

PART 3
Milk



Introduction

Demand for milk and other dairy products is rising even faster than the demand for meat. FAO estimates that per capita milk consumption in the developing world will increase by 1.3% a year between 1999 and 2030 (a 50% rise in 30 years), while production will grow by 2.5% a year, more than doubling output in this period (FAO 2007, p. 141–5).

In some countries, notably India, dairying is still dominated by smallholders, while in others, such as Brazil, the number of smallholders has fallen as production has increased (FAO 2007, p. 159–60). Locally produced milk must compete with imported powdered milk, often from subsidized producers in the developed world.

Because fresh milk is highly perishable, dairies normally have to be close to their suppliers to ensure that the milk can be pasteurized and chilled quickly. That normally excludes producers in remote areas with bad roads and no electricity: they are left with few customers except for their immediate neighbours. Pastoralists face additional constraints: forced to move in search of pasture, they cannot establish permanent collection points or delivery arrangements. In addition, many pastoralist groups have a cultural bias against selling milk: milk is something to be given away.

This section reports on two cases that run counter to this conventional wisdom:

- Tiviski: A dairy that sources milk from pastoralists in **Mauritania**
- The golden udder: Marketing milk from camels in Puntland, **Somalia**.

The Tiviski dairy in Mauritania is a commercial venture that has defied expert advice to collect milk from mobile pastoralists hundreds of kilometres away, produce a quality product, and sell it in a crowded market in competition with imports. Camel milk is a niche product in Mauritania because it caters to a particular segment of the market (people from the north of the country). The dairy has also attempted to export a truly niche product – camel cheese – to Europe, but has encountered bureaucratic barriers that still must be surmounted.

The Somalia case describes how informal networks of local women have established a functioning marketing system that brings untreated, uncooled milk, also from remote, mobile herders, to the growing city of Boosaso. This case is all the more remarkable given the restrictions of the clan system in Somalia, and the lack of a central government.

REFERENCES

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Tiviski: A dairy that sources milk from pastoralists in Mauritania

Maryam Abeiderrahmane and Nancy Abeiderrahmane

It is still fairly cool when the milk collector arrives at the village to pick up the morning's milk. The animal owners help unload clean, empty aluminium cans from the vehicle, then heave cans full of fresh milk onto it. There is no time to lose: the milk must get to the collection centre on time so it can be weighed, tested, filtered and put into a bulk container for cooling. During the night, an insulated tanker lorry will haul it to the dairy, where it will be pasteurized and packaged into cartons, ready for sale.

Nothing unusual about this, you might think: after all, dairies throughout the world operate in much the same way. But wait: this is Mauritania, a vast, sparsely populated country on the southern fringes of the Sahara. The milk collector drives a donkey cart and must cross miles of roadless dunes to reach the "village", a dusty nomadic encampment. Some producers supply tiny quantities of milk. The collection centres are hundreds of kilometres from the dairy, in Nouakchott, the capital. And the animals that produce the day's milk are not familiar dairy cows: they are camels, local zebu cows, and goats.

SPRINGTIME IN THE DESERT

The dairy is called "Tiviski", the local word for springtime in the desert. Founded in 1987 by Nancy Abeiderrahmane, a British-born engineer who had settled in Mauritania, the dairy started operation in 1989, producing pasteurized camel milk in 1-litre and ½-litre gable-top cartons for sale in Nouakchott. A private enterprise, Tiviski has since branched out into cow and goat milk. It buys raw milk from pastoral producers, processes it into pasteurized milk, yoghurt and other dairy products, and sells them to retailers.

Tiviski runs a system that is basically simple, though it is fairly labour-intensive.

Milk producers. About 1 000 mobile herders supply milk twice a day from camels, cows and goats; some herders provide more than one type of milk, each in separate cans. Each supplier has one or more cans, identified with his or her number. (Producers often use this number to identify themselves on the telephone: "This is V127, Mokhtar".) Fifteen percent of the producers are women. Poorer herders bring very small quantities of milk (as little as half a litre); better-off producers may supply up to 300 litres a day. Tiviski pays the same price per litre, regardless of the amount delivered, even though dealing with small amounts is more costly because of the need to process paperwork and clean the cans.

Milk transporters. Twice a day, privately-owned, independent transporters collect the coded milk cans from herds, camps and villages. Their vehicles range from Land Cruisers to donkey carts, depending on distances, quantities, and the "roads", which include dirt tracks, compact level ground, and sandy dunes. These transporters do not buy the milk; they are not traders. They are paid to deliver the raw milk to the nearest collection centre.

FIGURE 25
Tiviski's milk suppliers are pastoralists who often move with their animals in search of pasture



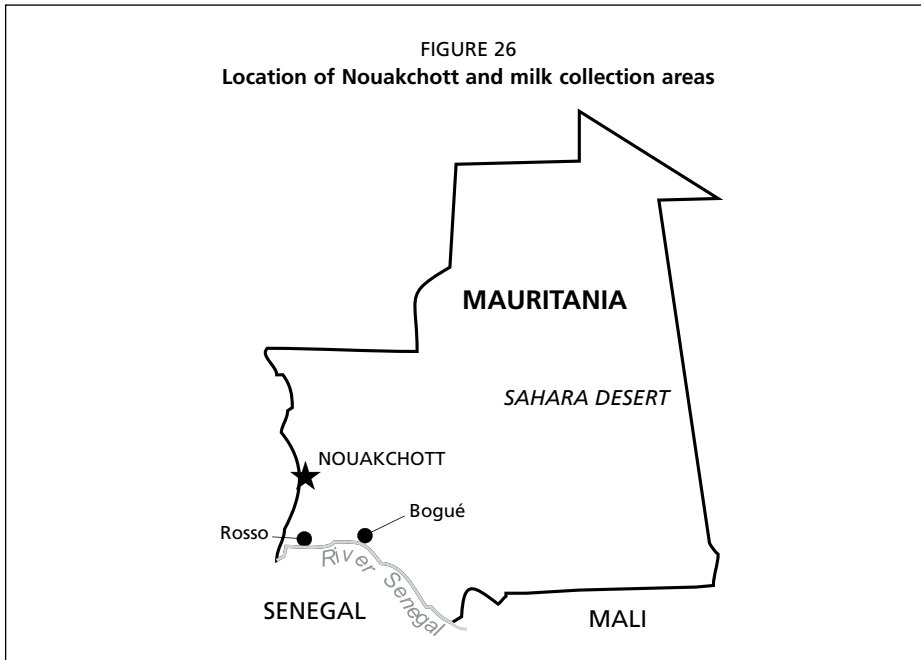
BOX 7

Livestock in Mauritania

Big and barren, Mauritania has more livestock than people: its 1.5 million cattle, 1 million dromedaries and 10–12 million goats and sheep outnumber the country's 3 million people. The climate is dry and grazing sparse, so almost all traditional livestock are kept in pastoral herds. In 1970, more than two-thirds of the population were nomadic, but now less than 15% are fully mobile. Camels and goats traditionally cover long distances – up to 1 000 km a year – particularly at the beginning and at the end of the short rainy season, which lasts from July to September. Herds of cattle also move around. Many herders take their animals across the borders to Mali (to the southeast) and Senegal (across the Senegal River to the south).

All the cattle are zebu. Animals kept by ethnic Fulani herders are mostly white with very long horns, while the (majority) Arabic-speaking people breed brown or black "Moorish" zebu, notable for their relatively good milk yield (an average of 3 litres/day). Tiviski buys milk from both sorts of cattle.

However, there appears to be a recent trend towards interbreeding, as herds have become visibly diverse. A few attempts have been made to introduce high-yielding cattle breeds, such as Holstein, "Pakistani", Jersey, but the environment is too harsh.



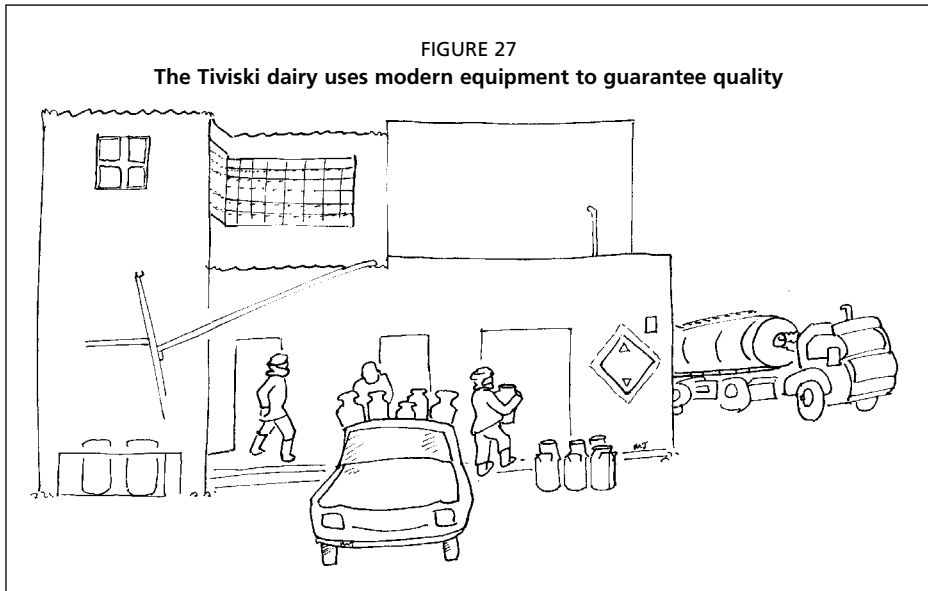
Collection centres. The herders are scattered over two areas roughly 90 x 90 km around two collection centres, located in the towns of Rosso (200 km from the dairy plant in Nouakchott), and Bogue, (320 km away). At the centre, staff check each can and reject it if the milk is acid, watered or visibly dirty. They then write out a voucher for each supplier, and either send it to the producer or keep it for him or her to collect at the centre. This voucher has a monetary value: suppliers can even use it to buy goods at local shops; the shopkeepers in turn can cash in the vouchers at the dairy.

Staff at the collection centres scrub the milk cans (around 1 000 cans, twice a day) before they are returned to the producers to be refilled with the next milking. The milk is filtered, chilled and stored in cooling tanks. At night, when it is cooler, insulated tanker trucks haul the chilled bulk milk to Nouakchott.

Dairy. The plant is a modern operation that can handle 30 000 litres of milk a day, though production is normally 12 000 to 18 000 litres (4 380–6 500 tonnes/year) and varies substantially with seasons and the overall economic situation. It uses modern, stainless-steel equipment and applies stringent quality controls to ensure consistent high quality.

The dairy processes the milk into about 20 different dairy products, including pasteurised milk, UHT (ultra-high temperature, sterilized) milk, sour milk, flavoured milk, cream, butter, yoghurt, cheese and ice cream, all packaged in attractive cartons or tubs. Cow milk accounts for the bulk of production and is made into the most products. Camel milk is made only into fresh pasteurized milk and cheese. The market decides on what can be produced: sour camel milk did not sell well, and was discontinued.

Retailers. Tiviski has 12 vehicles that deliver its products direct to 2 000 retail outlets (corner shops, wholesalers, groceries, supermarkets and hotels) in Nouakchott, as well as to other towns. UHT milk is sold all over the country, and even in neighbouring countries.



Tiviski attempts to keep retail prices as affordable as possible. Retailers are allowed 10% margin on all fresh products, and the company takes back unsold products to reduce retailers' risk. The strategy adopted is to have the best-quality product and to visit shops regularly so that the products are sold (or returned) before they go off.

ESTABLISHING A DAIRY

It was not always like this. Until 1989, Mauritania had no industrial-scale dairy outlet for local milk. There was not even any fresh pasteurized milk in the country. City-dwellers could buy imported sterilized or powdered milk, or they could keep their own animals. Two dairy plants (now closed) imported powdered milk and produced UHT milk and yoghurt.

During the 1980s, small dairy herds appeared around the main towns, selling raw milk. Camel milk was the first to be sold this way, at a very high price compared to imported sterilized cow milk.

Although camel milk may seem exotic, people from the north of the country prefer it (southerners prefer cow milk). However, according to a *hadith* (a tradition associated with the Prophet Muhammad), camels and their products are generally regarded as superior to others.

Nancy Abeiderrahmane decided to establish a dairy for three reasons:

- It seemed a good business – and development – idea to tap the country's unused milk potential, bridging the gap between remote producers and former pastoralists who had moved into the cities and were deprived of fresh milk, their staple food.
- She preferred pasteurized (vs. sterilized) milk.
- Along with many Mauritians, she liked the taste of camel milk.

The idea was to collect milk from producers (based on the belief that every part of the value chain should concentrate on its own task, do it well, and live from it) and sell it in the city as modern dairy products. However, this had not been done before in West Africa.

Technically, for milk to reach urban consumers in significant quantities, it must be packaged and able to last a few days. That means it has to be pasteurized (heated to above 70°C).

The original plant was a mini-dairy, designed to handle 600 litres/hour, and supposed to break even at 1 000 litres/day. The equipment was basic but state-of-the-art and all stainless steel, with continuous pasteurisation.

The initial investment was 1.5 million French francs (\$240 000), including a FF 1 million loan, from the Agence Française de Développement (French Development Agency), at 9% interest. This sum was used to buy a plot of land, build the plant, and buy the basic equipment and the first packaging. Optimistic planning, some contingencies such as a change of government policy and an unexpectedly costly power connection, and a lack of business experience led to a severe cash shortage for 5 years.

A border conflict with Senegal that began in 1989 forced Mauritanian refugees to return to their home country, bringing their cattle with them. That is how raw cow milk appeared in Nouakchott. Tiviski started processing some of this milk, and followed this with many more products based on cow milk. Nowadays 70% of Tiviski's output uses cow milk, 20% uses camel milk, and 10% goat milk.

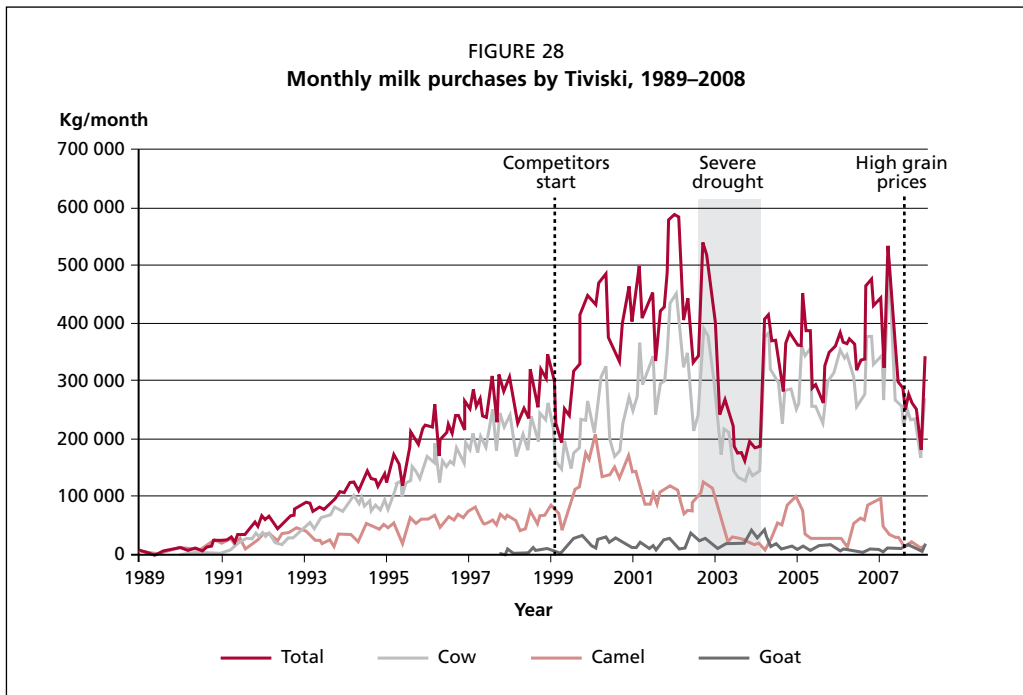
GROWING PROBLEMS

The first 5 years were very difficult. The most important problems faced by the young dairy were as follows.

- Although the original intention was to sell camel milk as an affordable product, the attempt to mobilize dedicated milk producers with contracts and fixed, reasonable prices failed. As a result Tiviski had to pay very high prices for raw milk, imposed by costly peri-urban production, the desert conditions, and consumers who were willing to pay higher prices for raw milk than for a pasteurized product.
- There is a deeply ingrained traditional prejudice against selling milk: doing so is seen as miserly and undignified. That made it very difficult to buy milk, especially after the first couple of years, when sales started to pick up. Tiviski had recognized this problem early on, but had underestimated its severity. To this day, social pressure is stronger than the perceived economic benefit, and only a fraction of the potential milk is delivered. Only people with no "honour" to lose were willing to sell milk to Tiviski, and these are not the most educated producers.
- Consumers assumed that anything made locally was automatically bad. This initial major hurdle has now been successfully overcome.

After a few years, sales improved, and so did the milk supply. As a result the company recorded steady growth. Figure 28 reflects some of the difficulties encountered, including seasonal fluctuations, droughts, competition, and global crises.

- The first substantial drop was caused by the onset of local competition in 1999, but the biggest challenge followed a severe drought that began in 2002. The food price crisis in 2007 also took its toll.
- Seasonal and annual variations, both in production and consumption, have always been a problem. Camel milk production dropped dramatically after 2002, though it has peaked every 2 years since. Production also varies seasonally, with a low period between September and November.



By 2000, business was good, but these seasonal variations called for a solution: the dairy needed a product with a longer shelf-life. Tiviski decided to set up an UHT plant for cow milk. Because it is sterilized, UHT milk can be stored unopened for a long time without refrigeration.

AIMING FOR THE NICHE

From a global perspective, packaged camel milk certainly is a niche product: it is rare, it tastes good, and scientific research is increasingly vindicating what camel breeders have known all along: that camel milk has many beneficial properties for humans.

So there is a big potential market for camel milk in the West. But Tiviski has not been able to take advantage of this, for several reasons:

- Fresh milk is highly perishable, and camels are always in remote areas, far from the main markets in Mauritania's cities, and even further from affluent Western markets that would be willing to pay more. Fresh milk has to be sold within 8 days after leaving the dairy. That requires a ready-developed distribution and marketing system; otherwise, the risk and losses are too high.
- Fresh milk is a relatively low value-per-weight product. The already relatively high price of camel milk would be more than doubled by the cost of airfreight, cold storage, middlemen, etc, so nobody was willing to try selling it in an untried market.
- Tiviski hoped that it would be possible to make UHT camel milk, so extending the shelf life and avoiding the need to keep the product chilled. But tests in the new UHT unit showed that camel milk cannot tolerate being heated above 100°C, as required for the UHT process.

Owing to all these problems, camel milk can only be sold on the local market, where it is viewed as a staple food, not a niche product, and has always had to compete with imported sterilized cow milk from all over the world. Therefore it has not benefited from any “niche”-based privilege.

However, Tiviski has not given up the hope of marketing camel milk in Europe. Research is continuing, and Tiviski hopes that one day it will be possible to make UHT camel milk.

CHECKING FOR CHEESE

Cheese made from camel milk is another possibility. In 1993–4, with help from FAO, Tiviski learned how to make the world’s first camel-milk cheese. This product was aimed at the European market, as Mauritians do not like or eat cheese, especially not the Camembert-flavoured soft cheese that results from camel milk. Neighbouring countries do not want products from camel milk. In Europe, it would be possible to position camel cheese as a rare, specialty product that would attract a high price, so covering the airfreight and marketing costs.

Unfortunately, while Tiviski was developing camel cheese, the European Union introduced regulations that excluded all Mauritanian animal products, including camel milk. Lengthy discussions have overcome some hurdles, but Mauritanian camel milk and cheese are not yet allowed into Europe.

The output of delicious (to European tastes) and unique camel cheese has hovered around 80 kg a month for the last 8 years, whereas the German market alone could have absorbed tonnes of it every week.

In 2008, an attempt to export to the USA failed because soaring global grain prices virtually halted the production of camel milk as herders trekked their animals to Senegal, where they could find pasture. Milk supplies have resumed recently, but in very small amounts.

DESIGN CHOICES

Quite a lot of thought went into the initial basic design of Tiviski. Some decisions were open-ended; others were imposed by circumstances. The main choices made were:

- Collecting **fresh milk** from livestock owners instead of using imported powdered milk.
- Making **high-quality products**, by processing the milk in a state-of-the-art dairy, albeit a small one instead of using low-tech approaches.
- Packaging milk in attractive gable-top **cartons** instead of cheap plastic pouches.
- Selling through existing **corner shops**, which all have refrigerators, instead of indirectly through middlemen or in specialized shops.

From the beginning, the whole operation seems to have strayed quite consistently from “expert wisdom”. Some examples include:

- For African markets, experts recommend low-tech/low-price products. This usually results in low-quality products in unattractive packaging.
- Experts claim that African milk is not profitable because of low milk yields from the animals. They recommend importing high-yielding breeds, regardless of the environment.

- The experts also say that African milk is too contaminated for industrial processing.

Tiviski has disproved these claims. There is certainly a market for low-quality products, but everyone likes higher quality, and if the raw material is expensive, it is wise to target higher market segments. Tiviski has found ways to collect milk from hundreds of individual small-scale producers. And in terms of quality, although it is not possible to attain present-day Western bacterial counts, Tiviski has proved that local farmers are able to supply milk within reasonable hygienic levels, comparable to those in Europe 30 or 40 years ago.

SERVICES TO SUPPLIERS

Buying milk directly from each supplier, with no intermediate trader, is the key to controlling raw milk quality. Tiviski pays the same price for all kinds of milk, at all times of year, to avoid renegotiating prices each season.

Every day, the lorries take a list of how much milk each producer has delivered to Nouakchott. There they are inputted into custom-designed software. From that moment, the producers can get paid whenever they want. To get paid, the producer hands over his or her delivery slips, and the computer checks the amount due, subtracting any loan reimbursements (see below). Although it would be more practical if payments were spread out, most producers want to be paid at the beginning of the month, putting stress on staff and cash flow. Such a system is possible only because it is computerized: the very large number of suppliers and customers generate a considerable volume of data to be processed each day.

The dairy provides the milk producers with various services, including supplying feed concentrate, milk cans and veterinary care (all on credit), as well as providing training in hygienic milking, advice on feeding, and cash loans. A Tiviski liaison officer maintains communication with the herders and develops such services. The producers are organized into groups, which are responsible for ensuring that loans to their members are repaid. If a member fails to repay a loan, Tiviski deducts what is owed from the group members' milk accounts. Social pressure and solidarity ensure that defaults are rare.

INVESTMENT

In the 19 years since its founding, Tiviski has invested a cumulative total of \$5.4 million in its operation and has made a cumulative profit of about \$5 million, or a return on capital of about 7.7% a year (though fluctuating exchange rates make such calculations rather uncertain). All the profit has been re-invested: although it is a limited partnership, Tiviski has never distributed any dividends.

The years 2000 and 2001 showed such a fine profit that a major investment decision was made: the UHT plant. Tiviski had to borrow a large amount to pay for this costly plant, but competition from milk importers meant it failed to increase revenue significantly. In 2008 this situation started to improve slowly, owing to various unrelated external market factors.

Tiviski is entirely self-sustaining. Revenue must not only cover costs, but leave enough profit to allow for expansion, equipment replacement, etc. Tiviski has bought much of its equipment second-hand, putting heavy demands on the technicians' very African genius to keep them running.

CHALLENGES

Tiviski's history has not been easy, and challenges have evolved over the years. Some have been overcome, others have subsided, and others still remain.

- **Milk collection.** Collecting milk is a commonplace notion, but it was not done yet in West Africa, and it is made more difficult by the fact that the herders move around. The physical difficulty of collecting milk was compounded by the deeply ingrained traditional prejudice against selling milk.
- **Seasonal supply and demand.** Milk production is seasonal everywhere, but in the Sahel seasonal fluctuations are extreme. There is always too much milk, or not enough. Plus, consumption also varies widely, but always in the opposite direction. This translates into recurring seasonal dissatisfaction, either among suppliers or among customers. The UHT milk plant was built to solve this problem.
- **Skilled labour.** The lack of skilled workers and vocational training in the country are a major hindrance for an industrial plant.
- **Input procurement.** Procuring packaging, spare parts, cleaning products and so on, is much more complicated and expensive than in developed countries. Access to foreign currency was a headache for many years.
- **Consumer awareness.** Consumers do not know about microbes, they do not understand what pasteurization and sterilization mean, and they do not know the difference between butter and margarine. Well-off urbanites are willing to pay more than \$2.00 for a litre of raw camel milk, but not for pasteurized camel milk, thus distorting suppliers' perception of what is a reasonable price.
- **Advertising.** Although Tiviski has made many efforts to advertise, it faces four main hurdles: the cost of advertising, a lack of suitable media, the lack of local skills to produce commercials, and the widespread belief that advertising reflects insufficient sales. Mauritians read little, so most never see advertisements in newspapers or magazines, and they do not actively read posters or packaging. Television is expensive, and viewers tend to watch foreign channels and zap the commercials. As a result, even when Tiviski has run adverts, there has been no detectable impact on sales.

Producers also face major challenges:

- **Physical environment.** The Sahelian environment is a challenge in itself: recurrent drought, irregular rainfall and extreme temperatures are not ideal for dairying.
- **Policy.** There is a total lack of government policy, interest, help or encouragement. There are few roads, no veterinary care, no support, no extension work, no education, and no assistance with technical know-how.
- **Fodder.** The rising price of fodder and the absence of local production (except for some concentrate made from imported raw materials) have discouraged many producers.

COMPETITION

At first, competition came only from sterilized milk imported from Europe. Tiviski's pasteurized milk was sold at higher prices than this imported milk until 1999, when higher production made it possible to squeeze Tiviski's price into the same bracket. Although the

dairy's fresh milk sales rose every time the imported milk was scarce, Tiviski's fresh milk did occupy its own market share.

However, in 1997, local competition started.

- A powerful businessman diversified from cement bagging, commerce and banking to start an identical operation, taking half of Tiviski's suppliers without seeking new ones.
- A banker imported Holstein cows, together with French staff and fodder, and aggressively marketed raw (non-pasteurized) milk in cartons. This enterprise failed after 2 years for two reasons: (a) the expensive cattle were not used to local conditions, so gave low yields of 10 litres a day; and (b) raw milk has a very short shelf life.
- This banker then sold the cows and equipment to a local entrepreneur, who sold raw Holstein milk in buckets and made cultured milk from powder. He recently started collecting milk of local breeds and selling it in cartons.
- More recently, an existing unit has also begun collecting fresh milk, pasteurizing it and selling it in cartons.

Three competitors in a very small market makes things difficult. Tiviski's peak production (a rare occurrence) is about 20 000 litres a day, but it can stagnate below 10 000 litres a day for months on end – way below any reasonable break-even point. Competitors operate on even smaller quantities, and yet the myth is that “the market is unlimited”.

The size of the market depends on how much people can spend. If the economy improves, sales increase, but conversely every crisis reduces sales.

THE VALUE CHAIN

Before Tiviski started operating, fresh milk was practically not marketed at all in Mauritania, except for a few thousand litres sold raw by herders who lived near the cities direct to consumers or to small-scale milk retailers (Figure 29). Most fresh milk was consumed by families who owned animals.

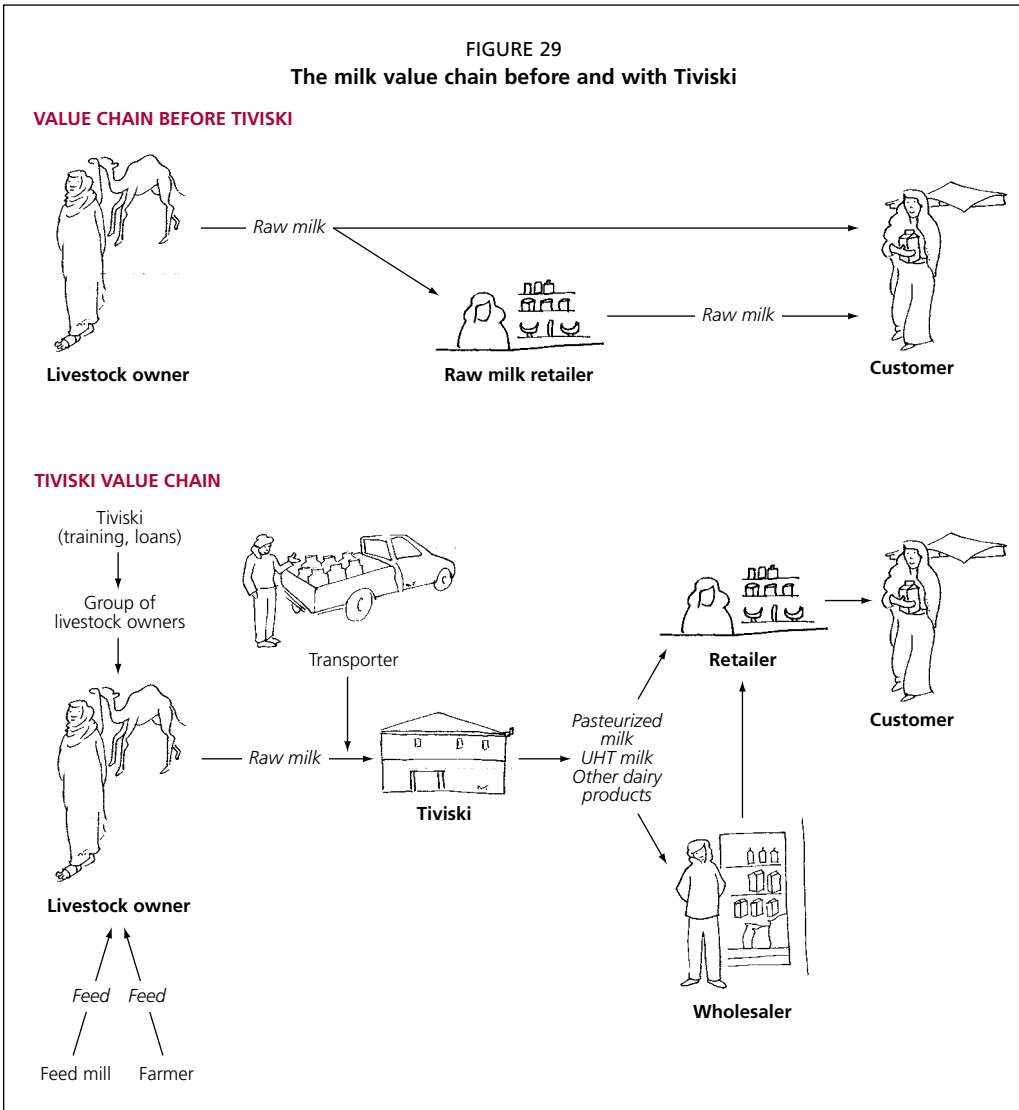
Now milk production and related enterprises are a significant economic activity in the supplying regions. The value chain extends upwards to animal feed suppliers, and down to consumers, including collectors, the processing plant and retailers.

THE POLICY ENVIRONMENT

The policy environment has been neutral or negative. The Mauritanian government has shown no interest in the industry and has not tried to protect it from cheap foreign imports. European Union regulations have prevented camel cheese from being exported to the nearest affluent, cheese-eating market.

RETURNS FOR PRODUCERS

Tiviski has to align its selling price as far as possible with foreign prices in order to compete with imported milk, so is squeezed between the high prices it has to pay for raw milk, and low prices for the milk it sells. The raw milk purchase price in Mauritania has always been extremely high by world standards: it was \$0.50 when it was \$0.32 in Europe and \$0.22 in New Zealand. Tiviski pays the herders around \$0.70 per litre of milk. The retail price of a litre carton of pasteurized milk is around \$1.50.



The price Tiviski pays producers depends on the need to keep producers in business, but also on the market. For example, in 2008, Tiviski raised the price it paid producers (as well as its retail price). But soaring fodder prices forced herders to take their animals into Senegal, leading to a sharp drop in production. Tiviski could not afford to raise retail prices further, and the camels were not yielding enough milk to pay for their feed.

In the dairy's 20 years' work, herders have practically never had to ask for a price rise, as the company has always forestalled their need. If times get difficult, meetings are held, difficulties are explained, undertakings are made. Tiviski's competitors seem to suffer more pressure from their suppliers. Mobile telephones have made communication even more direct, and frequent field visits by the dairy's liaison officer provide a day-to-day awareness of the producers' state of mind.

PRODUCER TRAINING

Tiviski has invested heavily in training the producers how to supply milk in a way a modern dairy plant needs: hygienically and on time. In 2001, a specialized unit was set up to provide training, veterinary care and fodder on credit.

In the long run, it appears that non-material incentives do not work. Suppliers now know all about hygienic milking, but may not take the trouble to do so as a matter of routine.

Historically – in other countries – material incentives usually consist of higher prices for better-quality milk. But such incentives are not necessarily applicable in the Mauritanian context. It was tried but later dropped for several reasons:

- The base price of milk was already so high that any increase could only be a small percentage of the price, so not worth the effort.
- The herd owners do not pass on the bonus to their employees who milk the animals by hand – so they have no incentive to improve hygiene.

In practice, the incentive goes mainly to larger suppliers for a variety of practical reasons. For example, lab tests to check the milk quality are costly, but they are impossible to apply to 1 000 producers who each supply tiny amounts.

No amount of persuasion can make delivery vehicles arrive early: herders take their time milking, and the vehicle owners also run many other errands for their customers, so they arrive as late as possible.

As a result, a sort of passive control system has proven effective and feasible: the milk is tasted and rejected if it is unsatisfactory. Tiviski staff are trained to detect acidity or watering in milk, and to tell the difference between camel, cow and goat milk. Problems can arise if competitors do not have such controls, but in the long run producers accept the correlation between proper milking procedures and milk acceptability.

Milk should be cooled as soon as possible after milking to maintain quality. The gates of the collecting centres are locked at 10:00 or 10:15 each morning and evening. But unfortunately all the vehicles arrive at the same time, in the last 10 minutes. That means a considerable wait before the milk can be cooled, but no amount of arguing or planning has yet convinced the drivers to space their arrivals so that every vehicle can be unloaded quickly.

Clean milk cans are also vital. Tiviski imports aluminium alloy milk cans from India and sells them at cost price, on credit, to the herders. The cans are scrubbed and disinfected by Tiviski staff at the collecting centres.

On the whole, milk quality is remarkably good compared to other similar settings, to the extent that it can be treated in an UHT plant, against all “expert” statements that this cannot be done with African milk.

ORGANIZING PRODUCERS

Tiviski has repeatedly encouraged producers to form some type of organization. This would help both the producers and the dairy: it would help practical coordination, and dairy cooperatives have worked well in Western countries. Plus, foreign donors do not offer aid to private companies, but many institutions would be ready to assist a herders’ organization. Indeed, Mauritania has hundreds of more-or-less fictitious organizations to harvest such aid.

But Tiviski's efforts to get the herders organized have met with little success. The main reason for this failure seems to be their pastoral, mobile lifestyle, which makes it extremely difficult for them to organize. "Mauritanians can only organize against someone," says one herder. Each time an organization was set up, it first concentrated the herders' frustrations against Tiviski – not for consistent or specific motives such as milk price, but essentially because Tiviski is their only interface with the outside world. Time will show herders that things can be done more profitably together.

One example of a positive trend appeared in the milk collection system. Most of the collection vehicles belong to private operators (some are themselves milk suppliers who also pick up the milk of relatives). The producers pay the vehicle owner at the end of the month. In several cases, Tiviski had to rent vehicles to collect milk from areas where transport was either not profitable or complicated because many unrelated smallholders were scattered over long distances. The dairy charged these suppliers for this service on a quantity/distance basis. Gradually, the suppliers involved were prompted first to choose a cheaper vehicle, then to rent it themselves, and finally to buy their own vehicle as a group. This type of process will eventually lead to practical organizations that are able to improve the herders' efficiency.

Pastoralist herders live and think on a day-to-day basis, and do not make financial calculations on an annual basis. Although for roughly half of the year they have practically no expenses, when they have to buy fodder in the remaining 6 months they compare their daily income and expenditure, and complain loudly. They do not calculate the returns from the herd growth rate, or the different values of a healthy cow or camel compared to a skinny one – or a dead one. They have a wealth of ancestral knowledge, but much of this no longer applies now since they shifted from being nomadic to semi-nomadic.

THE IMPACT OF A SMALL DAIRY

Although on a global scale Tiviski is a very small dairy, it has established itself as the undisputed leader in the local market and has gained the confidence of consumers, mainly thanks to its consistent focus on quality.

- **Jobs.** Tiviski now has some 230 staff (all local), who work in two shifts. It has directly and indirectly created about 3 000 jobs for livestock owners, their employees, milk transporters, fodder suppliers and so on – a significant number in a country of only 3 million people. The livestock are fed with agricultural by-products, helping to develop farming.
- **Local economy.** In the milk-producing areas, suppliers use their milk-delivery slips to pay for goods at local shops. The milk vouchers are almost used as a local currency: at the end of the month, many shop keepers or fodder suppliers bring in milk vouchers to convert to cash.
- **Producers.** Over the years, the producers have increased their herd sizes, and fewer animals fall ill or die. The herders now have a regular monetary income (without having to sell stock), which they use to feed and look after their herds, and to improve their standard of living. The livestock are safeguarded against drought: in the dry season, the producers supply more milk to the dairy so they can buy fodder; in tough years, the revenue from milk feeds the whole herd, not only the females and calves.

- **Consumers.** Fresh milk is good for city-dwellers: pasteurized milk has fewer germs than raw milk and more vitamins than imported sterilized milk.
- **Foreign exchange.** Producing milk locally instead of importing it saves foreign currency at a national level.
- **International recognition.** Tiviski has become known throughout the world for its work in developing a local dairy and promoting camel milk. In 1993, Tiviski's founder Nancy Abeiderrahmane received a prestigious Rolex Award for Enterprise in recognition of her work.

MORE INFORMATION

Tiviski: www.tiviski.com

The golden Udder: Marketing milk from camels in Puntland, Somalia

Michele Nori

WIIL IYO CAANO!

“Sons and milk” are what Somalis wish someone they have not seen for some time. And when parting for a long period, they wish each other “*nabad iyo caano*”, or “peace and milk”.

Milk is important in Somali culture. Much comes from dromedaries, of which Somalia has more than 6 million – almost half the world’s total. They are raised almost exclusively for their milk, and camel milk is staple food for much of the country’s human population.

Like in some other areas of the Horn of Africa, buying and selling camel milk used to be taboo: Somali families drank the milk from their own camels, or gave it to friends and relatives. But the growth of cities has created a strong demand for milk among urban residents who have no camels of their own. In Puntland in northeastern Somalia, an elaborate system of trading the milk has emerged since the early 1990s. An interesting feature of this system is that milk and its marketing are managed mainly by women, even though men own the camels and are responsible for managing, milking and selling them.

The information in this chapter is drawn largely from a food security programme run by UNA (a consortium of Italian NGOs) and the Milking Drylands research initiative, both funded by the European Commission and implemented in 2001–7.

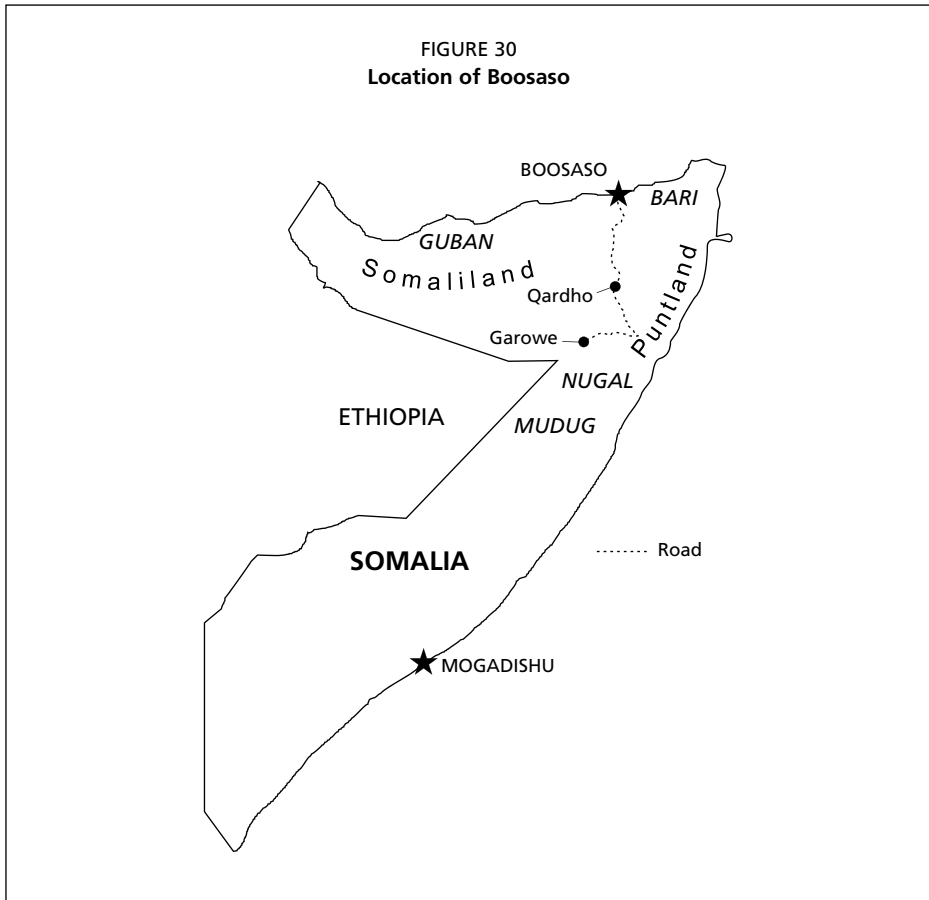
CAMELS IN SOMALIA

Pastoralism is the traditional backbone of the Somali economy. About 70% of the population are pastoralists, with camel herding prevalent in the north, cattle more common in the south, and large herds of sheep and goats all over the country.

Camels are ideal milk producers in the drylands of Puntland. They can go without water for long periods. They browse in loose groups, moving slowly through an area to feed on grasses and tree leaves. The browse is sparse, forcing the herd to be continually on the move.

Even in very dry conditions, camels produce milk continuously for 18 months before production drops. Fresh camel milk keeps better in hot weather than milk from other animals. Without refrigeration, it becomes slightly sour (forming a product known as *suusaac*) or very sour (*karuur*). For home use, this fermented milk is kept in traditional containers, which are smoked to reduce the number of bacteria.

According to one UNA survey, the average camel herd in Puntland has some 72 animals. Overall milk production depends on various factors. The main one is the number of animals



in milk: about a quarter are lactating at any one time, though this number can be much lower if a drought prevents females from getting pregnant. Or it can be higher: in 2006, when herds were recovering after a drought, about 60% of the animals were in milk. It takes at least 2 years for production to recover after a lengthy drought. Other important factors are the season, access to pasture, the condition of the pasture, the stage of lactation, the calving rate and the health of the mother and calf.

At birthing, a female gives an average of 3.5–4 litres per day, falling to about a litre during the long dry season. The calf needs about one-third of the milk, leaving the remainder for human consumption or sale. The number of milkings depends on the stage of lactation and the season: the animals may be milked twice or even three times a day during the wet season, or just once during the morning at the peak of the dry season. A lactating camel gives milk only in presence of her calf. If this has died or been culled, the herders keep its skin to show to the mother to stimulate milk letdown.

There are three main breeds of camel: the Coastal or Bari, the Guban from the mountain plateau, and the Hawd from the Nugal and Mudug regions and nearby parts of Ethiopia (Figure 30).

MEN'S CAMELS, WOMEN'S MILK

Patchy, unpredictable rain makes pastoralist life a risky business. If rain falls on the other side of the valley, a herder family needs to be able to bring its animals there so they can graze, even if that area is controlled by another family or group. A complex set of social mechanisms, managed by the elders, governs who can use what resources at which time.

The Somali clan system is a traditional organizational structure that binds together people who are related. It runs through the male line: people are members of their father's and grandfather's clan. But men normally marry women from outside their clan, creating ties and alliances that cut across clans. Such cross-ties are important to allow people from one clan to use resources controlled by another.

In such a system, men are strongly attached to their clan, while women have a more ambiguous status: they are the natural interface between two groups, as a woman's father and brothers will belong to one clan, while her husband and sons to another. This dual status lets them move freely and means they are often involved in negotiations and managing conflicts between groups.

It is the men who are responsible for managing and milking the camels, which represent the family's wealth and prestige, and are its most reliable insurance against drought. But the ownership of camels is attached to the clan structure: they are considered a corporate asset of the clan. So if a man wants to sell a camel, he has to consult other men in the clan.

Women look after the house, care for children, and manage and milk the family's herd of sheep and goats. These small livestock are secondary assets: they can be sold if the family needs cash quickly. They are not seen as clan assets: a family can decide to sell a sheep or goat without consulting the clan.

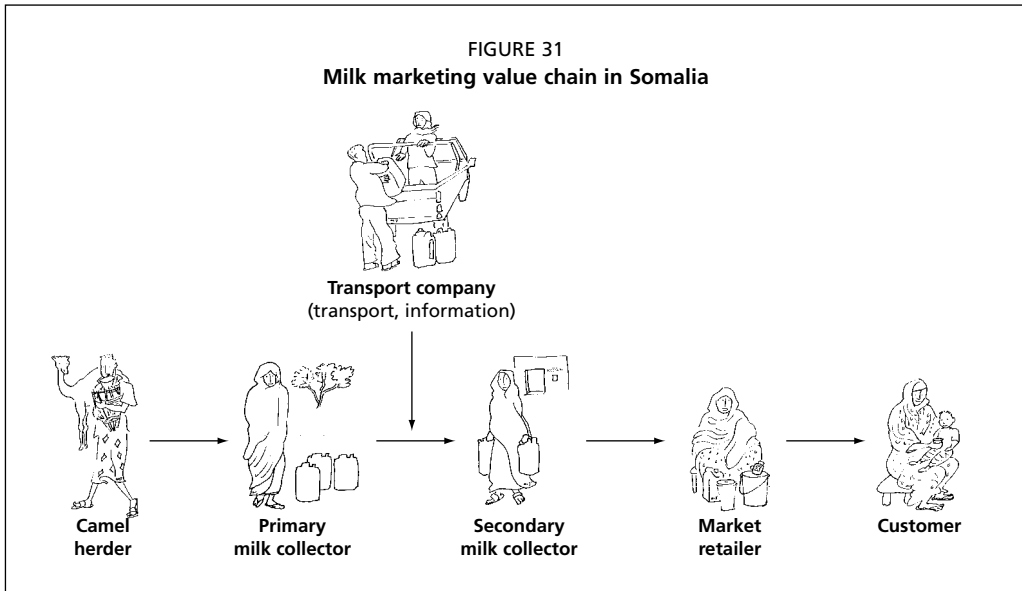
Marketing tasks are divided among men and women: the men sell livestock, while women are mainly responsible for selling milk. Men milk the camels, so decide how much milk goes for the calf and how much is left for family use. This is an important role, as it decides how much milk is used to reproduce the herd, and how much to maintain the household. But once the milk is extracted from the animal, the women take charge of it. They decide how much to give to children, how much to use for other needs, and recently, how much to sell.

MARKETING MILK

The civil strife that began in 1991 in Somalia has had little direct impact in the northeastern region, but has led to a massive increase in urban populations there as people have fled the conflict-torn south. Some women organized small but effective networks to collect, transport and sell milk to the cities in Puntland. Two things have helped them: the construction of a major tarmac road that cuts through the region, and the lack of a central government to control and tax them.

Little by little, the marketing of camel milk has expanded. Nowadays hundreds of litres of milk are traded every day from production areas inland to markets in cities over 100 km away.

The value chain involves five sets of actors, from the producers to the retailers who sell to consumers (Figure 31).



The herders milk the animals and store it in traditional containers, known as *haruub*, which are treated daily with charcoal to keep them hygienic. This practice gives a typically smoky taste to the milk. The herders walk an average of nearly 9 km each day to bring their morning milk to the primary collectors. They carry it in plastic jerry cans that originally held food oil.

The primary milk collectors (known as *kaameley* in Somali) are women in mobile camps who follow the herders as they migrate. They pour the milk into their own jerry cans, which they keep clean somehow with special stones and very small amounts of water, which is scarce in the bush. Most require their trading partners in the towns to clean the jerry cans before sending them back to them.

As a rule of thumb, each primary collector serves some 8–20 herding households, though in a good season one collector may serve up to 40 herders. Collectors have various types of ties with the herders they serve: the mobility of the herds and the collectors forces these ties to be loose and flexible.

The primary collectors exchange the milk for cash, basic staples or other items, so they earn not only from their mark-up on the milk, but also by selling goods. They order these goods from their trading partners in town, or direct from wholesalers. They also provide credit to the herders if needed, for example during a lengthy dry season or period of economic hardship. This petty trade and the capacity to buffer their clients' short-term financial difficulties is a vital livelihood support for many pastoralist households.

Transport companies are hired by women collectors to carry milk, related information and goods between rural and urban areas. Their Toyota pick-ups bring milk from the production areas to the urban markets, and carry commodities from urban stores and markets to rural communities. At least six companies operate from the town of Qardho, about 200 km south of Boosaso, the Puntland capital. During good rainy seasons, the numbers increase.

FIGURE 32
Market retailers buy milk from the secondary collectors to sell to consumers



The companies, which are run by men, typically have at least three vehicles, and each driver stays overnight in the bush for one or two nights. Each driver drives around different collection sites according to routes negotiated with the primary collectors, delivering water and goods and collecting milk. Each car serves 10–12 primary collectors. All three drivers meet at an agreed place and load their milk onto one of the pickups, which then heads to town. Bringing the milk from the herder to the market can take 9–10 hours or more.

The drivers are vital to ensure that the milk arrives on time and in good condition. With no refrigeration available, they have to drive fast over rough terrain to make sure the milk does not spoil in the heat. While partially fermented milk can still be consumed, it fetches a lower price.

Secondary milk collectors (*aanooley* in Somali) are based in markets in the towns of Qardho, Garowe and Boosaso. They receive the milk sent each day and sell it directly or distribute it to market retailers. The next day they send the empty jerry cans and a share of the money back to the primary collectors through the same route. Sometimes they also supply imported commodities to their primary collector partners. An average of 2.35 primary collectors supply milk to each secondary collector.

Market retailers take the milk from the secondary collectors and sell it to consumers in the market. They add their own mark-up to the price, and pay the secondary collectors at the end of each day.

RELATIONSHIPS IN THE CHAIN

Besides delivering milk, containers and money, the transport companies enable a continuous circulation of people and news about rain, pasture conditions, animal health, market prices and events. A majority of the drivers belong to the Midgaan, a minority group in the area.

If the transport companies are the lifeblood of the system, the women collectors' networks are its backbone. These networks hinge on the personal relations between the primary and the secondary milk collectors. These partnerships are fairly stable: they do not change from one season to another. The women are not necessarily related by blood or marriage; instead they talk about "friendship" or "business", and there are cases where "we only know each others' names though we don't know the faces". Family ties are often important for newcomers to the business, when sisters often form a partnership as primary and secondary collectors. But such ties become less important in the longer term.

Many women who head households are involved in milk marketing: in a survey, about 44% of the women said they were from such households, compared to an average of 35% for the region as a whole. On top of that, another 11% of secondary collectors said their husbands were out of work. This underlines the importance of the milk trade to vulnerable households.

In 2006 the **primary milk collectors** paid an average of 5 000 Somali shillings for a *galaan* (about \$0.20 for 0.75 litres) of milk. Prices may fall to a low of 4 000 shillings per *galaan* in the wet seasons (April–June and October–November) when camels produce more milk, rising as high as 7 000 shillings in the dry seasons. Other factors affecting price include transport problems and insecurity.

Transport costs about 1 200 shillings per *galaan*, though prices may vary markedly depending on distances and road conditions – which are highly related to seasonality.

The **secondary collectors** typically charge a standard rate of 600 to 1 000 shillings per *galaan*. The final retail price averages 7 200 shillings, varying from 6 500 shillings in the wet season to 11 000 in the dry.

IMPROVING THE SYSTEM?

This remarkable marketing system developed without any external support. But can it be improved? External interventions have been limited to a project by UNA, a consortium of Italian NGOs, through a project funded by the European Commission. This tried to contribute to improving milk quality in local markets. Its small-scale, low-budget community-based investments have shown a degree of success. For example, the project provided aluminium containers through a revolving fund to improve milk hygiene, strengthened local capacities of involved stakeholders, and built basic market facilities in Qardho where milk could be stored and sold in improved conditions.

But the project's effort to establish a big processing plant to prolong the shelf life of camel milk by pasteurizing and packaging it has faced a number of technological and institutional constraints. Notably, the ownership and control of such big investment, which came from external funding, created a number of problems, which have eventually made it of little relevance to local people. Nowadays it works during some seasons and shuts down or converts to packaging juice in others. Its main failure lies in its inability to establish links and obtain milk from the existing networks of women.

Other interventions, mainly by international NGOs, address animal health in the area. This is indeed a critical matter affecting milk production and the pastoral economy.

SUSTAINABILITY MATTERS

Marginal lands, an erratic and drought-prone climate, a scattered and very mobile population, no central government, widespread insecurity, minimal infrastructure and non-existent public services: these are not very promising conditions for sustainable development. Despite these factors, Somali pastoral society has developed a sustainable and expanding system for marketing milk, one that supplies the cities with a basic food, and supports the livelihoods of many people in both rural and urban areas.

Food security

For the herders, selling sheep and goats is a major income source. But animal sales follow seasonal patterns, and are disrupted by Arab countries' bans on livestock imports from Somalia. For many herders, the daily income from milk marketing is a vital complement to livestock sales, as well as enabling them to buy staple foods and other items. It also enables them to cope better with hazards such as drought, epidemics and conflict, due to the credit system that is attached to milk marketing. By exchanging milk for grain, the women can better feed their families. Milk marketing also serves the nutritional needs of urban residents, who are in dire need of animal proteins.

Milk sales are normally related to the need to earn money; when milk prices are low, many herders stop selling their milk and consume it themselves instead. That explains why in the dry season, 30% of the milk produced is sold, while in the rainy season, when more milk is available, only 27% is sold. It also explains why poorer households market a greater share of their milk: they are in more need of money. Exchanging milk for cereals is a good strategy in caloric terms; milk is rich in protein but low in calories: one kilogram of camel milk has only about 700 calories, while a kilo of rice or wheat has about 3 300–3 500 calories. Changes in terms of trade between these two products are critical, but are generally favourable to herders.

Environment

From an environmental perspective, the milk marketing system stimulates rather than constrains livestock mobility, which is vital to allow the natural vegetation to recover. The producers' herds are not tied to one location, but move in search of forage and water. The primary collectors follow them. In the long dry season, many camel herds are to be found along the eastern coast, far away from the main towns. Milk marketing remunerates productivity, and thus provides incentives to herd mobility.

A new pattern of herd management seems to have emerged. Previously, young herders would take milking camels far away from the hut, leaving flocks of sheep and goats to graze nearby. Now, the lactating camels are being split into two groups: one sent to distant pastures, and the other kept near the hut to produce milk for sale. In addition, herders are increasingly using cement-lined reservoirs to water sheep and goats, so these animals are less likely to be herded as far as the coastal belt.

Gender

The marketing system is also sustainable because it builds on and reinforces the social capital of Somali pastoral society. The clan system governs resource access, camel management,

stock trading and other important aspects of Somali pastoralism. Men, with their strong clan affiliation, cannot easily buy and sell milk from other clans' camels without detailed negotiations between the clans involved. This does happen, but only to a limited extent. Both men and camels are embedded in clan-related mechanisms, so arrangements for milk trading have to be continuously renegotiated between the clan leaders of the different herds grazing in an area. This would imply very high transaction costs.

Women, on the other hand, face none of these problems. Their affiliation to the clan system is weak: they do not belong to a clan, so do not embody its interests. They cannot be seen as "competitors" by members of other clans. The only arrangements they have to undertake with local pastoralists are purely commercial: the purchase price, the form of payment, and options for credit. For them, transaction costs are minimal.

We can thus see a clear dualism between production and marketing. Men manage camels, but women sell the milk. Women manage sheep and goats, but men buy and sell them. These complementary roles share power and responsibility within the household and give the system a series of checks and balances that are critical to ensure its sustainability.

MORE INFORMATION

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