The formal dairy chain of Addis Ababa

An analysis of the integration of small-scale farmers

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An analysis of the integration of small-scale farmers

Olga van der Valk
Abebe Tessema, Dairy Consultant (Ethiopia)

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The peri-urban dairy chain of Addis Ababa (Ethiopia) is characterised by its highly informal character, in particular for small-scale dairy farming. Only 2% of all the milk produced in Ethiopia reaches the market through the formal market chain. A quick analysis of the product flow from the peri-urban areas of Addis Ababa shows that seasonal mismatches occur between demand and supply of dairy products. Main factors are the Ethiopian fasting periods and feed scarcity in the dry period. The preference of the Ethiopian consumer for traditional products represents market opportunities for small-scale farmers' incursion into end markets.

De peri-urbane zuivelketen van Addis Abeba (Ethiopië) wordt gekenmerkt door zijn zeer informele karakter, met name voor kleinschalige veehouders. Slechts 2% van alle melk die in Ethiopië wordt geproduceerd, bereikt de markt via de formele marktketen. Een snelle analyse van de productenstroom vanuit de peri-urbane gebieden van Addis Abeba laat zien dat er een seizoensgebonden discrepantie bestaat tussen de vraag naar en het aanbod van zuivelproducten. De belangrijkste factoren zijn de vastenperiodes in Ethiopië en de voedselschaarste in de droge periode. De voorkeur van Ethiopische consumenten voor traditionele producten biedt kleinschalige veehouders de kans om hun stempel te drukken op de eindmarkten.

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Orders
+31 70 3358330
publicatie.lei@wur.nl

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Preface

This report is the result of a supply chain analysis conducted in as part of the project 'Improving the Dairy Sector of Ethiopia'. This project is carried out within the Policy Support Cluster International Cooperation; one of the major programmes for international research and capacity building at Wageningen University and Research Centre. The Cluster is funded by the Netherlands Ministry of Agriculture, Nature and Food Quality.

Building on previous research activities carried out in 2008 which provided insight into the knowledge and development related issues in the dairy sector in Ethiopia, in 2009 these findings led to a market chain analysis and a capacity building needs assessment for the peri-urban areas of Addis Ababa, Ethiopia, with specific focus on small-scale dairy development.

The collaboration of many stakeholders in the dairy sector; farmers, processors and retail is acknowledged and highly appreciated, in particular the farmers of the Selale Dairy Farmers Cooperative Union; staff of Lame Dairy PLC; Land O'Lakes International Development, and Beral Milk. Through the research and development opportunities provided by Ir. Geert Westenbrink, Agricultural Counselor at the Royal Netherlands Embassy in Addis Ababa, new business opportunities have become apparent and have led to partnerships and the first pilot projects for Dutch Agribusiness.

We hope that the current report will support the efforts by the SNV-BOAM team in Addis Ababa, and thank Mahlet Yohannes and Marc Steen for provided feedback.

Prof Dr R.B.M. Huirne
Managing Director LEI

Summary

The formal dairy chain in and around Addis Ababa is characterised by many small-scale suppliers of fresh milk and two big leading processing plants.
A market survey was conducted to describe the formal dairy supply chain. It focused on the factors influencing the apparent mismatch between supply and demand of fresh milk in the formal market chain in and around Addis Ababa.

There are three main production areas (milk sheds) around Addis Ababa supplying the formal peri-urban dairy chain: Selale to the North of the capital (estimated at 26 to 40,000l per day), Debre Zeyt and Assela to the South-East (10 to 15,000l); and Sebata area to the South-West (9 to 13,000l). Most suppliers are small-scale farmers selling to both small and big processors; or through a primary cooperative and Cooperative Union.

Cooperatives have started to create their own marketing channels by setting up small processing facilities. Marketing efficiency tends to be lacking, which is notable from deals in payment to members.

Contracts between market partners (cooperative-processor) are made for a maximum period of one year. Default on contracts by farmers/cooperatives occur during periods of scarcity of supply; and by processors during months of oversupply of raw milk. There is hardly any collaboration in the chain (either horizontal or vertical).

Quality control is almost exclusively done by platform testing with a lactometer for specific gravity and an alcohol test for measuring acidity of milk. No arbitration in quality control takes place. More detailed quality measurement (microbiological and antibiotic) only takes place at the largest processing plants. There are no voluntary minimum quality standards set by the dairy industry. There is no premium paid for quality milk, though the trend is towards the introduction of differentiated milk products in the market.

In the retail sector in Addis Ababa there are an estimated 28 supermarket outlets, 70 shops with a dairy section and numerous kiosks. The smaller shops target the lower end market with unbranded products, mainly milk in 500-ml sachets, butter (table, cooking, cosmetic), ayib and some hard cheese. The larger shops target higher end market consumers and expatriates with a larger assortment of tetra packed fresh and (imported) UHT milk; (imported) yoghurts; different kinds of (imported) cheeses and imported milk powder.
Most variation in price is found in yoghurt and cheese.

The variation in both supply and demand of (fresh) milk affects performance of the formal dairy chain and feasibility of entrepreneurial operations from farmers to retail.

Peaks in demand after fasting periods while supply suffers a dip during the dry period, lead to a shortage in the milk supply in Addis Ababa. During the fasting period before Easter, the lack of demand leads to low milk prices while animal feed prices are high because of the ending dry season. The informal chain functions as a buffer to counterbalance the differences between oversupply, with a peak in August and undersupply, with a peak in April-May, right after Easter, in the formal market.

Market opportunities are found in:

- products with longer shelf life to bridge the slack in demand during fasting periods. Processing fresh milk into UHT milk or powder requires substantial investments;
- development of new products with more added value, such as yoghurts and drinking yoghurts and milk snacks to be consumed out-of-home. This will stimulate payment differentiation according to quality and the development of voluntary industry standards reducing food safety risks;
- development of new markets outside Addis Ababa where the segment of fasting orthodox-catholic consumers is smaller;
- upgrading of traditional products (ayib cheese, ghee butter) with new brands. This is a good alternative for market incursion by small processors and dairy cooperatives. Upgrading of processing facilities is needed; as well as measures enhancing cooperative efficiency in financial administration and marketing.

Samenvatting

De formele zuivelketen in en rond Addis Abeba wordt gekenmerkt door veel kleinschalige leveranciers van verse melk en twee grote verwerkingsbedrijven, die het grootste marktaandeel hebben. Een marktstudie is uitgevoerd om de formele zuivelketen te beschreven en analyseert de factoren die van invloed zijn op de klaarblijkelijke slechte aansluiting van aanbod en vraag naar vers melk in de formele zuivelketen in en rondom Addis Ababa.

Er zijn drie hoofdproductielocaties in de omgeving van Addis Abeba die hun producten via de formele peri-urbane zuivelketen leveren: Selassie ten noorden (geschatte melkproductie: 26.000 tot 40.000l per dag), Debre Zeit en Asela ten zuidoosten (10.000 tot 15.000l) en Sebeta ten zuidwesten van de hoofdstad (9.000 tot 13.000l). De meeste leveranciers zijn kleinschalige melkveehouders die hun producten zowel aan kleine als grote verwerkers of via basiscoöperaties en coöperatieve verenigingen leveren.

Coöperaties zijn begonnen hun eigen kanalen naar de markt te creëren door kleine verwerkingsbedrijfjes op te zetten. De weg naar de markt lijkt niet efficiënt te zijn en dat is te zien aan afspraken over de uitbetaling aan leden.

Contracten tussen marktpartners (coöperatie-verwerker) worden afgesloten voor maximaal één jaar. Er worden geen contracten gesloten tussen veehouders en coöperaties tijdens periodes van schaarste in levering en verwerkers sluiten geen contracten tijdens periodes van overbevoorrading van rauwe melk. Er wordt nauwelijks samengewerkt binnen de keten (horizontaal noch verticaal).

Kwaliteitscontrole vindt uitsluitend plaats op basis van een analyse met een melkweger om het soortelijk gewicht te bepalen en een alcoholtest om de zuurgraad van de melk te meten. Er vindt geen arbitrage plaats bij de kwaliteitscontrole. Een gedetailleerdere kwaliteitsbepaling (microbiologisch en antibiotisch) wordt alleen gedaan bij de grootste verwerkingsbedrijven.
Er bestaan geen vrijwillige minimumkwaliteitsnormen voor de zuivelsector. Er wordt geen meerprijs betaald voor kwaliteitsmelk, hoewel er een trend lijkt te bestaan richting de introductie van gedifferentieerde melkproducten op de markt.

De retailsector van Addis Abeba telt naar schatting 28 supermarkten, 70 winkels met een zuivelafdeling en talloze kiosks. De kleinere winkels richten zich met merkloze producten op eindconsumenten uit de lagere klassen. Het gaat met name om melk in verpakkingen van 500 ml, boter (tafelboter, braadboter

en cosmetische boter), ayib en enkele soorten harde kaas. De grotere winkels richten zich op eindconsumenten uit de hogere klassen en bieden een groter assortiment met verse en (geïmporteerde) houdbare melk in tetrapakken, (geïmporteerde) yoghurt, verschillende soorten (geïmporteerde) kaas en geïmporteerd melkpoeder. Vooral voor yoghurt en kaas zijn de prijsverschillen groot.

Het verschil tussen de vraag naar en het aanbod van (verse) melk is van invloed op de prestaties van de formele zuivelketen en de haalbaarheid van retailactiviteiten voor melkveehouders.

De piekvraag na een vastenperiode en de onderbevoorrading tijdens de droge periode leiden tot een tekort in de melkvoorziening in Addis Abeba. Tijdens de vastenperiode voor Pasen leidt het gebrek aan vraag naar melkproducten tot lage melkprijzen, terwijl de voederprijzen hoog zijn vanwege het einde van het droge seizoen. De informele keten functioneert als een buffer om de verschillen tussen overbevoorrading (piek in augustus) en onderbevoorrading (piek in april/mei, direct na Pasen) op de formele markt te compenseren.

Er zijn marktkansen op het gebied van:

- producten met een langere levensduur bij opslag om het gebrek aan vraag tijdens de vastenperiodes te overbruggen. Er zijn grote investeringen nodig om verse melk te verwerken tot houdbare melk of poedermelk;
- het ontwikkelen van nieuwe producten met meer toegevoegde waarde, zoals (drink)yoghurt en melksnacks die buitenshuis kunnen worden geconsumeerd. Dit vormt een stimulans voor het betalen van een meerprijs voor kwalitatief betere producten en voor het ontwikkelen van vrijwillige industrienormen, wat de kans op voedselveiligheidsrisico's beperkt;
- het ontwikkelen van nieuwe markten buiten Addis Abeba met minder consumenten die vasten vanwege hun orthodox-katholieke overtuiging;
- het uitbreiden van traditionele producten (ayib, kaas, vloeibare boter) met nieuwe merken. Dit is een goed alternatief voor kleinschalige verwerkers en zuivelcoöperaties om hun stempel te drukken op de markt. Het is noodzakelijk om verwerkingsbedrijven te verbeteren en om maatregelen te treffen voor een betere efficiëntie van de financiële administratie en het op de markt brengen.

1 Introduction

With more than 40 million head of cattle, Ethiopia has the largest number of livestock in any country in Africa. Despite this large number of animals, the consumption of milk per capita is amongst the lowest in the continent. There seems to be an *unmet and growing demand for fresh milk in urban centres* whilst processing plants still operate at under-capacity. To ease this problem, donors and NGOs undertake various support efforts aimed at strengthening production a improving access to markets; however, there is hardly any rise in production and volume of marketed milk.

While in the urban retail market (supermarkets) processed and packed dairy products appear to be sold out quickly, small-scale milk producers have difficulties entering the formal market chain.

Consequently, for the 2009 BOCI programme 'Cluster based dairy development in Ethiopia' a supply chain analysis was conducted. The study consisted of a revision of available sources on the dairy market chain in Ethiopia, in particular of Addis Ababa. In the meantime a short mission to Ethiopia served to fill in gaps of information, by holding interviews with key stakeholders.

The formal market chain is defined as follows: milk is produced and marketed through registered marketing channels, processed in established processing plants and put on the market in packed products. The main market for packed dairy products is Addis Ababa and neighbouring towns (Debre Zeyt). Other towns are relatively small and the formal market is very small or non-existing. The research concentrated on the Addis Ababa milk shed.

1.1 Research questions

Two research questions were guiding the research:

- How can the formal dairy supply chain in Ethiopia be described?
- What are the factors influencing the apparent mismatch between supply and demand in the formal market chain supplying the Addis Ababa market?

Three areas of research are distinguished:

1. Market and marketing issues: number and type of outlets for dairy products; demand and fluctuation in demand; price differentiation, product diversification, customer segmentation;
2. Organisational issues in the supply chain: distribution capacity and network; number and size of market players; structure of the chain; collection points, contracts; quality specification and price policies; link with the informal market;
3. Technological issues: infrastructure; quality of inputs; farming systems (subsistence, semi-commercial, commercial).

The last area of research - an inventory of technological bottlenecks - was not topic of the supply chain analysis. In the summary of dairy supply chain characteristics (chapter 6) findings from the literature study can be found, including technological aspects.

The report is divided into several chapters. The first chapter following the introduction gives an overview of the actors participating in the formal chain; starting with an overview of the farming systems. The chapters 3 to 5 describe product flow; organisational issues and market respectively; while Chapter 6 gives conclusions; chapter 7 recommendations.

2 Description of the formal dairy chain

2.1 Introduction

As part of the BO-CI dairy support project to Ethiopia in 2008, the different production systems in Ethiopia were characterised and analysed. Basically, dairy production was seen to be divided into four different productions systems:

- pastoralism, providing milk for pastoral communities in arid and semi-arid areas;
- small-scale, mixed crop-livestock production systems;
- peri-urban and urban dairy farming;
- large-scale dairy farming.

Of these four systems, the last two are mainly engaged in the formal supply chain, which requires an amount of specialisation into dairy activities. To a lesser degree small-scale, mixed crop-livestock production systems also supply to the formal chain. Surplus production from *pastoralist areas* is seasonal and too remote. In the rural areas, local breeds are used, suitable especially for ploughing. Their milk (with higher fat content) is economically more attractive for processing traditional products (butter, cheese).

In 2008 a number of successful (small and medium scale) specialised dairy producers were interviewed. The results of that study show that main reasons for investing in dairy production were the nearness to markets, a constant market throughout the year and technical support, mainly from NGOs. Peri-urban farmers have positively responded to market opportunities for dairy products in the growing urban centres.

In a study done by ILRI in 2000, seven farming systems were distinguished (see Appendix 1), with peri-urban, intra-urban and large-scale dairy farms participating in the formal dairy chain. Other small-scale farms were seen to participate in the formal chain indirectly through delivering milk at collection points of the then state enterprise Dairy Development Enterprise.[1]

[1] Nowadays, Lame Dairy (formally DDE) has no farm and only does processing.

2.2 Informal dairy chain

Only 2% of the milk produced in Ethiopia reaches the market through the formal dairy chain. The rest of the milk is consumed at home, processed into traditional products and/or reaches the market via informal marketing channels.

The informal liquid milk market involves direct delivery of fresh milk by producers to consumers in the immediate neighbourhood and sale to itinerant traders or individuals in nearby towns. In the informal market, milk may pass from producers to consumers directly or it may pass through two or more market agents. The informal system is characterised by no licensing requirement to operate, low cost of operations, high producer price compared to the formal market and no regulation of operations (Redda in Rangnekar and Thorpe, 2002).

The traditional processing and trade of dairy products, especially traditional butter and cottage cheese (ayib), dominate the Ethiopian dairy sector. Of the total milk produced only 5% is marketed as liquid milk, among others due to the underdevelopment of infrastructure in the rural area (Tefera, 2008).

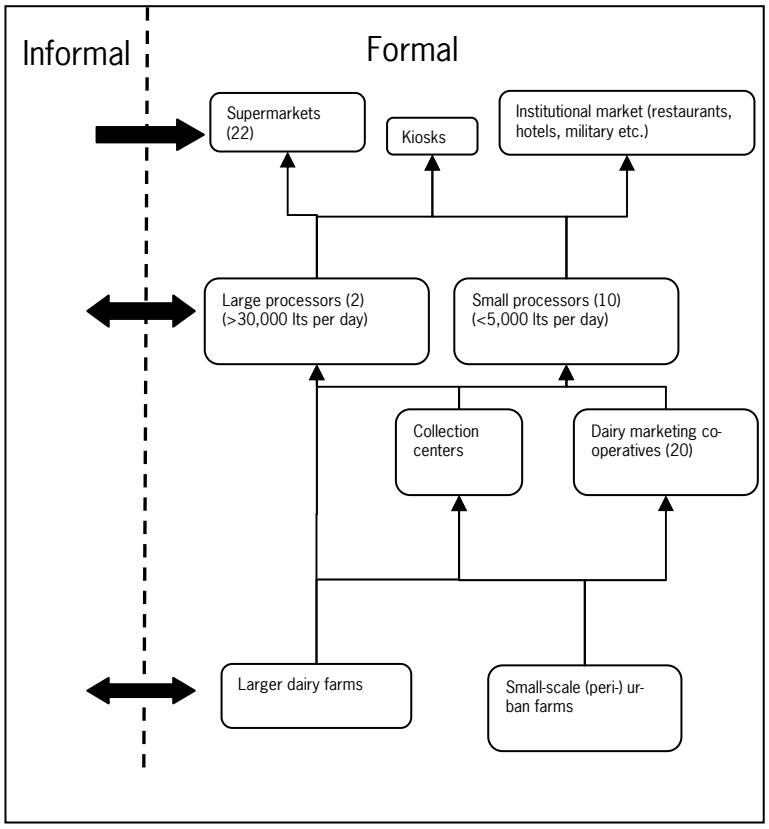
One final aspect to be taken into account is the trade-off in employment when stimulating the formal dairy chain: ILRI calculated that in the Kenyan formal dairy industry 0.2 to 0.4 jobs were created per 100l of milk handled daily, while the same amount creates employment for 2 to 3 informal traders in Kenya and Tanzania (ILRI, 2004, in D'Haese).[1]

2.3 Processing plants

The formal dairy chain is defined by the amount and size of established processing plants that put the packed products in the market (see Figure 2.1). The smaller the processor, the more diffuse the distinction between formal and informal market, as the smaller processors market unbranded milk in pouches on the final market (both consumer and institutional). Several primary cooperatives and dairy cooperative unions possess simple processing equipment (with a capacity of around 200l per day), serving the informal market. Only one cooperative (Ada'a Liben) markets pasteurised milk. The institutional market (hotels, restaurants) also buys raw milk - from the informal market chain.

[1] http://www.ilri.org/ILRIPubAware/Uploaded%20Files/200481194500.00BR_ISS_OptionsInDairy ProcessingAndMarketing.htm.

Figure 2.1 **Structure of the dairy chain**



Source: Compiled by author based on primary data.

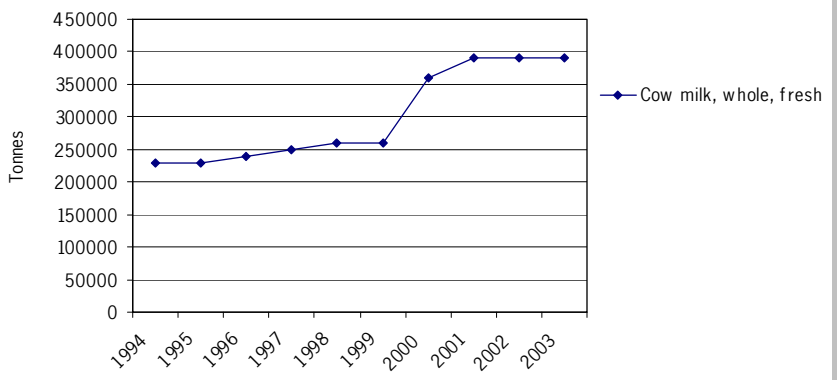
Some small processors produce their own milk, some only collect and process. Without pretending to be complete, Table 2.1 gives a list of small-scale processors. The processors without own milk production facilities are the most recent. According to the manager of Beral, a small processor-retailer, the turnover of small processors is large. He could mention at least 4 small processing companies that had surged and disappeared in recent years.[1]

[1] Interview with Mr. Tewelde, manager and owner, 15 May, 2009.

Table 2.1	Small dairy processors in and around Addis Ababa		
With own farm	**Years of existence a)**	**Without own farm**	**Years of existence**
Beral	27 years	Berta	4 years
Fantu	20 years	Lema	2 years
Genesis	12 years	Family Milk	2 years
Ada'a Liben (coop)	11 years (of which 1 year as processor)	Bora	6 months
Prime Milk Dairy	3 years	Holland Dairy	3 months

a) As per May 2009.

Figure 2.2 **Milk processing in Ethiopia**



Source: FAOSTAT, accessed 10 April 2009.

There are two large-scale processors supplying the market of industrialised processed dairy products: LAME Dairy and Sebata Agro-Industry. Milk processing has experienced a sudden growth in 2000. The establishment of Sebata Agro-Industry in 1998 might be the cause of the sudden surge of milk processing after 1999.

2.3.1 Lame Dairy

The LAME Dairy is a privatised state company. It was formally known as Shola, and before that as the state-owned Dairy Development Enterprise (DDE). The DDE was established in 1979 to operate the nationalised state farms, establish a milk collection network, process and market dairy products, provide advisory

and limited technical service to farmers, and sell veterinary medicines and feed to farmers (Ahmed, 2003). The present enterprise is not engaged in milk production but collects milk for processing from different sources, including large commercial farms and collection centres that receive milk from smallholder producers (Tefera, 2008).

The enterprise operates 25 milk collection centres and chilling stations (milk collection centres with milk cool tanks) within a radius of 140km from Addis Ababa. These are located around Addis Ababa, 13 of them near Selale, 5 near Holeta and 7 around Debre Brehane (Ahmed et al., 2004).

Having an original capacity of about 60.000l per day, since its inception the enterprise has only used its full capacity during the four-year period from 1987 to 1990 (Staal, 1995). Nowadays it processes about 25,000-30,000l per day with the operation of one of the two production lines. The other production line has partly been disassembled and is used for spare parts.

Products sold include pasteurised milk, butter, soft cheese, yoghurt, cream milk, formago (cheese) and ice cream (Ahmed, 2004).

Other reasons for the low capacity use include management problems, financial difficulties, and unstable and low consumption levels of processed milk. In 2008, the plant came in the hands of a new owner, who started new investments like purchasing a road tanker to collect the milk. At present it produces pasteurised milk in 500 ml plastic pouches.

The production of pasteurised milk and yoghurt are core business, while butter and ayib are secondary. Gouda cheese is made during slack time in market demand (fasting periods). Ayib was reported to be made whenever quality problems arise (the Lame Dairy processing equipment originates from 1947). Lame Dairy is upgrading its facilities to produce branded yoghurt in different presentations. Throughout the year, figures by Lame Dairy show a stable production of pasteurised milk. Minor variations in the production can be found for butter (higher production in October and April) and yoghurt (higher production in October and January/February). Gouda cheese production mainly takes place during April; the production of ayib in October and April.[1]

Lame Dairy carries pasteurised milk, table butter (200gr), cooking butter (1kg), ayib, cheese (one mould only for supermarket and hotels), cream and yoghurt. Yoghurt is now distributed in bottles of 100l to the depots, where cups are filled. Lame Dairy has ordered processing facilities to make branded yoghurt cups, with a capacity of 1,000l per day.

[1] Based on classified information provided by interviewees.

The largest supplier of milk to Lame Dairy is the farmers cooperative union Ada'a Liben in Debre Zeiyet. The Selale Dairy Farmers Cooperative Union in Chancho used to deliver to Lame Dairy but has not done so in recent years. Lame Dairy uses a structured pricing system in which bulk suppliers are given a higher price among which farmers unions are contracted (TechnoServe, 2006). Lame Dairy also operates with collection centres for individual farmers in the urban areas. It recently opened a fifth collection centre at the factory gate.

2.3.2 Mama Milk/Sebata Agro Industry

Like LAME Dairy, the Sebata Agro Industry is a former state farm which started milk processing with a capacity about 30,000 l per day. The milk processing plant was established in April 1998 and is now the second largest processor. Around 6,000-10,000l of raw milk comes from the owner's own dairy farm (600 cows), 25km west of Addis Ababa. Furthermore, the company's sources it's raw material from smallholders within a 100-km radius.

This dairy processing enterprise is using some of the quality standard measures such as HACCP (Hazard Analysis Critical Control Points) in the processing and distribution of the products.[1] They have invested in UHT (Ultra High temperature Treatment to produce milk with long shelf life) processing facilities.

New production lines produce 500-ml carton pouches (Tetra Fino Aseptic) and 250 ml portion packages (Tetra Brik Aseptic). UHT products are aseptically processed and packaged and have a shelf life of 6-12 months without the need for cooling during storage and transportation.[2]

Consequently, the new production lines form part of a strategy to even out the seasonality in milk production and consumption. Sebata Agro Industries operates the brand 'MAMA'.

The small-scale processors can be divided into companies with their own farms, and processors that only collect milk.

2.3.3 Prime Milk Dairy

- 100 dairy cow operation, production of 10-15l daily; it is their intention to grow to 300 cows;

[1] http://www.business-ethiopia.com/achievements.html#milk.

[2] Tetra Pack Food for Development Office 'Ethiopia - School milk and integrated dairy development', concept paper 2006-06-20, accessed on 7 April 2009.

- Started in 2006;
- Has own feed mill and biogas plant;
- Delivers milk twice a day to 10 restaurants in town.

2.3.4 Family Dairy

- Processing Plant in Addis Ababa with equipment from Israel (spare parts not available);
- Reception tank; pasteuriser, three bulk tanks with dispensers into 1/2l plastic bags;
- Capacity 5000l a day;
- Small laboratory present.

(Vernooij, Mission report sept 2007)

2.3.5 Beral Milk

- Started in 1990s;
- Has own farm;
- Produces 3,000l per day from own farm, 500l per day bought from other farmers.

2.4 Dairy cooperatives

According to Ahmed (2004), a lot of dairy marketing cooperatives have received support from donor assisted dairy development programmes. Two cooperatives were established by the FAO/Technical Cooperation Programme and the World Food Programme (WFP), while 30 cooperatives were established by the Smallholder Dairy Development Project (SDDP, 1995-1998) implemented under the Ministry of Agriculture with assistance from the Finnish International Development Agency. It is unclear whether the marketing operations of these dairy unions will be feasible, once external financing stops.

In general, cooperatives are seen both by farmers and governmental institutions as input providers and entities for the implementation of agricultural and development policies. Serving as a marketing unit requires from the Cooperative Union a different approach (external clients) from servicing members (internal clients). Respondents noted inefficient management practices, sometimes

aggravated by external political influences.[1] There are little possibilities for members to control financial administration of daily operations.[2]

2.4.1 Ada'a Liben cooperative

The Ada'a-Liben Woreda Dairy and Dairy Products Marketing Association was established in 1998 in Debre Zeyt town, 45km southeast of Addis Ababa, Ethiopia with the main objectives to minimise the high transaction cost for the sale of milk and reduce seasonal price fluctuations.

In 2003, membership counted 428 full members (with a total of 1,716 cows) while another 181 non-member dairy farmers supplied milk to the association. It has two chilling tanks for storage of fresh milk. The association currently employs 70 regular staff.

For pasteurising and processing the cooperative has purchased a pasteuriser and a butter churn (Tegegne, 2003). The association supplies feed (grass hay and concentrate feed mix) to its members.

2.5 Non-governmental dairy support programmes

2.5.1 SNV[3]

The core of SNV's approach is to bring all the value chain actors and the stakeholders together in Coordination Groups (multi stakeholder platforms), in order to strengthen branch and business associations in selected value chains. SNV promotes the market pull strategy, which means that producers are not supported directly, but through market chain actors operating downstream in the supply chain.

Concretely, SNV has realised the establishment of the Ethiopian Milk Producers and Processors Association (EMPPA).

[1] Weakening of cooperatives in the Assela area was noted by Land O'Lakes staff (personal interview), as consequence of restructuring of government departments in charge of supporting cooperatives. Furthermore, reiterating bureaucratic procedures were mentioned as barriers; as In order to obtain credit, cooperatives have to reconfirm their status as cooperative.

[2] In the Selale Dairy Farmers Coopertive Union, the board presents figures and financial results once a year, which limits say by members on operational procedures and outcomes (interview with board).

[3] http://www.business-ethiopia.com/achievements.html

In the dairy sector SNV supports the development of small business initiatives. It furthermore provides assistance for new dairy processors in accessing finance from private banks. It provides capacity building for producers and processors, and facilitates linkages between them.

SNV promotes investments in the formal dairy chain to reduce commercial risks and enhancement of quality standards throughout the chain and quality differentiation in the end market.

2.5.2 Land O'Lakes

Land O'Lakes is working among others in the Tigray Dairy Sector by organising dairy cooperatives, training management committees and assisting them to build the cold chain infrastructure. Currently, LOL has installed four cooling/ chilling units but the plan is to construct two large processing facilities. The partners are Tigray Chamber of Commerce and Industry and the SIMRET Agriculture and Industry Share Company (TechnoServe, 2006)

The model of Land O'Lakes to work with smallholders, is as follows (Vernooij, mission report 2007):

- Lead farmer system: 140 lead farmers extend knowledge to 20-30 farmers in their surroundings; lead farmers are recruited in coordination with the Ministry of Agriculture;
- Lead farmers are assisted by team of 10 extension officers;
- 3 times per year a 3-4 days training;
- Small-scale farmers: <15 cows. Most are small-scale (5 cows); some medium (15-20 cows);
- Support of local collection centres (a number of 25 till 2007) and distribution systems;
- Change indicators at production level: milk yield, land management, hay and fodder production (yield and practices);
- Change indicators at collection centre: quantity and income from sales;
- Biggest impacts expected: improved market access and sales; on-farm production level (udder health, mastitis).

2.6 Conclusions dairy market operators

In the formal dairy chain in and around Addis Ababa, two big processors, Lame Dairy and Mama Milk (Sebata Agro-Industries) are price setters for milk suppli-

ers. Around ten smaller processors are active and have made the milk collection in the milk sheds of Addis Ababa more competitive, to the advantage of farmers as this has lead to better prices. International NGOs are supporting small processors and marketing activities by primary cooperatives (Unions) to up heave the technical and marketing capacities of small-scale farmers.

The big, and some of the small processors carry established brands of pasteurised milk products; yoghurt, traditional cheese and butter. The smaller processors form the link between informal and formal dairy chain with unbranded traditional milk products.

More elaborated products with added value, like milk powder, are still imported.

3 Product flow in formal chain

3.1 Supply

There are three main areas around Addis Ababa, considered milk sheds of the formal dairy supply chain for the capital:

- Selale area (Chancho): North West;
- Debre Zeyt, Narazeth, Assella area: South East;
- Sebata area South West.

Two factors in the product flow are important to consider:

1. Dry and wet seasons. It is estimated that there is up to 60% difference between the volume of milk production in dry and in wet season. Dry seasons result in lower milk yields due to lack of feed and sometimes also water. As a result of lower yields the fat content of milk can be somewhat higher. The availability of enough feed of good quality has a positive effect on milk production during the wet season (June to September). Small rains in February and March relieve the dry period (October-May) somewhat, though these are more erratic (there were no small rains in 2008).
2. Climatologic conditions: the Sebata and Selale area are the highest regions, located at more than 2,000m above sea level. This means an average ambient temperature of 17-18° C. Debre Zeyt, which is located at 1,800m above sea level, has an average ambient temperature of 21-23°C. Shelf life for ayib may be around 5 days in the Sebata region versus 3 days in Debre Zeyt according to interviewed respondents. Without cooling installations, quality deterioration of raw milk before processing may be less in colder areas. Shelf life to a large extent is determined by hygiene factors.

3.1.1 Selale area

Main operators in the Selale area are Lame Dairy, the Selale's Farmers Cooperative Union (18 Primary Cooperatives) and Mama Dairy. Recently, Lame Dairy has established three chilling centres (with cooling tank), while it already has several established collection centres along the road.

With the purchase of an insulated road tanker for transporting milk, Lame Dairy is collecting further away from Addis. According to the production de-

partment of the company, the further away from Addis, the more milk can be bought (probably because of less competition) and at a lower price. With the chilling centres, competition has increased in regions at a larger distance from the city and prices there have gone up.

Total quantity of milk bought by Lame Dairy in this area is estimated at around 15,000l per day in the dry season up to 22,000l in the wet season.

Organised suppliers

The Selale Union collects milk from its member cooperatives, 6,000l per day during the dry season and 10,000 during the wet season in 2008. Until 2006 the Union sold the milk to Lame Dairy, but since two years it has started to sell to Berta and Family Dairy. This has led to a slightly higher price to the Union and less rejection of milk.[1]

The next important collector of milk in the Selale area is Mama Milk (Sebata Agroindustries). This company collects between 5,000 and 8,000l of milk per day.

Table 3.1 Raw milk collection in Selale area

	Dry season		Rainy season	
		Litres/day		Litres/day
Union 18 primary coops	6,000		10,000	
Sold to:				
Berta		3,000		5,000
Family Dairy		3,000		5,000
3 chilling centres Lame Dairy	15,000		22,500	
Mama Milk	5,000		7,500	
Total region	26,000		40,000	

Source: Estimations by authors.

3.1.2 Debre Zeyt, Nazareth, Asella region

In the milk shed around Debre Zeyt, the Ada'a Liben cooperative is a strong player with its own processing installation. About one third of the milk collected

[1] During 2006 around 13% of all collected milk was rejected in Addis Ababa at factory gate of Lame Dairy. More milk is rejected when there is less demand for processed products. Source: interview with board of Selale Farmers Cooperatives Union.

by the cooperative is processed; the rest is sold to Lame Dairy, of which Ada'a cooperative is preferred supplier.

Other companies collecting milk in the Debre Zeyt area are Mama Milk (though this company is stronger in the Sebata area) and the smaller processors, such as Holland Dairy, Genesis Farm, Family Milk, Bora and Lema Family.

Table 3.2 Raw milk collection in Debre Zeyt-Assela area

	Dry season		Rainy season	
	Litres/day		Litres/day	
Ada'a Liben Dairy coop a)	4,000		6,000	
Sold to:				
Own processing		1,500		2,400
Lame Dairy		2,400		3,600
Mama Milk	2,000		3,000	
Holland Dairy	2,000		3,000	
Family Dairy	1,000		1,500	
Bora	1,000		1,500	
Lema Family	500		750	
Total region	10,500		15,750	

a) Farmer members of Ada'a also deliver directly to Genesis Farm.
Source: estimations by authors.

3.1.3 Sebata area

Milk collection in the Sebata area is dominated by Sebata Agro-Industries, under the brand name Mama Milk. Besides Mama Milk, only some cooperatives and smaller farms operate in the area, mainly selling to Mama Milk.

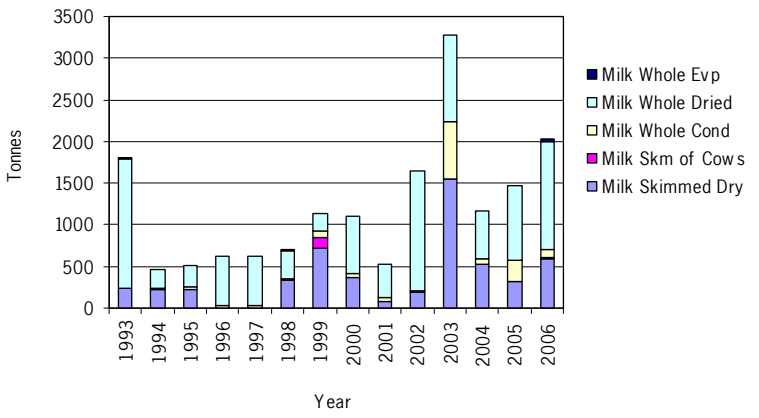
Table 3.3	Raw milk collection in the Sebata area			
	Dry season		Rainy season	
	Litres/day		Litres/day	
Cooperatives	2,000		3,000	
Sold to:				
Mama Milk		1,600		2,400
Family Dairy		400		600
Mama Milk	5,000		7,500	
Nur Dairy Farm	1,000		1,500	
Tilahun Farm	1,000		1,500	
Total region	9,000		13,500	

Source: Estimations by authors.

3.2 Milk imports

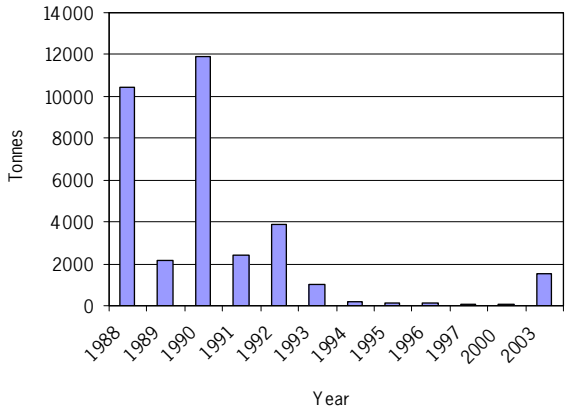
Despite having the largest livestock number in Africa, milk products are imported in Ethiopia. All milk powder products are imported, as there are no processing installations in Ethiopia yet. The figure below shows that general imports have increased slightly since the start of the new century, with a peak in 2003, when due to drought food aid was given. In Figure 3.2 imports by the World Food Program are given.

Figure 3.1 **Milk imports in Ethiopia**



Source: FAOStat.

Figure 3.2 **Skimmed milk imports by the World Food Program (WFP)**



2Source: FAOStat.

3.3 Demand

A consumer study by Land O'Lakes (2003) on dairy consumers showed that the degree of compliance with fasting is very high, 68% on average.

Figure 3.3	Fasting periods in Orthodox Church										
Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	55 days fasting						16 days			30 days fasting	
1	0.7	0.7	1.25	1.2	1	1	0.85	1	1	1	0.7

The calendar of the orthodox Christian church involves three prolonged fasting periods per year (before Easter, in August and December), and two fasting days every week (Wednesday and Friday), for a total of more than 200 days per year. See Figure 3.3. During fasting days most orthodox Christians abstain from consuming products of animal origin. During the period between Easter and Pentecost (50 days), Christians will refrain from the usual fasting on Wednesday and Friday. For this period processors experience an increase in demand for butter and ayib. It can be assumed that also the informal market will experience an increase in demand.

Calculations based on a survey held among consumers in Addis Ababa show that daily consumption of milk and other dairy products decreases by almost 60 percent during fasting periods (Francesconi, 2009). During the main fasting season (period before Easter) of the Ethiopian Coptic Orthodox Church, Lame Dairy experiences between 30%-40% reduction in sales (TechoServe, 2006; interview Lame Dairy April 2009). A small milk processor commented on a reverse trend in areas with more a Muslim population, such as Nazareth, with more instead of less demand during April (fasting period before Easter) in comparison with the period after fasting (May).

Based on comments, an estimation has been made of the fluctuation in demand throughout the year. Demand was also reported to decline slightly during the wet season, as people tend to drink less when it is rainy and cold. Furthermore people dispose of less cash in the wet season, and are consequently more inclined to process themselves (informal market).

3.4 Mismatch between supply and demand

In Figure 3.3, a variation quota has been assigned to each month in the year for the market in Addis Ababa, based on the number of fasting days during that period, and estimates on increased consumption of milk products immediately afterwards.

To show the mismatch between demand and supply during the year, figures from the Central Statistics Agency from the three registered (largest) dairy processors, during 2006-2007 were taken (see Table 3.4). Based on the total yearly volume, monthly processed raw milk has been distributed over 12 months in accordance with the variation quota as set by the authors. Consequently, the total amount of officially registered processed raw milk has been taken as an indicator of demand in the formal chain (see Table 3.5).

Nevertheless, consumer demand will probably be higher, in view of the milk products reaching consumers through informal markets; and as can be deduced from the fact that shops are frequently sold out.

Table 3.4 Processed milk in 2006-2007

		Quantity of major raw materials consumed a)		
		Local	**Imported**	**Total**
Milk (raw)	hectolitre	113,204	0	113,204
Milk (powder)	tonnes	93 b)	16	109
	Cost of raw materials consumed a			
		Local	**Imported**	**Total**
ETB1,000		46,601	7,222	53,823
Price per litre:		4.12		

a) Based on data from 3 establishments: one public (now Lame Dairy) and two private companies.
Source: CSA, 2006-2007; b) Ethiopia does not have a milk powder processing industry, but has been category zed by the CSA as local.

The fluctuations in demand, as calculated according to fasting days during the year, have been marked out against the fluctuations in supply. The latter shows a curving line with a peak in wet season and a dip in the dry season (with a reported difference of 50 to 60%).

The total production has been set - theoretically - to match the total quantity of milk processed with the total quantity of raw milk supplied in the formal chain in one year. In reality, of course, quantities of milk, both processed and produced in the formal chain, are larger, as neither amounts processed by small processors nor supply from the informal market are included in these figures. By means of triangulation of data, in Appendix 2: Summary of dairy supply chain aspects.

Marketing aspects

- Highly fluctuating demand because of fasting days;

- Seasonal fluctuations in supply of quantity and quality of milk;
- Fragmented market at supply side;
- Unreliable supplies: seasonal milk fluctuations across the seasons, unequal distribution of the products between different outlets. Delays in collecting milk from the farmers to the processing plants and in delivering from the processors to the distributors lead to high incidences of spoilage;
- In a survey by D'Haese et al., farmers pointed out the fluctuation of the milk price as their main problem, followed by the prices of feed and lack of stricter criteria for quality control (in coops).

Market aspects

- Negative consumer perception of product quality and hygiene of (industrialised) dairy products;
- Low level of supermarket penetration as main retail outlet for formal market chain;
- Low purchasing power of average Addis consumer;
- According to a survey made by ILCA (Mbogoh and Telahun, 1984), rising prices and stagnant real income do not significantly affect the demand for milk. as it is a necessity product. Importance is given to liquid milk as infant food and it serves as source of food of alternative sources. As a consequence, households are forced to sacrifice any other expense in favour of milk. With increasing income demand will also increases. (Getachew and Gashaw, 2001);
- Level of product substitution (considerate imports of milk products, like milk powder and UHT milk);
- A price sensitive market: consumer wants cheap products, cheap packaging material needed;
- The market for out-of-home consumption is largely untapped (midmorning, lunch and afternoon consumption of food takes place outside home) (Land O'Lakes, 2006);
- Packaging and marketing of locally produced milk products not attractive compared to the imported products;
- Traditionally the Ethiopian consumer is not a liquid milk consumer but a consumer of processed milk products like butter and ayib. Change in consuming habits will not only happen due to rising incomes but also with changing life style (food diets).

Organisational aspects

- No (enforcement of) public quality standards in the formal dairy chain (production practices; hygiene, product qualities);
- Absence of minimum quality standards set by industry;
- Unstructured market chain at producer level (small-scale farming) and consumption level (large informal market);
- Low availability of quality input services (AI, credit, feed);
- Small-scale farming systems favouring incursion on informal market chain (directly to consumer with traditionally processed milk products (butter; ayib));
- Inefficiency of bulking: high transaction costs;
- Weak entrepreneurial management and general operation of primary cooperatives and Unions mixed with socio-political functions.

Technological bottlenecks

- Almost no chilling and cold room facilities at milk collection level;
- Faulty and old processing equipment in some plants resulting in waste??? of the processed products;
- Lack of cold chain leading to high incidences of spoilage. (to dairy plant and from dairy plant);
- Withdrawal of stocks at retail level of some products (Lema milk) due to poor packaging and no effective advertising, leading to regular losses for lack of demand (TechnoServe, 2006).

Quality aspects

- The monitoring and control of the milk and dairy regarding quality still remains limited. Deliveries are reviewed with an alcohol test and a lactodensimeter test to check on basic food safety and possible fraud (D'Haese, 2005). No bacteriological tests; quality control only using physical and chemical tests;
- Production practices not optimal (hygiene at milking, high incidence of mastitis);
- No proper utensils to bring milk from farmer to collection centre: mostly plastic containers;
- Local farmers do not like improved/ pure bred breeds, though crossbreeds are used; as the fat % of the milk is perceived to be lower and therefore gives a lower butter production (Vernooij, 2007, p. 16).

Farming aspects

- Silage making or adoption of forage legumes often involves the introduction of a new crop into the farming system. How the new crop fits into the existing system is critical to successful introduction;
- A higher level of expenditure on feed does not always result in more milk of a higher quality if feed quality is low. Farmers with more cattle are likely to afford better feed and more care;
- Performance of dairy chain linked to performance of grain crop market chain and industry; and subsequently of animal feed prices. For the composition of dairy concentrates there is a high use of by-products of the milling industry (wheat bran, maize bran) and protein sources (from oil seed). The latter in particular is the most expensive ingredient.

In appendix 3 the yearly amount of raw milk for the three milk sheds around Addis Ababa has been calculated. This results in an estimated production of raw milk between 19,230 and 20,655 thousand litres of raw milk per year, compared to the 11,3,20 thousand litres of registered processed milk (Table 3.4).

Figure 3.4 shows that during the months of February and March, there is an oversupply of raw milk, whereas during late April and May (the months following the fasting periods), there is a shortage of milk. For processors the fasting months are most difficult, as processing facilities cannot function at full capacity. To maintain the facilities in operation, during slack times in demand, processors switch to producing products with longer shelf life, like cheese instead of pasteurised milk). Overstocking leads to related financial pressure.

For retailers, the month after fasting is most difficult, as they frequently face empty shelves in the shop. Though we have no first-hand information, we assume that high end retailers (supermarkets supplying to better-off customers) will buffer with imported products. Only in supermarkets imported milk products other than powder could be found, such as UHT milk, cheeses and yoghurts, coming from Europe (France), Egypt and the United Arab Emirates.

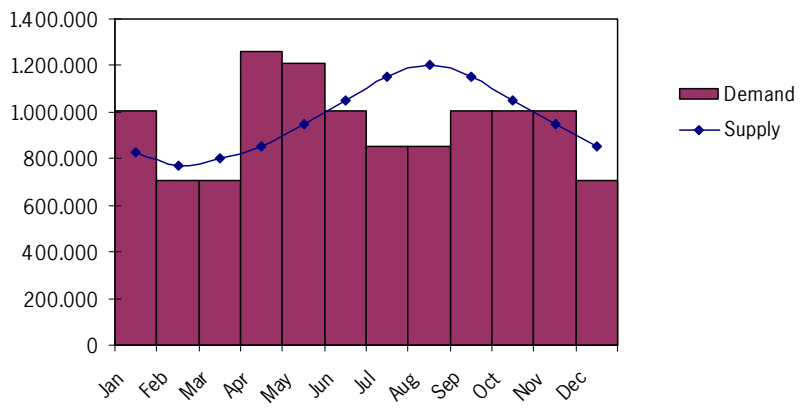
Small processor:
In retail, we cannot vary the prices according to consumers in accordance with the price paid to producer. Consumer prices can go up, never down. We can produce extra cheese during the fasting period. However, this cheese cannot be sold as demand will only go up some 30% after fasting, and you still have to sell your regular production. So one third you can sell, for two thirds you have no market.
You can continue maybe two to three months with a stock, but then you're out of money. You also loose on product quality in stock, due to temperature fluctuations, handling etc.
Instead of processing, we throw away milk. We cannot afford not to buy from our producers, as they will stop selling to you. They don't care about our problems.

Table 3.5 Calculation of fluctuation in supply and demand of raw milk

lts X 1000	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Demand	1,006	704	704	1,258	1,208	1,006	855	855	1,006	1,006	1,006	704	11,320
Supply	825	770	800	850	950	1,050	1,150	1,200	1,150	1,050	950	850	11,595

Source: CSA 2006-2007 for total processed milk, taken as approximation of total demand in formal dairy chain. Total supply estimated in function of total demand; fluctuations in the year based on interviews and estimations by authors.

Figure 3.4 Mismatch between demand and supply within the year



Source: elaborated by author, based on estimations from interviews and SCA data.

3.5 Conclusion

Two phenomena are the result of the mismatch between supply and demand. First, the variation shows that there is a direct link between the formal and the informal market: the latter functions as a buffer. During the months of shortage of supply, the informal market will be at its smallest size, while in the months of abundance of supply, producers are forced to sell their milk through the informal chain (traditional dairy products).

Second, the practice of buffering gives rise to the formation of spot markets with no development of vertical collaboration between suppliers and processors. The high fluctuation in product flow is thus a disincentive for quality differentiation in the chain.

There are two examples of these dynamics most mentioned by market partners, both producers and processors. First that in the period of milk shortage (April, May[1]) producers will default on contracts to find the highest price, while rejected milk by one processor will be bought by another, affecting minimal quality standards in the chain. Another example refers to the period of oversupply, during which producers (cooperatives, Unions) are forced to take back milk rejected at the factory gate and process it themselves for the informal market, resulting in loss of quality. It was reported that large-scale processors seem to set higher quality standards (alcohol tests with higher alcohol levels) and by doing so they reject raw milk on quality grounds when supply is high and demand low.

During our brief market survey of dairy products in Addis Ababa we could not find any UHT milk from Mama Milk. Reportedly Sebata Agro-Industries does have the UHT equipment in place and operating so UHT milk might be marketed the UHT outside Addis.

[1] In these months just before the start of the rainy season, there is a severe shortage of feed.

4 Organisational arrangements in the dairy chain

4.1 Contracts between farmers and cooperative/trader

Farmers diversify risks by selling to more than one milk collector. Both members and non-members sell to cooperatives. Though the bylaws prescribe that members can only sell through their cooperative on the risk of being expulsed, in practice farmers also sell elsewhere, mainly for financial reasons. Traders pay on the spot, whereas cooperatives generally pay once every two weeks, which may extend to one month.[1] The level of enforcement of contracts depends on (social) control exercised by the cooperative. Registration of agricultural practices and number and characteristics of cows is not general practice.

Table 4.1 Daily milk collection of a Primary cooperative in Selale

	Farmer level processing HH a)	Delivered to coop		Gender			Avg per person per day
				M	F	Total	
Coop b)		8-5-2009					
Member	1	134	35%	20	6	26	5.2
non-member	1	244	65%	7	27	34	7.2
		378		27	33	60	

a) About 10% of what is produced is retained at household level. Every farmer keeps 1 or 2l of the daily milk production for household consumption, which they process themselves into ayib and butter. b) Coop has 80 registered members (all milk producers); with a total milk production of about 395l per day in dry season, 450 in rainy seasons.
Source: Interviews with farmers of Jate Primary Coop.

Gender and dairy business at farm level

Women are member of the coop when they are head of their household. The coop will only register household sales when the registered member comes to sell. This is mainly the husband: the Selale Dairy Farmers' Union has 1,275 registered male members against 137 women. It is the women who deal with 80% of dairy activities, as it is part of their domestic work.

[1] Interview with coop member of Selale Dairy Cooperative, Selale, 14 May 2009.

This might be the reason that the majority of non-members selling to the coop are women (see Table 4.1). Therefore, it is not unlikely that some of the milk comes from the same household as the milk sold by members.

When prices go up, industrial processors will try to put the coops out of business by raising prices. Coops have difficulty to compete when prices are high because of lack of working capital.

Member of Selale Dairy cooperative:
She has four cows, and has been member of the coop for three years. She produces about 30l per day, of which she sells around 6l to the cooperative, while she holds 1l to process herself into butter, once she has 10l. The remainder she sells to restaurants and hotels in town. Since one month, the cooperative sells at ETB4.25 per litre, the restaurant pays ETB130 per month (around ETB4.30 per litre). When asked why she is member of the coop, she explained that regional prices went up once the cooperative started to collect milk (from ETB2 to ETB4 per litre). The reason for selling outside the cooperative is the delays in payment (payment every 2 weeks).

The large processors decide on the price, the coops and farmers are price takers. Sometimes the smaller processors (Berta) will raise prices in the region, which obliges the larger processors (Mama Dairy; Lame) to do the same.

Price differentiation is based on the distance from dairy farmer to Addis Ababa. Nevertheless, recently, with the chilling centres established by Mama Dairy and a truck with bulk tank, this type of price differentiation has been abolished.

4.1.1 Quality control

Composition of milk tends to be better (higher fat content) in the dry season than in the rainy season, because of lower milk yields in the dry season and type of feed.

Most farmers bring their milk in plastic containers ('jerry cans') of 25 to 40l. Some coops have aluminium containers of 55l (donated by Finnida/SNV) made available to their members. With technical support by SNV-BOAM, plans are developed for coops to clean these containers (one for morning milk, and one for evening milk). Price difference in container: plastic (ETB400); aluminium (50l) ETB1,200.

Aluminium containers improve hygienic quality of the milk.

In Nazareth, the Awash Dairy Cooperative has a small collection centre - dairy shop where members come to bring their milk and consumers come to buy it. Members have a small booklets in which all milk delivered is registered. Two women manage the collection centre: one for the collection, one for sales to the public.
Price paid to the producer is 4.75 at the shop, selling price to the consumer is ETB6. The cooperative collects around 1,500l, of which it sells 300 out of the shop to customers, and 1,200l to Holland Dairy in Debre Zeyt (at ETB5 per litre).

All quality control at field level (collection centre) is done by so called platform testing quality control, done with simple equipment. An alcohol test verifies the acidity of milk, while the lactometer test determines the specific density to know whether water has been added. The milk is sometimes also tasted.

The use of antibiotics is a more serious issue for the quality of milk than bacterial contamination.[1] Quality control for antibiotics is an issue to processing industry, as for processing (yoghurt) one needs milk without traces of antibiotics. So far anti-biotics may be not a large problem as the use of anti-biotics by the small-scale farmers will be very limited. Development of joint quality standards, adopted by the dairy industry may help increase the general quality of milk in the formal chain.[2]

4.2 Contracts between cooperative/Union and processors.

Contracts are made based on volumes and price. Price is fixed for 3 to 6 months, but cooperatives commented three to five changes in price during the year, mainly adjustments in the dry season when feed becomes scarce and production costs as well as milk prices go up. Price are readjusted in the wet season when large volumes come into the market.

In the case of the Selale Union, the Union pays the price set by the primary cooperative to members (with difference of 10 cents), which follows local spot prices. Negotiation conditions in the Selale area improved with the entrance of new buyers-collectors.

[1] Total bacterial count (TBC) or also called Total Plate Count (TPC) are used to check microbial contamination; Somatic Cell Count (SCC) is an indicator for number of cells in the milk contamination; increased levels mainly caused by mastitis).

[2] Government standards are being developed but not yet official.

Table 4.2 Estimation of price down break		
Location	**Price/cost per litre (ETB)**	**Payment by**
Price to consumer a)	6	
Factory gate	5.50	Processor to Union
Transport paid by Union Selale-Addis Ababa	0.25	
Collection centre Jate Dairy Coop (member of Selale Dairy Farmers Union)	5.1	By Union to Primary coop
Coop Member, delivery collection centre	5.2	Jate Coop to member

a) Prices to consumer range from ETB6 to 10,50 per litre in supermarkets and dairy shops; b) Price of ETB5 based on price paid by Ada'a Liben. Prices paid to members by the Jate Primary Cooperative, member of the Selale Dairy Farmers Cooperative Union, fluctuated between ETB3.85 and 5 during the last year.
Source: Interviews with farmers of Jater Primary Coop, board of the Selale Dairy Farmers Cooperative Union, estimation authors.

Being market leaders, the large processors (Lame Dairy and Mama Milk) set price.[1]

Cooperatives have been reported to default on contracts in volume when there is shortage of milk in the market, selling elsewhere.[2]

4.2.1 Quality control

As noted previously, rejection rate of milk seems to be higher during times of abundance of supply. Formal regulations or arbitration procedures for quality control between market partners do not exist; enforcement on contracts or standards is difficult.

All processors use the same equipment to assess the quality of the milk (lactometer, alcohol test). The largest processors (Lame, Mama) have a small laboratory to do additional microbial and antibiotic tests. There are (as yet) no third party laboratories for testing milk quality.

Processors do not differentiate in payment to farmers for quality milk (fat content, hygienic quality etc.), mainly because there is no differentiated market for milk products with added value. According to the Selale Farmer's Union, it causes farmers to go for the minimum quality level (fat content).

[1] In 2007, the two small processors Berta and Holland Dairy increased prices in the northern milk shed of Selale, in order to gain market in the region.
[2] Interview Production department Lame Dairy, 13 May 2009.

Lame Dairy uses preferred suppliers for making cheese during the spring fasting period for quality reasons. However, these producers do not get a premium for their milk.

As the dairy processing industry is looking for new markets for milk products with added value (Land O'Lakes, 2003; TechnoServe, 2003), there is a growing need for quality milk. This nevertheless has not yet led to common practice of differentiated milk prices.

4.2.2 Processing of milk by producers.

Rejected milk which is already sour is generally processed into butter and ayib. The morning milk is sold fresh, while the evening milk is processed (as is the case in Debre Birhan). Due to lack of cooling facilities evening milk cannot be marketed.

The Jate Dairy Coop, member of the Selale Farmers' Union noted that the ayib produced by the Union is of lower quality than that processed and sold by the coop. This they deduced by the fact that more milk is used to get one kilo of butter.[1] Possible explanations range from variation in processing skills, the adding of water, or the use of fresh versus rejected milk.

The coop is obliged to sell Union's products at local selling points, but they prefer not to, as they consider their own products of better quality. The coop claims that customers prefer the higher quality of the coop itself, even though the Union products are sold at an inferior price (ETB75 for 1 kg of butter, while coop sells at ETB85 per kg).

Calculation of costs and revenue of informal processing by the Jate Cooperative shows that it is profitable business.

When fresh milk is decreamed, 90% is skimmed milk and 10% cream. Of the skimmed milk, 7l is needed to make 1 kilo of ayib, e.g. 7.8l of fresh milk, while it takes 21l of fresh milk to make 1 kilo of butter; e.g. 2.1l of cream. See Table 4.3.

The Jate cooperative processing equipment has a capacity of 200l daily, which yields close to 26 kilos of ayib and about 13 kilos of butter. Total raw material costs are ETB800.

[1] Interviewed farmer at the local processing facility commented that to make 1 kilo of butter, the Union needs around 30l of fresh milk; versus 21l by the coop. Such a large difference in yield is however not likely.

Table 4.3	Milk processing into butter and ayib cheese				
fresh milk (litre)	**skimmed milk**	**cream**		**Price (ETB)**	**At local (informal) market**
	90%	10%			
				4	Fresh milk (1 lt)
100	90	10		1.5	Skimmed milk (1 lt)
7.8	7		1 kilo ayib	15	Ayib (1 kg)
21		2.1	1 kilo butter	80	Butter (1 kg)

Source: Interviews with staff operating the Jate cooperative processing equipment.

With a calculation of personnel costs (one supervisor, one assistant) of ETB600 per month, the difference between selling fresh milk and processed milk is ETB3.14 per litre. See Table 4.4.

Marketing costs are not included, but are low as product is sold out of factory and in coop shop.

Table 4.4	Profit and loss account per day	
Profit and loss account *		
Income from sales per day		
	385.71	sales ayib
	1,066.67	sales butter
	1,452.38	total gross income per day
	7.26	gross income per litre
Variable costs		
	800	total cost raw material
	24	labour per day
Revenue		
	628.38	total net income per day
	3.14	net income per litre = profit

* Only variable costs included, no fixed costs.
Source: Calculations by the Jate Primary Coop's processing manager.

There might be various reasons not to increase the amount of milk processed and sold ex-factory. The facilities were obtained with external financing, so capital for extension might be lacking. The coop might not want to uphold their quota sold through the Cooperative Union, or the coop might currently already be satisfying local demand.

5 Market and marketing of dairy products

5.1 Retail sector

Within Ethiopia, supermarkets have gained presence during the last five years in Addis Ababa, especially in and around the richest area of the city (Bole) where the number of supermarkets doubled. The very first supermarket (*Bambis*, which is still in business) was established in Addis Ababa at the end of the Imperial regime (1930-1974). At the moment there are 22 supermarkets registered with the chamber of commerce of Addis Ababa. Outside Addis Ababa the number of supermarkets remains very limited. Supermarkets in Ethiopia appear to be concentrated in a few wealthy neighbourhoods (Bole area) of the capital city, as observed also in other poor countries (World Bank 2007: 126, cited in Francesconi, 2009).

Table 5.1 Supermarkets in Addis Ababa

Supermarket	No. branches	Supermarket	No. branches
Bambis	1	Felix	2
Shoa plc 2 Ethiopian	2	Fantu	4
Shi Solomon	4	Hadiya Trading Enterprise	1
Seven Eleven	1	Leonardo	1
Negash Supermarket	1	Abrico	1
Addis Supermarket	1	Abadir	2
Shoppers' Mart	3	Friendship	1
Novis	3	Total branches:	28

Source: Regoverning Markets, 2007.

Due to a lack of adequate information it is not possible to quantify the share of supermarkets in the food retail sector of Addis Ababa. With respect to the dairy sector, however, primary data from a survey among consumers in Addis (Francesconi, 2009) shows that supermarkets sell on average 35,000 kg (in milk equivalent) of dairy products per day, accounting for an 11 percent share of the total dairy retailed in Addis Ababa in 2006.

Dairy outlet	No.	Sales (kg milk equiv.)	Share of total dairy retail	Share industrial dairy products a)	Share traditional dairy
Supermarkets	22	35,000	11%	29%	2%
Other retailers	?		89%	61%	98%

a) 91% of dairy products sold in supermarket are industrially produced.
Source: Francesconi, 2009.

5.2 Assortment and prices in Addis Ababa

A quick survey among supermarkets and kiosks in Addis Ababa and Nazareth shows that consumer retail can be divided into three categories. An overview of the assortment in each retail outlet surveyed[1] can be found in Table 5.2 and Table 5.3. The different presentations and correspondent prices for each product in each retail outlet can be found in Appendix 2: Summary of dairy supply chain aspects.

Marketing aspects

- Highly fluctuating demand because of fasting days;
- Seasonal fluctuations in supply of quantity and quality of milk;
- Fragmented market at supply side;
- Unreliable supplies: seasonal milk fluctuations across the seasons, unequal distribution of the products between different outlets. Delays in collecting milk from the farmers to the processing plants and in delivering from the processors to the distributors lead to high incidences of spoilage;
- In a survey by D'Haese et al., farmers pointed out the fluctuation of the milk price as their main problem, followed by the prices of feed and lack of stricter criteria for quality control (in coops).

Market aspects

- Negative consumer perception of product quality and hygiene of (industrialised) dairy products;
- Low level of supermarket penetration as main retail outlet for formal market chain;

[1] Only mentioned shops were visited. As registration could not take place in the shop itself, we have no pretense of completeness of data.

- Low purchasing power of average Addis consumer;
- According to a survey made by ILCA (Mbogoh and Telahun, 1984), rising prices and stagnant real income do not significantly affect the demand for milk. as it is a necessity product. Importance is given to liquid milk as infant food and it serves as source of food of alternative sources. As a consequence, households are forced to sacrifice any other expense in favour of milk. With increasing income demand will also increases. (Getachew and Gashaw, 2001);
- Level of product substitution (considerate imports of milk products, like milk powder and UHT milk);
- A price sensitive market: consumer wants cheap products, cheap packaging material needed;
- The market for out-of-home consumption is largely untapped (midmorning, lunch and afternoon consumption of food takes place outside home) (Land O'Lakes, 2006);
- Packaging and marketing of locally produced milk products not attractive compared to the imported products;
- Traditionally the Ethiopian consumer is not a liquid milk consumer but a consumer of processed milk products like butter and ayib. Change in consuming habits will not only happen due to rising incomes but also with changing life style (food diets).

Organisational aspects

- No (enforcement of) public quality standards in the formal dairy chain (production practices; hygiene, product qualities);
- Absence of minimum quality standards set by industry;
- Unstructured market chain at producer level (small-scale farming) and consumption level (large informal market);
- Low availability of quality input services (AI, credit, feed);
- Small-scale farming systems favouring incursion on informal market chain (directly to consumer with traditionally processed milk products (butter; ayib));
- Inefficiency of bulking: high transaction costs;
- Weak entrepreneurial management and general operation of primary cooperatives and Unions mixed with socio-political functions.

Technological bottlenecks

- Almost no chilling and cold room facilities at milk collection level;
- Faulty and old processing equipment in some plants resulting in waste of the processed products;
- Lack of cold chain leading to high incidences of spoilage (to dairy plant and from dairy plant);
- Withdrawal of stocks at retail level of some products (Lema milk) due to poor packaging and no effective advertising, leading to regular losses for lack of demand (TechnoServe, 2006).

Quality aspects

- The monitoring and control of the milk and dairy regarding quality still remains limited. Deliveries are reviewed with an alcohol test and a lactodensimeter test to check on basic food safety and possible fraud (D'Haese, 2005). No bacteriological tests; quality control only using physical and chemical tests;
- Production practices not optimal (hygiene at milking, high incidence of mastitis);
- No proper utensils to bring milk from farmer to collection centre: mostly plastic containers;
- Local farmers do not like improved/ pure bred breeds, though crossbreeds are used; as the fat % of the milk is perceived to be lower and therefore gives a lower butter production (Vernooij, 2007, p. 16).

Farming aspects

- Silage making or adoption of forage legumes often involves the introduction of a new crop into the farming system. How the new crop fits into the existing system is critical to successful introduction;
- A higher level of expenditure on feed does not always result in more milk of a higher quality if feed quality is low. Farmers with more cattle are likely to afford better feed and more care;
- Performance of dairy chain linked to performance of grain crop market chain and industry; and subsequently of animal feed prices. For the composition of dairy concentrates there is a high use of by-products of the milling industry (wheat bran, maize bran) and protein sources (from oil seed). Especially the latter is the most expensive ingredient.

Appendix 3

According to Lame Dairy, supermarkets have grown in importance, and there are 70 retail outlets with a dairy section. Retail prices are higher, but only slightly. There are currently ten brands of pasteurised milk in the market. The last 10 years competition has become fierce, because of new entrants.[1]

5.2.1 Supermarkets

Supermarkets with larger surface and broad assortment (Bambis; Fantu; Abadir) have a relatively large section of cooled shelves and carry branded products usually from one specific processor. Besides local production, these shops also sell imported dairy products, mostly cheeses and sometimes UHT milk (Abadir carries both Tetra Packed and bottled UHT milk, both from France). The local production includes Tetra Packed pasteurised milk (Bambis); assortment of cheeses (Fantu carries several smoked cheeses and provolone from own production) and sometimes non branded table and cosmetic butter- On entering the supermarkets, it is immediately visible that they target higher income class and expatriates.

Even in the supermarket, quality problems were visible, like the inflated top of a yoghurt package, whereas expiring data as registered on package was still 7 days away.

5.2.2 Kiosks

Kiosks are small grocery stores with one or two glass refrigerators mainly carrying unbranded plastic sachets of fresh milk, and butter. Cheese, mostly traditional and non-branded, and ayib are also sold.

In Nazareth, branded milk (Mama Milk) was sold out at the end of the afternoon. Kiosks have closed (ordinary) refrigerators to store dairy products and soda water. For prices see also Table 5.3.

5.2.3 Dairy shops

Dairy shops in Addis Ababa resemble kiosks, only with relatively more assortment of dairy products. In Nazareth, the dairy shops only sell milk, butter, ayib and cheese.

[1] Interview Mrs. Shewanesh, head marketing dept. lame Dairy, 13 May 2009.

We observed a case of wrongly labelled 500-ml sachets of fresh milk (package said 250 ml).

Table 5.2 Assortment in retail outlets in Addis Ababa

Product		Abadir	Bambis	Beral	Berta	Fantu	Shoppers mart
Fresh milk	non branded			X	X		
	branded		X				
UHT milk	National (local)						X
	Imported	X					
Butter	table	X		X	X		
	cosmetic			X	X		
	cooking				X		
Yoghurt	non branded			X	X		
	branded		X				X
	imported	X					
Cheese	non branded	X	X	X	X	X	
	branded	X				X	X
	imported	X	X			X	X

Source: Based on personal observations by authors.

Table 5.3 Assortment in some retail outlets in Nazareth

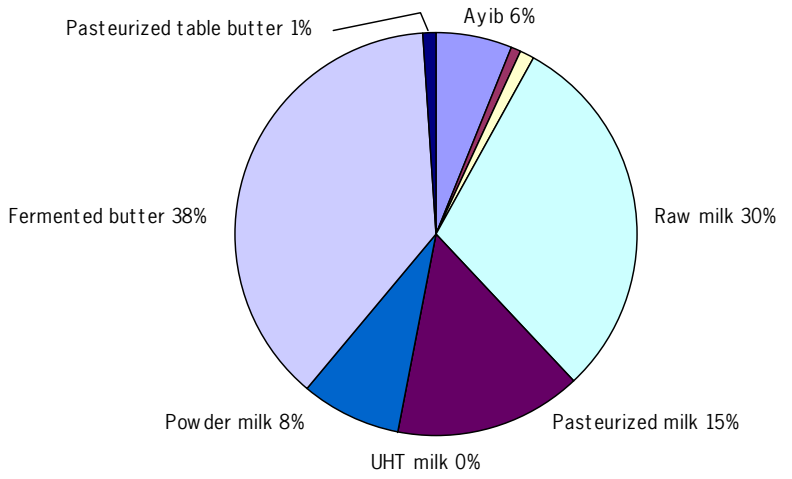
Retail outlet	Product	Description	Unit	Price (ETB)
Holland dairy shop	Pasteurised milk	Sachets with brand Ada'a Coop	500ml	5.00
Kiosk	Pasteurised milk	Sachets with brand Mama milk	500ml	6.00
Holland dairy shop	Cheese	cottage (ayib)	1 kg	16.00
Holland dairy shop	Cheese	Gouda Genesis	1 kg	100.00
Holland dairy shop	Yoghurt	Holland Dairy plain cup	500ml	7.00
Holland dairy shop	Yoghurt	Holland Dairy plain cup	250ml	4.00
Holland dairy shop	Yoghurt	Holland Dairy flavoured cup	250ml	7.00

Source: Based on personal observations by authors.

5.3 Customer preferences

Francesconi (2009) mentions that one of the main reasons for consumers in Addis Ababa (in household survey) for buying dairy products from traditional outlets is that supermarkets are too far from home or simply unknown. Figure 5.1 gives an estimation of milk consumption/purchase in Addis Ababa.

Figure 5.1 **Estimate of dairy consumption breakdown by product, Addis Ababa, 2006**

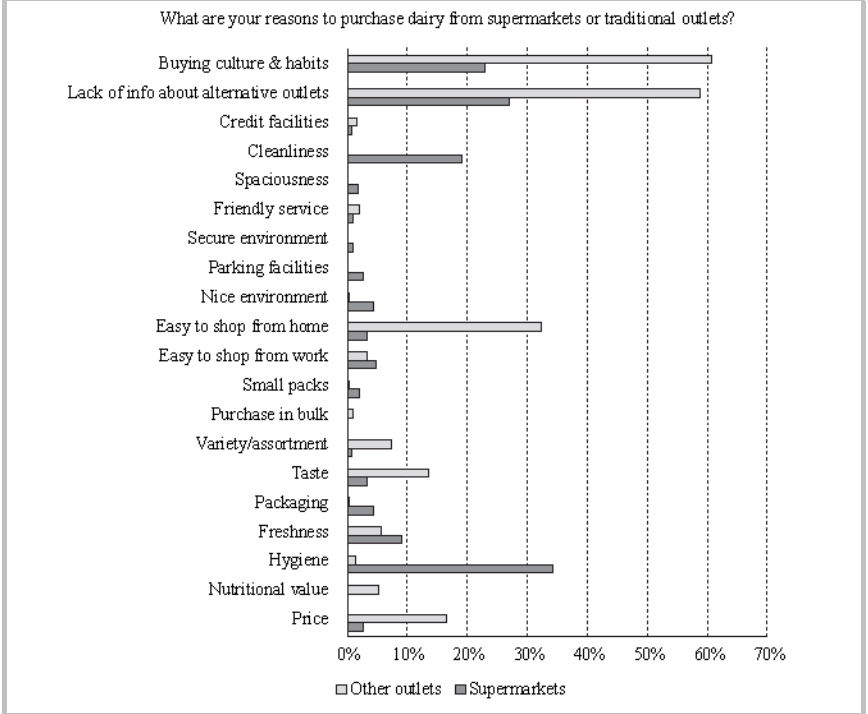


Source: Francesconi, 2009, p. 61.; based on household data.

Many households in Addis Ababa have been purchasing from urban farmers, itinerant traders and wet markets for generations, and tend to consider supermarkets as 'fancy places for rich to shop'. Some consumers mention the superior taste and nutritional value (fat content) of raw (whole) milk from farmers in comparison to pasteurised milk from supermarkets.

Price difference is not a main reason not to buy dairy in supermarkets. Those who do buy dairy in supermarkets mention especially the superior hygiene of products and stores (35%) and the cleanliness (19%) as a reason to buy in supermarkets (Francesconi, 2009, p 65.) See Figure 5.2.

Figure 5.2 **Reasons consumers prefer supermarket over traditional outlets**



Source: Francesconi, 2009, p. 65; based on household data.

The study by Land O'Lakes (2006) confirms also the strong preference for traditional products and family/social traditions:

- Low level of exposure to new products, such as fruit yoghurts, dairy snack foods and varieties of branded butter;
- Stable demand for traditional cheese (ayib) and traditional butter;
- Yoghurt indicated by consumer to be limited in price and availability (LoL).

In general, the development of formal dairy markets depends on:

- employment and educational level of women (one additional year of education gives a 2% increase of probability of buying in supermarket (Francesconi, 2009);
- purchase power (availability of refrigerator);
- penetration level of large supermarkets.

5.4 Product distribution and payment policies

The largest processor, Lame Dairy Industries has 11 sales routes within a diameter of 20 km in Addis Ababa. Three of the routes sort to the higher income areas (Bole area, where most of the supermarkets are situated), the rest to middle and low income areas (Piazza, Mercato).

On each of the sales routes, a truck goes out at 5 am in the morning, returning at 12:00 to replenish stock according to orders received by the sales department. Only two of the trucks are refrigerated. On 4 of the 11 routes, depots are located, from which customers can purchase their products.[1]

In total Lame Dairy distributes 25,000l of liquid milk products and 250 to 300 kilos of butter. Ayib, soft and hard (Gouda) cheeses are not distributed on daily basis.

In total Lame Dairy sorts to 13 kiosks and 95 wholesalers. Of total products distributed, 25% goes through the depots; 15% to supermarkets and institutional market (hospitals, hotels, university), and 10% is distributed to individuals out of the truck.

Contracts with wholesale customers, including retail, are made for 3 or 6 months, or a yearly basis. The contract establishes amount, price and general delivery conditions. The company does not sell on consignment.

There are three payment models:

Advanced payment	=> about 12% of all sales
On credit basis	=> about 8% of all sales.
On cash basis	=> rest of sales.

Lame Dairy has tried to expand outside Addis from Mojo to Awassa and Nazareth, but the initiative was halted after technological problems occurred with the cooled truck.

5.5 Markets outside Addis Ababa

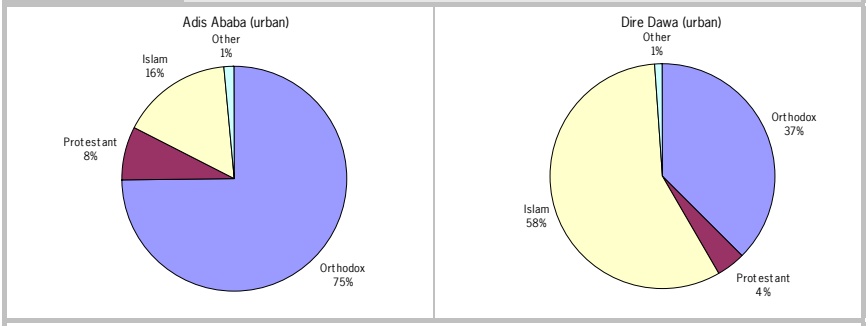
As noted before, variation in product flow can be mitigated by selling on end markets with different religious backgrounds (to counterbalance the effect of fasting periods). For example 75% of the population in Addis Ababa is orthodox, against 16% Muslim; while in Dire Dawa 37% is orthodox and 58% Muslim. As

[1] Previously, Lame Dairy only had 4 distribution routes.

for the largest end markets, Table A5.1 shows the main cities of Ethiopia, unfortunately without distinguishing religious affiliation. Addis Ababa is the largest urban agglomerate by far, with 2.7 million inhabitants; followed by Dire Dawa with almost 250,000 inhabitants (CSA preliminary census results 2007). The cities showing most population growth from 1994 to 2007 are Awassa (376%) and Harari (240%). See Table A5.1 in Appendix 5. Figures on rural and urban population categorised according to religion in Ethiopia are shown in Figure 5.4.

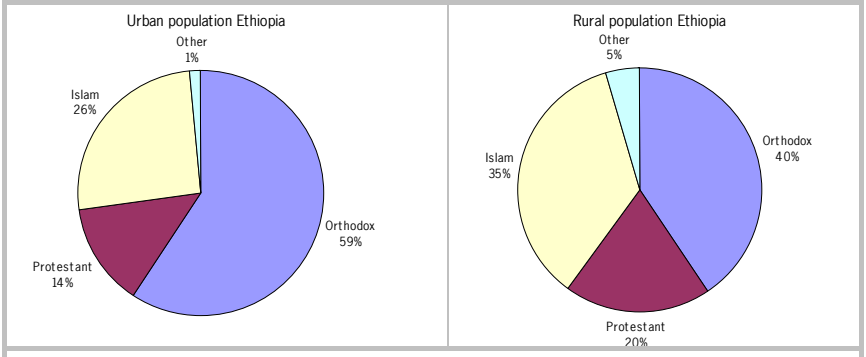
The data used for the figures in this section can be found in Appendix 5 and originate from the CSA Census 2007.

Figure 5.3 **Population according to religion in Addis Ababa and Dire Dawa**



Source: CSA census 2007.

Figure 5.4 **Urban and rural population in Ethiopia according to religion**



Source: CSA census 2007.

5.5.1 Urban markets in Ethiopia

The regions of Amhara and Oromia have the largest population. Oromia state has most people living in urban settings (3.37 million inhabitants), followed by Addis Ababa City (2.74 million inhabitants).

Having noted the lack of infrastructure and the technologically lowly developed product flow in and around Addis Ababa; these will also be the bottleneck for marketing in urban areas outside Addis Ababa. There will be less market opportunities for consumer segmentation and the sales of products with added value. See also Figure A5.1 to Figure A5.3 in Appendix 5.

6 Conclusions

6.1 Description of the formal dairy chain

The formal dairy chain is defined as the registered marketing channels through which milk is produced and processed in established processing plants and presented to the market in packed products.

In practice, the distinction between the formal and informal market is difficult to make. Several small processors are registered and pack their products, but without branding and with simple packaging (like yoghurt in plastic coffee cups). In comparison to home-made products, hygienic conditions of the processing will be better and the product safer because of temperature treatment (pasteurisation) received.

The formal peri-urban dairy chain around Addis Ababa is characterised by three main production areas: Selale to the North of the capital (26 to 40,000l per day), Debre Zeyt and Assela to the South East (10 to 15,000l); and Sebata area to the South West (9 to 13,000l). Increased competition has led to better prices for farmers and cooperatives in the chilling centres further away from Addis.

Individual farmers diversify risk by selling to different buyers. Cooperatives generally pay more, but have longer delays in payment (a standard of 15 days, which may prolong into a month). Exclusive selling to the cooperative by members is prescribed but hardly enforced.

There are two large dairy processors (Lame dairy and Mama Milk/Sebata Agro-Industries) collecting milk mostly from small-scale farmers in each of the areas, through collection centres along the main roads. Lame Dairy is a privatised state company and the oldest, while Sebata Agro Industries (a former State Farm) has been a runner up with the brand Mama Milk and the only company to have started with UHT processing of milk.

For the last decennium, more (around 10) small processors have entered the market, half of which have their own dairy farm. Most of them also own at least one retail outlet (dairy shop).

Cooperatives have also started to function as marketing channels for packed processed milk and milk products. Ada'a Liben cooperative in Debre Zeyt is the oldest and the only one with formal processing facilities (branded packaging of pasteurised milk). In general cooperatives in their operations are

expected to comply with the different functions they are supposed to perform: a political channel for government (and donor) policies; service provision at discount to members, and efficient marketing.

The retail market consists of around 28 supermarket outlets/dairy shops of different size, and numerous kiosks. Total number of shops with a dairy section in Addis Ababa is estimated at 70.

The smaller shops target the lower end market with unbranded products, mainly milk in 500 ml sachets, butter (table, cooking, cosmetic), ayib and some hard cheese, while the larger shops target higher end market consumers and expatriates with an larger assortment of tetra packed fresh and (imported) UHT milk; (imported) yoghurts; different kinds of (imported) cheeses and imported milk powder.

In the latter case, prices to consumer are slightly higher than in kiosks. Most variation in price is found in yoghurt and cheese.

Contracts between market partners are made for a maximum period of one year. Agreements are made on volumes and price. Independently of the duration of the contract, price is adjusted three to five times a year according to spot market prices.

Default on contracts by farmers/cooperatives occurs during periods of scarcity of supply; and by processors during months of oversupply of raw milk. There is hardly any collaboration in the chain (neither horizontal nor vertical).

Quality control is almost exclusively done by platform testing with a lactometer for specific gravity and an alcohol test for measuring acidity of milk. No arbitration in quality control takes place. More detailed hygienic quality measurement (microbiological and antibiotic) only takes place at largest processing plants.

There are no voluntary minimum quality standards set by the dairy industry. This means that milk rejected by one processor, may be accepted by another, undermining production for quality. There is no premium paid for quality milk.

6.2 Performance of the dairy supply chain

Appendix 2 gives an overview of supply chain aspects for dairy products influencing the performance of the dairy supply chain.

The variation in both supply and demand of (fresh) milk is the main determinant for the formal dairy chain. It is this variation that affects performance of the chain and feasibility of entrepreneurial operations throughout the chain.

Peaks in demand after fasting periods while supply suffers a dip during the dry period, lead to shortage of milk supply in Addis Ababa. During the fasting period before Easter, producers suffer from low milk prices because of the lack of demand; while feed is in short supply and animal feed prices are high because of the ending dry season. The informal chain functions as a buffer to counterbalance the differences between oversupply (peak in August) and undersupply (peak in April-May, right after Easter) in the formal market.

As a result of the variations in supply and demand, long term contracts in volume are difficult to establish, and the formal milk supply chain functions mainly on spot market basis, with no fixed volumes between market partners or price differentiation based on quality.

Variations in demand and supply give rise to price fluctuations for farmers during the year, and commercial risk for farmers and other market actors.

Availability of feed has direct influence on the performance of the formal dairy supply chain. Shortage of feed gives rise to high prices, affecting dairy farmers' economy (feasibility if farmer has financial capacity to buy) and yield per cow (if farmer has no financial capacity to buy). Access to water sources and to land for grazing or production of own animal feed around Addis Ababa also influences farmers' economy, as having own forage production is by far cheaper than purchasing hay and supplementation with relative high amounts of concentrates.

Performance of the dairy chain is affected by low technology level throughout the chain: scarce use of cooling facilities; use of old and simple small-scale processing equipment, resulting in wastage and dubious product quality.

Current strategies by processors to mitigate variations in supply and demand are:

- Production of UHT milk, which has a longer shelf life (3 to 6 months). This is done by the processor with the largest market share, Mama Milk (Sebeta Agro-Industries). A non-exhaustive sampling of retail market outlets in Addis showed that imported UHT milk is mainly sold at larger supermarkets (Bambis, Abadir), supplying to wealthier consumers, including expatriates. No UHT milk from Mama Milk was found in the short market survey done. This milk is marketed outside the Addis Ababa region;
- Bridging periods of dips in demand by processing of products with longer shelf life such as ayib and hard cheese (Lame dairy). This alternative is limited in accordance with (quality of) storage facilities and financial capacity of processor (carrying stock affects cash flows and financial position);

- Adjust processing capacity to average, and buy additional milk products (butter, ayib) during peaks in demand (smaller processors);
- Price differentiation: milk processors pay a lower price in periods with large supply and higher price in periods with high demand.

7 Recommendations

As noted, the main factor affecting feasibility in the formal dairy supply chain is the variation in supply and demand because of temporal excess and scarcity of raw milk during the year.

If the sudden drops in demand are mitigated, price fluctuation will be less, and a stable price will provide more incentive to farmers to invest in quality and equipment.

There are several strategies possible to mitigate variations in product flow: the diversification of markets towards urban markets with larger Muslim population (good distribution network is needed); export; diversification of dairy products with extended shelf life and usage on fasting and non fasting days; and upgrading of storage and transportation technologies throughout the chain.

For export, the current processors business do not comply with international standards (old/rudimentary facilities), maybe with the exception of Mama Milk (Sebata Agro industry) complying with HACCP standards.

Diversification of markets and dairy products with longer shelf life require heavy investments which will only be feasible to larger dairy processors. Neither smaller processors nor farmers are not yet sufficiently organised to engage in capital intensive joint investments.

As a consequence, two different upgrading strategies are envisaged for upgrading profitability and quality in the formal dairy chain.

7.1 Amplifying the formal dairy market in Ethiopia

The formal dairy market can be amplified by diversification of products and penetration of new markets (nationwide and export). To do this, fresh investments are needed in processing methods and distribution systems.

As mentioned, UHT milk or powder milk is an option for bridging slack periods in demand in the Addis Ababa market. Processing fresh milk into powder milk requires very high investments.

For the marketing of large UHT volumes, targeting the middle class (without refrigerator) rather than high end (niche) consumer segment is an option, with smaller packages targeting kiosks. The aim would be to work with high volume,

high stock turn (turnover rate) and (relatively) low price, rather than aim for added value and price differentiation.

Products with higher shelf life enable extension of the market outside of Addis Ababa where fasting practices are different. A strong distribution network is needed.

Yoghurt is seen as an untapped market for market actors, with which new consumer segments can be addressed (the youth with drink yoghurt) at other moments during the day (like the mid-afternoon snack).

7.2 Upgrading strategy for peri-urban farmers and cooperatives of farmers

Income opportunities in more formal sales may be better if supply is organised and negotiation power versus processors increases, but as quality standards will become higher, rejection rates will be higher. As a consequence smallholders and the other actors in the chain (milk collectors) face the challenge to improve raw milk quality need for more asset specific investments (investment in cooling facilities etc.) and will bear more risk.

Feed and variation (both in demand and in supply during the year) are main hurdles to overcome regarding farm profitability. These have a direct link with geography; farming systems (mixed farming systems), land availability reallocation and the competition between food and feed.

For farmers, efficient bulking and up-scaling in the different phases of the supply chain appears to be a better strategy for amplifying the formal market, than strategies of adding value by targeting niche products with high value presentation.

Several studies note the consumer preference for traditional dairy products and liquid milk sold via the informal chain because of perceived higher quality and probably also price. As farmers and cooperatives do not have the investing power of large processors nor can compete with the latter's market position in the higher end customer segment; organising supply by bulking at average quality standards and target peri-urban markets in the producing areas may be a better option.

Transaction costs can be limited and specific costumer demands satisfied with the development of branded assortment of traditional products for local markets through informal outlets (like cooperative shop)

As mentioned. a study by ILRI in Kenya found that policies towards milk marketing may need to weigh the potential benefits to consumers of pasteurised

milk channels against the potential benefits of employment through informal raw milk channels (among other costs and benefits), where more than 10 times the number of jobs can be created per unit of milk. This is particularly the case in areas where people are resource-poor and so can't pay high prices for processed milk, where opportunity costs for labour and employment options are low, and where people traditionally prefer whole milk. Nevertheless, this informal processing needs upgrading in terms of hygiene, quality and marketing potential.

One form of developing the informal market towards a supply (and demand) of more industrialised dairy products is by stimulating small rural enterprises with smallholder, labour-intensive processing technologies (such as hand-driven churners for butter production) (Ahmed, 2004).

For cooperatives, more transparency in the links between the different commercial operations needs to be established, as well as more insight in how these operations interrelate in costs and cash flows. To achieve this, the ownership relation between cooperatives and individual members needs to be well defined, that is, property rights and titles to assets need to be clear to all. It may be necessary to subdivide daily operations (sales of feed to members, collection of milk and sales to processors) into separate companies managed by the cooperative but owned by specific members.

Entering the formal chain with a reliable market is an incentive for increasing the number of cows and for investments in better breeds. This means that improving the informal chain by means of upgrading traditional processing technologies will lead to higher quality, entrepreneurship and more supply.

Several market parties suggested stronger government regulation and enforcement, for example by forcing farmers only to sell milk to cooperatives or established processors, or by prohibiting unbranded dairy products, but this will create other problems (pushing all small-scale enterprises out of business).

7.3 Proposals for further research

1. Cost-benefit analysis comparing small-scale production (< 10 cows; estimated at 75% of all dairy farms around Addis) with large-scale production (> 25 cows, estimated at 1%of all dairy farms), including environmental pressure. The head of the production department of Lame Dairy commented that having own milk production is more costly than purchasing milk (with average price of ETB4.12 in 2006/2007).

2. Cost-benefit analysis for export potential; including purchasing power of regional markets (Middle East) and competition analysis of other milk producing countries (Kenya, Egypt).
3. Consumer behaviour to assess market potential of different dairy products:
   - UHT milk with higher shelf life is also a viable option for low-income households (without refrigerator). What is demand for UHT milk? In what presentations?
4. Analysis of land and water usage for crop and commodity production; farming systems; and long term development of Addis Ababa and peri-urban agricultural sector.
5. Analysis of link between performance of grain supply chain and dairy supply chain (prices) and food-feed-fuel competition.

Literature and websites

Ahmed, M.A.M., S. Ehui and Y. Assefa, *Dairy development in Ethiopia*. EPTD Discussion Paper No. 123. International Food Policy Research Institute, 2004.

D'Haese, M., G.N. Francesconi and R. Ruben, *Network management for dairy productivity and quality in Ethiopia.* Development Economics Group, Wageningen University, 2005.

Francesconi, G.N. and R. Ruben, *Pros and Cons of Agri-Cooperatives in Emerging Markets. Evidence from Dairy in Ethiopia.* 2007.

Francesconi, G. N., *Cooperation for competition, Linking Ethiopian farmers to markets*. PhD. Thesis. Mansholt Graduate School of Social Sciences, Wageningen University, 2009.

Getachew, F. and G. Gashaw, *The Ethiopian Dairy Development, A Draft Policy Document*. MOA/FAO, Addis Abeba, Ethiopia, 2001.

Land O'Lakes, Research International, *Ethiopian Dairy Consumers. Usage and Attitudes Study*. Powerpoint presentation. 2006.

Rangnekar, D. and W. Thorpe (eds), *Smallholder dairy production and marketing - Opportunities and constraints*. Proceedings of a South-South workshop held at NDDB, Anand, India, 13-16 March 2001. NDDB (National Dairy Development Board), Anand, India and ILRI (International Livestock Research Institute), Nairobi, Kenya. 538 pp., 2002.

Staal, S., C. Delgado and C. Nicholson, 'Smallholder Dairying Under Transactions Costs.' In: *East Africa World Development*, 25 (1997) 5, pp. 779-794.

Staal, S.J., A. Nin Pratt and M. Jabbar, *Dairy Development for the Resource Poor*
Part 2: Kenya and Ethiopia Dairy. PPLPI Working Paper No. 44-2. Development Case Studies, ILRI, 2008.

Technoserve Kenya, *Developing a Market led Strategy for the Ethiopian Dairy Industry. A Dairy Value Chain Case Study*. SNV, Ethiopia, 2006.

Tefera, E., *The role of dairy cooperatives in stimulating innovation and market oriented smallholders development: The case of Ada'a Dairy Cooperative, Central Ethiopia.* MSc. Thesis. Department of Rural Development and Agricultural Extension, School of Graduate Studies, Haramaya University, 2008.

Tegegne, A., 'Financing Market-oriented Dairy Development, the case of Ada'a-Liben Woreda Dairy Association, Ethiopia.' In: *Urban Agriculture Magazine* 9 (April 2003) 2.

Vernooij, A., *Fact finding mission report 2007*. Wageningen University, 2007.

Yigrem, S., F. Beyene, A. Tegegne and B. Gebremedhin, Dairy production, processing and marketing systems of Shashemene-Dilla area, South Ethiopia. IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project. Working Paper 9. ILRI (International Livestock Research Institute), Nairobi, Kenya, 62 pp., 2008.

Appendix 1

ILRI classification of dairy farming systems

Traditional crop/livestock farms in rural areas	***Intensified dairy/crop livestock farms***	***Crop/livestock farms with intensive cropping***	***Specialised dairy farms***	***Peri-urban farms in and around secondary towns***	***Intra urban Addis***	***Urban secondary town***
25-130 km from Addis (avg 68 km)	Around Addis	25-60 km from Addis	15-60 km from Addis	25-60 km from Addis		'milk shed' around Addis
	Smallholder farms with intensive dairy production system. Landholding 50% of traditional farms and milk production 15% higher		Large farms with average holding of 8.9 ha	Grazed on own or rented land	Zero grazing	Grazing, some stallfeeding
Little or no specialised inputs (improved breeds, supplementary feed, housing, veterinary care, etc)	Experiences with dairy development projects under the Ministry of Agriculture; which influence on production system. Improved genotypes, artificial insemination, improved forages, con-	Cropping system more intensive, with a frequent use of fertilisers. Use of supplementary feeds to animals	Frequent use specialised inputs such as improved genotypes, artificial insemination, forage production, improved housing, concentrate feeding, veterinary care, etc.	Grazing, stall-fed roughages; basal diet is hay; agro-industrial by-product. Commercial concentrate rations used by large farms. Use of non-conventional feed resources like hulls of pulse and other	Stall-feeding based on purchased hay, agro-industrial by-products and concentrates	

Traditional crop/livestock farms in rural areas	*Intensified dairy/crop livestock farms*	*Crop/livestock farms with intensive cropping*	*Specialised dairy farms*	*Peri-urban farms in and around secondary towns*	*Intra urban Addis*	*Urban secondary town*
	centrate feeding, housing, calf bucket feeding and early weaning are common practices			crops, traditional brewery and alcohol residues, poultry waste, vegetable and fruit wastes		
					Cross bred and high grade cows; highest level exotic blood	High level exotic blood
Average 4 cows	Average 4 cows; but	Farms and herds are 25% larger than the traditional crop/livestock farmers	Average 17 cows	Average 5 cows		Average 2 cows
Daily sales of fresh milk to DDE. Excess milk is processed into butter and a local cottage cheese (known as *Ayib*) and sold in local markets		Fresh milk is sold to the DDE. Rare practice of making dairy products	Daily sales of fresh milk > 30l; primarily to local informal markets or DDE. Additional off-farm activities often generate more income than livestock		High yield per cow; sold directly to local market	Milk sold to local markets or DDE; or processed into butter/ayib. Off-farm activities represent 2/3 of their income
Source: Azage Tegegne, Million Tadesse, Alemu Yami and Yoseph Mekasha (2000): 'Market-oriented Urban and Peri-Urban Dairy Systems, processed by author.						

Appendix 2

Summary of dairy supply chain aspects

Marketing aspects

- Highly fluctuating demand because of fasting days;
- Seasonal fluctuations in supply of quantity and quality of milk;
- Fragmented market at supply side;
- Unreliable supplies: seasonal milk fluctuations across the seasons, unequal distribution of the products between different outlets. Delays in collecting milk from the farmers to the processing plants and in delivering from the processors to the distributors lead to high incidences of spoilage;
- In a survey by D'Haese et al., farmers pointed out the fluctuation of the milk price as their main problem, followed by the prices of feed and lack of stricter criteria for quality control (in coops).

Market aspects

- Negative consumer perception of product quality and hygiene of (industrialised) dairy products;
- Low level of supermarket penetration as main retail outlet for formal market chain;
- Low purchasing power of average Addis consumer;
- According to a survey made by ILCA (Mbogoh and Telahun, 1984), rising prices and stagnant real income do not significantly affect the demand for milk. as it is a necessity product. Importance is given to liquid milk as infant food and it serves as source of food of alternative sources. As a consequence, households are forced to sacrifice any other expense in favour of milk. With increasing income demand will also increases. (Getachew and Gashaw, 2001);
- Level of product substitution (considerate imports of milk products, like milk powder and UHT milk);
- A price sensitive market: consumer wants cheap products, cheap packaging material needed;
- The market for out-of-home consumption is largely untapped (midmorning, lunch and afternoon consumption of food takes place outside home) (Land O'Lakes, 2006);

- Packaging and marketing of locally produced milk products not attractive compared to the imported products;
- Traditionally the Ethiopian consumer is not a liquid milk consumer but a consumer of processed milk products like butter and ayib. Change in consuming habits will not only happen due to rising incomes but also with changing life style (food diets).

Organisational aspects

- No (enforcement of) public quality standards in the formal dairy chain (production practices; hygiene, product qualities);
- Absence of minimum quality standards set by industry;
- Unstructured market chain at producer level (small-scale farming) and consumption level (large informal market);
- Low availability of quality input services (AI, credit, feed);
- Small-scale farming systems favouring incursion on informal market chain (directly to consumer with traditionally processed milk products (butter; ayib));
- Inefficiency of bulking: high transaction costs;
- Weak entrepreneurial management and general operation of primary cooperatives and Unions mixed with socio-political functions.

Technological bottlenecks

- Almost no chilling and cold room facilities at milk collection level;
- Faulty and old processing equipment in some plants resulting in waste of the processed products;
- Lack of cold chain leading to high incidences of spoilage. (to dairy plant and from dairy plant);
- Withdrawal of stocks at retail level of some products (Lema milk) due to poor packaging and no effective advertising, leading to regular losses for lack of demand (TechnoServe, 2006).

Quality aspects

- The monitoring and control of the milk and dairy regarding quality still remains limited. Deliveries are reviewed with an alcohol test and a lactodensimeter test to check on basic food safety and possible fraud (D'Haese, 2005). No bacteriological tests; quality control only using physical and chemical tests;

- Production practices not optimal (hygiene at milking, high incidence of mastitis);
- No proper utensils to bring milk from farmer to collection centre: mostly plastic containers;
- Local farmers do not like improved/ pure bred breeds, though crossbreeds are used; as the fat % of the milk is perceived to be lower and therefore gives a lower butter production (Vernooij, 2007,p. 16).

Farming aspects

- Silage making or adoption of forage legumes often involves the introduction of a new crop into the farming system. How the new crop fits into the existing system is critical to successful introduction;
- A higher level of expenditure on feed does not always result in more milk of a higher quality if feed quality is low. Farmers with more cattle are likely to afford better feed and more care;
- Performance of dairy chain linked to performance of grain crop market chain and industry; and subsequently of animal feed prices. For the composition of dairy concentrates there is a high use of by-products of the milling industry (wheat bran, maize bran) and protein sources (from oil seed). Especially the latter is the most expensive ingredient.

Appendix 3

Calculation of yearly milk production in and around Addis Ababa

Below are the different calculations of yearly volume of raw milk produced by the three milk sheds around Addis Ababa (Selale, Assela/Debre Zeyt, Sebata); varying the duration of peak and slack production during the year. This results in an estimated production of raw milk between 19,230 and 20,655 thousand litres of raw milk; versus the statistically registered amount of processed raw milk of 11,320 thousands of litres in 2006-2007.

Table A3.1 **Calculation yearly milk shed production: 4 peak versus 8 slack months**

Litres of raw milk	wet season:	4 months		dry season:	8 months	Total year
	per day	per month (x30)		per day	per month (x30)		
Selale	40,000	1,200,000	4,800,000	26,000	780,000	6,240,000	11,040,000
Assela	15,750	472,500	1,890,000	10,500	315,000	2,520,000	4,410,000
Sebata	13,500	405,000	1,620,000	9,000	270,000	2,160,000	3,780,000
Total amount of raw milk per year							19,230,000
Total amount of raw milk per year x1000							19,230

Source: Based on calculations by authors of fresh milk production in the three milk sheds around Addis Ababa.

Table A3.2 **Calculation yearly milk shed production: 5 peak versus 7 slack months**

Litres of raw milk	wet season:	5 months		dry season:	7 months	Total year
	per day	per month (x30)		per month (x30)		
Selale	40,000	1,200,000	6,000,000	26,000	780,000	5,460,000	11,460,000
Assela	15,750	472,500	2,362,500	10,500	315,000	2,205,000	4,567,500
Sebata	13,500	405,000	2,025,000	9,000	270,000	1,890,000	3,915,000
Total amount of raw milk per year							19,942,500
Total amount of raw milk per year x1000							19,943

Source: Based on calculations by authors of fresh milk production in the three milk sheds around Addis Ababa.

Table A3.3	Calculation yearly milk shed production: 6 peak versus 6 slack months						
Litres of raw milk	**wet season:**		**6 months**		**dry season:**	**6 months**	**Total year**
	per day	**per month (x30)**		**per day**	**per month (x30)**		
Selale	40,000	1,200,000	7,200,000	26,000	780,000	4,680,000	11,880,000
Assela	15,750	472,500	2,835,000	10,500	315,000	1,890,000	4,725,000
Sebata	13,500	405,000	2,430,000	9,000	270,000	1,620,000	4,050,000
Total amount of raw milk per year							20,655,000
Total amount of raw milk per year x1000							20,655
Source: Based on calculations by authors of fresh milk production in the three milk sheds around Addis Ababa.							

Appendix 4

Presentations and prices of dairy products in retail outlets

Retail outlet	Product	Description	Unit	Price	Lt/kg
Beral Shop	Fresh milk	sealed white plastic bag pasteurised	500ml	4.00	8.00
Berta	Fresh milk	sealed white plastic bag	500ml	5.00	10.00
Bambis	Fresh milk	Skimmed milk 1% fat tetra pack	1 lt	10.35	10.35
Bambis	Fresh milk	Skimmed milk 1% fat tetra pack	0.5 lt	5.25	10.50
Bambis	Fresh milk	Pasteurised 2.6% fat tetra pack	1 lt	10.35	10.35
Bambis	Fresh milk	Pasteurised 2.6% fat tetra pack	0.5 lt	5.25	10.50
Shopper's mart	UHT milk	Semi-skimmed 1.5% fat	1 lt	30.00	30.00
Abadir	UHT milk	Semi-skimmed; low fat etc. French	1 lt	24.50	24.50
Abadir	UHT milk	Semi-skimmed; bottle, French	1 lt	30.90	30.90
Berta	Butter	Cooking butter (fermented)	1 kg	65.00	65.00
Beral Shop	Butter	Cosmetic for hair	50grs	5.00	100.00
Berta	Butter	Cosmetic for hair	100grs	12.00	120.00
Beral Shop	Butter	table butter	200grs	18.00	90.00
Berta	Butter	table butter	200grs	18.00	90.00
Abadir	Butter	unsalted table butter	1 kg	85.00	85.00
Abadir	Butter	table butter	200grs	17.00	85.00
Beral Shop	Yoghurt	plastic (coffee) cup	120ml	3.00	24.90
Berta	Yoghurt	plastic (coffee) cup	120ml	4.00	33.20
Bambis	Yoghurt	Flavoured Mama plastic cup	150ml	4.95	32.70
Bambis	Yoghurt	Genesis cup	300ml	8.65	25.95
Shopper's mart	Yoghurt	Holland Dairy plain cup	500ml	9.00	18.00
Abadir	Yoghurt	Holland Dairy plain cup	500ml	8.57	17.14
Abadir	Yoghurt	Holland Dairy plain cup	250ml	5.50	22.00
Shopper's mart	Yoghurt	Holland Dairy flavoured cup	250ml	8.50	34.00
Abadir	Yoghurt	Holland Dairy flavoured cup	250ml	9.00	36.00
Abadir	Yoghurt	Imported yoghurt flav (French) 4 cups	200ml	39.50	197.50
Beral Shop	Cheese	Provolone	1 kg	24.00	

Retail outlet	Product	Description	Unit	Price	Lt/kg
Berta	Cheese	Provolone	1 kg	60.00	
Bambis	Cheese	Provolone	1 kg	90.00	
Fantu	Cheese	Provolone	1 kg	69.00	
Berta	Cheese	mozarella	1 kg	53.50	
Bambis	Cheese	mozarella	1 kg	83.00	
Berta	Cheese	cottage (ayib)	1 kg	24.00	
Bambis	Cheese	recotta	1 kg	55.00	
Abadir	Cheese	recotta	1 kg	55.00	
Shopper's mart	Cheese	Gouda Holland Dairy	1 kg	120.00	
Fantu	Cheese	Gouda Lame Dairy	1 kg	90.00	
Abadir	Cheese	Gouda Lame Dairy	1 kg	120.00	
Abadir	Cheese	Gouda imported	1 kg	490.00	
Abadir	Cheese	Feta	1 kg	160.00	

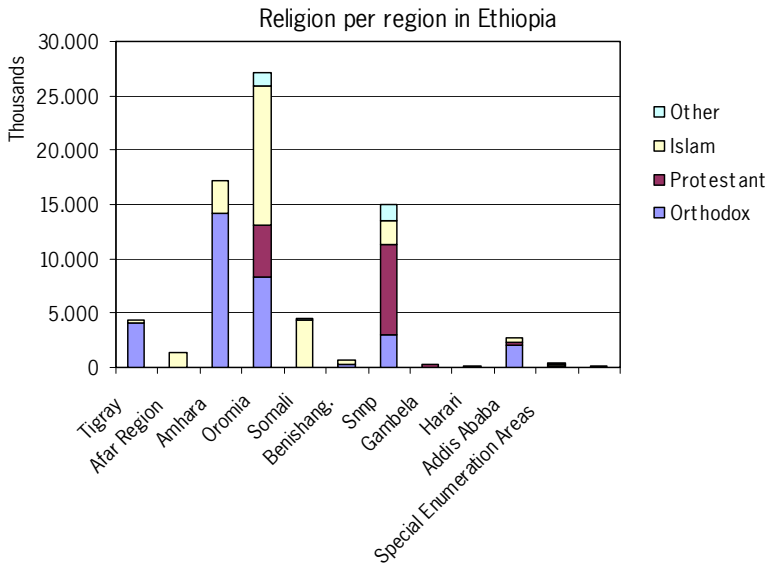
Source: Based on personal observations and registration by authors.

Appendix 5

Population size of regions by religion and place of residence: 2007

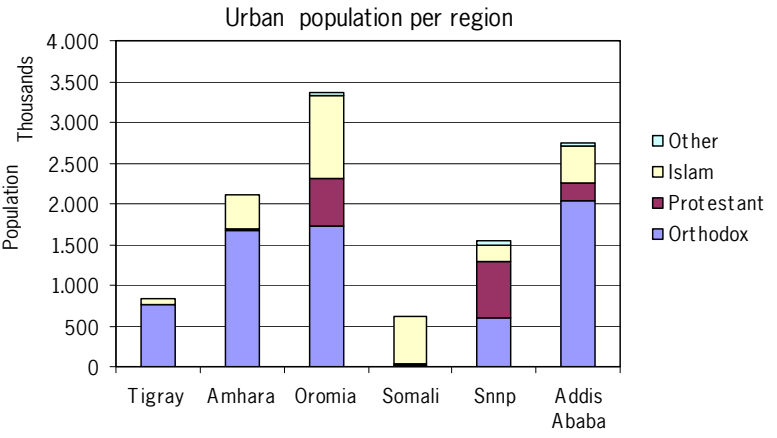
Table A5.1	Size of main cities in Ethiopia	
Main cities Ethiopia		
Name	**Population**	**population**
	1-7-1994	**28-5-2007**
	estimate	**Census**
Addis Ababa	2,084,588	2,738,248
Dire Dawa	164,851	342,827
Awassa City	69,169	259,803
Adama (Nazret)	127,842	222,035
Bahir Dar	96,140	220,344
Mekele	96,938	215,546
Gonder	112,249	206,987
Harari	76,378	183,344
Dessie	97,314	151,094
Jimma	88,867	120,600
Shasheme	..	102,062
Bishoftu	73,372	100,114
Note: numbers from the 2007 census are preliminary results.		
Source: CSA, Ethiopia		

Figure A5.1 **Religion per region in Ethiopia**



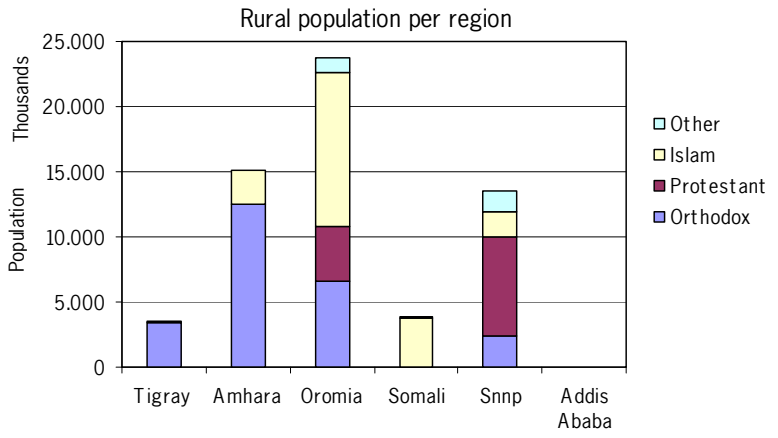
Source: CSA census 2007.

Figure A5.2 **Urban population according to religion and region**



Source: CSA census 2007.

Figure A5.3 **Rural population according to religion and region**



Source: CSA census 2007.

COUNTRY-Total	Urban + Rural		Urban		Rural	
All Persons	73,918,505	100%	11,956,170	100%	61,962,335	100%
Orthodox	32,138,126	43%	7,070,932	59%	25,067,194	40%
Protestant	13,746,787	19%	1,614,145	14%	12,132,642	20%
Islam	25,045,550	34%	3,098,275	26%	21,947,275	35%
Other*	2,966,632	4%	172,818	1%	2,793,814	5%
TIGRAY Region						
All Persons	4,314,456	100%	842,723	100%	3,471,733	100%
Orthodox	4,123,087	96%	764,996	91%	3,358,091	97%
Protestant	3,635	0%	2,775	0%	860	0%
Muslim/Islam	171,219	4%	70,221	8%	100,998	3%
Other	16,515	0%	4,731	1%	11,784	0%
AFAR Region						
All Persons	1,411,092	100%	188,973	100%	1,222,119	100%
Orthodox	54,675	4%	37,349	20%	17,326	1%
Protestant	9,344	1%	4,903	3%	4,441	0%
Muslim/Islam	1,324,050	94%	145,995	77%	1,178,055	96%
Other	23,023	2%	726	0%	22,297	2%

COUNTRY-Total	Urban + Rural		Urban		Rural	
AMHARA Region						
All Persons	17,214,056	100%	2,112,220	100%	15,101,836	100%
Orthodox	14,208,067	83%	1,667,487	79%	12,540,580	83%
Protestant	30,240	0%	21,416	1%	8,824	0%
Muslim/Islam	2,952,775	17%	414,476	20%	2,538,299	17%
Other	22,974	0%	8,841	0%	14,133	0%
OROMIA Region						
All Persons	27,158,471	100%	3,370,040	100%	23,788,431	100%
Orthodox	8,269,813	30%	1,725,432	51%	6,544,381	28%
Protestant	4,818,842	18%	588,427	17%	4,230,415	18%
Muslim/Islam	12,886,961	47%	1,006,436	30%	11,880,525	50%
Other	1,182,855	4%	49,745	1%	1,133,110	5%
SOMALI Region						
All Persons	4,439,147	100%	621,210	100%	3,817,937	100%
Orthodox	27,893	1%	25,612	4%	2,281	0%
Protestant	2,635	0%	2,289	0%	346	0%
Muslim/Islam	4,369,426	98%	584,302	94%	3,785,124	99%
Other	39,193	1%	9,007	1%	30,186	1%
BENISHANGUL-GUMUZ Region						
All Persons	670,847	100%	97,965	100%	572,882	100%
Orthodox	221,168	33%	50,175	51%	170,993	30%
Protestant	90,272	13%	17,914	18%	72,358	13%
Muslim/Islam	304,432	45%	28,514	29%	275,918	48%
Other	54,975	8%	1,362	1%	53,613	9%
SNNP Region						
All Persons	15,042,531	100%	1,545,710	100%	13,496,821	100%
Orthodox	2,995,555	20%	596,600	39%	2,398,955	18%
Protestant	8,346,046	55%	698,997	45%	7,647,049	57%
Muslim/Islam	2,118,977	14%	197,044	13%	1,921,933	14%
Other	1,581,953	11%	53,069	3%	1,528,884	11%

COUNTRY-Total	Urban + Rural		Urban		Rural	
GAMBELA Region						
All Persons	306,916	100%	77,878	100%	229,038	100%
Orthodox	51,454	17%	19,499	25%	31,955	14%
Protestant	215,092	70%	47,089	60%	168,003	73%
Muslim/Islam	14,919	5%	6,434	8%	8,485	4%
Other	25,451	8%	4,856	6%	20,595	9%
HARARI Region						
All Persons	183,344	100%	99,321	100%	84,023	100%
Orthodox	49,704	27%	48,224	49%	1,480	2%
Protestant	6,311	3%	6,091	6%	220	0%
Muslim/Islam	126,488	69%	44,253	45%	82,235	98%
Other	841	0%	753	1%	88	0%
ADDIS ABABA						
All Persons	2,738,248	100%	2,738,248	100%		
Orthodox	2,044,481	75%	2,044,481	75%		
Protestant	212,806	8%	212,806	8%		
Muslim/Islam	443,821	16%	443,821	16%		
Other	37,140	1%	37,140	1%		
DIRE DAWA						
All Persons	342,827	100%	232,854	100%	109,973	100%
Orthodox	87,629	26%	87,246	37%	383	0%
Protestant	9,583	3%	9,523	4%	60	0%
Muslim/Islam	243,188	71%	133,720	57%	109,468	100%
Other	2,427	1%	2,365	1%	62	0%
SPECIAL ENUMERATION AREAS						
All Persons	96,570	100%	29,028	100%	67,542	100%
Orthodox	4,600	5%	3,831	13%	769	1%
Protestant	1,981	2%	1,915	7%	66	0%
Muslim/Islam	89,294	92%	23,059	79%	66,235	98%
Other	695	1%	223	1%	472	1%

* Other: Catholic, traditional and other.
Source: CSA, Census 2007, preliminary.

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