

The contribution of camel milk to pastoralist livelihoods in Ethiopia

An economic assessment in Somali Regional State

Sisay Kebede, Getachew Animut and Lemma Zemedu

Country Report

April 2015

Drylands and pastoralism

Keywords:
Drylands, pastoralism,
economic resilience

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Acknowledgements

The synthesis of research was guided by Saverio Krätli as a consultant for IIED and facilitated by Eshetu Yimer at Tufts University. The report was reviewed by Caroline King-Okumu at IIED and edited by Lucy Southwood.

Partner organisations

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Published by IIED, April 2015

Sisay Kebede, Getachew Animut and Lemma Zemedu. 2015. *The contribution of camel milk to pastoralist livelihoods in Ethiopia: An economic assessment in Somali Regional State*. IIED Country Report. IIED, London.

<http://pubs.iied.org/10122IIED>

ISBN: 978-1-78431-151-3

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This is one of a series of reports synthesising the findings of field research conducted by masters' degree students at Ethiopian universities who investigated the contribution of pastoral production to the national economy. The students developed the research to complement their degree studies, with support from the International Institute for Environment and Development and Tufts University.

Contents

Acronyms	2	3.4 Milk production, consumption and sale	14
Glossary	2	3.5 Camel milk marketing system	15
Executive summary	3	3.6 Camel milk sales in different markets	16
1 Introduction	4	3.7 Economic contribution of camel milk	17
2 Research methodology	6	3.8 Camel milk marketing channels	18
2.1 Description of the study area	7	3.9 Marketing costs and margins	21
2.2 Sampling strategy and procedures	7	3.10 Constraints to camel production and milk marketing	22
2.3 Data collection	7	4 Discussion and recommendations	23
2.4 Data analysis and calculation	8	Conclusion	25
3 Results	10	References	26
3.1 Household characteristics	11	Related reading	27
3.2 Camel ownership and purpose of ownership	11	Appendix 1. Questionnaire format	28
3.3 Reproductive and lactation performance of camels	13		

Acronyms

ESAP	Ethiopian Society of Animal Production
GMM	share of gross marketing margin
GMMp	producers' share of gross marketing margin
IIED	International Institute for Environment and Development
ILCA	International Livestock Center for Africa
NGO	non-governmental organisation
NMM	share of net marketing margin
SD	standard deviation
SPSS	Statistical Package for Social Science
TGMM	total gross marketing margin

Glossary

birr	Ethiopian currency. Exchange rate US\$1=18.81 birr from October 2013 (www.oanda.com).
dam	The female parent of an animal, especially of domestic stock.
kebele	The smallest administrative unit in Ethiopia. It is part of a woreda , which in turn is part of a zone, which is part of a region
woreda	A third-level administrative division in Ethiopia. A district.

Executive summary

This study took place in Fafan zone, Somali Regional State, eastern Ethiopia. Its objectives were to determine the economic contribution of camel milk to pastoral households in Somali Regional State and all other value chain actors involved in the marketing of camel milk, and to assess camel milk marketing channels and price margins along the value chain.

The study used purposive sampling to select two districts (Babile and Gursum) with camel milk production potential and common camel milk marketing practices. Group discussions with key informants – such as elders and experts from the Office of Pastoral and Rural Development and non-governmental organisations (NGOs) – provided an overview of the camel milk production and marketing system. Trained enumerators used a pre-tested questionnaire under the supervision of the researcher, Sisay Kebede, to survey 150 pastoralist producers, collecting information on the amount of milk they produced, consumed and delivered, their sale prices and the number of individuals who sold milk. We used purposive sampling to select pastoralists from each district and its *kebeles*, based on the ownership of at least three lactating camels.

The two study districts provided a starting point to trace camel milk marketing routes and the consequent value chain of camel milk. We monitored milk marketing during the rainy season, and interviewed 50 camel milk trade actors from five marketing centres – Babile, Harar, Dire Dawa, Gursum and Jijiga.

We estimated average camel milk produced per head per day in Babile district to be 5.31 ± 0.078 litres at early lactation and 1.33 ± 0.054 litres at late lactation. In Gursum district, it was 5.16 ± 0.150 (early) and 1.09 ± 0.034 litres (late). We estimated the amount of camel milk produced per day per household to be 45.17 ± 2.210 litres in Babile district and 43.89 ± 2.247 litres in Gursum district. These figures indicate the potential and similarity of the two study sites in camel milk production. Similarly, the amount of camel milk sold per day per household was 39.96 ± 2.064 litres in Babile and 39.947 ± 2.240 litres in Gursum.

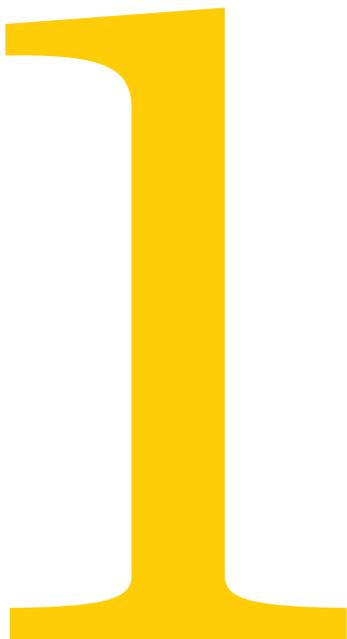
Our study found that camel milk accounted for about 82 per cent of total income among pastoralist producers, making it an important source of income compared to other commodities. Camel milk traders rely more heavily on camel milk, which contributes about 93 per cent of their income. They are not very engaged in other types of work, depending mainly on the camel milk trade.

We identified two main types of milk outlet in the study districts: in the direction of Jijiga town, from where it is sometimes transported to neighbouring countries, and in the direction of Harar and Dire Dawa town, from where it goes to Addis Ababa. The distance from household to market, the lack of market information and the lack of access to adequate transport are all important variables which significantly affect production and marketing decisions as well as participation in camel milk marketing.

In conclusion, this study shows that camel milk makes a substantial economic contribution to pastoralist households and those involved in marketing camel milk, and there is good potential for market-oriented camel dairy development in the study districts. For this to happen, there is a need for interventions to:

- develop infrastructure and enhance input supply systems
- provide extension services, capacity development and training to enhance pastoralists' skills in dairy production, processing and marketing
- improve access to veterinary services, transport and market information, feed production and conservation systems, feeding strategies and systems, milk handling, processing and marketing systems, and
- introduce milk cooperatives.

Introduction



Pastoralism is a way of life that is well suited to the arid and semi-arid parts of Ethiopia (Dawit 2000). Livestock are critical to pastoralists' wellbeing – as a source of food, employment, income and savings – and bring many benefits to society. Pastoral production also makes a significant contribution to the national economy, raising 40 per cent of the country's cattle, 75 per cent of goats, 25 per cent of sheep, 20 per cent of equines and 100 per cent of camels (Yacob 2002). Revising pastoralist-related policies will help ensure pastoralism continues to exist, bringing benefits to society and to the national economy.

Direct and indirect values are useful in helping governments identify the tangible benefits that can be obtained and sustained from pastoralism if they design policies in its favour (Scoones and Wolmer 2006). The total direct economic contribution of pastoralism to the Ethiopian economy – through the production of milk, meat, skin, hides and so on – has been estimated at US\$1.53 billion, which accounts for about six per cent of annual agricultural GDP (Berhanu and Feyera 2009). Despite this economic contribution, the pastoral production system in Ethiopia, like in many other African countries, has been fundamentally misunderstood.

Camels contribute significantly to livelihoods in and beyond pastoral communities. Although camels provide different products and services, their milk is a commodity that makes a direct economic contribution to the pastoral system and the various value chain actors involved in marketing the milk. But to date there has been a lack of work documenting the economic value and benefits of camel milk to the pastoral system and the country at large, the actors involved in the camel milk trade or the marketing channels for camel milk. As a result, the economic value of the pastoral system – including the contribution of camel milk to household subsistence, local and national economies – has been grossly underestimated.

Due to this lack of information, there have been minimal policy measures to address and acknowledge the importance of camels in particular and pastoralism in general. This situation demands the generation of appropriate data around the economic contribution that camel milk makes to pastoralists, trade actors and the regional and national economies. Such information would be useful to bring the economic contribution of the pastoral system to the attention of policymakers. Acknowledging pastoralism as a viable livelihood that plays an important economic role in pastoral areas and beyond will help them to develop policies that could make the system more productive.

This study was designed to determine the economic contribution of camel milk to pastoral households in Somali Regional State and all other value chain actors involved in the marketing of camel milk, and to assess camel milk marketing channels and price margins along the value chain. The Somali region accounts for 57 per cent of Ethiopian pastoralists. Other pastoral areas in Ethiopia include the Afar region (26 per cent); Oromiya Regional State (10 per cent) and the lowlands of Southern Gambella and Benishangul (7 per cent) (Yacob 2000, Sandford and Habtu 2000).

This paper presents a synthesis and discussion of key findings from a Masters' degree research project at the School of Animal and Range Sciences, Haramaya University, Ethiopia. The research was carried out with support from the International Institute for Environment and Development (IIED).

Research methodology



2.1 Description of the study area

The study was conducted in the Babile and Gursum districts of Fafan zone of Somali Regional State, eastern Ethiopia (Figure 1).

Rainfall in the study area is generally erratic and only takes place between June and September. Babile district faces a long drought season from November to June, while the long drought period for Gursum district is from November to May. Both districts are mainly rangeland and livestock rearing is the major activity. Pastoral production systems predominate in Babile; Gursum has an agro-pastoral system with some pastoral production.

2.2 Sampling strategy and procedures

The two study districts were purposively selected due to their high potential in camel milk production and the common practice of marketing camel milk. Various previous studies had ranked and identified the districts, which both supply large volumes of camel milk to the market. Camel milk from the study area also passes through distant marketing channels up to central Ethiopia and into neighbouring countries such as Somaliland and Somalia.

We selected the study districts, kebeles and respondents within each district after a rapid informal field survey and discussion with the Somali Region Agricultural Office, Pastoral Affairs Office, elders and other experts. The three kebeles selected from each district – Kora, Anot and Fugnancabsa in Babile and

Bombas, Golehajo and Tigdem in Gursum district – are all commonly known to have good potential for camel milk production.

The study selected a total of 150 pastoralists involved in camel milk production, with an equal number from each district. They were all from households which owned at least three lactating camels and had a minimum of five years' milking experience.

We also selected a sample of 50 camel milk trade actors from five marketing centres –Babile, Harar, Dire Dawa, Gursum and Jijiga – to interview. We used Babile and Gursum as starting points to trace camel milk marketing routes and assess the marketing channels, also assessing the consequent value chain of camel milk.

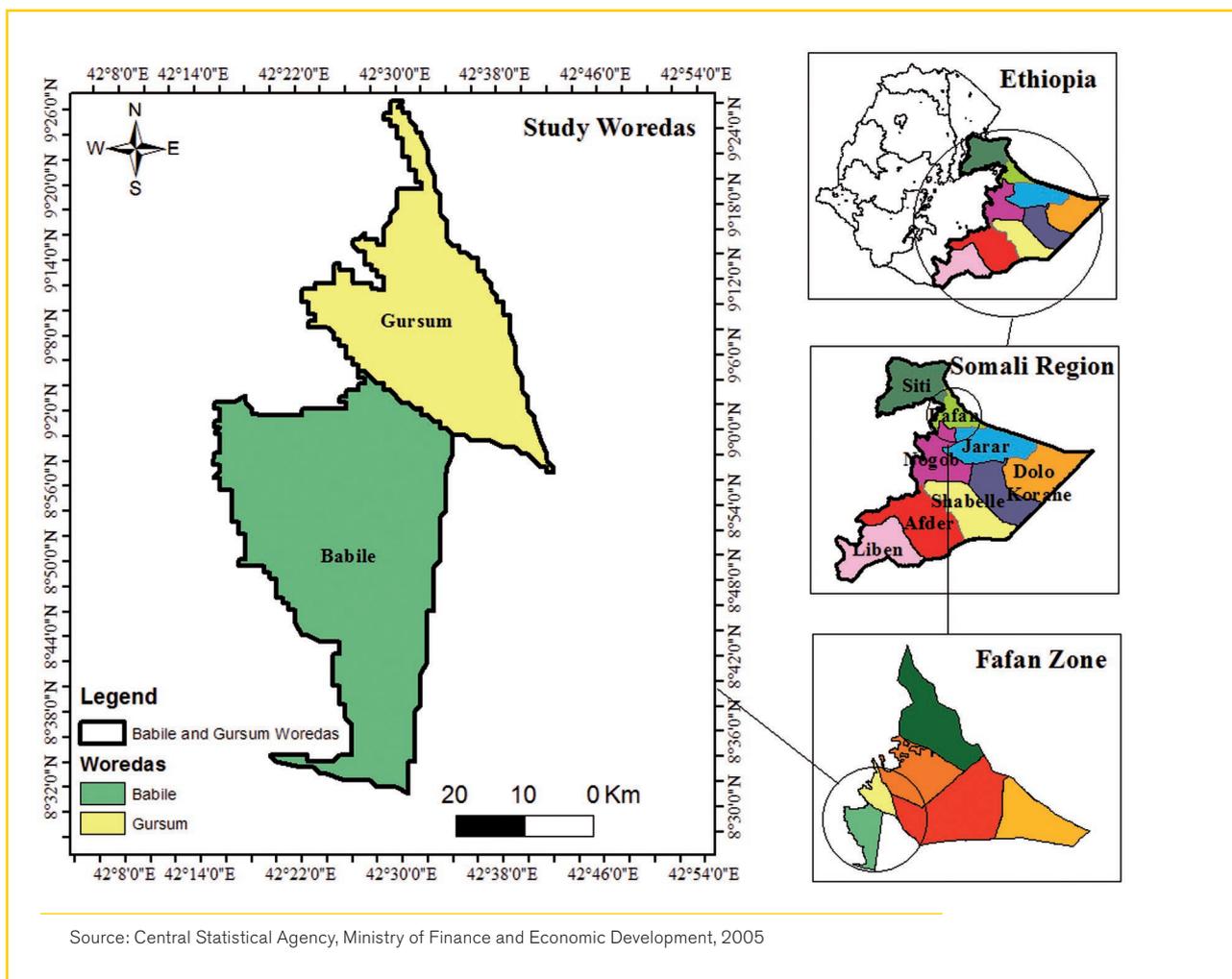
2.3 Data collection

The study generated both qualitative and quantitative data, including two cross-sectional surveys during the wet season, with field data collection between 1 October and 10 November 2013. The first survey (in October) targeted pastoralist household respondents involved in camel milk production; the other camel milk traders. The method of data collection was a single-visit formal survey (ILCA 1990), using a structured questionnaire developed after pre-testing on 10 pastoralist respondents and five camel milk trade participants. A total of 40 people took part in focus group discussions and key informant interviews in both districts, providing additional and supplementary information. Focus groups were made up of 20 camel producers, 10 camel milk traders, four representatives of government offices, two NGO representatives and four local elders.

Table 1. Description of study districts

DISTRICT	BABILE	GURSUM
Metres above sea level	950–1,700	900–2,400
Annual temperature	15–25 °C	15–23°C
Average rainfall (mm)	600–900	500–700
Area (hectares)	22,881	27,006
Population	36,000	93,000

Figure 1. Somali Regional State and zones selected for the study



Data from the pastoralist respondents focused on household heads. The survey gathered information on the following:

- household characteristics
- number and productivity of camels
- constraints of camel production
- source of household income
- contribution of camel milk to household income and/or food
- number of lactating camels
- amount of camel milk produced per animal
- lactation length of camels
- estimated total milk produced from total lactating camels and/or per household
- amount of camel milk consumed and sold
- where and for whom the camel milk is sold

- prices of camel milk, and
- knowledge of the marketing channel and trade actors of camel milk and market costs.

2.4 Data analysis and calculation

The study applied descriptive statistics – frequencies, means and percentages – to the data collected through the questionnaire and analysed it using the 2011 Statistical Package for Social Science (SPSS) variance procedure to compare the price of camel milk from pastoralists with camel milk in all market places.

We gathered information at each market place on the price of camel milk and problems related to camel milk marketing, monitoring the amount of milk delivered to the market for seven days. Enumerators took the mean values at each marketing gate/route, under the supervision of the researcher. Secondary data from governmental offices – including the Agricultural and

Pastoralist Affairs Offices – and NGOs supplemented the survey data.

We divided the total milk production from each household into portions used for home consumption and for sale, and used nearby market prices to estimate the value of camel milk consumed at home and therefore the total revenue from camel milk. We also identified different market channels – bush, local, terminal and export markets – and determined the profit share and market margin for the different marketing actors: bush traders, assemblers, local traders and exporters.

We then summed up the value of milk from production to the terminal market, to create a total economic valuation of camel milk production per pastoralist household for each district. This figure could be extrapolated to estimate the total value of camel milk production on a regional basis by multiplying it by the total number of pastoral households in the region.

The methods we used to analyse the performance of camel milk markets were channel comparison and marketing margin. The analysis of marketing channels was intended to provide a systematic knowledge of the flow of goods and services, from production to final consumers.

We recorded marketing costs – those incurred in the performance of various marketing activities of goods from producer to consumers – for different market actors. The marketing margin is the difference between the price that the consumer pays and the price that producers get for their product (Cramer and Jensen 1982).

We calculated the total gross marketing margin (TGMM) as:

$$\text{TGMM} = \frac{\text{end buyer price} - \text{first seller price}}{\text{end buyer price}} \times 100$$

TGMM is useful to calculate producer's gross margin, or the producer's share in consumer price (GMMp), which is the portion of the price paid by the consumer that goes to the producer. This is calculated as:

$$\text{GMMp} = \frac{\text{end buyer price} - \text{TGMM}}{\text{end buyer price}} \times 100$$

Results

3

3.1 Household characteristics

Most of the camel milk producer respondents were male. More than 90 per cent were married and the rest were divorced (see Table 2). Respondents' average age was 48, and their mean family size 11.4. Three-quarters were illiterate; few had formal primary education and about one-fifth had received informal or religious school training. All pastoralist producer respondents had more than 31 years' experience in camel production.

All respondents involved in trading camel milk were female and married (Table 3). Their average age was 41, and they had a mean family size of 10. Most of the milk trader respondents were illiterate; one-fifth had received religious school training and a similar number had formal primary education. Respondents' experience in camel milk trading ranged from a couple of years to a couple of decades.

3.2 Camel ownership and purpose of ownership

Interviewed pastoralists owned different livestock species including camels, cattle, goats, sheep, donkeys and poultry, with camels constituting a significant proportion of their total herds. The mean total camel population per household was slightly higher in Babile than Gursum, whereas the number of lactating camels per household was more or less similar between the districts (Table 4). The lower camel ownership per household in Gursum might be associated with the changing production systems towards increasing agro-pastoralism. There were a total of 1,252 lactating camels in the two districts considered in this study. Respondent households each had a mean of 8.4 lactating camels.

Sale of camel milk provided the major source of household income in the all six kebeles in the current study (Table 5). Households generated remaining income from the sale of animals, crops or charcoal.

Table 2. Sociodemographic characteristics of the 150 pastoralist respondents

VARIABLE	% OF RESPONDENTS	MINIMUM	MAXIMUM	MEAN	SD
Sex					
male	82.0				
female	18.0				
Marital status					
single	0				
married	92.0				
divorced	8.0				
Educational status of household head					
illiterate	75.3				
informal School	21.3				
primary school	3.30				
Age of household head (years)	–	38	68	48.10	7.56
Family size	–	6	19	11.35	2.31

SD = standard deviation

Table 3. Sociodemographic characteristics of the 50 milk trader respondents

VARIABLE	% OF RESPONDENTS	MINIMUM	MAXIMUM	MEAN	SD
Sex					
male	0				
female	100				
Marital status					
single	0				
married	100				
Educational status of household head					
illiterate	64.0				
informal school	18.0				
primary school	18.0				
Age of household head (years)	–	20	55	41.5	6.44
Number of trading years		2	22	9.12	4.61
Family size	–	4	14	9.96	2.01

SD = standard deviation

Table 4. Number of total and lactating camels owned by respondent households (75 respondents per district)

VARIABLE	NUMBER PER HOUSEHOLD			
	Minimum	Maximum	Mean	SD
Babile				
total camels	16	66	34.5	17.4
lactating camels	5	14	8.4	3.14
Gursum				
total camels	16	51	28.5	11.14
lactating camels	5	12	8.3	1.82

SD = standard deviation

Table 5. Major sources of income for the 150 pastoralist respondents

HOUSEHOLD INCOME SOURCE (% of total respondents)	STUDY KEBELES					
	Anot	Kora	Fubnancabsa	Bombas	Golehajo	Tigdem
Animal sales	20	16	–	24	24	24
Camel milk	52	84	76	70	76	76
Milk from other livestock species	12	–	–	–	–	–
Crop sales	–	–	–	6	–	–
Charcoal	16	–	24	–	–	–

The contribution of animal and crop sales to household income in Gursum district was a consequence of the presence of the agro-pastoral production system, which integrates the production of crops such as maize and sorghum with livestock herding.

In some study kebeles (such as Tigdem) there was almost no income from the sale of milk from other livestock species or crops. This was because the pastoralists mostly engaged in camel production, due to severe climatic conditions. In two of the study kebeles (Anot and Fugnancabsa) households made charcoal to diversify their income, a situation that demands attention to protect the environment, make subsistence viable and minimise the effects of climate change. Designing support mechanisms to enhance household income by improving livestock production such as milk output from camels could help achieve this.

All respondents noted that the main purpose of keeping lactating camels was for milk production, both for household consumption and for sale. This is consistent with a previous report (Jahnke 1982), which observed that the purpose of milk production was to provide milk for the family and to sell. Our study respondents also noted that their main reasons for keeping male camels were breeding, prestige, transportation and market exchange. Camels are well adapted to the changing climate in general and in the pastoral system in particular.

3.3 Reproductive and lactation performance of camels

The mean age of camels at first calving was four years (Table 6). This is lower than the age at first calving noted in previous studies (Tefera and Gebreah 2001, Ahmed *et al.* 2005) for eastern Ethiopia (5 years) and the Afer zone of the Somali region (5.2 years). The gestation period of camels in this study was 13 months, and the mean calving interval was two years. This is similar to the values reported by the earlier studies (Tefera and Gebreah 2001, Ahmed *et al.* 2005).

Respondents said that service years per camel were one and a half to two decades. They also indicated that good management systems could extend the number of service years.

The overall daily estimated camel milk yield per individual animal in the study area was 5.23 litres in early lactation and 1.21 litres in late lactation (Table 7). Respondents estimated the overall average daily volume of camel milk throughout the entire lactation period at 3.22 litres. Over an average lactation period of 13 months, the overall estimated camel milk yield per household was 2,040 litres, slightly higher than the 1,895 litres of camel milk production Baloch (2002) reported over the

Table 6. Camel reproductive parameters, as reported by the 150 pastoralist respondents

VARIABLE	MINIMUM	MAXIMUM	MEAN \pm SE
Age at first calving (years)	3	5	4 \pm 0.03
Gestation period (months)	12	13	13 \pm 0.0
Calving interval (months)	23	25	24.25 \pm 0.037
Service years (years)	15	20	17.5

SE = standard error

Table 7. Milk yield performance and camel lactation length (75 respondents per district)

VARIABLE	STUDY DISTRICTS	
	Babile	Gursum
Milk yield during early lactation (litre/day)	5.31 \pm 0.078	5.16 \pm 0.150
Milk yield during late lactation (litre/day)	1.33 \pm 0.054	1.09 \pm 0.034
Lactation length (months)	13.85 \pm 0.080	12.53 \pm 0.058

lactation length of 446 days. Such differences could be attributed to variations in feed availability, breed differences and breeding practices (Mukasa-Mugerwa 1981, Ahmed *et al.* 2005).

Camel milk production and lactation length were slightly higher in Babile than Gursum. The results are comparable to previous studies, which found the average lactation period of camels in eastern Ethiopia to be one year (Tefera and Gebreah 2001). Another report noted that lactation length of camels in Jijiga was 15 months, while in Shinile zone it was 13 months (Getahun and Brucker 2000). This indicates that lactation length for camels varies from place to place. The present result is within the range of eight months to two years reported for east African camels (Schwartz and Dioli 1992).

Traditional hand milking is the only method of milking practiced in both districts. Camels are milked between once and five times a day, depending on the season. If a calf seems weak or becomes ill, its dam (mother) will be milked less frequently and the amount of milk taken on each occasion reduced. Traditionally, calves are allowed to suckle their dam before and after milking, to initiate milk let-down and then drain whatever is left in the udder. Milking frequency depends on feed availability. On average, respondents reported milking four times a day in the wet season, and 2.4 times a day in the dry. This is higher than a previous study, which found that camels in the Somali region were milked three times a day during the wet season and twice a day in the dry (Getahun and Bruckner 2000).

Camel milk can stay fresh for longer periods than milk from other livestock. About 88 per cent of respondents noted that the shelf life of camel milk was more than five days, if handled well and smoked properly. Smoking of milk handling utensils improves the aroma and flavour of the milk. Accordingly, pastoralist households use different plants to smoke their utensils, the most common being *ejersa* (*Olea africana* L). All respondents indicated that camel milk has good medicinal value for various human ailments. Traders boil camel milk to extend its shelf life because they do not have safe milk storage or access to refrigerators. They do not dry it for milk powder in any of the study sites or market centres.

In the study area, milking camels is primarily the job of men (73 per cent), whereas women do all the selling of milk. There are no intensive production systems; camels are exclusively raised under extensive production systems. About 37 per cent of respondents said they had access to extension services to support camel production, although 30 per cent said they only had occasional contact with extension agents; 63 per cent had no contact with extension support systems.

3.4 Milk production, consumption and sale

During the study period, mean daily camel milk production per household in early lactation was 45.2 litres in Babile and 43.9 litres in Gursum (Table 8). Babile's slightly higher milk yield was associated with the number of lactating camels respondents owned. We calculated total milk produced a day at 3,388 litres in Babile and 3,292 in Gursum. Households in Babile deliver about 88 per cent of their milk to the market; in Gursum they deliver around 91 per cent. Respondents in both districts bring some 6,000 litres of milk to market every day. Even though milk volume decreases during the dry season, respondents indicated they sell camel milk during both the dry and wet seasons.

Figure 2. Bottled camel milk is delivered to market for sale



Figure 3. Producers and traders sell milk by the roadside



Table 8. Camel milk production, consumption and sale (75 respondents per district)

VARIABLE	STUDY DISTRICTS	
	Babile	Gursum
Total milk produced (litre/household)	45.17 ± 2.210	43.89 ± 2.247
Total milk consumed (litre/household)	4.88 ± 0.163	3.95 ± 0.102
Total milk sold (litre/household)	39.96 ± 2.064	39.947 ± 2.240
Camel milk price (birr/litre)	7.60 ± 0.102	8.35 ± 0.055

The marketing of camel milk does not vary much with the seasons, as longer lactation lengths mean that camels continue to produce milk during the dry season (Mekuriaw 1998). Respondents noted that milk prices show seasonal variations due to variable milk supply, and milk prices also vary between the two study districts. This might be due to differences in the supply of camel milk. Focus group participants noted that the price of camel milk is decided by traders. About 97 per cent of respondents indicated that at times there is inadequate market demand for camel milk – due to a lack of transportation, accessible roads or market information. As a result, they ferment the milk to increase its shelf life, but demand for fermented camel milk is low. Roadside milk marketing is common in the region, due to the lack of subsistence market demand.

More milk is destined for consumption in Babile than in Gursum, due to the accessibility to other food sources in the latter. According to respondents, camel milk consumption levels vary depending on the severity of weather conditions. Fresh and fermented milk are the common milk products consumed in households in the study area; respondents do not produce butter, cheese or other camel milk products. Children are the major consumers of camel milk at home. We estimated that on average households in the study district consume 637 litres of camel milk every day, which translates to a value of 5,077 birr (about US\$170) a day.¹

3.5 Camel milk marketing system

The marketing of milk in Babile and Gursum is mainly traditional, with identified outlets including rural assemblers, commission men, cooperatives and the producers themselves. At the time of study, the cooperative milk trade association in Babile had about 52 women members; the one in Gursum around 65. The cooperatives do not receive adequate support from local government, such as access to credit and market linkages.

Most households and milk traders are individual sellers and camel milk marketing is not well organised. Producers sell most of their milk in surrounding bush markets, followed by local/district markets, terminal and export markets (see Table 9 for breakdown). Most respondents said that the buyers set the milk prices, although a few indicated that demand, supply and negotiation also contribute to price-setting. Most respondents noted that the lack of accessible marketing infrastructure and market linkages force them to sell camel milk with a relatively unfair share of benefit.

Milk price fluctuations and consumer or other trade participants interfering in price setting were the two major problems in camel milk marketing in the study districts. Almost two-thirds of respondents noted that unsold milk would either be returned to them or sold off at low prices after inappropriate price decisions and price fluctuations. Such marketing systems result in milk wastage and discourage pastoralist producers from taking their product to market. Although producers usually get paid for their milk right away, sometimes payment is delayed by some days after the sale.

Figure 4. Milk marketing systems and some measuring instruments



¹ Exchange rate US\$1 = 18.81 birr from October 2013 (www.oanda.com). This exchange rate can be applied to all costs mentioned in this report.

Table 9. Camel milk marketing centres, price setting, payment schemes and reactions to price fluctuation in Babile and Gursum (150 respondents)

VARIABLE	FREQUENCY	% OF RESPONDENTS
Market centres for sale of camel milk:		
bush market	56	37.3
local market	51	34.0
terminal market	31	20.7
terminal/export market	12	8.0
Prices set by:		
buyers	58	38.7
demand and supply	19	12.7
negotiation	12	8.0
demand/supply and buyers	38	25.3
buyers and negotiation	23	15.3
Payment scheme:		
immediately after sale	56	37.3
days after sale	12	8.0
both immediate and delayed	82	54.7
Sellers' reaction to unexpectedly low market price:		
do not sell the milk	51	34.0
sale at low price	2	1.3
both do not sell and sale at low price	97	64.7

3.6 Camel milk sales in different markets

More camel milk is sold in the Gursum market area, compared to other sampled market centres. This is partly due to the presence of a cooperative in Gursum that facilitates milk marketing. There is also high demand for camel milk in Dire Dawa, Jijiga and Harar markets (see Table 10).

Respondents indicated that, in addition to the milk sold locally, every day around 3,000 litres of camel milk goes to Addis Ababa, and about 21,000 litres to neighbouring Somaliland (Hargessa) and Somalia (Mokadisho) from

each sample market centre. Pastoralists sometimes sell to these markets directly from their villages, apparently without being taxed – representing a significant contribution that the country could accrue from the sector. This practice also enables illegal traders to reap unfair benefits from such trading ventures.

At each of the five sample market centres, camel milk is sold both as fresh whole milk and fermented milk, with the former in greater demand. About 73 per cent of trader respondents noted that, if milk prices fall below expectations, they will take it home and sell it another day or at another market.

Table 10. Average camel milk sales at local markets (litres/day)

MARKET	MINIMUM	MAXIMUM	MEAN	SD	SUM	% OF TOTAL MILK MARKETED
Babile	12	57	40.64	13.95	447	6.08
Harar	74	235	164.63	72.80	1317	17.92
Dire Dawa	217	236	225.14	10.16	1576	21.44
Gursum	20	730	221.45	326.84	2436	33.14
Jijiga	73	216	121.15	44.83	1575	21.43

Table 11. Daily economic contribution of camel milk to pastoralist and trader households

SOURCE OF INCOME	MINIMUM (BIRR)	MAXIMUM (BIRR)	MEAN (BIRR)	TOTAL (BIRR)
Pastoralist households				
camel milk sales	96.36	582.36	236.78	35,516.85
other income	22.00	83.00	51.19	7,678.00
Camel milk traders				
camel milk sales	34.56	1,464.70	455.88	22,794.23
other income	0.00	167.00	34.40	1,720.00

3.7 Economic contribution of camel milk

Pastoralist respondents noted that the income they get from camel milk sales allows them to cover most of their daily household needs and buy small ruminants. They earn about 4.6 times more from camel milk sales than from other sources (see Table 11). In general, camel milk accounts for about 82 per cent of pastoralists' total income. These results reflect previous studies, which found that:

- food security in most of the Ethiopian lowlands is highly associated with livestock and livestock products (Beruk and Tafesse 2000)
- roughly 40 per cent of gross revenue in the Borana plateau was derived from milk, with the remainder from live animals and meat, so nearly all the food and income for pastoralists was ultimately derived from livestock (Coppock 1994), and
- poor smallholder dairy producers traded expensive calories (milk and meat) for cheap calories (cereals), thereby improving their total food consumption (Alderman 1987).

Camel milk traders are not much engaged in other types of work. They are mainly dependent on the camel milk trade, which contributes about 93 per cent of their income. Their mean daily income is 456 birr (Table 11).

In the study area, camels are the major livelihood source for pastoralists and camel milk traders, who earn a small income from other sources such as crop farming and formal employment. Our results indicate that about 1,650 surveyed pastoralist producers and their families rely on camel milk for job opportunities, food supplies and income. The same is true for about 133 camel milk traders from the five market centres of Babile, Harar, Dire Dawa, Gursum and Jijiga. The mean family size among traders was 10, so we can say that camel milk marketing is the sole income source for some 1,330 people in the study area.

Pastoralist producers reported that mean daily incomes of 237 birr from camel milk sales and 51 birr from other sources. This translates to an annual income of 85,320 birr from the sale of camel milk and 18,360 birr from other sources, which is a considerable income by Ethiopian standards. Camel milk accounts for about 82 per cent of total annual income among individual pastoralist producers.

If we extrapolate this household income, we can calculate a total annual income of 6,635,592,360 birr for the 77,773 households in the rural areas of Fafan zone, Somali Regional State. Each pastoralist household consumes about 4.3 litres of camel milk daily, which translates to a monetary value of 1,029 birr a month, or 12,348 birr a year for each pastoralist producer. If we add this to our previous calculation, we can estimate the total net value and economic contribution of camel milk to the study site at about 7,595,933,364 birr.

Camel milk traders reported that their daily income from the milk trade was 456 birr, much higher than the 34 birr they earn from other activities. This can be translated to an annual monetary value of 164,160 birr each, which represents about 93 per cent of their total income. If we extrapolate this, we get a total annual income of 21,833,280 birr for 133 traders.

Finally, if we add the monetary value of camel milk consumption and sales income for pastoralists to the total annual income for camel milk traders, we calculate the total net value and economic contribution of camel milk to be 7,617,766,644 birr.

3.8 Camel milk marketing channels

Our study identified eight camel milk marketing channels for Babile (Table 12) and 10 for Gursum (Table 13). Each study district has two outlets for milk products: informal export markets and local sales. In Babile, the main receivers of camel milk are wholesalers (35 per cent), rural assemblers (29 per cent) and urban assemblers (15 per cent). In Gursum, the main receivers are wholesalers (28 per cent), milk cooperatives (24 per cent) and rural assemblers (17 per cent).

Figures 5 and 6 show the market channel outlets for Babile and Gursum. In Babile (Figure 5), the largest share of milk goes down the producer – wholesaler – retailer – consumer channel, followed by the producer – rural assembler – wholesaler – retailer – consumer channel. In Gursum (Figure 5), most milk is sold down the producer – wholesaler – retailer – consumer channel, followed by the producer – milk cooperative – exporter route.

BOX 1: ACTORS IN THE CAMEL MILK MARKETING CHANNELS

Producers are first link actors of the market channel, who produce and supply surplus milk to the market. Our study revealed that about 25.95 per cent of milk producers sold to market wholesalers.

Rural assemblers buy milk products in bulk with cash and credit and deliver these to the next market chain. They collect large volumes of milk from pastoralist producers and/or bush markets and mostly sell the product on to market wholesalers.

Urban assemblers/commission men buy milk products in bulk and mostly work for wholesalers. They buy milk at the farm gate, from rural assemblers and/or bush markets in larger volumes and deliver the product to the next market chain, usually wholesalers.

Milk cooperatives buy and sell milk products in bulk, as they have better financial and information capacity. They collect milk at the farm gate, from rural assemblers, bush markets and/or roadside markets in larger volumes than any other marketing actors. Milk

cooperatives mainly sell their products to wholesalers and market retailers.

Wholesalers buy milk products in bulk, as they have better financial and information capacity. They buy milk at the farm gate, from assemblers/commission men and/or roadside markets in a larger volume than many other marketing actors. The majority of wholesalers sell their products to market retailers, some also sell to exporters.

Retailers have limited capacity for purchasing and handling products and low financial and information capacity. They are also the ultimate actors in the market chain who buy and deliver milk to consumers. They are numerous compared to the number of wholesalers and rural assemblers. They sell milk directly to consumers in small volumes, having bought larger volumes from wholesalers, assemblers or producers.

Table 12. Channels for Babile market outlet (3,022 litres)

CHANNEL NUMBER	CHANNEL	LITRES	% OF TOTAL
1	producer → consumer	220	7.28
2	producer → retailer → consumer	400	13.24
3	producer → wholesaler → retailer → consumer	784	25.95
4	producer → rural assembler → wholesaler → retailer → consumer	624	20.65
5	producer → rural assembler → retailer → consumer	248	8.19
6	producer → urban assembler → wholesaler → retailer → consumer	200	6.62
7	producer → urban assembler → retailer → consumer	264	8.74
8	producer → wholesaler → wholesaler-retailer → consumer	282	9.33

Figure 5. Camel milk market channels in Babile

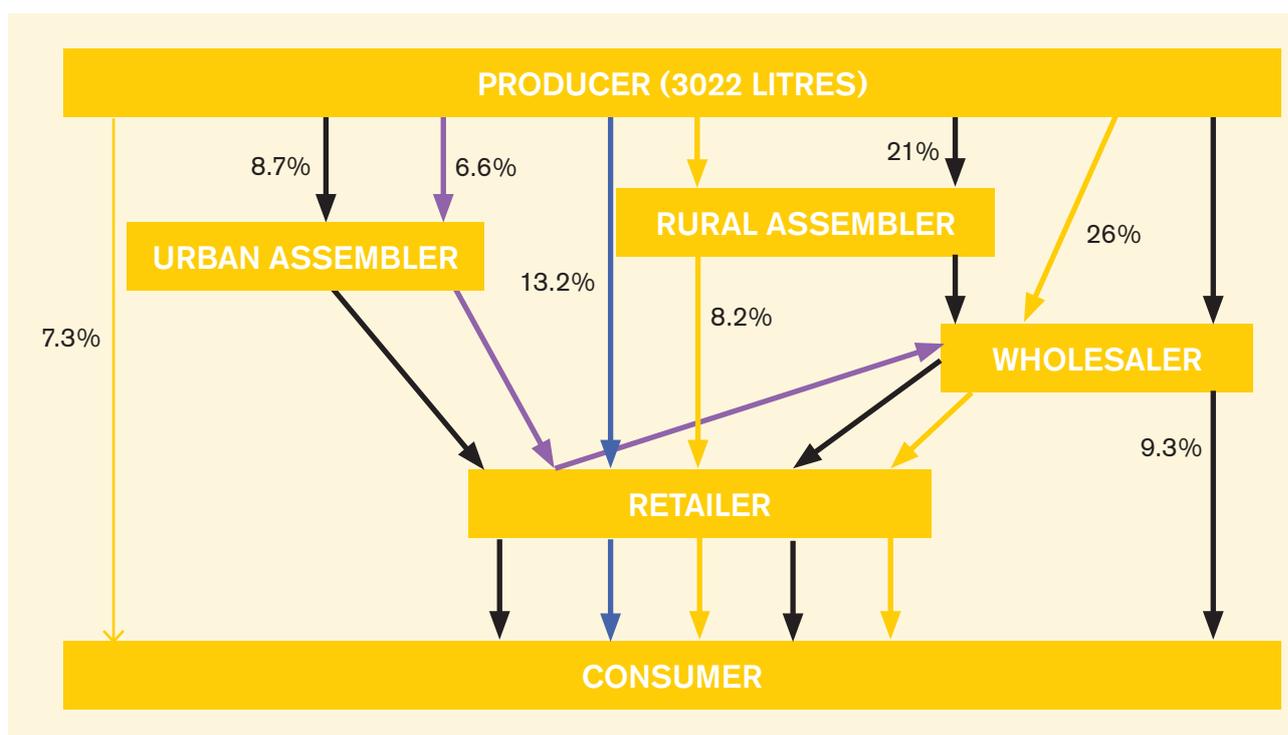
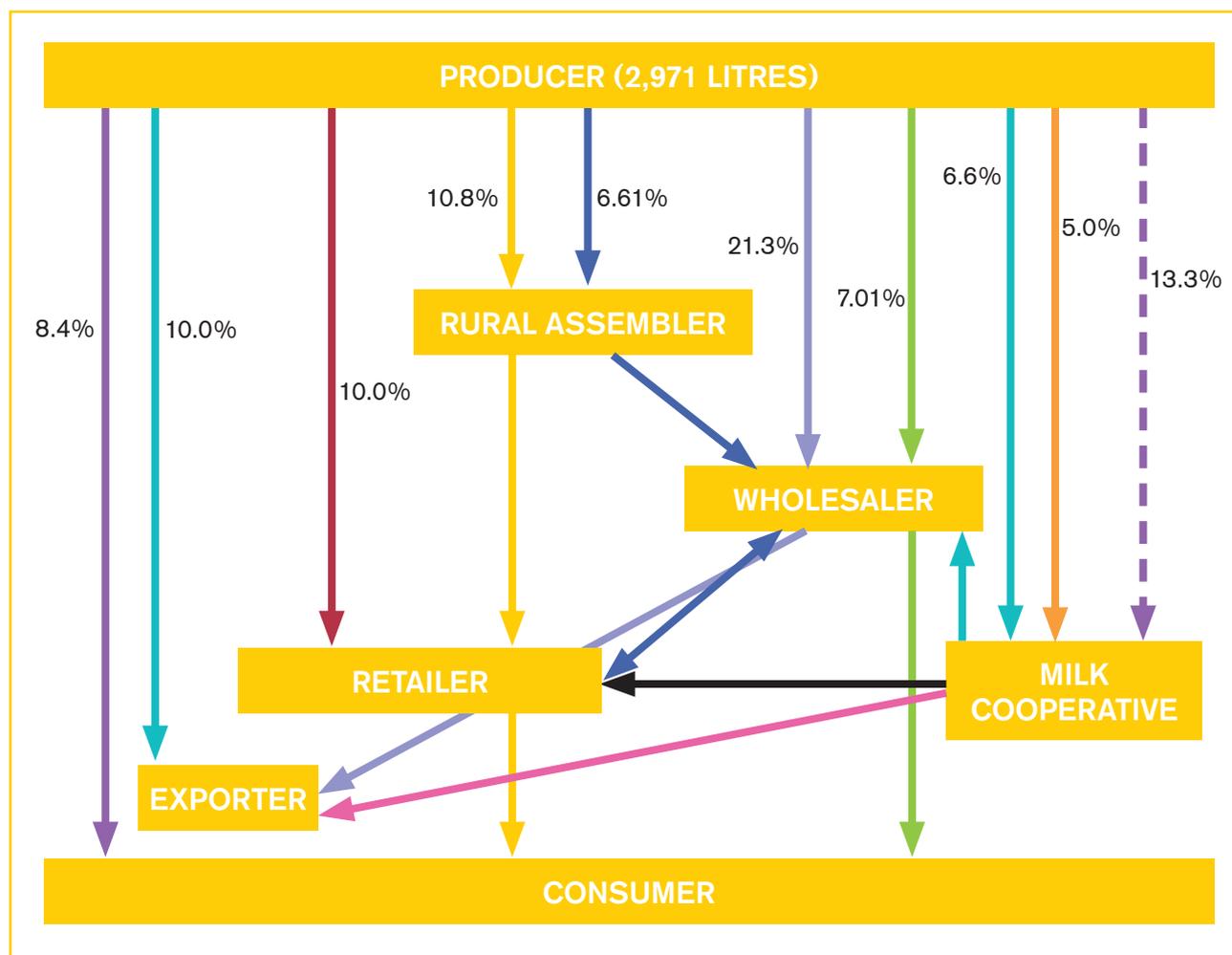


Table 13. Channels for Gursum market outlet (2,971 litres)

CHANNEL NUMBER	CHANNEL	LITRES	% OF TOTAL
1	producer → consumer	252	8.41
2	producer → retailer → consumer	299	10.06
3	producer → wholesaler → retailer → consumer	638	21.30
4	producer → rural assembler → wholesaler → retailer → consumer	324	10.81
5	producer → rural assembler → retailer → consumer	198	6.61
6	producer → milk cooperative → wholesaler → retailer → consumer	200	6.68
7	producer → milk cooperative → retailer → consumer	150	5.01
8	producer → milk cooperative → exporter	400	13.35
9	producer → wholesaler → exporter	210	7.01
10	producer → exporter	300	10.01

Figure 6. Camel milk market channels in Gursum



3.9 Marketing costs and margins

Table 14 shows the marketing costs of camel milk transactions for different agents – producers, assemblers, milk cooperatives, wholesalers, exporters and retailers. Boiling costs are lower for cooperatives than other traders, because they have the capacity to distribute the milk immediately, and therefore less need to boil it first. Boiling costs are highest for retailers and wholesalers, who buy a lot of milk expecting higher prices. Decreased market demand sometimes forces traders to boil the milk to increase its shelf life. Total marketing costs are higher for wholesalers and retailers and lower for milk cooperatives. Based on the results of this study, the profit margin for traders from a litre of camel milk range from 0.39 birr for urban assemblers to 3.43 birr for retailers.

Our study analysed marketing margins based on the average sale price in the different marketing channels for producers, assemblers, wholesalers and retailers.

For the Babile marketing route, without considering Channel 1, where producers sell directly to consumers, the total gross marketing margin (TGMM) was high in all channels. Producers' shares of the gross marketing margin (GMMp) was similar in all marketing channels.

For the Gursum marketing route, without considering Channel 1, TGMM was high for channels 2, 3, 4, 5, 6, 7 and 10. It was low for channels 8 and 9. Producers' shares of the TGMM was highest for channel 9.

Table 14. Marketing costs (birr/litre)

Cost items	Producer	Rural assemblers	Urban assemblers	Wholesaler	Retailer	Cooperatives
Telephone	0.99	0.79	0.69	0.53	0.81	0.03
Tax	0	0.03	0.02	0.083	0.233	0
Labour	0.03	0.23	0.5	0.25	0.64	0.07
Brokerage	0	0	0	0	0	0
Transportation	2.16	0.61	0.85	0.83	0.3	0
Storage	0	0	0	0	0	0
Boiling	0	0.7	0.93	2.11	2.13	0.07
Personal expenses	1	0	0.73	0.16	0.23	0
Salt	1	0	0	0	0	0
Medicine/vet	2.13	0	0	0	0	0
Milk equipment	0	0	0.15	0.08	0.07	0
Perishability loss	0	0	0	0	0	0
Other	0	0	0	0	0	0
Total cost per litre	7.31	2.36	3.87	4.043	4.413	0.17
Selling price per litre	7.97					
Average purchase price per litre		8.33	9	10.5	12.18	8
Total cost		10.7	12.87	14.543	14.39	8.17
Average selling price		11.3	13.26	15.34	17.82	9
Profit	0.66	0.56	0.39	0.797	3.425	0.83

Table 15. Marketing margins for Babile and Gursum market outlet channels

Marketing margin	Actors	Marketing channels in Babile and Gursum market outlets (%)										
		1	2	3	4	5	6	7	8	9	10	
Babile												
TGMM		0	55.27	55.27	55.27	55.27	55.27	55.27	55.27	55.27		
GMM	producers	100	44.73	44.73	44.73	44.73	44.73	44.73	44.73	44.73		
GMM	rural assemblers				29.47	29.47						
GMM	urban assemblers						39.89	39.89				
GMM	wholesalers			48.04	48.04		48.04		48.04			
GMM	retailers		55.27	55.27	55.27	55.27	55.27	55.27				
NMM	rural assemblers				166	166						
NMM	urban assemblers						204	204				
NMM	wholesalers			218	218		218		218			
NMM	retailers		229	229	229	229	229	229				
Gursum												
TGMM		0	55.27	55.27	55.27	55.27	55.27	55.27	11.44	11.44	48.04	
GMM	producers	100	44.73	44.73	44.73	44.73	44.73	44.73	44.73	88.56	88.56	51.96

TGMM = total gross marketing margin; GMM = gross marketing margin; NMM = net marketing margin

3.10 Constraints to camel production and milk marketing

The most important challenges facing camel keepers in Fafan zone are:

- low selling prices for camel milk
- a lack of milking and milk transporting materials
- a lack of transport facilities
- a lack of institutional and technical support
- the long distances to market – women often travel between 5 and 10 kilometres to sell milk, and
- a lack of access to credit.

Feed shortage is also a problem, aggravated by other factors such as the invasion of rangelands by poisonous and unpalatable plant species. Disease also limits the productivity of camels in the study area.

The lack of access to adequate clean water is another constraint on camel production, which may also contribute to milk spoilage. The most commonly used containers for storing and transporting milk to markets are plastic jerry cans and bottles (Figure 4). These are

not easy to clean and frequently lead to milk spoilage, which is of a great concern to producers and traders in the area. Camel milk traders buy mainly fresh milk from producers due to consumer preference for fresh milk (Farah *et al.* 2007, Seifu 2007). As a result, pastoralists may lose any surplus milk they produce if it is not sold immediately after milking.

Pastoralist producers and traders do not have access to credit, but about 77 per cent of respondents indicated they needed it. Close to 87 per cent of pastoralist respondents noted that their source of market information was other producers or traders; around 10 per cent said they received information by telephone; the remainder got it through personal observation. About 96 per cent of trader respondents indicated that their source of market information was other traders and telephone communications. These figures indicate a lack of established system for disseminating milk market information in the study districts. Available market information is not transparent among all categories of trade actors, which leads to high price variability and difference among traders.

About 82 per cent of camel milk trader respondents have no legal trading licence, and about 37 per cent do not pay taxes to the government. As a result, they noted that their participation in the camel milk trade has not received attention from the government.

Discussion and recommendations

4

In the study area, camels are the major livelihood source for pastoralists, who only derive a small amount of income from other sources such as crop farming and formal employment. Pastoralist producers earn mean daily incomes of 237 birr from camel milk sales and 51 birr from other sources. This translates to a monthly income of 7,110 birr from camel milk sales, which is a considerable income by Ethiopian standards. On average, each pastoralist household also consumes about 4.3 litres of camel milk daily, which translates to a monetary value of 1,029 birr per month, considering the local price of milk.

Camel milk is also an important source of income for trade actors involved at different points of the marketing chain. According to our survey results, the majority of camel milk traders do not engage in other types of work and are fully dependent on camel milk trading. Their mean daily income from the milk trade is 456 birr – much higher than the 34 birr they earn from other activities. It is clear, therefore, that camel milk is essential to the traders' livelihoods, accounting for some 93 per cent of their estimated total daily income.

The study confirmed that the sale of camel milk is highly affected by:

- price fluctuation
- inadequate access to marketing services and support
- long distances to market, and
- other infrastructural and institutional issues.

Given the appropriate institutional support and infrastructural development to remove these constraints, camel milk could contribute much more to producers, trade actors, and to the regional and national economy at large.

This study highlights the meaningful economic contribution camel milk makes to the pastoral system in terms food security, income generation and job creation. As such, we recommend that policymakers design appropriate policies to develop the sector further.

The study identified that most of the problems in the camel milk marketing chain are related to production and marketing. We discuss these below, along with recommended appropriate interventions that could help increase the marketable supply of milk and solve the marketing and related problems.

1. Pastoralist producers and traders need modern inputs such as medicine, veterinary support and market links.
 - Providing these at the right time, in the required amount and at reasonable prices will increase production and solve the problems of accessing credit.

2. The pastoralists interviewed appeared discouraged from increasing milk production by the severity of challenges that they face.

- Ongoing education, training and support from extension experts in the production and marketing of camel milk can change attitudes, increase production and help producers market any surplus milk.

3. Poor milk storage, handling and processing facilities leads to the loss and deterioration of market surpluses in rural and market centres because milk is bulky and perishable.

- Providing producers with the necessary equipment and materials for milking their camels, handling, processing and storing their milk could help solve this problem.

4. Access to market information and transport facilities has a significant, positive effect on market participation and the quantity of milk supplied. Pastoralists in the study area do not get timely access to market information and transport to make appropriate marketing decisions. They depend on traders and other pastoralist friends for price information.

- Simultaneously conveying reliable and timely market information to all stakeholders could widen the benefits of the milk market.

- Effective and continuous market links make a marketing system operate efficiently and harmoniously. The availability of timely and precise market information and transport facilities increases producers' bargaining capacity to negotiate with buyers. Improving the efficiency of the market extension system and updating extension agents' knowledge and skills to improve production and marketing systems would help link pastoralists directly to markets and ensure a reliable market outlet for producers in the study area, even where settlements are widely dispersed.

Our study identified scope and priorities for further research, which could help ensure the implementation of well organised regional and national camel milk marketing. These include:

- measuring the medicinal and monetary value of the beneficial health contribution camel milk makes to pastoralist households, and
- studying camel milk, live animal and camel meat marketing systems and their economic value in all pastoralist areas outside of Babile and Gursum woredas.

Conclusion

The study has shown that camel milk makes a great economic contribution to pastoralist households and those involved in marketing it. The benefits of producing, consuming and marketing camel milk could be further increased through practical interventions by government or non-government actors.

There is also good potential for market-oriented camel dairy development in the study districts. As well as directly benefiting the pastoralists and traders involved, this would increase the contribution of camel milk production to the national economy. To create an environment that will enable this, there is a need for interventions that will:

- develop infrastructure
- enhance input supply systems and extension services
- undertake capacity development and training to enhance pastoralists' skills in dairy production, processing and marketing
- improve access to veterinary services, transport and market information
- improve feed production and conservation systems, feeding strategies and systems
- improve milk handling, processing and marketing systems, and
- introduce milk cooperatives.

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Appendix 1.

Questionnaire format

I. Socioeconomic characteristics of respondents

1. Name of household head/respondent _____
2. Number of years lived in this area _____ (years)
3. Sex of household head/respondents
 - a. male b. female
4. Age of household head _____ (years)
5. Marital status of household head
 - a. single b. married c. divorced d. widowed
6. Education level of household head _____
7. Total number of family members
 - a. 1–5 b. 6–10 c. 11–15 d. more than 15

II. Resource endowment and uses

A. Source of income

1. What is the source of income for the household? (List the different sources of income in order of importance)
 - a. camel rearing _____
 - b. other livestock rearing _____
 - c. crop cultivation _____
 - d. trade _____
 - e. other _____
2. If your income is from camel rearing, which camel product/service is the major income source?
 - a. sale of live camels
 - b. sale of camel milk
 - c. sale of cheese
 - d. sale of butter
 - e. sale of camel meat
 - f. camel use for transport
 - g. other products _____

B. Camel production systems

1. How long have you engaged in camel production activities?
 - a. less than 5 years
 - b. 5–15 years
 - c. 16–30 years
 - d. 31–45 years
 - e. more than 45 years
2. What is your level of camel management systems?
 - a. extensive
 - b. intensive
 - c. semi-intensive
3. What are the major camel production problems in your area?
 - a. feed
 - b. water
 - c. disease
 - d. market
 - e. other (specify) _____
4. How many camels do you have in your herd?
 - a. less than 5
 - b. 5–15
 - c. 16–30
 - d. More than 30

5. What are the purposes of camel production? (List in order of importance)
 - a. milk production b. meat production c. transportation d. draught purposes
 - e. social values f. hide g. manure/pellet h. other (specify) _____
6. When do you largely sell your animals/camels ?
 - a. during dry season b. during wet season c. all the time d. during drought
 - e. during holidays f. other (specify) _____
7. Which type of camel is mainly intended for sale?
 - a. female b. male
8. How many litres of total milk is produced during early lactation from your total camel herds per day?
 - a. less than 10 litres b. 10–25 litres c. 26–40 litres d. more than 40 litres
9. How many litres of milk is used for family/household consumptions from your total daily production?
 - a. less than 5 litres b. 5–10 litres c. 11–20 litres d. more than 20 litres
10. What is the shelf life of camel milk in your household without spoilage?
 - a. less than 1 day b. 1–3 days c. more than 3 days
11. What is the trend of camel milk production in your area?
 - a. increasing b. decreasing c. the same
12. How much litres of milk is produced from individual camel per day?
 - a. less than 5 litres b. 5–10 litres c. 11–15 litres d. more than 15 litres
 - e. other (specify) _____
13. How much milk do your individual lactating camels produce during late/last milk production?
 - a. less than 5 litres b. 5–10 litres c. 11–15 litres d. the same as during early lactation
14. What is the major source of food in your household?
 - a. camel milk b. camel meat c. other crop sources d. firewood sales
 - e. other (specify) _____
15. How you cover all other household/family consumption needs?
 - a. camel milk sales b. other livestock milk sales c. camel/live animal sales
 - d. other (specify) _____
16. Do you think that your family's/household's life is mostly depending on camel rearing; especially on camel milk?
 - a. yes b. no c. similar to other livestock rearing
17. If **yes** for Q16, is this due to:
 - a. their high adaptability b. high milk palatability c. different feed/niche availability
 - d. other (specify) _____
18. What is the peak period of camel lactations?
 - a. less than 10 months b. 10–15 months c. 16–19 months d. more than 19 months
19. At what age do camels first calve in your areas?
 - a. less than 4 years b. 4–6 years c. more than 6 years

20. What is the gestation period of your camels?
 - a. 12 months
 - b. 12–13 months
 - c. more than 13 months
21. What is the calving interval for your camels?
 - a. 12 months
 - b. 12–15 months
 - c. 16–19 months
 - d. more than 19 months
22. How many lactating camels do you have in your households?
 - a. Less than 5
 - b. 5–10
 - c. more than 10
23. Have you practised milk processing – for example, butter and cheese production?
 - a. yes
 - b. no
24. Who is engaged in camel milking?
 - a. male
 - b. female
 - c. both
25. Who is engaged in camel herding? _____
26. What is the length of production/service for individual camels (in years)?
 - a. less than 6
 - b. 6–12
 - c. more than 12
27. Did you have extension contact in relation to production?
 - a. yes
 - b. no
28. Do you think that camel milk has any medicinal value, compared to milk from other livestock?

If **yes**, describe all _____

C. Marketing/sale and price of camel milk

1. How many litres of milk do you sell, out of total milk you produce daily from your total camel herds?
 - a. less than 10
 - b. 10–25
 - c. more than 25
2. To whom are you selling your milk?
 - a. pastoralist households
 - b. bush/local market traders
 - c. district market traders
 - d. main market traders
 - e. exporters
 - f. others (specify) _____
3. How do you spend the money you earn by from milk sales?
 - a. on materials for family and household
 - b. on food commodities
 - c. buying live animals
 - d. other (specify) _____
4. How much distance do you cover/travel to sell camel milk and milk products in a day?
 - a. less than 5km
 - b. 5–10km
 - c. more than 10 km
5. Who among your household members is engaged in selling camel milk? _____
6. Does the price of camel milk increasing from time to time in your area?
 - a. yes
 - b. no
7. If **yes** for Q6, is this due to:
 - a. supply shortage
 - b. demand increasing
 - c. severity of drought
 - d. distance from market places
 - e. other (specify) _____
8. When do you sell the milk?
 - a. public market days
 - b. every day
 - c. other (specify) _____

9. What was your input for camel milk production and their sources?

Type	a. yes b. no	Source (code)	Amount use	Value in birr	a. in cash b. in credit
Feed					
Water					
Labour					
Medicine/Vet					
Housing					
Milking material					
From:					
a. from market		e. development centre			
b. Bureau of Agriculture/PA		f. from field			
c. own production		g. through pipe watering			
d. local factory		h. other (specify) _____			

10. Did you need credit for your production?

- a. yes b. no

11. If **yes**, have you received credit for camel milk production purpose?

- a. yes b. no

12. If **yes**, how much credit did you borrow for production purposes?

_____ birr

13. For what purpose did you take the credit in relation to milk production?

- a. to buy inputs b. to buy household materials c. to buy camels
d. other (specify) _____

14. From whom did you get credit for milk production?

- a. a relative b. a bank c. a micro finance institution d. other (specify) _____

15. Does your product have preference by buyers?

- a. yes b. no

16. If **no**, what interventions do you need to attract a better price?

17. What are the your products' marketing problems? Rank horizontally*

Lack of market	Low price	Distance	Lack of transport	Lack of market information	Brokers hinder fair sales	Perishability	Tax	Others (specify)

* a =most severe; b = second severe, etc.

18. What is your suggestion to solve each problem? _____

19. How much milk and milk products do you supply to the market and market agents?

20. Do you negotiate on prices?

- a. yes b. no

21. How did you sell your product?
 a. direct to the buyer b. through a commission man to the buyer
 c. through a broker d. other (specify) _____
22. What problem/s were created by brokers in the milk and milk products trade? _____
23. Did you face difficulty in finding buyers when you wanted to sell your products?
 a. yes b. no
24. If **yes** to Q23, is this due to:
 a. inaccessibility of market? b. lack of information? c. low price offered?
 d. other (specify) _____
25. What do you do if you don't get the expected price for your product supply?
 a. take it back home b. sell at lower price c. take it to another market the same day
 d. other (specify) _____
26. Who sets your selling price for your products?
 a. You do b. demand and supply c. buyers d. negotiations
 e. other (specify) _____
27. When do you get the money after you sell your products in credit/if any?
 a. as soon as I sell b. other days c. other (specify) _____
28. What average costs do you incur for transporting and handling your products?
 _____ birr.
29. Are there any other costs incurred?
 _____ birr.
30. Do you have any information on where milk and milk products go after you sell them on this market?
31. How do you get information on supply, demand and the price of milk and its by-products?

USE CODE	SOURCE OF INFORMATION CODE
Supply	a. other milk traders
Demand	b. radio
Price	c. telephone
	d. personal observation
	e. broker
	f. newspaper
	g. TV
	h. Other _____

End of the interview

Thank you very much for responding to the questions.

This is one of a series of reports synthesising the findings of field research conducted by masters' degree students at Ethiopian universities who investigated the contribution of pastoral production to the national economy. The students developed the research to complement their degree studies, with support from the International Institute for Environment and Development and Tufts University.

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