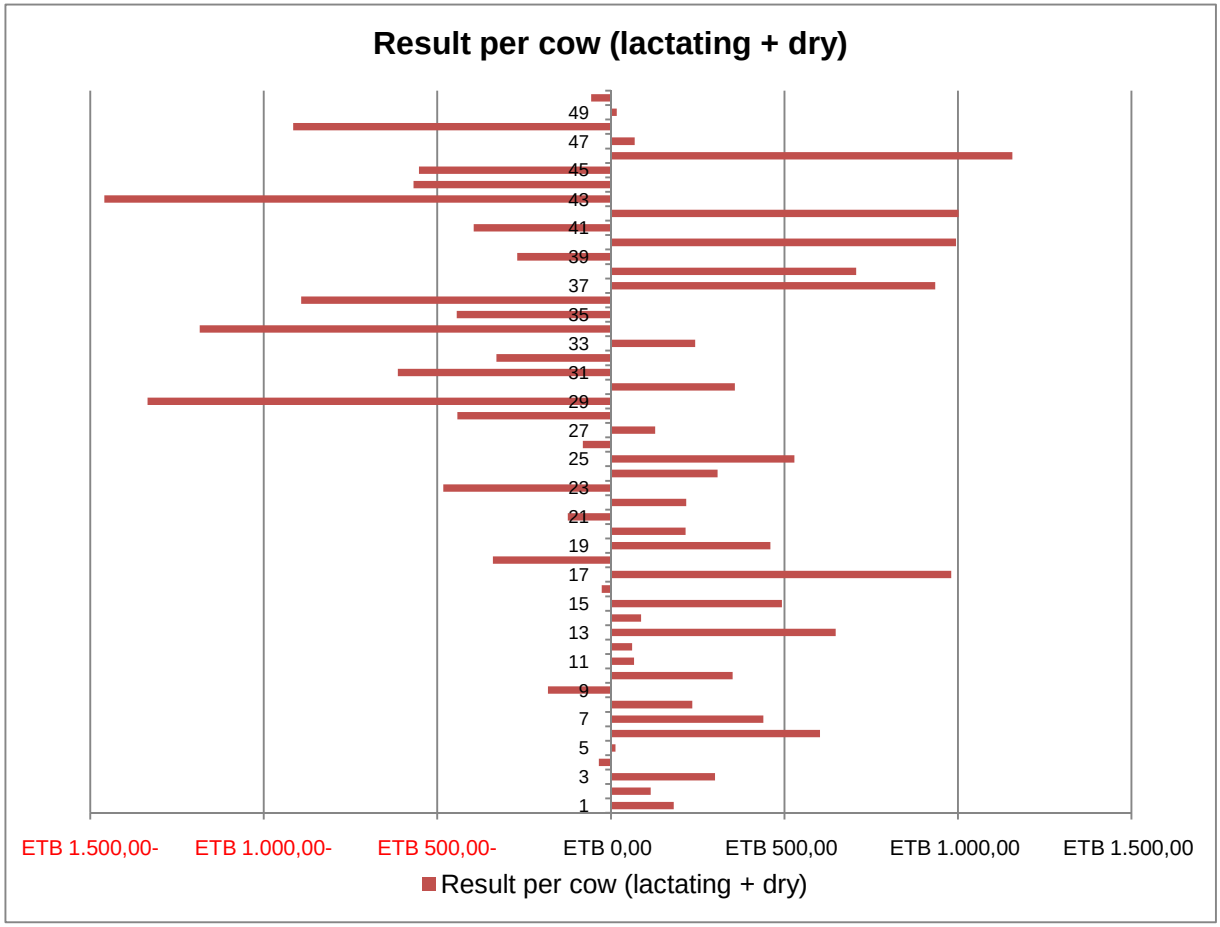

Figure 35 Individual farm result per cow (excl cattle changes)

The figure above shows the results per cow per month for each individual farm. The result is built up from the total monthly revenues (excluding cattle sales) minus the total monthly expenses (excluding cattle purchases). It shows that the result per cow on 21 of the 50 farms (42%) is negative.

The farm result is calculated with the income from milk and manure sales and the expenses on feed, animal and fixed costs. No cattle changes are included. The result per cow is based on the result calculation and divided by the amount of mature animals, in lactation and dried off.

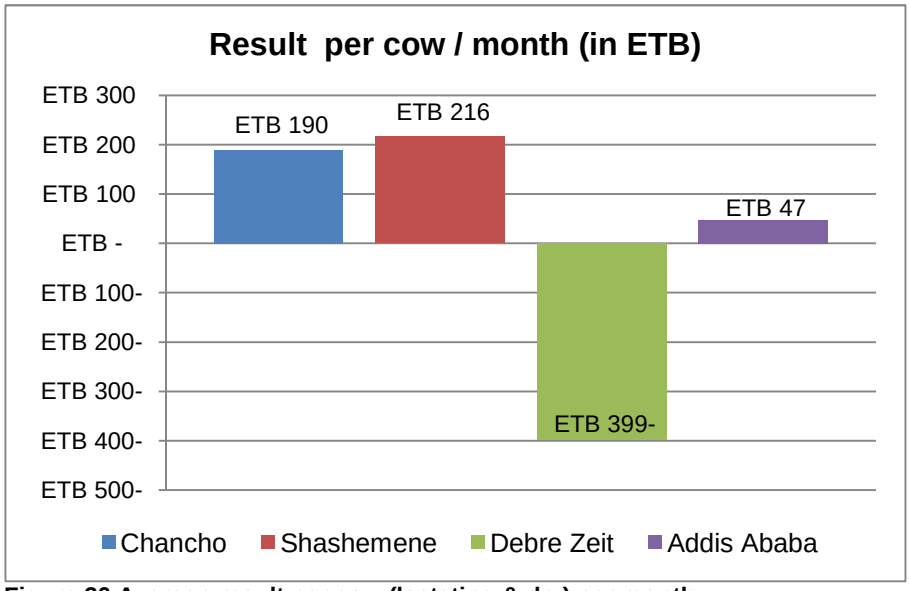

Figure 36 Average result per cow (lactating & dry) per month

Figure 36 shows that despite the high milk revenues from Table 12, the cows can have a negative result. The cattle purchases and sales influence these figures greatly, in this graph they are left out. The amount of animals influence the figures as well compared to the previous figure.

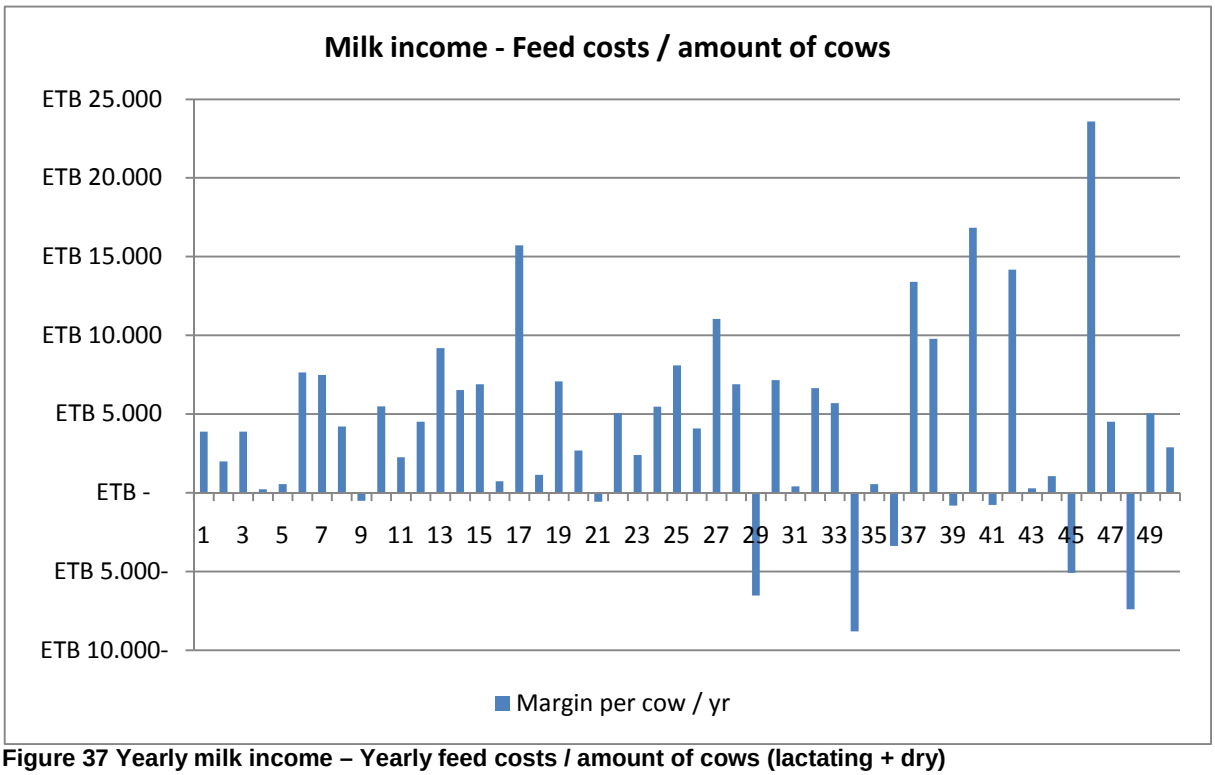

Figure 37 Yearly milk income – Yearly feed costs / amount of cows (lactating + dry)

Figure 37 represents the yearly margin per cow per farm. The figures are based purely on milk income and feed costs. The average margin per cow per year is ETB 4265 with a standard deviation of ETB 6032.

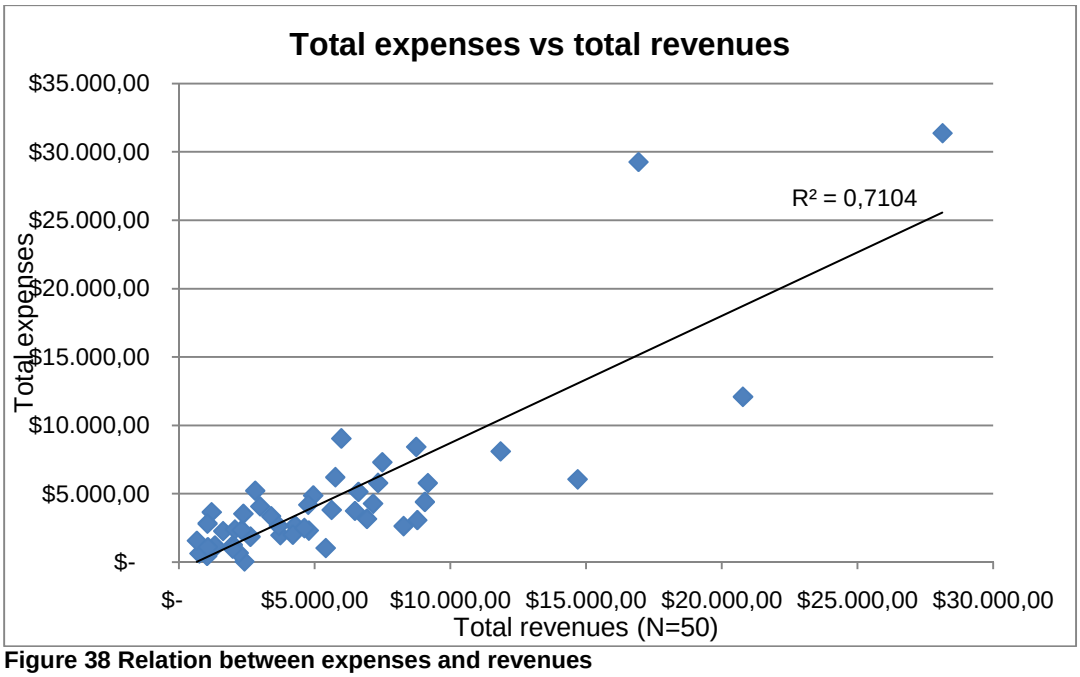

Figure 38 Relation between expenses and revenues

The graph in Figure 38 shows that there is a fairly strong relation between the total expenses and the total revenues on farm level. Even without the two outliers(29.000 and 31.000) R^2 is 0.6151, meaning there is still a fairly strong relation.

5.6 Farmer's opinions

The farmers were asked to give their own opinion about several topics regarding dairy farming in Ethiopia.

What is your opinion about the current milk marketing?
The general opinion is that is important to have cooperatives that mediate with processors, but there are a lot of complaints about the current milk prices, the prices do not match with the feed prices and the prices farmers receive from the informal market.

"Milk prices paid by cooperative are too low to compensate for feed; it's a killer." - (anonymous farmer from Addis Ababa)

All farmers agree it is better to sell the raw milk to a processor or a cooperative than to process it themselves to butter or ayib. It costs too much time and labour for a low profit. Selling raw milk in the informal market gives a higher price, but the demand is low and irregular.

Do you face any problems on feeding, breeding or, diseases?
The main problem around feeding are the high feed prices and the low quality of the roughages that are available. From time to time the availability is also a problem, especially in the dry season and in regions where there is a low level of production of roughages. In terms of concentrates the main complaint is that the concentrate are too expensive or not available. Some farmers doubt the benefits of feeding concentrates and are therefore not buying any concentrates.
A frequently heard complaint concerning the breeding of cattle is the lack of exotic breeds (Holstein) and the poor quality from the AI services (too late, high prices, lack of good breeding material).
Fertility problems, like badly conceiving cows and reproductive diseases, are also often mentioned. When using a bull service the problem of transmitting diseases occurs frequently according the farmers.
Farmers would like to be able to gain more genetic improvement in their herd so they will be able to produce more milk and generate more income.

Farmers call various diseases as problems, like Foot and Mouth Disease (FMD), mastitis, black leg and sometimes Anthrax. Other concerns are the high costs for medicine and treatments, if they are available to farmers.

Why not keeping more dairy animals?
The most heard answer on this questions was the lack of Birrs, more animals means more costs on feeding, breeding and veterinary services, and with the current prices no farmer thought of keeping more animals. Quite a lot of farmers had to sell animals to make ends meet.

"Feed prices are high, so I don't want to increase the number of animals, but supply me with higher producing animals or breeding materials. Then I need less animals for the same or maybe more milk!" - (anonymous farmer from Chancho)

Other issue on this topic is the lack of land, most farmers were situated in towns with only little space to keep animals on their property, this restricts the number of animals drastically. Some farmers mentioned the fact that keeping more animals means more work, and good labourers are hard to find, so no workers no expansion.

5.7 Case studies

Two situations have been created, one extensive and one (peri)urban farm, to simulate the current farming situation. The baseline situations, with production levels and feed types, are as farmers described them during the interviews, and what I observed during these interviews.
For the starting situation I have been aiming for the present production levels, with trying to get the right production with the feed intake in balance.
The amounts of feed are based on amounts that farmers bought per month and the number of animals they feed during that month. The amount of feed divided by the number of animals gives roughly the amount of feed that is fed per animal. Asking directly how much is fed is difficult as farmers do not way the feed and use different kinds of scoops or buckets to dose the feed.

The optimisation is based on improving technical parameters like inter calving time, calving age of heifers and lactation length. If farmers can manage to improve these results with better management a big step has been made. It will result in healthier cows and improve the cows performance as well.
Making improvements with better feed gives in theory quicker results, but to obtain better feed is difficult as many farmers are dependent on others for their feed.

The first of two cases is an extensive farm. Cows are able to go out for grazing, the number of animals is quite high, and technical figures are far from optimal.

Table 20 Case 1, extensive farm

Present situation		
Lactating animals	4.56	
Dry animals	5.44	
Young stock	9.00	
Total dairy animals		19
Average day production per cow		8.8 lt
Average age first calving		3.2 yrs
Lactation length		250 days
Calving interval		548 days

Ration for situation 1;
Roughages: Grazing (medium quality) for limited time a day, hay (poor quality), straw mix (barley, wheat, teff)
Concentrates: Wheat bran, nough cake and brewers waste

The ration for lactating animals consists of:
4 kg of hay
3 kg of straw mix
4 kg of fresh grass, this is an assumption as it is not clear how big the grass intake is.
2 kg of wheat bran
2 kg of nough cake
2 kg of brewers waste

Optimal farming situation
The ration for case 1 stays the same as in the present situation during the optimisation. The improvements have been made only on the farm management. If the feed would be improved as well, even better results could be achieved.

Table 21 Case 1, results

	Present	Optimum (1)		Optimum (2)	
Lactation length	250 days	275 days		290 days	
Calving interval	548 days	480 days		425 days	
Lactating animals	4.56	5.73		6.82	

Dry animals	5.44	4.27		3.18	
Production per cow	8.8 lt	8.8 lt		8.8 lt	
Production per cow / year	1471 lt	1848 lt	+ 26%	2201 lt	+ 50%
Cost price per litre	ETB 6,35	ETB 5,38	- 15%	ETB 4,77	- 25%
Cash balance (roughly)	ETB -13.000	ETB -2.100		ETB 8.000	

A longer lactation length of 275 or 290 days and a shorter calving interval of 480 or 425 days can cause a higher year production per animal of respectively 26% or even 50%. With a rise in production a lower cost price per litre is expected as well.
Improving these technical figures has also a financial benefit as the cash balance rises from a negative balance to ETB 8.000. This is based on a rough calculation though.

The second case farm is a medium sized urban farm. This means lower number of animals than the extensive farm, grazing is not an option and production levels are higher.

Table 22 Case 2

Present situation		
Lactating animals	3.06	
Dry animals	1.94	
Young stock	4	
Total dairy animals		9
Average day production per cow		12.4 lt
Average age first calving		2.5 yrs
Lactation length		275 days
Calving interval		450 days

Ration for situation 2;
Roughages: Hay (poor quality), straw mix (barley, wheat, teff), maize stovers.
Concentrates: Wheat bran, nough cake

The ration for lactating animals consists of:
5 kg of hay
1 kg of straw mix
4,5 kg of maize stovers
3 kg of wheat bran
3.5 kg of nough cake

Optimal farming situation
When the technical data from this farm are optimised positive results on a higher year production and lower cost price can be expected.

Table 23 Case 2, results

	Present	Optimum (1)		Optimum (2)	
Lactation length	275 days	300 days		300 days	
Calving interval	450 days	420 days		405 days	
Lactating animals	3.06	3.57		3.70	
Dry animals	1.94	1.43		1.30	
Production per cow	12.4 lt	12.4 lt		12.4 lt	
Production per cow / year	2765 Lt	3232 lt	+ 17%	3351 lt	+ 21%
Cost price per litre	ETB 3.19	ETB 2.28	- 29%	ETB 2.23	- 30%

When the farm management improves and the lactation length is expanded to 300 days and the calving interval shortened to 420 or even 405 days the rise in production could possibly be 17% or even 21%, this causes a lower cost price as well. However the difference with a 420 days calving interval or 405 days is minimal. But 29% reduction of the cost price is worth something already.
The longer lactation length of 300 days, and a shorter calving interval of 420 days means on a yearly base almost 2350 litres of milk are produced 'extra' compared to the present situation, meaning an extra income of ETB 10.575.

Improving the technical data is showing better results, technically and financially, and should be easier to implement than feeding better feed to the animals.
Providing the animals with better feeding has a major influence as well, particular in the daily production levels, cows will be able to produce more milk. However getting better feed is the problem, higher quality feed is not available or it is too expensive for most farmers.
Therefore improving the farmers technical performance has better change to succeed, when the necessary services (AI & veterinary services) are providing a good service as well.

5.8 Result discussion

The total group of respondents counted 50 farmers these 50 farmers had on average 12,9 dairy animals (from calf to cow). The largest herds are in the Chancho region, which can be explained by the fact that there is more land available for the farmers. This region is the only one where all farmers used grazing to feed their cows.
On average 90.5% of the animals on the farms were female animals, to be used for dairy production, the other 9.5% are male animals, used for breeding, fattening or as working animal.

The percentage of dried off female animals varies between the regions from 18% to 38% in relation to the total number of mature female animals, no young stock included.

On average the mortality rate is 19%, with excesses from 5% to 75%, the high numbers caused by small herds that lose one or two animals. However the average 19% is high on the high side, compared with neighbouring countries, although the sample is small.
Diseases and problems during or shortly after giving birth were the main problems causing death with the animals. The diseases were not further specified.

The most common way of cattle breeding among the respondents is by Artificial Insemination, 52% of the farmers says they use either governmental or private AI services. The second most common way is a combination of AI services and a local bull service or an own bull. The rest is divided by the use of bull services or own bulls. General complaints from farmers about their breeding are, lack of good genetic material and bad and expensive service from the AI services.

The average milk production of all farmers is 11,1 litre per day, with an average lactation length of 10 months. The average calving interval is 16 months, with a standard deviation of 4.8 months. That leaves a period of roughly 178 days the animals are dried off and not producing any milk. It should be noted that animals sometimes are not dried off at all, cows are being milked until they calve, and started up again a few days after calving.
The production levels vary from region to region, the lowest yields are in Shashemene, with average 7.3 litres a day, and the highest in Debre Zeit, with 14 litres a day, almost double.

Quite some farmers have sold animals over the past year, different reasons were mentioned, but the most common were feed shortages, old age of the animals and lack of production. Not mentioned but suspected is also economic side, selling an animal brings in cash, and it seems many farmers survive with the sale of animals, this will be mentioned further on.
On average 1 to 2 animals were sold, most of them mature cows, but also some (pregnant) heifers and bull calves. Only a few farmers have bought animals over the past year, probably due to the high prices of animals.
Almost 75% of the produced milk that is sold, is sold to a local dairy cooperative. Around 10% is sold to a cooperative and to a processor, another 8% is sold partially to a cooperative and locally. The remaining 10% of the produced milk is divided amongst home processing & selling, local sales or purely for home consumption.
Most farmers are happy that cooperatives are being formed to create a better position in the dairy market.
Not all milk is sold, about 25-30% of the produced raw milk is used for feeding calves or for home consumption.

On the moment of interviewing, September/October 2010, the prices for raw milk varied from ETB 4.5 per litre to ETB 7.5 per litre. During the previous year the prices fluctuated between ETB 4 per litre and ETB 5.5 per litre. There was variation between the region, but hardly any variation within the region because of the fact that farmers mostly delivered all to the same cooperative which paid the same price. A few farmer were able to sell raw milk directly to a processor which paid ETB 7.5 per litre which was exceptional.

The monthly income from milk or homemade dairy products of the farmers that were interviewed is on average ETB 4,730. The average total income is on average ETB 8,322 with a range from ETB 3,832 to ETB 16,991. The total income consists of all income the farmers receive, income from sold milk or dairy products, income from sold manure and income from sold animals.
The milk revenues per dairy animal(lactating and dry animals) vary per region from ETB 462 in Debre Zeit to ETB 1,425 in Addis Ababa, on average it is ETB 845 per mature animal.
Farmers generate income from other sources as well besides milk or dairy products. Some farmers are able to sell manure as fuel, and most farmers sell animals, to other farmers or for slaughter. The selling of manure is a grey area, not much figures are known, farmers also tend to give away the manure to neighbours or employees. The extra income from manure is an extra for the farmers. The selling of animals on the other hand can be seen as a life saver for some farms. They tend to even their costs with the sale of (pregnant) animals.

On the costs side there are different aspects as well, but the most important is feeding. Feed costs count for 60 – 70% of the total expenses on the farms. Feed costs consist of costs for roughages and concentrate ingredients. Most farmers need to buy all the feedstuffs as they do not own any land to grow crops themselves. Only in Chancho farmers can let their cattle out to go grazing, they also have the possibility to grow teff and other grains and feed the straw to their cattle. Feed prices for the different products can vary widely from one region to another, this has to do with the availability and possible transport costs from supplier to local market.
The total feed costs per month range from ETB 240 in Chancho to ETB 947 in Addis Ababa.

The other important source of costs is animal costs, this contains veterinarian and breeding costs. On average ETB 558 is spent monthly on veterinarian costs and on breeding an average of ETB 557.
Complaints about the breeding services that are used are that the genetic material is not good enough, it offers no genetic improvement that farmers would like to see. The AI services are often late or offer poor services which results in cows not fertilized and a returning AI technician.

The third part of the costs are the fixed costs. This part is hard calculate as many things are handled privately. The main focus was on labour and transport costs. Not all farmers made these costs, but these were the most reliable. On average ETB 45 is spent monthly on transport of milk and feed. Monthly fees for labour are on average ETB 275.

All costs together divided by the amount of milk produced gives the cost price of a litre of milk. The cost prices vary from ETB 2.20 to ETB 5.46 on average.

Result[2] per litre milk vary from a negative ETB 0.09 to a positive ETB 0.28 per litre of produced milk. Debre Zeit and Addis Ababa show a negative result per litre of sold milk. This is mainly due to the high cow- and feed costs on the farm in these regions.

The result per cow differs strongly per region, Debre Zeit has a negative result of ETB 399 per cow per month, Shashemene has the highest result per cow with ETB 216 per month. The difference is due to a different herd size and more expenses on feed and animal costs.

[2] Result: milk and manure income – feed, animal and fixed costs divided by the amount of milk ór by the number lactating and dry cows

6 Discussion

The objective of this thesis was to gain insight into the economic performance of the Ethiopian dairy sector.
In the following sections, I summarize the research presented in this thesis, consider the implications of the results, and discuss its limitations.

The most heard complaints among the farmers is the high pricing and scarcity of roughages and concentrates, and the low price they get for their raw milk. Besides the high prices, the scarcity of cattle feed is high, as the crop residues (straw and hay) are also used as building material or as fuel. Various studies have identified this feed problem as the most important cause of the low production of the livestock sector in Ethiopia (Gebremedhin et al. 2008).

What are the characteristics of the dairy sector in Ethiopia and which players are involved?
Ethiopia has a large dairy producing potential, with 50 million heads of cattle it has the largest herd of Africa. But this herd is not producing to its full potential, it is limited by various factors. Several factors emerged during the interviews; the high (feed)prices but also lack of milk marketing, lack of breeding material and lack of management.

Religion plays an important role in Ethiopia, the Orthodox church counts over 200 fasting days in a year, this means no animals products can be consumed, also no milk or dairy products. This has a huge impact on dairy consumption and production schemes. Cooperatives cannot supply the usual amount of raw milk to their processors when fasting days are coming. This means they have to reject milk from farmers or have to process the excess milk into butter or ayib.
Getachew (2001) indicates that 68% of the total milk produced is used for human consumption in the form of milk, butter, cheese and yoghurt, while the rest is given to calves and wasted in the process. Among these products UHT and powder milk are not produced in Ethiopia at the moment, and are usually imported from European and Arabic countries (Francesconi, 2006).

The supply of good quality animal feed is low. Roughage production is mostly done by hand and brings low yields of low quality, due to the low supply prices are high, even for low quality products. Feed costs are on average over 60% of the total costs for a litre of milk. In some cases feed costs rise to over 80% of the total costs.

Breeding is an aspect that should be upgraded, the government does not allow higher quality breeding material from outside Ethiopia, and importing live animals is also very difficult or not allowed. While looking at neighbouring Kenya, the introduction of grade cattle actual can improve the productivity of dairy cattle (Ahmed, et al. 2003). Therefore, smallholders in Ethiopia should also be assisted to acquire grade cattle to increase productivity.
From the farmers comes the complaint that the actual AI services are functioning poor. They arrive too late or not at all, have only low genetic material and demand high prices per insemination.
The service from the NGO's like USAID and Land O'Lakes is usually better, but they charge high prices and their material is also from poor genetic material because of regulations.

What tendencies and trends can be seen in the dairy value chain sector of Ethiopia?
The most common farming system in Ethiopia is the smallholder system, a family with on average 5 dairy animals in their backyard. The production for such a smallholder differs from 1.5lt till 15lt per cow per day, although those amounts are not proper registered. The average milk production of all farmers is 11,1 litre per day, with an average lactation length of 10 months.

Low milk prices, 4 to 5 ETB per litre, are an often heard complaint of the farmers, they see supermarket prices that are double of what they get for their milk. During the previous year the prices fluctuated between ETB 4 per litre and ETB 5.5 per litre. Some processors pay more but are not always accepting the whole amount of milk from the farmers.

Mentioned earlier are the complaints about the high costs for roughages and concentrated feeds. The prices of especially the premixed concentrates are too expensive and are not interesting for the farmers to use, especially without any clear test results.
The feed costs rise on some farms over 80% of the total costs of a litre of raw milk.

Feeding
The most used feedstuffs are hay, teffstraw, a straw mix of oats/barley/wheat and teff, and in some cases so called 'cut and carry' forage grasses like, Sudan grass, Elephant grass or Napier grass. In the Chancho region all the farmers also used grazing besides the forage feeds.

The amounts of forage crops produced on the farm are mostly unknown or not accurate as the produce is not weighed and mostly stacked in piles instead of bales.
Products that are bought to feed the animals are usually delivered in bulk quantities (per truckload, donkey load or per Bajaj/rickshaw load), and usually not in bales, which makes it hard to estimate amounts of feedstuffs being bought.

The quality of the roughage is very low. It has a low energy content and contains not many nutrients, like for example elephant grass or straw. In general the hay which can be bought is of low quality as well. The storage in piles during the raining season does not improve the quality as mostly the piles are not covered with plastic.
Main reason for the low quality is the late harvest of hay. When it is harvested the nutritional value is already quite low and the grass is high in fibre content. This makes it less appetizing for cattle.

The most common types of concentrates farmers use are wheat bran, nough cake and ready mixed meals. The availability of these concentrates differs from region to region and the prices are fluctuating and depending on the availability. The amount that farmers feed to their animals of these concentrates is hard to estimate as they do not weigh the products, but use improvised scoops or cups to measure.
When the farmers are asked why they are not feeding more concentrates they reply with the fact that it's too expensive or they see no results.

How is the current economic performance, on cash flow level, of different case farms?
Comparing prices or income between farmers or regions is difficult as every farmers buys in different quantities, per bale or per donkey-load etc. Some cooperatives offer roughages or concentrated feeds to their members as a service and to obtain a better trading position and negotiate lower prices. These services are well used by the members and they like to see these kind of services to be expanded with AI services for example.

Looking at the income of farmers, all farmers have income from milk or home processed dairy products, a number of farmers have also income from the sale of livestock. Only a few farmers generate income from the sale of feed stuffs, in Chancho only, or from the sale of manure as a fuel.
The average total income is on average ETB 8,322 with a range from ETB 3,832 to ETB 16,991, this includes all kinds of income. The milk revenues split up per region and per animal shows the following in Chancho a cows revenue is ETB 602, in Shashemene ETB 891, ETB 462 in Debre Zeit and ETB 1,425 in Addis Ababa, on average it is ETB 845 per mature animal.

Due to low production levels, high costs and low income the economic situation on some of the farms is alarming. Farmers are forced to sell animals to have enough income for their family. Farmers spent from ETB 240 to ETB 950 per lactating animal on feed stuffs per month. From all 50 farmers 24%(12) of them have a cost prices that exceeds the amount of money they receive per litre of milk. Feed costs count for 60 – 70% of the total expenses on the farms. This is in the same range as neighbouring country Kenya, where feed prices have risen since October 2010 with 60%. (www.allaboutfeed.net, 2011)

The other important source of costs is animal costs, this contains veterinarian and breeding costs. On average ETB 558 is spent monthly on veterinarian costs and on breeding an average of ETB 557.
The third part of the costs are the fixed costs, with the main focus on labour and transport costs. On average ETB 45 is spent monthly on transport of milk and feed. Monthly fees for labour are on average ETB 275, this is total paid, not per labourer.

All costs together divided by the amount of milk produced gives the cost price of a litre of milk. The cost prices vary from ETB 2.20 to ETB 5.46 on average.

The most important figure for farm management in this research is the result on farm level, how is the farm doing financially. There are large differences between the regions the average result per cow in Chancho is ETB 190, in Shashemene ETB 216, in Debre Zeit ETB -399 and in Addis Ababa ETB 47. Debre Zeit is striking in a negative way, reason for the negative results are the high feed and animal costs and the low number of animals per farm.

7 Conclusion and recommendations

After researching the important sources in this matter; conducting field visits and interviews I thought I was able to answer my research questions and the statements. In this chapter a general conclusion will be drawn up.

Dairy production in Ethiopia does not meet the current demand. Although processing equipment is adequately available and access to markets is being organized through private and cooperative collection centres, the total market potential is not met. Small scale producers are not able to produce to their maximum capacity due to feed issues and restrictions in herd size but also in genetic improvement.
There is a will amongst the farmers but there are not enough enablers to improve the situation, although NGO's are working hard to improve the services, for instance the Land O'Lakes AI service.

The main objective of the research project was to identify constraints faced by dairy farmers in Ethiopia that influence their economic performance. The research was guided by the following objective: identify the major bottlenecks as well as the opportunities influencing the economic performance of dairy farmers in Ethiopia, in order to improve their economic situation.

7.1 Conclusion

The main (economical) influences for smallholders on dairy farms can be summarized as follows:

- Their production system does not allow further intensification of milk production. Farms are small; urban farmers are restricted by local government due to odour nuisance.
- High pricing of animal feed, veterinary services and breeding services.
- The main input, animal feed, is not in sufficient quantities and qualities available.
- Farmers lack the technical (knowledge) and there is inadequate capacity for improving.

Despite the expectation that cultural and religious tradition would negatively influence the decisions of farmers not to invest in milk production, this was found not to be an important issue for farmers. Their concentration on processed, long life product eliminates the problem.

Reasons for not expanding their herd and milk production according to the farmers:

- Lack of money; feed, animal services and animals are expensive
- Lack of land; land is expensive or not available, many farmers keep animals in their backyards in the cities or villages
- Technical support; poor service from veterinary and poor materials and service from AI services.

7.2 Recommendations

In order to improve the problem of a poor economic situation among dairy farmers, the following directions for development support for small scale dairy farmers in rural and urban areas emerge:

- Assist rural mixed smallholders with improvements in soil cultivation methods. Improving the roughage supply can help them a lot on improving their cattle production. The provision of shared (cooperative) equipment could be an idea, or supplying better seeding material.
- Support the smallholders in improving their management skills. Trying to achieve a higher lactation length and a lower inter-calving period can increase the yearly production, and thus increase the income. To achieve such results management skills are necessary, heat detection, feeding strategies, young stock raising, are important points of attention for a dairy farmer. A lot can be gained with early heat detection and insemination. Further research should be done to the skills and needs of farmers.

Local workshops on different topics could be organised to create awareness amongst farmers.

- Besides the management skills good extension services are needed. AI services should be on time and the technicians should be well prepared and trained. The same for veterinarian services. For both, they should be affordable for small scale farmers, otherwise they will choose for the local bull service (with free diseases) or buy cheaper medicine.
- To stimulate the genetic improvement of the cattle, more exotic breeding material should come available.
- Or urban smallholders should aim at improving the production of the local animals. Local animals, under the given circumstances, give better economic returns per litre of milk produced, as their fat % is almost twice as high as that of crossbred or purebred dairy cows.

- A general point of improvement, the overall supply and quality of roughages should be improved. Better roughages can improve milk yields, more roughages can lower the prices which allows farmers to buy more feed.

The effect of fasting periods are felt by the commercial processors; their demand drops, while the supply is not affected. Presently this leads to very uncertain agreements between suppliers (either individual farmers, cooperatives or collection centres) and conflicts between parties are not uncommon. There is a need for further insight for appropriate strategies for processing plants to bridge the dip in consumption during fasting periods.

The negative effects and risks of intensive animal keeping in densely populated areas, like Addis Ababa or Shashemene, need to be investigated. Manure is available in large amounts, but cannot be put to use as the farmers do not own land. The manure can attract flies, which are potentially vectors of various diseases, and causes odour nuisance. Therefore drying manure and using it as fuel is good alternative, or the building of biogas installations should be further stimulated.

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Annex 1 Summary of respondents

	Region	Nr	Cattle	Dairy	Avg prod/ cow / day	Total yr prod in lt	Lactation length	Estimated calving interval
1	Ch	1	4	8	18.5	5000	440.0	700.0
2	Ch	2	20	20	10.0	27700	310.0	584.0
3	Ch	3	12	10	10.0	9250	210.0	548.0
4	Ch	4	13	10	7.0	8820	240.0	730.0
5	Ch	5	19	15	8.0	17000	270.0	730.0
6	Ch	6	15	14	10.0	14000	210.0	730.0
7	Ch	7	28	27	14.0	57500	240.0	360.0
8	Ch	8	33	33	8.0	25000	240.0	360.0
9	Ch	9	21	19	10.0	18000	240.0	360.0
10	Ch	10	42	27	13.0	37000	270.0	360.0
11	Ch	11	42	37	10.0	18000	240.0	360.0
12	Sha	1	11	11	7.5	16200	210.0	480.0
13	Sha	2	2	2	3.0	2350	210.0	?
14	Sha	3	5	4	7.5	6480	510.0	570.0
15	Sha	4	10	9	5.5	16225	210.0	450.0
16	Sha	5	3	4	5.0	1800	390.0	?
17	Sha	6	4	4	15.0	12890	240.0	360.0
18	Sha	7	4	4	6.0	4380	300.0	360.0
19	Sha	8	4	4	7.5	6528	300.0	570.0
20	Sha	9	19	16	3.0	4320	210.0	510.0
21	Sha	10	9	6	1.5	800	360.0	510.0
22	Sha	11	4	4	8.0	5760	450.0	510.0
23	Sha	12	5	5	15.0	7512	300.0	450.0
24	Sha	13	11	9	8.0	14400	270.0	Unreliable
25	Sha	14	2	2	9.0	3240	270.0	360.0
26	DZ	1	130	124	13.0	205200	300.0	420.0
27	DZ	2	52	45	10.5	57600	330.0	390.0
28	DZ	3	5	6	18.0	10800	330.0	Unreliable
29	DZ	4	2	2	15.0	5400	330.0	390.0
30	DZ	5	20	14	18.0	30600	300.0	405.0
31	DZ	6	8	8	10.0	12775	330.0	360.0
32	DZ	7	8	8	11.0	16200	360.0	450.0
33	DZ	8	8	8	23.0	16560	150.0	360.0
34	DZ	9	10	8	?	?	300.0	360.0
35	DZ	10	18	10	7.5	5400	300.0	360.0
36	DZ	11	23	23	?	40068	?	?
37	AA	1	4	4	10.0	10800	360.0	570.0
38	AA	2	6	6	11.0	11880	240.0	360.0
39	AA	3	4	4	16.0	5760	210.0	420.0
40	AA	4	2	2	17.0	38250	225.0	?
41	AA	5	4	4	20.0	10800	300.0	360.0
42	AA	6	10	10	15.0	21600	720.0	900.0
43	AA	7	3	3	20.0	7200	390.0	450.0
44	AA	8	5	5	9.0	6480	210.0	600.0
45	AA	9	5	5	11.0	7920	240.0	720.0
46	AA	10	7	7	22.0	15840	360.0	720.0
47	AA	11	6	6	10.0	7200	720.0	720.0
48	AA	12	2	2	7.0	2520	210.0	360.0
49	AA	13	9	9	9.0	10800	240.0	360.0
50	AA	14	1	1	10.0	3600	360.0	360.0

Annex 2 Checklist

Farm Questionnaire for farm economic analysis								
Farm:								
Resource person:								
Dairy Cattle Herd Structure on the farm								
						Number		
Total livestock							**nr**	
Cattle							**nr**	
Sheep							**nr**	
Goat							**nr**	
Dairy cattle							**nr**	
If crossbred: what percentage Holstein Friesian							**%**	
No of cows producing milk							**nr**	
Lowest nr of cows in milk							**nr**	
Highest nr of cows in milk							**nr**	
Dry cows (mature cows not producing)							**nr**	
Pregnant heifers							**nr**	
Average age at first calving							**yrs**	
Heifers more than 1 year old,not pregnant							**nr**	
Heifers 3-12 months old							**nr**	
Heifer calves 0-3 months							**nr**	
Bull calves 0-3 months							**nr**	
Bulls 3-12 months							**nr**	
Bulls for breeding older than 12 months							**nr**	
Bulls for fattening, older than 12 months							**nr**	
Average age of mature dairy cows							**yrs**	
Average nr of milking cows culled/ sold (last 12 months)							**nr**	
Average nr of heifers culled/sold							**nr**	
Main reasons for culling /selling milking cows								
Average number of animals that died (last 12 months)								
	mature animals						**nr**	
	young stock						**nr**	
	calves (< 3 months old)						**nr**	
Nr of animals bought and price							**nr**	
							ETB	

Technical key data													
Avg milk production per lactating cow/day											**Kg/Lt**		
Average length of the lactation (days)											**Days**		
Estimate of calving interval (days)											**Days**		
Composition of the ration													
Type of **roughage** and amounts in ration													
											kg		
											kg		
											kg		
											kg		
How much roughage is produced on site											**kg**		
How much roughage is bought from outside											**kg**		
Which roughages are bought													
Where are the roughages bought from													
How satisfied are you about your roughages									Fully	Medium	Not		
			Why?										
Type of **concentrate** and amounts													
Milking cows											**kg**		
											kg		
											kg		
Dry cows											**kg**		
											kg		
											kg		
Young stock											**kg**		
											kg		
Why not feeding concentrates?													
Where are the concentrates bought from?													
Why components indstead of compound?													
How satisfied are you about your concentrates									Fully	Medium	Not		
			Why?										
Are you prepared to buy compound concentrates									Yes	Maybe	No		
			Why?										
Are you prepared to feed more concentrates if available on credit?									Yes	Maybe	No		

Economic Data								
REVENUES								
Milk								
Milk is sold to					Coop.	Processor	Local	
	Amounts in kg or %							
Milk price /kg (last month)							**ETB**	
Lowest milk price (last year)							**ETB**	
Highest milk price (last year)							**ETB**	
Total amount of milk produced on the farm (kgs)							**kg**	
Total amount of milk sold (avg kg/month during last year)							**kg**	
Income from milk sales (avg/month last year)							**ETB**	
Total amount of milk used for calves per month during last year							**Ltr**	
Total amount of milk used for home consumption per month during last year							**Ltr**	
Cattle sales								
Income from sales of cows culled (average per month during last year)							**ETB**	
Price of young stock (females)								
0-1 year							**ETB**	
1-2 years							**ETB**	
2-3 years							**ETB**	
Price of young stock (bulls)							**ETB**	
Income from sales of bulls/ bull calves and other young stock								
(average per month during last year)							**ETB**	
Sale of manure								
Price of manure per ton??? Per carload??							**ETB**	
Income from sales of manure (average per month during last year)							**ETB**	

COSTS							
Feeding							
Concentrate feeds							
Dairy meal milking cows(AFC Koudijs)					**ETB**		per kg
Dairy meal other suppliers					**ETB**		per kg
Young stock meal (AFC Koudijs)					**ETB**		per kg
Wheat bran					**ETB**		per kg
Nough cake					**ETB**		per kg
Cotton seed cake					**ETB**		per kg
Wet brewer's grain/ waste					**ETB**		per kg
Other products:					**ETB**		per kg
					ETB		per kg
					ETB		per kg
Average costs of purchase of concentrate feeds on the farm							
(average per month during last year)					**ETB**		
Roughage/ forage							
Tef straw					**ETB**		/ bale
Wheat/ barley straw					**ETB**		/ bale
Hay					**ETB**		/ bale
Lucerne hay					**ETB**		/ bale
Other crop residues					**ETB**		
Average costs of purchase of roughage/ crop by product/ green forage on the farm							
(average per month last year)					**ETB**		
Minerals					**ETB**		
Other feed related costs					**ETB**		

Veterinary costs							
Treatments (price per treatment)							
Government service						**ETB**	/cow
Private service						**ETB**	/cow
Veterinary drugs							
Antibiotics for mastitis treatment						**ETB**	/cow
Other treatments						**ETB**	/cow
Vaccination costs						**ETB**	/cow
Deworming costs						**ETB**	/cow
Other veterinary costs						**ETB**	/cow
Total costs on veterinary treatments/ drugs (avg per month during last year)						**ETB**	
Breeding costs							
AI							
Av. Price per insemination (incl semen)						**ETB**	/cow
Costs on breeding spent on the farm (average costs per month during last year)						**ETB**	
Costs for bull service per mount/cow						**ETB**	
Land and forage costs							
Costs of establishment of forage crops						**ETB**	
Seed						**ETB**	
Costs of land cultivation						**ETB**	
Price of fertilizer						**ETB**	
Urea -46	per 50 kg					**ETB**	
NPK	per 50 kg					**ETB**	
Total costs spent on fertilizer for forage crops/pasture grown last year						**ETB**	
Other land costs			price per ha			**ETB**	
Hire of land for long term use			price per ha			**ETB**	
Hire of land for hay						**ETB**	
Total costs of land hire of the farm during last year						**ETB**	
Cost of utilities							
Electricity						**ETB**	
Price per KWh						**ETB**	
Total costs on the farm per month							
Petrol / transport milk/feed						**ETB**	
Price per liter						**ETB**	
Total costs on the farm per month during last year							
Diesel						**ETB**	
Price per liter						**ETB**	
Total costs on the farm per month during last year							
Water						**ETB**	
Price per KWh						**ETB**	
Total costs on the farm per month during last year							

Labour costs							
Permanent labour						**ETB**	
Costs per worker per month						**ETB**	
Total costs permanent labour on the farm per month during last year							
Casual labour							
Costs per worker per day						**ETB**	
Total costs casual labour on the farm per month during last year						**ETB**	
Transport costs							
Expenditure for transport milk, feed per month (no use of own transport)						**ETB**	
Costs of maintenance							
Transport means							
Costs of maintenance car for transport milk, feed per month						**ETB**	
Equipment							
Costs of maintenance equipment for feeding, milking etc per month						**ETB**	
Barn							
Costs of maiantenance for barn per month						**ETB**	
Costs of loan and credits							
Size of loan						**ETB**	
Costs of interest per month						**ETB**	
Investment costs							
Car/truck							
Age						**ETB**	
Price new value						**ETB**	
Barn							
Approximate costs at time of construction						**ETB**	
Estimated costs of construction if built new in 2010						**ETB**	
Equipment		(price if bought in 2010)					
Milking machine						**ETB**	
Milking utensils (buckets etc) (new value)						**ETB**	
Land							
Purchase of land last 5 years						**ETB**	
Costs per ha						**ETB**	

Market and other information		
Marketing of milk		
Sales of traditional butter and ayib		
Houshold expenses per month		
What is better: selling milk to cooperative or or selling self made butter and ayib?		
Main problems related to:		
Feeding of the animals		
Diseases of the animals		
Breeding of the animals		
Marketing of the milk		
Why not keeping more dairy animals		