

Economic contribution of the camel milk trade in Isiolo Town, Kenya

Margaret Waithera Mwaura, Oliver Vivian Wasonga,
Yazan A M Elhadi and Robinson Kinuthia Ngugi

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About the authors

Margaret Waithera Mwaura (corresponding author)
Masters degree candidate
University of Nairobi
waithera.margaret@yahoo.com

Oliver Vivian Wasonga
Lecturer
Department of Land Resource Management and
Agricultural Technology Range Management Section
PO Box 29053-00625
Nairobi
www.uonbi.ac.ke
oliverwasonga@uonbi.ac.ke

Yazan A M Elhadi
Lecturer
Department of Land Resource Management and
Agricultural Technology
Range Management Section
PO Box 29053-00625
Nairobi
www.uonbi.ac.ke
yazan.a.m.elhadi@gmail.com

Robinson Kinuthia Ngugi
Associate Professor
Department of Land Resource Management and
Agricultural Technology
Range Management Section
PO Box 29053-00625
Nairobi
www.uonbi.ac.ke
rkngugi@gmail.com

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International Institute for Environment and Development
80-86 Gray's Inn Road, London WC1X 8NH, UK
Tel: +44 (0)20 3463 7399
Fax: +44 (0)20 3514 9055
email: info@iied.org
www.iied.org

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

Contents

Acronyms	2	4 Discussion	23
Glossary	2	5 Conclusions	25
Executive summary	3	References	27
1 Introduction	4	Related reading	29
1.1 Problem statement and justification of the study	5	Appendices	30
1.2 Study objectives	6		
2 Methodology	7	Appendix 1. Questionnaire used to collect data from camel milk traders in Isiolo Town	30
2.1 Study area and target population	8	Appendix 2. Questionnaire used to collect data from camel milk transporters in Isiolo Town	33
2.2 Data collection	8		
2.3 Profitability analysis, Tawakal marketing group	9		
3 Findings	10		
3.1 Characterisation of camel milk channels and actors involved	11		
3.2 Volume, value and income generation	14		
3.3 Contribution of camel milk to Isiolo's economy and society	19		

Acronyms

CS	cost of sales
GPM	gross profit margin
GPMR	gross profit margin ratio
KCA	Kenya Camel Association
KLMC	Kenya Livestock Marketing Council
TR	total revenue

Glossary

bulker	a camel milk trader who buys milk from different sources and sells it on, mainly at wholesale outside the area.
camel milk bar	a shop that sells only camel milk and its products to consumers.
marketing group	a group of camel milk traders who collectively market camel milk.
nyirnyir	dried camel meat
retailer	a trader who sells camel milk directly to consumers (includes camel milk bars)
suusa	sour camel milk
village collector	a trader who buys camel milk from different producers in different villages and sells it on, mainly to bulkers.

Executive summary

Camel milk production and marketing in the peri-urban areas of Africa is an emerging innovation with development potential. Pastoralists are increasingly producing milk for the market as well as for subsistence, contributing to the growth of a production subsector with notable resilience to climate variability and change. In Kenya's Isiolo County, the subsector is not yet fully developed and remains highly informal, with mainly women trading raw milk between families and clans.

The Agricultural Sector Development Programme has recognised the camel milk value chain as one of the three most strategic value chains in Isiolo County. There is therefore a need for information on the camel milk value chains that could be used to formulate appropriate policies and inform development interventions.

This report provides a synthesis of findings from a field study to determine the economic contribution of the camel milk trade to Isiolo Town. A full account of the study, its findings and analysis will be presented as a Masters' degree thesis at the University of Nairobi. The study used surveys of camel milk traders and transporters, key informant interviews and focus group discussions to:

- characterise the camel milk marketing channels in terms of origins, direction, number, gender and organisation of the people involved
- assess the camel milk marketing channels in Isiolo County in terms of trade volumes and associated prices and incomes by season, and
- determine the contribution of camel milk to the economy, including total revenue accruing to Isiolo Town from the camel milk trade by season in terms of taxes, licenses, permits and levies.

Our study found that the camel milk trade creates a monthly gross turnover of up to KSh10.58 million, about 94 per cent of which was due to the demand for camel milk in the Nairobi terminal market. We demonstrate the economic contribution of the camel milk trade to Isiolo Town in terms of employment, contribution to household income of trade actors and their employees, and contribution to public revenue.

Most of the traders and labourers in the trade said it is their main source of household income, which supports 1,046 people. This includes the traders and labourers themselves, their spouses, children and close and distant relatives. Producers and their households depend on camel milk production for their health, nutrition and income.

The demand for hygienically produced camel milk in urban areas outstrips supply and is likely to continue to grow. This underlines the importance of the camel milk trade in Isiolo Town as a potential driver of economic development in the county and the national economy. The formalisation of the informal camel milk trade through marketing groups in Isiolo is already increasing traders' income and public revenue.

As the county continues to develop the camel milk sector, it is important to ensure that it continues to maximise the benefits to the most vulnerable as well as to the economy. The findings of this study will inform the development of a camel policy for Isiolo County.

Introduction



Pastoralists have long been viewed as conservative herders bound by primitive cultural urges to build up their herds to maintain or boost their ego and prestige (Herskovits 1926). Such myths have continued to dictate the development policies in the drylands of Kenya, which are geared towards changing the pastoralists rather than resolving the constraints they face. Pastoral systems are ideally suited to drylands as they endure low, unpredictable, scattered and variable rainfall, high temperatures that lead to high evapotranspiration, poor soils and rough topography (Stenning 1959). Pastoralists live with and off the uncertainties of such ecosystems, not only coping with but also using the conditions to generate benefits that are greater than would be the case if resources were uniform (Scoones 1995, Little *et al.* 2001, Krätli and Schareika 2010).

Previous studies identified livestock production that is anchored on strategic mobility and livestock feeding selectivity as the most suitable system for such dryland ecosystems (Sombroek *et al.* 1982, Behnke and Scoones 1993, Krätli *et al.* 2012). The potential to use this environmental dynamism as an asset makes pastoralism stand out from other production systems. But the resilience of pastoral production systems faces ongoing challenges from human population growth, recurrent droughts, conversion of rangelands to other uses, weak governance, increasing insecurity, political and economic marginalisation and policy-related constraints (Kashayet *et al.* 1998, Mkutu 2001, Homewood *et al.* 2001). In response to these pressures, alternative modes of resource use and multiple forms of innovations are emerging among the pastoral peoples (Scoones and Adwera, 2009).

Camels are increasingly becoming a key pastoral asset. In the face of severe drought, the camel has been shown to survive and continue to produce milk (Belay *et al.* 2005). This is seen as a driver for the increase in camel rearing among pastoral communities in northern Kenya (Sperling 1987, Stiles 1987), along with growing market demand for camel products. The camel milk trade has the potential to contribute to climate change adaptation and to food and income security for various actors, especially women who play a key role in camel milk marketing (Urs 1990, Musinga *et al.* 2008, Anderson *et al.* 2010).

Camel milk production and marketing in peri-urban Africa is an emerging innovation with development potential, and pastoralists are exploiting the growing urban demand for camel milk in Somalia (Herren 1990, Farah *et al.* 2007), Kenya (Noor *et al.* 2012), Ethiopia (Seifu 2007), Djibouti, Mauritania, Morocco and Sudan (Wilson 1998). Pastoralists and their families, who are used to drinking camel milk and are spending their time and money in urban areas, are driving the growth of this sector. It has also been affected by changes in transportation and communications networks, most notably the introduction of the mobile M-Pesa money transfer system, which speeds up and facilitates payments from urban to rural areas.

The growth in urban demand for camel milk has shifted the focus of development efforts in pastoral areas, bringing camel milk – which has traditionally been produced and consumed in pastoralist households – into the market domain. Pastoralists are increasingly producing milk for the market as well as for subsistence, contributing to the growth of the camel milk subsector in the face of increasing climate variability and change. In Kenya, this trend has been reported in Isiolo County, where a thriving camel milk business has developed (Noor *et al.* 2012)

1.1 Problem statement and justification of the study

Previous studies on the economics of pastoralism have introduced the use of the total economic valuation approach to identify aspects of value in the pastoral sector that have previously remained unknown to many (Odhiambo 2006, Hatfield and Davies 2006, Davies 2007). In 2009, the Kenya's camel milk industry was estimated to contribute KSh16 billion to the national economy, producing about 552 million litres of milk (Behnke and Muthami 2011), mostly through pastoral production. This shows that the subsector has huge potential, given that it is not fully developed. Camel milk marketing remains highly informal and is characterised by mainly women trading raw milk between families and clans. The Agricultural Sector Development Programme has recognised the camel milk value chain as one of the three most important value chains in Isiolo County.

Previous studies have generally highlighted the growth and potential of camel dairy production and marketing in Isiolo County (Musinga *et al.* 2008; Noor *et al.* 2012). But there is little information on the camel milk trade's economic contribution to the County. Evidence-based, downscaled and site-specific data is imperative for the formulation of appropriate policies and to inform development interventions. There is a need for more detailed study and analysis of the camel milk value chain using appropriate methodologies. This will help unravel the trade and generate information that county governments can rely on to make decisions concerning the subsector and pastoralism more generally.

This report provides a synthesis of findings from a field study that was conducted between December 2013 and February 2014 to determine the camel milk trade's economic contribution to Isiolo Town. A full account of the study its findings and analysis will be presented as a Masters' degree thesis at the University of Nairobi.

1.2 Study objectives

This study's overall objective was to generate evidence-based information on the contribution of camel milk to the economy through in Isiolo Town.

Specific study objectives were to:

- characterise the camel milk marketing channels in terms of the origins, direction, number, gender and organisation of people involved
- assess the camel milk marketing channels in Isiolo County in terms of trade volumes and associated prices and incomes by season, and
- determine the contribution of camel milk to the economy, including total revenue accruing to Isiolo Town from the camel milk trade by season in terms of taxes, licenses, permits and levies.

This study focuses on pastoral camel milk, defined as camel milk produced under the pastoral production system where camels are herded on extensive rangelands with little or no external input, requiring movement of varying amplitudes. It assumes that all camel milk traded through Isiolo is pastoral camel milk, produced in this way.

Methodology

2

2.1 Study area and target population

Isiolo is considered one of Kenya's most vulnerable counties to climate change, subject to severe drought and unpredictable rainfall (Government of Kenya 2005). The county is located in the arid and semi-arid part of the country. It covers an approximate area of 25,605km² (ALRMP 2009), with an estimated population of 143,294 (Government of Kenya 2013). The annual rainfall of 400–600mm is too unreliable and erratic to support arable agriculture.

The rationale behind selecting Isiolo County as the study area was that the area had a thriving pastoral camel milk business (Musinga *et al.* 2008) The bulk of the camel milk from Isiolo County sold to the Nairobi and Maua terminal markets passes through Isiolo Town, which plays a very important role in the camel milk value chain as the main bulking, cooling and trading centre.

The county's main economic activity is pastoralism – an extensive livestock production system that relies on herd mobility and the strategic use of natural resources that are unevenly distributed in both space and time (Wane 2006). We assumed that all the camel milk traded within Isiolo Town market is produced under the pastoral system, making the trade of critical importance to the county's population as a whole.

Isiolo has a number of milk marketing groups. These are mainly self-help women's groups that promote collective action among the pastoral women to help them meet their financial needs which were adopted through camel milk marketing. Membership of these groups is strongly based around clan and family relations. Traders join the groups to acquire camel milk trading licenses and training from the government and development agencies. The groups also offer cooling facilities and provide a platform for their members to bargain for better prices and lobby for capital to develop their business capacity.

In conjunction with national organisations such as the Kenya Camel Association (KCA), the Dairy Training Board, Kenya Livestock Marketing Council (KLMC) and development agencies such as SNV and VSF-Suisse, the marketing groups have made efforts to improve the quality of camel milk traded in Isiolo. They do this by training camel milk producers and traders on hygienic camel milk handling, promoting the use of aluminium cans instead of plastic containers and adding value to products such as yoghurt and cheese.

Our field study targeted camel milk traders and transporters within Isiolo Town who dealt with pastoral camel milk. Camel milk production in Isiolo County has been grouped into production clusters based on the amount of milk produced: the Mlango-Ngarentare-Burat Cluster in Central Isiolo; the Kulamawe Cluster in Kinna and two minor clusters of Modogashe-Eldera in Sericho and Boji-Galfarsa-Malkadaka Cluster in Garbatulla (Musinga *et al.* 2008). Our study focuses on camel milk that enters Isiolo Town for marketing. Because the bulk of camel milk traded in Isiolo Town originates from Isiolo Central and Kulamawe clusters, our focus was on camel milk from these two production clusters.

Camel milk in Isiolo Town is handled by individual traders and marketing groups. There are three camel milk marketing groups in the town:

- Anolei Camel Milk Marketing Cooperative Society
- Tawakal Self-Help Women's Group
- Defee Self-Help Women's Group.

They all provide cooling facilities, market information, training and credit facilities and most importantly, bargaining power over the sale price of camel milk to the terminal market in Nairobi.

2.2 Data collection

Data collection took place between December 2013 and February 2014. We used semi-structured questionnaires to collect data from 43 available members of Anolei Camel Milk Marketing Cooperative Society. The group has a total of 63 members, who all operate individually despite belonging to a group. We used key informant interviews with five members from both the Tawakal and Defee Self-Help Women's Groups – the chair, the treasurer and three members.

We also collected data from all the businesses in Isiolo Town dealing with camel milk, including three restaurants and three camel milk bars, and used key informant interviews to collect data from the town's camel milk vendors. Interviews focused on:

- the source of the milk traded
- quantity of camel milk handled and its price by season
- number employees and their dependants
- number of traders' dependants
- contribution of the camel milk business to the traders' and employees' income, and
- contribution to Isiolo Town Council revenue through trading licenses and health permits.

Trained enumerators, who spoke Somali and Borana, helped collect the data. The terms used in data collection are explained in the glossary at the start of the report.

Camel milk from Isiolo Central and Kulamawe production clusters is mostly transported to Isiolo Town in four-wheel trucks, refrigerated mini-trucks and motorcycles. It is then transported to the terminal market in Nairobi daily on commuter buses. We purposively sampled 25 transporters and interviewed those who were willing to participate in interviews. These included five truckers and 16 motorcycle riders bringing camel milk into Isiolo Town from the production areas and four drivers of passenger buses transporting camel milk from Isiolo Town to Nairobi. We collected data on:

- the quantity of camel milk transported by each vehicle by season
- the charges for transporting a litre of camel milk
- sources of the camel milk transported
- number of people employed by the transporters
- contribution of the camel milk business to vehicle owners' and employees' income, and
- number of dependants of vehicle owners and employees.

We also conducted key informant interviews and focus group discussions with the relevant stakeholders in Isiolo County to collect data on:

- the sources of camel milk sold in Isiolo Town
- the volumes of camel milk traded by season
- the number of camel milk actors by gender in Isiolo Town, and
- fees collected through trading license and health permits.

Interviewees included the county revenue, trade licensing, livestock production and marketing officers. We also collected secondary data from the county's revenue office on revenue collected from camel milk traders within Isiolo Town for trading licenses and health permits.

2.3 Profitability analysis, Tawakal marketing group

Out of the three marketing groups in Isiolo Town, we only analysed the profitability of the Tawakal camel milk marketing group because it was the only one which had reliable data on the price of camel milk and cost of sales. The Tawakal camel milk marketing group buys milk directly from producers and sells it at the terminal market in Nairobi as a group. It only deals in camel milk, unlike the Defee group, which also deals in cow milk.

Although the Defee group has an average monthly gross income of KSh216,375 from camel milk, it was impossible to separate their sales costs from cow milk costs. Selling cow milk is Defee's primary enterprise, earning them about KSh547,500 a month selling 200 litres of cow milk a day fresh, fermented and in yoghurt form. The camel milk trade contributes only 28.3 per cent to the Defee group's total gross monthly income. In light of this, we did not attempt to calculate the gross profit margin ratio of their camel milk enterprise.

To assess the profitability of the camel milk trade for members of the Tawakal marketing group, we used the gross profit margin ratio approach. We used the two formulas below to calculate the percent of the selling price that is profit and to compare the gross profit margin ratios of the individual camel milk bulkers, and those of the Tawakal marketing group.

$$GPM = (TR - CS)/TR \quad \text{Equation 1}$$

TR = total revenue, or selling price

CS = cost of sales

GPM = gross profit margin

So, the total selling price minus the cost of sale divided by the selling price gives us the gross profit margin.

$$GPMR = (TR - CS)/TR * 100\% \quad \text{Equation 2}$$

The gross profit margin ratio (GPMR) is the percentage of the selling price that is profit. It is a good indicator of the financial health of a business and it must be high enough to cover costs and provide for profit. The cost of goods sold (CS) is the price of the goods, including inventory of raw materials and labour used in production, but it does not include selling or administrative expenses (Zions Business Resource Center 2011, Holland 1998).

Findings

3

3.1 Characterisation of camel milk channels and actors involved

3.1.1 Camel milk marketing groups in Isiolo Town

The bulk of camel milk in Isiolo Town is marketed through three main camel milk marketing groups.

Anolei Camel Milk Marketing Cooperative

Society: Registered in 2010, this group had an active membership of 43 traders at the time of our study, mostly Somali women from the Garre and Ajouran clans. Despite belonging to the group, members operate individually, buying milk from camel milk producers in Kulamawe, Mulango, Kachuru, Gibsing, Burat I and Burat II villages. Some also deal with camel milk from their own family herds, which contribute a daily average of five litres in the dry season and 10 litres in the wet. The group retails through their milk bar in Isiolo Town, selling 10–15 litres of fresh camel milk and yoghurt daily, depending on the season. They also sell a daily average of 83 litres per trader in the dry season and 110 in the wet season to Nairobi's Eastleigh area.

Defee Self-Help Women's Group: Formed in July 2013, it has 15 active members at the time of our study: 12 women and three men. Since its inception, the group has sold cow milk from Maua Town in Meru County at retail and wholesale to residents in Isiolo Town. In November 2013, the group ventured into selling camel milk as well, a move they attributed to the growing demand for camel milk in the Nairobi terminal market. All the members are traders, not producers. They buy milk from camel milk producers in Isiolo Central cluster. The group owns a camel milk bar in Isiolo Town, which retails 5–10 litres of camel milk (yoghurt and fresh) daily in the dry and wet seasons, respectively. They also sell a daily average of 65 litres of camel milk in the dry season and 120 litres in the wet season to the Nairobi terminal market. For all members of this group, the cow and camel milk business is their sole source of income. As well as earning an income from camel milk sales, group members are caregivers to orphans and vulnerable children. The group also supports people living with HIV and AIDS, and have made it easier for them to access camel milk and camel milk products to improve their nutritional status.

Tawakal Self-Help Women's Group: Formed in 1992, this group had 25 female and one male members at the time of study. Of these, only four are camel keepers, selling about two litres of camel milk a day to the group. The group also buys camel milk from other producers in Shaab, Mlango and Kulamawe villages, which they sell at retail in Isiolo Town and at wholesale in Nairobi. Even though the group owns a 500-litre capacity cooler, it only handles 120–200 litres of camel milk a day in the dry and wet seasons, respectively. They sell around 10–20 litres in Isiolo Town in fresh and yoghurt form, and the rest to Nairobi camel milk retailers and wholesalers. The group also provides camel milk storage and cooling services for non-member traders at a fee of KSh50 per 20 litres, per night.

Retailers in Isiolo Town include camel milk bars, vendors and restaurants. There are three camel milk bars owned by the camel milk marketing groups, each selling about 10 litres of camel milk a day in the dry season and 15 litres daily in the wet. They sell fresh milk, sour milk and yoghurt. To supplement their income from the camel milk trade, traders also operate other businesses selling bottled water, potato fries and fruit juice in the milk bars. Together, the restaurants, vendors and camel milk in Isiolo Town sell an average of 280 litres of camel milk a day in the dry and 530 litres in the wet seasons.

The camel milk vendors are women who purchase milk either from the producers or through bulkers and sell it in the markets or the streets of Isiolo Town. They usually sell fresh camel milk, but in the dry seasons when demand is higher, they also sell sour camel milk called *suusa* in the Borana language. At the time of the study there were 22 women vendors in Isiolo Town, half of whom sold camel milk during the day and the other half in the evening and at night. The women each sold 10 litres of camel milk a day in the dry season and 20 litres in the wet, as well as cow milk. Although they operate their businesses individually, the vendors have a rotating financial savings scheme to help the vendor(s) with the most financial need at any particular time. They sell fresh camel milk for KSh90 a litre in the wet season and KSh100 in the dry.

There were three restaurants selling camel milk to the consumers in Isiolo Town at the time of our study: Madiba, Classique and Baretum food court. The restaurants buy camel milk from individual bulkers in Isiolo Town every day, selling 10–20 litres a day, fresh, sour or in tea. They sell fresh camel milk for KSh120 a litre; a cup of tea made with camel milk costs KSh50, compared to KSh30 for a cup of tea made with cow milk.

3.1.2 Camel milk trade actors

Our survey respondents came from villages in Isiolo West (15.9 per cent) and Isiolo Central (84.1 per cent). The uptake of camel milk production near Isiolo Town due to easy access to market has led to an increase in the number of traders who come from the surrounding locations and villages.

Bulkers and retailers

Even though camels are mainly owned by men in pastoral communities, we found that pastoral women play a dominant role in marketing the camel milk in Isiolo Town, both as bulkers and retailers. Of the 63 respondents, 95 per cent were female, 78 per cent were aged 30–60 and 22 per cent were 30 or younger. Most had not received formal education through the school system; access to paid employment is difficult for them, particularly in the formal sector, and for those who are single or widowed. We also asked respondents to indicate their household size: 53.9 per cent had 6–10 members and 33.3 per cent had less than five members.

Seventy six per cent of the traders we interviewed were bulkers who buy camel milk from village collectors or producers and sell it wholesale to traders in the terminal market in Nairobi. These traders only deal in raw milk, which they cool overnight before transporting to Nairobi. Sixteen per cent were retailers buying camel milk from bulkers or producers and selling it to the consumers in Isiolo Town. These traders deal with fresh camel milk, sour milk and yoghurt. Businesses retailing camel milk include camel milk bars, restaurants and vendors. A small proportion of traders are both producers and bulkers or bulkers and retailers.

Transporters

All 25 respondents live in Isiolo Central and transport camel milk into Isiolo Town by truck or motorcycle and/or to the terminal market in Nairobi by passenger bus. All the transporters we interviewed were male; 68 per cent were aged 30 or younger and mainly used motorbikes, 32 per cent were aged 30–60 years and mainly used trucks and passenger buses. Of the 25 respondents, 15 had a household size of three or less members. These were made up mainly of the younger motorbike transporters whose household as composed of father, mother and one child. Transporters using trucks and passenger buses tended to have more children and their households had four to six members.

3.1.3 Camel milk supply sources and marketing channels

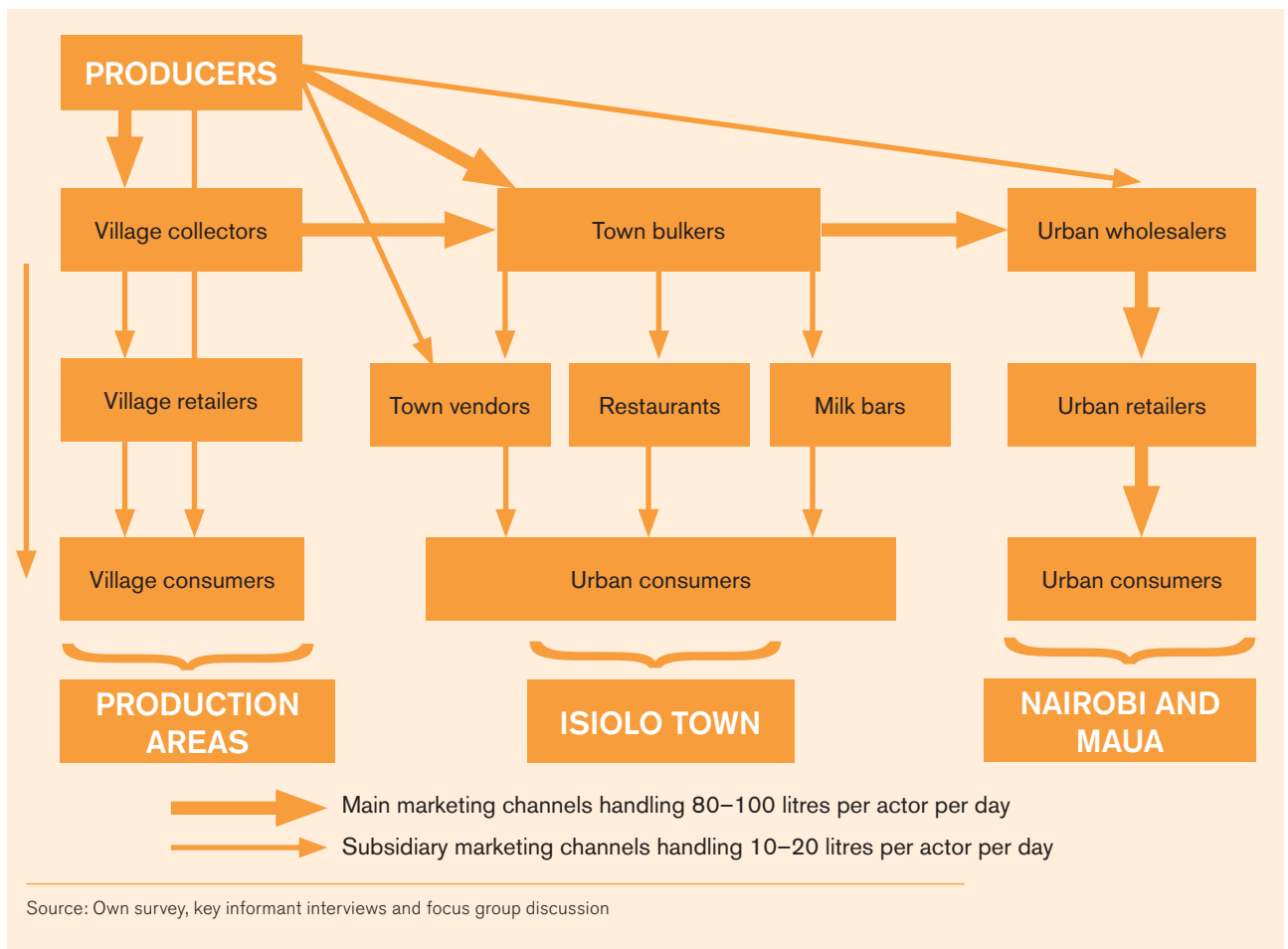
Camel milk from Kulamawe Cluster is traded to Isiolo Town through one major channel: the Kulamawe Self-Help Women's Group, which acts as village collector, buying camel milk from producers in Kulamawe and Yaqbarsadhi. The group boils the camel milk and packages it in 3, 5 and 10 litre smoked plastic containers, to enhance its taste and shelf life, and then transported to Isiolo Town market, mainly using trucks in transit from Wajir Town. With 19 women members, the group handles and sends about 300 litres a day to Isiolo Town in the dry seasons and 800 litres a day in the wet. With a total camel population of 6,000 largely Somali breeds, the Kulamawe Cluster could contribute more camel milk to the market in Isiolo Town. However, the long distance to the town coupled with the poor road network deters camel owners from producing milk for the market.

With a camel population of about 9,400, Isiolo Central Cluster contributes the bulk of camel milk traded in Isiolo Town. A large number of camel milk herds are grazed some 10–30 kilometres from Isiolo Town, especially during dry season, for easy access to the Isiolo camel milk market. Traders within Isiolo Town purchased directly from camel milk producers or through village collectors, an interaction that depends strongly on family and clan relations. Transporters move the camel milk daily from these areas to Isiolo Town by four-wheel truck and motorcycle. According to the transporters we interviewed, about 7,900 litres of camel milk is traded daily in Isiolo Town from Isiolo Central Cluster in the wet season and 4,300 litres in the dry.

Along the major marketing channels, the bulk of camel milk is traded as raw milk. The traders' major value-adding activity is transferring the milk from one location to another.

We can group the camel milk trade into three major interlinked segments (see Figure 1):

Figure 1. Camel milk marketing channels in Isiolo County



Village level: Village consumers get raw milk directly from camel keepers or through village retailers who buy from the camel milk producers. Most consumers who buy camel milk from village retailers are non-pastoralists employed as civil servants, including administration police, teachers and nurses.

In Isiolo Town: Retailers and wholesalers/bulkers sell camel milk here fresh, sour, as camel milk tea and as camel milk yoghurt. Bulklers include individual women traders and women’s marketing groups who buy milk directly from producers or through village collectors, mainly to sell in the Nairobi terminal market. Because camel milk usually reaches Isiolo Town by noon, bulklers cool the raw milk overnight to increase its shelf life before transporting it to Nairobi the following morning using commuter buses. They cool the milk in the cooling hubs that are owned by the marketing groups or individuals. The cooling hubs include rooms or halls fitted with deep freezers or coolers with different capacities. There are seven cooling hubs in Isiolo Town, three of which were owned by marketing groups.

Nairobi’s Eastleigh area: Wholesalers and retailers here buy camel milk from different sources including Isiolo County. At the time of our study, camel milk from Isiolo accounted for about 70 per cent of the camel milk traded here (as observed by Musinga *et al.* 2008). The camel milk bulklers we interviewed in Isiolo Town sell a daily average of 3,422 litres of camel milk to the Nairobi terminal market in the dry season and 4,532 litres in the wet. The business relationship between bulklers in Isiolo Town and traders at the terminal market depends on trust, as money is usually sent two to three days after delivery via mobile money transfer. Therefore, like the relationship between camel milk producers and bulklers, these are also deep rooted in clan and family relations.

Our study noted that a new market is emerging in Maua Town in neighbouring Meru County due to the gradual settlement of the Somali ethnic community, who are known to prefer camel milk. At the time of study, about 300 litres of camel milk were being transported to this market daily.

3.2 Volume, value and income generation

3.2.1 Volume and price of camel milk traded in Isiolo Town

Of the total volume of camel milk that enters Isiolo Town from Isiolo Central and Kulamawe production clusters, camel milk traders and businesses within Isiolo Town handle an average of 3,702 litres daily in the dry season and 5,062 litres in the wet. Camel milk producers also

sell their milk directly to traders in the terminal market in Nairobi.

Camel milk traders in Isiolo Town sell at retail in Isiolo Town and at wholesale to the Nairobi market. Only about 10 per cent is retailed in Isiolo Town (see Table 1). The bulk of the camel milk (90 per cent) is sold wholesale at the Nairobi market (see Table 2).

Table 3 shows how the price of camel milk also fluctuates by season. Buying prices in the dry season are around 37 per cent higher among bulkers/wholesalers and around 17 per cent higher among retailers. Generally, bulkers pay less for camel milk than

Table 1. Average daily retail camel milk sales in Isiolo Town, December 2013–February 2014

CATEGORY OF RETAIL BUSINESS	NUMBER OF BUSINESSES	AVERAGE DAILY SALES PER BUSINESS/TRADER (LITRES)		OVERALL AVERAGE DAILY SALES (LITRES)	
		WET SEASON	DRY SEASON	WET SEASON	DRY SEASON
Camel milk bars	3	15	10	45	30
Restaurants	3	15	10	45	30
Vendors	22	20	10	440	220
Total	28	50	30	530	280

Source: Own survey, interviews

Table 2. Average daily wholesale camel milk sale to Nairobi, December 2013–February 2014

NAME OF WHOLESALE BUSINESS	AVERAGE DAILY SALES PER BUSINESS (LITRES)	
	WET SEASON	DRY SEASON
Anolei cooperative	4,212	3,237
Tawakal marketing group	200	120
Defee marketing group	120	65
Total	4,532	3,422

Source: Author's calculation and key informant interviews

Table 3. Average buying and selling prices per litre

CATEGORY OF TRADER	AVERAGE BUYING PRICE (KSH/ LITRE)		AVERAGE SELLING PRICE (KSH/ LITRE)	
	DRY SEASON	WET SEASON	DRY SEASON	WET SEASON
Bulkers	67	49	89	72
Retailers	69	56	103	87

Source: Author's calculation and interviews

Table 4. Camel milk transported daily, by season

TOTAL AVERAGE VOLUME OF CAMEL MILK TRANSPORTED DAILY TO ISIOLO TOWN (LITRES)		TOTAL AVERAGE VOLUME OF CAMEL MILK TRANSPORTED AWAY FROM ISIOLO TOWN DAILY BY COMMUTER BUS (LITRES)	
DRY SEASON	WET SEASON	DRY SEASON	WET SEASON
4,928	6,660	5,120	5,920

Source: Author's calculation and key informant interviews

retailers, because they tend to source it directly from the producers rather than traders.

3.2.2 Volume of camel milk transported

There were 28 transporters bring camel milk from Kulamawe and Isiolo Central production clusters to Isiolo Town at the time of our study. Most (20) travelled by motorbike and eight had trucks. The 25 transporters we interviewed transport a daily average of 4,928 litres to Isiolo Town in the dry season and 6,660 litres a day in the wet. Motorbikes are particularly helpful in the wet season, when some of the production areas are rendered nearly impassable. Motorbikes transport about 26 per cent of all the milk transported in either season. The bulk of the camel milk is transported by truck.

Individual interviews revealed different load capacities for the motorcycles used in transporting camel milk, with some carrying as much as 200 litres per trip and others only 65. On average, motorcyclists transport 83 litres in the dry season and 110 litres in the wet. All the motorbike owners we interviewed also drive them; none have employees. The motorbikes transport camel

milk from production areas within 10–20 kilometres of Isiolo Town, and transportation charges vary by distance covered. As well as camel milk, motorbike drivers transport passengers within and around Isiolo Town.

About eight transporters use trucks with a capacity of 1.5–2 tonnes to transport camel milk to Isiolo Town. Some of the trucks are refrigerated, which helps lengthen the milk's shelf life. Most of the trucks transport about 800 litres in the dry season and 1,000 litres in the wet. They work along four main routes, with two trucks alternating daily. Most truck owners are also producers and traders. They charge KSh8 a litre and also transport passengers and other goods, including goats, for a fee.

Four Nairobi-bound passenger buses transport camel milk from Isiolo Town daily, carrying about 1,280 litres of camel milk a day in the dry season and 1,480 litres a day in the wet. The buses usually leave around 5am, so the milk reaches the terminal market by mid-morning. The milk is normally packed in 20-litre plastic containers, and each container is charged at KSh100. Each bus employs a driver, a loader, a conductor and a clerk.

3.2.3 Income of camel milk traders and transporters

Camel milk traders

All the traders we interviewed earned a total combined monthly gross income of KSh10 million in Isiolo Town in the dry season and KSh11.1 million in the wet, giving an average monthly gross turnover of 10.58 million (Table 5). Bulklers selling camel milk to the Nairobi terminal market earn about 89 per cent of the total. Individually, camel milk bulklers from Anolei group earn an average gross monthly income of about KSh200,995 in the dry season and KSh211,579 in the wet.

The costs of sales they incur include purchasing the camel milk, transportation, cooling, labour and repackaging (Murenzi 2003). Each trader pays the owners of the cooling hubs an average of KSh4,000 on

a monthly basis, to cover rent, electricity, security and water. Before camel milk is put in the cooler/freezers, it is transferred from the plastic containers to 2-litre plastic bags. A packet of 200 plastic bags costs KSh100, so each plastic bag costs KSh0.5. Transport costs to Nairobi using commuter buses were KSh100 per 20 litres and traders spend KSh50 a day on communication costs. We used these figures to calculate the average cost of sales per month, which we converted to a cost per litre by dividing the average total cost per month for each season by the quantity of camel milk traded. Table 6 shows a breakdown of costs.

We calculated the gross margin profit ratio for individual bulklers in Isiolo Town as 16.4 per cent during the dry season, rising to 21.3 per cent in the wet (see Table 7). The 4.9 per cent increase during the wet season could be attributed to the 32.5 percent increase in the volume of camel milk traded and a 26.8 per cent decrease in

Table 5. Gross combined incomes, camel milk traders

CATEGORY OF ACTOR	OVERALL AVERAGE DAILY GROSS INCOME (KSH)		OVERALL AVERAGE MONTHLY GROSS INCOME (KSH)	
	DRY SEASON	WET SEASON	DRY SEASON	WET SEASON
Camel milk bulklers	304,558	326,304	9,136,740	9,789,120
Camel milk retailers	28,840	46,110	865,200	1,383,300
Total	333,398	372,414	10,001,940	11,172,420
Average	352,906		10,587,180	

Source: Author's calculation and interviews

Table 6. Estimated monthly costs, camel milk bulklers, December 2013–February 2014

AVERAGE MONTHLY COSTS (KSH)	DRY SEASON	WET SEASON
Purchasing camel milk	163,842	161,040
Transportation	12,450	16,500
Rent	4,000	4,000
Labour	3,000	3,000
Repackaging for cooling	622.50	825
Telephone	1,500	1,500
Total costs of sales	185,414.50	186,865
Average monthly camel milk trade (litres)	2,490	3,300
Cost per litre (KSh/litre)	74.40	56.60

Source: Author's calculation and key informant interviews

the purchase price. For 80 per cent of the camel milk bulkers we interviewed, the camel milk business is their sole source of income. The other 20 per cent had other sources of income, such as selling of dried camel meat, locally known as *nyirnyir*, in Nairobi's Eastleigh area.

The Tawakal marketing group own a cooler that was donated to them. The cost of maintaining the cooler averages about KSh3,000 a month. The other costs incurred by the group include purchasing camel milk, transportation, labour, water, electricity and repackaging.

Table 7. Gross profit margin ratio, individual camel milk bulkers

ATTRIBUTE	DRY SEASON	WET SEASON
Average monthly camel milk traded (litres)	2,499	3,300
Average selling price per litre (KSh)	89	72
Average total monthly revenue* (KSh)	222,411	237,600
Average cost per litre (KSh)	74.40	56.60
Average total monthly cost of sales** (KSh)	185,925.60	186,780
TR less CS	36,485.40	50,820
Gross profit margin (TR less CS/TR)	0.164	0.213
Gross profit margin ratio (TR less CS/TR)*100	16.4	21.3

Notes: *TR = total monthly revenue; **CS = cost of sales
Source: Author's calculation and interviews

Table 8. Cost of sales, Tawakal marketing group

AVERAGE MONTHLY COSTS	DRY SEASON (KSH)	WET SEASON (KSH)
Purchasing camel milk	163,842	161,040
Transportation	18,000	30,000
Rent	10,000	4,000
Labour	3,000	3,000
Repackaging for cooling	900	1,500
Telephone	1,500	1,500
Electricity	3,000	3,000
Water	3,000	3,000
Cooling	3,000	3,000
Total sales costs	206,242	210,040
Average monthly camel milk trade (litres)	3,600	6,000
Average cost per litre	57.20	35.00

Source: Author's calculation and interviews

We calculated the average cost of sales per month per litre by dividing the average total cost per month for each season by the quantity of camel milk traded (see Table 9). This calculation shows that the Tawakal group's gross monthly income is KSh320,400 in the dry season and KSh432,000 in the wet. Their group's gross profit margin ratio is 53.4 per cent in the dry season and 40.3 per cent in the wet. The average gross profit margin ratio is 46.9 per cent, compared to 18.6 per cent for individual bulkers (Table 7). The group's other income includes KSh20,000 a month from two business rental houses it owns and about KSh3,000 a month in storage and cooling fees from non-member traders.

Camel milk transporters

The owners of the buses that transport camel milk to Nairobi earn an average gross monthly income of KSh2.157 million. They are renowned businessmen in Isiolo Town and all own other businesses within the town, such as hotels, gas stations, hardware and clothes stores. Camel milk transportation contributes about 10 per cent of the total gross income that they earn from the transportation business.

Table 9. Gross profit margin ratio, Tawakal marketing group

ATTRIBUTE	DRY SEASON	WET SEASON
Average monthly camel milk traded (litres)	3,600	6,000
Average selling price per litre (KSh)	89	72
Average total monthly revenue (KSh)*	320,400	432,000
Average cost per litre (KSh)	57.2	35.00
Average total monthly costs of sales (KSh)**	205,920	210,000
TR less CS (KSh)	114,480	222,000
Gross profit margin (TR less CS/TR)	0.357	0.513
Gross profit margin ratio (TR less CS/TR)*100	35.7	51.3

Notes: *TR = total monthly revenue; **CS = cost of sales
Source: Author's calculation and interviews

Table 10. Total gross monthly income, camel milk transporters

TRANSPORTATION ROUTE	AVERAGE MONTHLY GROSS INCOME (KSH) BY TYPE OF GOODS TRANSPORTED			TOTAL GROSS MONTHLY INCOME (KSH)
	CAMEL MILK	PASSENGERS	OTHER GOODS	
To Isiolo Town	365,475	70,500	400	436,375
To Nairobi	207,000	2,020,500		2,227,500
Total	572,475	2,091,000	400	2,663,875

Source: Author's calculations

Motorbike owners earn an average of KSh415 a day transporting camel milk during the dry season and KSh550 a day in the wet. This translates to a monthly gross income of KSh12,450 (dry season) and KSh16,500 (wet). Motorbike owners also earn an average of KSh600 a day from transporting people, or KSh30,450 a month. Transporting camel milk earns them around 45 per cent of their total gross monthly income.

Truck owners who transport goods to Wajir along the Kulamawe route earn an average of KSh3,000 a day from transporting camel milk to Isiolo Town on their return trips, or an average total gross monthly income of KSh72,000 during the dry season and KSh90,000 in the wet. On average, they also earn KSh52,900 a month from transporting people and other goods. Camel milk transport contributes 60 per cent of their gross monthly income. Four of the truck owners we interviewed said that transporting camel milk is their only source of income; the others were involved in other businesses such as camel milk production.

Table 11 summarises the costs incurred by camel milk transporters, including fuel and repairs, labour, insurance and loan repayments.

3.3 Contribution of camel milk to Isiolo's economy and society

3.3.1 Income and dependants

Our study found that the camel milk trade in Isiolo Town is a source of employment for 103 traders operating individually or as marketing groups. Most of the traders are women. In female-headed households, women use the income from their trade to buy food and medicine, pay school fees for the children, pay rent and to save capital for petty trade. In male-headed households, the women mainly use the income to improve the household's day-to-day living standards through food purchases, while the men take care of the expenses of rent and school fees.

The majority of the women involved in the camel milk trade belong to an informal savings scheme that provides financial help when emergency needs such as sickness arise in their households. So their participation in the camel milk trade and finance system not only helps them accumulate capital, but also allows them to access and contribute to a survival strategy in response

Table 11. Monthly expenses, truck and motorbike transporters

TYPE OF TRANSPORTER	LABOUR COSTS PER MONTH PER TRANSPORTER (KSH)	MONTHLY COST OF FUEL AND REPAIRS PER TRANSPORTER (KSH)	MONTHLY INSURANCE AND LOAN REPAYMENTS PER TRANSPORTER (KSH)	MONTHLY COST OF PERMITS/TAXES/LEVY PER TRANSPORTER (KSH)	TOTAL MONTHLY EXPENSES (KSH)
Truck	29,250	53,750	5,000	0	88,000
Motorcycle	0	2,000	1,000	0	3,000
Total	29,250	55,750	6,000	0	91,000

Source: Author's calculations

to economic hardships. This income and financial security is vital for their households' day-to-day living

"I have been in the camel milk business for 15 years now. I sell camel milk in Isiolo Town and it is through the income I get from this business that I have been able to feed and educate my family. Selling camel milk in the town daily, I have been able to get money that has helped me put my children through school. Currently I have four children in secondary school and the rest in primary school. I plan to educate all my children up to the secondary level using the money I get from this business." Mama Seina, camel milk vendor in Isiolo Town

The camel milk traders we interviewed employ a total of 31 labourers, mainly young men aged 30 years and below, who transport camel milk to the cooling hubs and to the bus park for Nairobi-bound passenger buses. For the labourers we interviewed, this employment is

their chief source of income. The traders we interviewed support a total of 606 dependants (see Table 12).

Each truck owner employs one driver and one conductor, and pays a clerk stationed at the bus park to record all the trucks that bring in camel milk and the quantity of camel milk per trader, to facilitate payment. The four commuter buses transporting camel milk to Nairobi employ a total of four drivers, four conductors, four loaders and four clerks. All of the employees we interviewed said that this employment is their sole source of income. But the camel milk transporters are involved in other businesses, including transporting passengers and other goods. Employees of camel milk transporters earn a total daily income of KSh33,500 (see Table 13). In total there are 268 transport owners, employees and dependants (see Table 14).

The earnings of the camel milk trade and transportation business actors we interviewed support a total of 1,046 people in the town (see Table 15).

Table 12. Number of camel milk traders, labourers and dependants

TRADER CATEGORY	NUMBER OF TRADERS INTERVIEWED	NUMBER OF LABOURERS	NUMBER OF DEPENDANTS (TRADERS)	NUMBER OF DEPENDANTS (LABOURERS)
Camel milk bulkers and milk bars	90	12	517	18
Vendors	10	0	80	0
Restaurants	3	19	9	20
Total	103	31	606	38
Subtotal		134		644
GRAND TOTAL			778	

Source: Author's calculation and interviews

Table 13. Daily incomes, camel milk transporter employees

TYPE OF EMPLOYEE	NUMBER	DAILY WAGES (KSH)	TOTAL DAILY WAGES(KSH)
Drivers	7	1,000	7,000
Conductors	4	5,000	20,000
Loaders	7	500	3,500
Clerks	6	500	3,000
Total	24	7,000	33,500

Source: Author's calculation and key informant interviews

Table 14. Number of camel milk transport owners, employees and dependants

CATEGORY OF TRANSPORTER	NUMBER OF OWNERS	TOTAL NUMBER OF EMPLOYEES	DEPENDANTS (OWNER)	DEPENDANTS (EMPLOYEES)
Transporters to Isiolo Town	23	16	69	80
Transporter to terminal market in Nairobi	4	16	12	48
Total	27	32	81	128
GRAND TOTAL	268			

Source: Authors calculation and key informant interviews

Table 15. Total number of traders, transporters and dependants

CATEGORY OF ACTOR	NUMBER OF ACTORS INTERVIEWED	NUMBER OF EMPLOYEES/ LABOURERS	DEPENDANTS (ACTORS)	DEPENDANTS (EMPLOYEES)
Traders	103	31	606	38
Transporters	27	32	81	128
Total	130	63	618	86
GRAND TOTAL	1,046			

Source: Author's calculation and key informant interviews

3.3.2 Revenue to Isiolo County Council from the camel milk trade

In 2013, Isiolo Town Council only collected KSh17,950 in revenue from camel milk trade bulkers and transporters. The only traders who paid the trading license and health permit fees were the three marketing groups. Of four cooling hubs that are not owned by marketing groups operated without required licenses and permits. Only one transporter paid the KSh7,000 licence fee.

Each trading license costs KSh1,750 for traders and KSh7,000 for transporters. The health permit fee for premises dealing with camel milk is KSh400 a year, and the health permit fee for individuals dealing with camel milk costs KSh500–1,000 twice a year, subject to the number of medical tests to be carried out per trader. Although camel milk is not currently taxed in Isiolo Town, the county has plans to introduce a tax on traders at a rate of 20 litres per 1,000 litres of milk traded (see Table 17). To implement this tax, the council will need to involve the stakeholders, especially the camel milk producers and traders who believe that camel milk, as a source of their livelihood, should not be taxed

Table 16. Revenue raised from camel milk trade, Isiolo Town 2013

CAMEL MILK BUSINESSES CURRENTLY CONTRIBUTING TO REVENUE	NUMBER OF BUSINESSES/ TRADERS	TRADING LICENSE (KSH/YEAR)	HEALTH PERMIT (PREMISES) (KSH/YEAR)	HEALTH PERMIT (INDIVIDUAL) (KSH/YEAR)	TOTAL
Cooling hubs	3	5,250	1,200	4,500	10,950
Camel milk transporter	1	7,000	0	0	7,000
Total		12,250	1,200	4,500	17,950

Source: Author's calculation and interviews

Table 17. Potential annual revenue from camel milk trade, Isiolo Town

BUSINESSES/ TRADERS CURRENTLY CONTRIBUTING TO REVENUE	NUMBER OF BUSINESSES/ TRADERS	TRADING LICENSE (KSH/YEAR)	HEALTH PERMIT (PREMISES) (KSH/YEAR)	HEALTH PERMIT (INDIVIDUAL) (KSH/YEAR)	PROPOSED CAMEL MILK TAX	TOTAL (KSH)
Cooling hubs	7	12,250	2,800	10,500	2,539,807	2,565,357
Camel milk transporters	7	49,000	0	0	0	49,000
Traders	103	0	0	154,500	0	154,500
Total		61,250	2,800	154,500	2,539,807	2,768,857

Notes: Figures are based on 2013 Isiolo County annual fees for trade licenses and health permits. The proposed camel milk tax figures are based on average daily trade 1,000 litres a day) and average selling price among bulkers (KSh 80.5) who sell most of the milk.

Source. Authors calculation and key informant interviews

Discussion

4

Our observation that most camel milk traders in Isiolo Town are women confirms previous studies (Musinga *et al.* 2008, Anderson *et al.* 2010). The camel milk trade provides opportunities to unskilled women who might not be able to compete for waged employment in peri-urban and urban areas. The participation of the women traders is important to their households, as the income they earned from the trade is used to buy food, pay school fees, settle medical fees and meet other household expenses. Their participation in the trade accumulates capital, diversifies household income away from dependence on livestock production and helps them gain access to savings and credit.

Our findings indicate that Isiolo County already accrues significant revenue from the camel milk trade through Isiolo Town, but this could increase still further. Camel milk itself is not taxed. Public revenue from the trade is limited to trading license and health permit fees. Collection of this revenue is not efficient because the camel milk trade is mostly informal, and the authorities do not know the exact number of actors and businesses dealing with camel milk. Many traders and the pastoralist communities who depend on them are likely to view taxation of the source of their livelihoods as a cultural taboo. As a result, extracting taxes, trading license fees and health permit fees could be controversial. So, even if the local authorities are aware of the sector, they have done little to regulate it.

The ongoing formalisation of the camel milk trade through the marketing groups could play a pivotal role in creating an avenue for camel milk taxation and the collection of other levies such as trading licenses and health permits. The groups have to be registered and are legally required to comply with business rules, including payment of fees for trading licenses and public health permits. Donors expect the groups to provide a springboard to an organised and more profitable camel milk marketing structure, enabling women traders to pool their limited resources to achieve both social empowerment and economic independence.

As well as increasing revenue collection, these groups provide scope for the local authorities and other organisations to invest more in camel milk value addition and hygiene to further support the development of the sub sector. Furthermore, our analysis of gross margin profit ratios generated by the marketing groups demonstrate that they can secure more profits for their members than they would get trading as individual bulkers. This would appear to suggest that the formalising through marketing groups is a win-win strategy, where both the authorities and traders can benefit.

It has been suggested that the growth and formalisation of the camel milk trade could have unintended consequences, with increasing profits attracting more skilled and educated participants who could squeeze out the marginalised women who established it (Anderson *et al.* 2010). It is important also to consider that the increasing power of the marketing groups could represent a potential threat to the individual traders who transport volumes of 20 litres or less to Nairobi. Village collectors and camel milk producers prefer to sell their milk to the marketing groups because they can also provide training and financial services to producers.

When this dominance by the marketing groups is coupled with poor trickling down of market information on prices, camel milk producers and village collectors have minimal control over their selling price and become price takers. This situation underlines the importance of marketing information in the value chain, and highlights an opportunity for organisations such as KLMC and the KCA to disseminate market information to producers and traders.

In the formalisation process, there is an opportunity and a need for the local authorities to engage with all the actors and ensure that any further formalisation creates benefits for everyone involved – including the most vulnerable – rather than squeezing them out of the business. To ensure that efforts to achieve the subsector's economic potential are strategically made, the authorities are developing a camel milk trade policy that will help to address outstanding issues including camel milk hygiene and value addition, which could draw on the findings of this study.

Conclusions

5

This study has shown the economic contribution of the camel milk trade to Isiolo Town in terms of employment, household income and contributions to public revenue. For most traders and labourers in the camel milk trade, this is their household's main source of income and supports them, their spouses, children and close and distant relatives. A total of 1,046 people depend on the camel milk trade in Isiolo. Many also depend on camel milk for health and nutrition and on milk production for income.

The camel milk trade creates a monthly gross turnover of up to KSh10.58 million, and this study highlights scope to increase this figure further. About 94 per cent of this was due to the demand for camel milk in the Nairobi terminal market. This demand for hygienically produced camel milk in urban areas outstrips supply and is likely to continue to grow. This underlines the importance of the camel milk trade in Isiolo Town as a potential driver of economic development in the county. Formalising the camel milk trade through marketing groups is already increasing income generated for traders and public revenues alike. As the county continues to develop the camel milk subsector, there is a need for care to ensure that it continues to deliver more and better benefits to the most vulnerable as well as to the economy of the county and the nation.

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Appendices

Appendix 1. Questionnaire used to collect data from camel milk traders in Isiolo Town

Introduction

Good morning/afternoon. My Name is Margaret Mwaura Waithera, a student at the University of Nairobi, Range Management section. The University of Nairobi and International Institute for Environment and Development, in collaboration with the Arid and Semi-Arid Lands Secretariat, formerly under the Ministry for Development of Northern Kenya and other Arid Lands, are jointly undertaking a pilot study to value various components of pastoralism in Isiolo County.

Purpose of this study

This study is part of the demand-driven pilot research aimed at revealing the real value of pastoralism following earlier consultation with stakeholders in Isiolo County. The aim of the study is to generate location-specific and evidence-based data on the contribution made by marketing camel milk from pastoral system to the economy of Isiolo Town in order to guide the decisions of the newly created Isiolo government on resource allocation and livestock development interventions.

I therefore request to have a discussion and ask you some questions. We want to establish the camel milk marketing channels in the county by finding out the actors involved in the trade at different levels by gender, volume and price of camel milk at the different nodes by season, the mode of transport used at different levels, value addition practices by gender, and the proportion of household income and revenue to the county council that camel milk trade contributes. We would also like to determine the factors that affect camel milk production and marketing in the study area, as perceived by the pastoral communities and the role played by producer marketing groups (cooperatives)

Please provide evidence-based information as much as possible, including statistics and real-life cases.

This interview will last approximately 30 minutes. Thank you in advance for your cooperation.

General information

1. Date of interview: _____ / _____ / _____ Name of enumerator: _____
2. Name of respondent: _____
3. Gender: 1) Male _____ 2) Female _____
4. Age 1) Under 30 (2) 30–60 (3) Over 60
5. Location _____ Sub-location _____ Village _____
6. Distance to the nearest market (km) _____
7. Main occupation _____
8. Role:
 - 1) Village milk collector _____ 2) Village-based retailer _____
 - 3) Town-based retailer _____ 4) Bulking agent _____
 - 5) Other (please specify) _____
9. How long have been in the milk business? _____

Milk source, actors and quantity

1. What is the source of the milk you stock/sell? (Please fill in the table below)

Source	Distance(km)	Mode of transport from source	Quantity of milk bought daily		Buying prices of milk	
			Wet season	Dry season	Wet season	Dry season

2. To whom do you sell your milk? Please fill the table below

Client	Selling price (KSh)		Volume sold (litres)	
	Dry season	Wet season	Dry season	Wet season

3. How much milk did you sell yesterday, in litres? _____

4. Was the milk quantity normal?

1) Yes _____ 2) No _____

5. If not, how much milk would be normal, in litres? _____

6. Please give reasons for the above difference _____

7. On average, how much milk (in litres) do you sell during

1) Dry season? _____ 2) wet season? _____

Income, costs and number of employees

1. How much did you make yesterday from milk sales, in KSh.? _____

2. Was this amount normal?

1) Yes _____ 2) No _____

3. If not, what is the normal amount? _____

4. Please give reasons for the above difference? _____

5. What are your average daily sales during

1) Dry season? _____ 2) Wet season? _____

6. What factors determine the buying and selling prices? _____

7. In what mode of payment do you receive payment?

1) Cash _____ 2) Cheque _____ 3) Mobile money _____

4) Credit _____ 5) Other (please specify) _____

8. How frequent are the payments?
 1) Daily _____ 2) Fortnightly _____ 3) Monthly _____
 4) Other (please specify) _____
9. Do you employ labourers?
 1) No _____ 2) Yes _____
10. If **Yes**, how many labourers did you employ in the last wet season?
 1) Female _____ 2) Male _____
11. How many labourers did you employ in the last dry season?
 1) Female _____ 2) Male _____
12. How much (in KSh) did you spend on wages last month? _____
13. Was this the normal amount?
 1) Yes _____ 2) No _____
14. If not, what is the normal amount? _____
15. What other costs did you incur last month? Please fill in the table below

ITEM	Transport		Security	Market fees	Trading license	Taxes	Water	Health permit	Other (specify)
	Source to Isiolo	Isiolo to Nairobi							
Amount in KSh per month									

16. How many people are supported by this business?
 a) Owner – 1) Male _____ 2) Female _____
 b) Labourer – 1) Male _____ 2) Female _____
17. Is the trade your only source of income?
 a) Owner 1) Yes _____ 2) No _____
 b) Labourer 1) Yes _____ 2) No _____
18. If **no**, please list all your income-generating activities and how much you get from each per month

Source of income	Wet season amount (KSh) per month	Is that normal? (yes/no). If no , what is normal?	Dry season amount (KSh) per month	Is that normal? (yes/no). If no , what is normal?
Transporter				
Labourer				

Factors affecting marketing

19. In your view, what are the constraints to marketing pastoral camel milk in the county?

Factors	Rank (1-10)
Inadequate transport infrastructure	
Poor market information flow	
Lack of support institutions	
High marketing costs	
Poor milk handling practices	
Inadequate cold storage facilities	
Other (please specify)	

Appendix 2. Questionnaire used to collect data from camel milk transporters in Isiolo Town

- Date of interview: _____ / _____ / _____
- Name of respondent: _____
- Age: (1) Under 30 (2) 30-60 (3) Over 60
- Location _____ Sublocation _____
Village _____
- Vehicle type? _____
- Household size/composition
1) Number of males _____ 2) Number of females _____
- What is your main occupation? _____
- Do you own this vehicle?
1) Yes _____ 2) No _____
- For how many years have you been transporting camel milk? _____
- How many litres of camel milk did you transport yesterday? _____ litres
- Is that the normal quantity you transport?
1) Yes _____ 2) No _____
- If No, what is the normal quantity? _____ litres
- Why did you not transport the normal amount? _____
- What is the total capacity of your vehicle? _____ litres
- Have you ever used the total capacity of your vehicle?
1) Yes _____ 2) No _____
- If yes, when was that? _____
- What is the daily average amount of milk you transport?
1) Wet season _____ Dry season _____

18. Where do you transport the camel milk from/to?

Milk source?	Final destination	Distance (km)	Hours spent (hrs)	Price per 20-litre jerry can	Price per 10-litre jerry can	Other charges

19. How much did you earn yesterday from transporting camel milk? _____ KSh

20. Is that the normal amount?

1) Yes _____ 2) No _____

If **no**, what is the normal amount? _____ KSh

21. How many labourers did you employ in the last wet season?

1) Female _____ 2) Male _____

22. How many labourers did you employ in the last dry season?

1) Female _____ 2) Male _____

23. How much (in KSh) did you spend on wages last month?.....

24. Was this the normal amount?

1) Yes _____ 2) No _____

25. If **no**, what is the normal amount? _____

26. Please give reasons for the difference above? _____

27. What were your other expenses (in KSh) last month? (Please fill in the table below)

Item	Security	Market	Trading	Taxes	fuel	Business	Other (specify)
		fees	license			permit	
Amount (in KSh) per month							

28. Is the trade your only source of income?

a) Owner 1) Yes _____ 2) No _____

b) Labourer 1) Yes _____ 2) No _____

29. If **no**, Please list all your income-generating activities and how much you get from each per month

Source of income	Wet season amount (KSh) per month	Is that normal? (yes/no). If no , what is normal?	Dry season amount (KSh) per month	Is that normal? (yes/no). If no , what is normal?
Transporter				
Labourer				

30. For whom do you transport milk?

Milk clients	Quantity of milk transported		Frequency of payment	Payment mode
	Dry season	Wet season		

31. What are the challenges of transporting camel milk compared to other goods? _____

32. What factors affect camel milk marketing in Isiolo Town? (Please fill in the table below)

Factors	Rank (1-10)
Inadequate transport infrastructure	
Poor market information flow	
Lack of support institutions	
High marketing costs	
Poor milk handling practices	
Inadequate cold storage facilities	
Other (please specify)	

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

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International Institute for Environment and Development
80-86 Gray's Inn Road, London WC1X 8NH, UK
Tel: +44 (0)20 3463 7399
Fax: +44 (0)20 3514 9055
email: info@iied.org
www.iied.org

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