"Cash from Camel Milk: The Impact of Commercial Camel Milk Sales on Garre and Gaaljacel Camel Pastoralism in Southern Somalia"

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The production system of the two agropastoral societies in this study is based on camel husbandry but also includes important cattle and crop components. The author looks at the access of households to the basic productive assets, livestock herds and agricultural plots, and at their distribution between households. The study examines the camel milk offtake which is possible within the traditional pastoral production system. The incidence and frequency of milk sales according to season is discussed, and an attempt is made to assess the amounts which are consumed and sold by sample households of different wealth strata. Finally, the impact of commercial marketing on the local societies is discussed.

Introduction

Socio-economic research among Somali camel pastoralists has been scarce. This paper aims to broaden the knowledge on Somali camel production systems by presenting a case study of two communities on which until now little information has been available: the Garre and Gaaljacel in the interriverine area of southern Somalia (see Map 1). Their case is particularly interesting for two reasons:

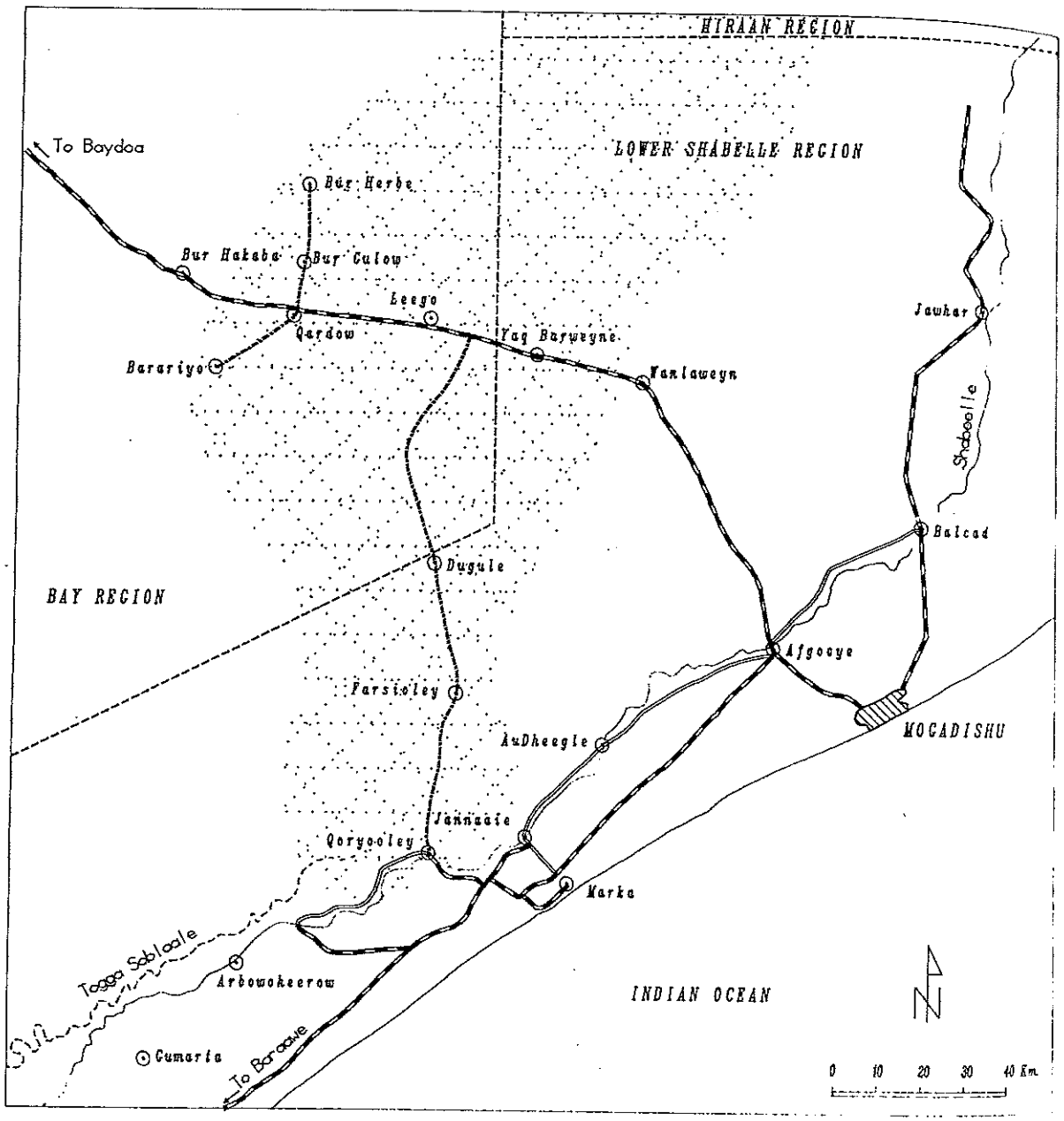
Firstly, despite the heavy emphasis on camel husbandry the production system of the Garre and Gaaljacel includes important cattle and crop components. It is thus an example of a maximally diversified agropastoral system entailing very complex household strategies. Thus, the Garre and Gaaljacel differ both from the northern and central Somali and the agropastoralists of the Bay region; from the former by their agropastoralism, from the latter by their heavier emphasis on camels, their higher mobility and a segmentary agnatic organization closer to the northern clan families.

Secondly, the majority of Garre and Gaaljacel camel owners in the study area have been integrated, over the last 20 years, into the commercial camel milk trade supplying Mogadishu. While most pastoral producers in Africa have become petty commodity producers (or "pastoral peasants") linked to the national markets, their integration has usually been through the market for animals (or meat) rather than milk.

It was mainly the second aspect which was the focus of a study carried out for the Somali-Swedish Camel Research Project located in the Somali Academy of Sciences and Arts (SOMAC) and financed by SAREC. In particular, the study sought to assess the amounts of camel milk produced, consumed, and sold in the Garre/Gaaljacel system, the characteristics of households selling milk, and the actual and potential impacts of the commercialization of camel milk. In this essay, the commercial sale of milk it looked at exclusively from the producer side. Fuller reports have been given elsewhere on Garre/Gaaljacel agropastoral strategies (Herren, 1990a), and the marketing network itself (Herren, 1990b).

Although there has been a tendency in pastoral studies to see populations as fairly homogeneous, and to give generalized descriptions of pastoral production systems, the SOMAC study deliberately looked at the distribution of wealth between households. As this was found to be very skewed, I have tried wherever possible, to differentiate

Map 1. *Area of Garre and Gaaljacel Camel Pastoralism in Southern Somalia*



between the socio-economic strategies of different wealth strata in Garre and Gaaljacel society.

Method and Setting

Fieldwork was carried out for 3 weeks in 1987 and for 10 weeks in 1988. Both periods of fieldwork fell into the winter/spring dry season (*jilaal*), so that the system was not seen in operation at its peak time at the end of the summer wet season (*gu/deyr* interface).

Data are based on an iterative methodology building up a qualitative understanding through informal interviews with camel owners, milk traders and other people in the area. In the second period of fieldwork, a preliminary appraisal in 1988 allowed the establishment of specific interview guidelines. Interview partners were chosen by chance, mostly at the well or in the village of Yaq Bariweyne, or during 1-day field trips within the area. Given the terms of reference, the study focused exclusively on camel-owning households and disregarded pastoralists owning cattle and small stock. In the sample, poor camel owners may have been considerably underrepresented, as they tend to stay near their fields at the end of *jilaal* rather than in the pasture areas near to Yaq Bariweyne. It was possible to talk to roughly 140 camel owners/herders about a core set of issues. Although there may be differences between the Garre and Gaaljacel communities, it was not possible to differentiate them in the interviews, and they are therefore treated as one community here.

The area of study straddles three administrative regions: Lower Shabelle, Bay, and Hiraan (see Map 1). Ecologically and by landuse type, it is delimited on the eastern and southeastern side by the extensive crop lands of Wanlaweyn area (*Dafeed*) and the Shabelle riverine fringe. On the western side, it is similarly bounded by the croplands around Bur Hakaba. In the north, towards the rangelands of Hiraan region, and the south, towards the large interriverine grazing lands known as *dooy*, the area is not delimited by a change in ecological conditions or landuse. Here, the boundary is given by a social boundary of the production system; although ownership of grazing land is vested in the state and access is open to all Somali citizens, most herders prefer to stay in the area they consider as their home, and where they have longstanding traditional and social relations.

Rainfall is above 600mm inland of Qoryooley and decreases towards the northwest to about 400–450mm, with the usual bimodal distribution of rainfall characteristic of most Somalia. There are four marked seasons, the dry *jilaal* (December–March) and *hagai* (July–September) and the wet *gu* (April–June) and *deyr* (September-November). It should however be noted that the seasons may not be very discrete in a given year. Thus it seems that around Yaq Bariweyne, both the *hagai* seasons of 1987 and 1988 had at least as much rainfall as the following *deyr* seasons.

The Distribution of Agropastoral Wealth

The Basic Productive Unit—the Household (*qoys*)

In both Garre and Gaaljacel society, the basic productive and decision-making unit is the household, usually called *qoys* in the study area. Although most informants maintained that a *goys* basically consists of a man and his wife (or wives) and children, an independent *goys* is not usually formed with the marriage of a son. As among northern Somali, and in line with the slow growth of camel herds, new *goys* are only gradually established as "... the sons *grow into rights* in their father's herd" (Lewis, 1961, emphasis mine). As long as a father is alive, married sons tend to reside with him and the camel herd, though *de jure* allocated, is kept and herded as a single unit, the father's. Thus, the household development cycle usually entails a fairly long period of patrilineal extension during which the term *goys* refers both to the whole and the sub-

units. In the following, a household was defined restrictively as a married man, his wife (or wives) and unmarried children. In a sample of 152 *goys*, only about 10 percent included dependents not belonging to the agnatic core, and only 7 percent included a hired herder (*gowsaar*).

Households usually reside in camps (or hamlets) made up of more than one household. The 152 sample households lived in 70 camps at the time of study, i.e. camps were made up of 2.2 households on average. While about one-fifth of the households resided alone, three-quarters lived with close agnatic relatives. The use of the term *reer*, which also means an agnatic segment of any structural level, for a camp underlines the basic agnatic tendency of camp formation.

The Distribution of Wealth

Here the type of assets the sample households relied upon is first discussed. Then, the size of herds and of fields is studied more closely in an attempt to stratify the population into wealth classes. As can be seen in Table 1, not many households owned only camels. While their camel holdings were very close to the average of the whole sample, such households tended to be on the lower side of the wealth spectrum, as they did not own other assets. Thus, a "camel-only strategy" tended to indicate a failure to reasonably diversify the household economy.

A combination of only camels and cattle was uncommon as the requirements of camel and cattle husbandry are so diverse. The same is true for a camels-fields-only strategy. If a household is forced to or decides to rely on two assets only, those most easily combined are clearly camels and small stock; 72 percent of the sample owned this combination. A combination of three assets was most common. Again, the combination of camels-fields-cattle was rare because of the diverse requirements. If a household is so well endowed, it will usually also include small stock and thus have all four assets. A strategy combining the easily managed camels and small stock combination diversified by a field, and the livestock-only strategy were equally common. A good quarter of households had all four assets, which implies a heavy labour demand. Not surprisingly, most of these households were quite wealthy or rich.

Table 1. *Composition of assets of camel-owning households (N=90)*

Percentage of Households Owning			Percentage of Households Owning		
A. Camels only		17	Small Stock		72
B. Camels–Cattle	3		Cattle	Plus any other assets	49
Camels–Small Stock	17	23	Field		49
Camels–Field	3				
C. Camels–Cattle–Small Stock	15				
Camels–Cattle-Field	4	33			
Camels–Field–Small Stock	14				
D. All 4 Assets		27			
Total		100			

Almost three-quarters of the households owned small stock. These are easily combined with camels in the operation of pastoralism, are the necessary "small change" in the pastoral system, and the main source of meat from domestic slaughter. About half of the households had cattle. In the sample, cattle ownership was directly proportional to wealth, and thus a sign of a successful diversification of assets. Finally, half of the households in the sample owned a field (or fields), and were thus agropastoral. This is not a new phenomenon; most informants stated that the field was cleared before the generation of their grandfather. Field ownership is thus not, as in many other cases, a result of impoverishment. In the sample, field ownership was not related to wealth in livestock; about equal proportions of all wealth strata owned fields.

In order to assess the inequality in the distribution of agropastoral wealth, the sample was stratified into three ranks of equal size on the basis of livestock holdings only (disregarding agricultural plots and non-pastoral income). Table 2 shows rank-specific model herds containing all three types of livestock. As has been shown above, not every household in fact owns the full set of assets.

First, it may be noted that field sizes are small in comparison to the adjacent Bay area, where the typical field size is around 2 ha (Massey, 1987). This reflects the subordinate importance of agriculture among camel-owning households. Second, the average herd size of about 37 LSU/household (or 7 LSU/capita) is comparable to holdings reported from the Central Rangelands (Howze, 1989) and from Kenyan pastoralists in similar ecological conditions (Herren, 1990c).

However, the distribution of wealth was very skewed. The poorest third of the sample owned only 10 percent of the total domestic animal biomass, while the richest third owned 60 percent. The difference was greater for both types of large stock, but less for small stock. There is apparently a "target size" of small stock herds; if a household has enough small stock for household slaughter and for covering small cash requirements, it will not further invest in small stock. In conclusion, as in the Central Rangelands (cf. Howze, *ibid.*), herd and field sizes were clearly insufficient for the poorest third of the households. It is doubtful whether the poorest households could survive without a client relation to richer households or remittances from migrant labourers. Labour migration was not surveyed in the study, but Hussein (1990) has shown that it was significant in the late 1980s.

Table 2. *Model livestock holdings and field sizes, by wealth rank**

Wealth Rank	Camels	Cattle	Small Stock	Livestock Units**	Percentage of Area Herd Owned	Field Size (ha)
Rich	49	27	42	68	60	0.8
Medium	25	11	30	34	30	0.5
Poor	9	1	20	12	10	0.2
Mean	26	13	30	37		

*Based on a sample of 90 households

**While camel herds could in most cases be counted, the number of small stock and cattle and the size of fields are based on producer estimates. Conversion to Livestock Units (LSU): 1 head of small stock=0.17 LSU, 1 head of cattle=0.71 LSU, 1 camel=0.87 LSU (following an ILCA conversion rate based on metabolic weights developed by Bekure et al., n.d.).

Camel Husbandry

In this section, an attempt is made to assess the reproductive performance of the camel as a crucial factor affecting potential milk offtake. This is done by looking at herders' breeding strategy and the parturition intervals recorded for a sample of camel herds. Unfortunately, it was not possible to assess camel herd structures from direct observation. These were therefore assumed to be similar to those reported from other subsistence-oriented pastoral systems in southern or central Somalia, as herds are geared towards maximum production of both offspring and milk. For the whole region, the proportion of females has consistently been reported to be between 76 and 82 percent (Watson, 1986; Hussein, 1987; Boykin, 1988; Elmi, 1989; Howze, 1989). Based on the same data, we can expect a proportion of breeding females of about 40 percent.

The Camel Breeding Strategy

Camel owners widely agreed on the proper way to breed camels, and their preference underlines the subsistence and dairy character of their outlook. Ideally, camels should become pregnant in one of the wet seasons (*gu* or *deyr*), and therefore give birth in the corresponding wet season of the following year. A dam should then be milked for 1 year and be served again. Thus, a camel would have a calf every second year. If a female does not become pregnant 1 year after the birth of the last calf, it continues to be milked, but the calf is then usually weaned. The herder then tries to cover the dam in every consecutive wet season. In 1988/89, in a sample from Yaq Bariweyne (n=171 calves), 56 percent of the females giving birth had done so in *gu*, and 44 percent in *deyr*. Comparative data (Hussein, 1987; Elmi, 1989) note a higher proportion of births in *gu*, but given the fact that the *deyr* of 1988 had been particularly dry, it is probable that in the study area, pregnancies are usually more evenly distributed between the two rainy seasons, thereby assuring an even supply of milk to the household.

Reproductive Performance

Although the birth of a calf every other year is the clear aim of herders, this is not very usual. In a smaller sample of 14 herds, a closer look was therefore taken at the interval between birth and the onset of the next pregnancy. Of 77 dams that had given birth in *gu* 1987, and should ideally have become pregnant in *gu* or at least *deyr* 1988, 17 (22 percent) had failed to do so. Of 67 dams that had given birth in *deyr* 1987, and should therefore have got pregnant in deyr 1988, 21 (45 percent) had failed to do so. Thus, roughly a-quarter of the females did not become pregnant as intended. If this pattern is extrapolated, the average parturition interval is at least 28 months. If miscarriages and completely barren females are taken into account, the actual average parturition interval is even longer. While the target parturition interval of 24 months is also not reached in other African camel systems (Wilson, 1989 gives intervals of 25–30 months for Niger and 26.8–28.4 months for Kenya), the performance in the study area seems particularly low.

If we assume, following Hjort and Hussein (1986), that camels have their first calf at about the age of 6 years and the last calf at the age of about 20 years, the above parturition interval results in an annual calving rate (live births per mature female) of 0.42 or less. The calving rate of 0.72 used by Hjort and Hussein in their herd modelling calculations therefore seems optimistic. The same is true of other reports which also assume calving rates of 0.5 and above (e.g. USAID Bay Region Survey, USAID Bay Region Project Appraisal, Southern Rangelands Survey, all cited in Hashi and Mahamud, 1988). Two recent reports on the Central Rangelands (Boykin, 1988; Mascott, 1986) both report a calving rate of 0.35, which is more in line with the above extrapolation.

An important implication for the discussion on milk production is that with the above calving rate, the proportion of lac-

tating females (not to be confused with the females actually milked) is theoretically between 15 and 22 percent in the study area—those having calved within the last year plus about 25 percent of this number which have not become pregnant and continue to be milked. This is in line with the data in Hussein (1987), but somewhat higher than recent survey data from the Central Rangelands which give lower percentages of 12 percent (Howze, 1989), and 13 percent (Hargus, 1989). In Section 5, some possible reasons for the low productive performance and, therefore, for the low potential milk offtake from camel herds in the study area are discussed. In general, however, the results underline the dire lack of and need for detailed studies on the constraints affecting camel productivity in Somalia.

Given the above data on reproductive performance, we can expect low camel herd growth rates. Concomitantly, the margin for voluntary offtake is low as well. Hjort and Hussein's simulation (*ibid.*) gives a potential growth rate of 4.9 percent, but as has been shown above, their assumptions are on the optimistic side. Similarly, Boykin (1983) calculates a growth rate of about 5.5 percent for the Central Rangelands. An overall annual herd growth rate of 13 percent as implied in the data of one survey in southern Somalia (LRDC, 1985) seems dubiously high. Although it was beyond the scope of the present survey to study the offtake from camel herds, recall data on camel sales from *gu* 1988 to *jilaal* 1989 were collected from 50 households whose camel herds could be counted at the Yaq Bariweyne well. From these herds, the commercial offtake rate was 3.5–5.0 percent, which seems rather high given the potential herd growth rates discussed above. Moreover, sales rates were even higher (7.0–8.5 percent) in poor households, which seems unsustainabe. In conclusion, the results again underline the dire need for reliable camel productivity studies in Somalia.

Camel Milk Production

Calf Management

The most radical decision that can be taken to increase milk offtake (or to reduce stress on or even save a dam) is to slaughter a calf, and take all the milk for the family. The calves that are culled are predominantly male, but also female calves can be culled. From the Central Rangelands, Elmi (1989) reports that 83 percent of male calves and 25 percent of female calves were slaughtered at birth. This pattern produces the typical age/sex structure of Somali herds (cf. Watson, 1986).

In the study area, the practice (and the dam subject to it) is called *igar*. In 21 herds surveyed, three-quarters had at least one *igar* dam. The decision to cull a calf depends heavily on the assessment of the season: in 1988/89, 10 percent of all *gu*-calves had been slaughtered, compared to 30 percent of all *deyr*-calves. The *deyr* of 1988 was considered as particularly bad, and so therefore were chances of calf survival. In 80 percent of cases, the reason given was to increase milk offtake, while in 16 percent of cases, the calf was needed for a herd fertility ceremony (*xus*). In only a few cases was the calf slaughtered to save the dam.

As camel dams only let down their milk if they smell the calf and after it has suckled, a special effort has to be made to keep a dam lactating when its calf has been slaughtered. In the study area, herders used two methods (cf. Hashi, 1984; Elmi, 1989). Either the calf's skin or a puppet made of the skin was used to stimulate the dam (a practice called *magaar* or *saar*), or the dam was trained to accept a foster calf (called *sidig*) by a variety of methods well described also by Elmi (1989). Herders claimed that fostering was not very often necessary. Indeed, cases of *sidig* were only reported in 10 percent of herds surveyed.

The Management of Milk Offtake

The daily and seasonal milk offtake for human consumption is the result of a subtle fine-tuning of offtake from each individual

dam. Actual daily offtake depends on the presence or absence of a calf, the condition of both the calf and the mother, the stage of lactation, the pasture situation, and the needs of the household. The offtake is regulated on the one hand by restricting the access of the calves, on the other hand by the frequency and difficulty of milking.

In the study area, a combination of two methods is employed to restrict the access of the calves:

In the large majority of cases, calves are, throughout the year, separated from their mothers during the night and kept in a special enclosure. During the day, and in a few cases during the night, calves stay with their dams. Therefore, a second method has to be used.

The second method entails two, three or four teats being tied (*mar*, noun *marein*) with soft bark (*maraq*) of an acacia species, to prevent the calf from suckling. All teats are alternately suckled and milked to secure a regular milk flow.

Over the first few weeks, newborn calves are not restricted, but sometimes separated to prevent them from drinking too much. Then, two teats are usually tied during the day until the calf has reached an age of 9 months. In the case of a foster calf, one of the dams may alternately have all four teats tied. During particularly dry or wet spells, the herder may decide to leave more or less milk to the calf. At the onset of the rainy season 1 year after the calf's birth, three teats or even all may be tied.

It was stated above that it is the preferred herder strategy to mate a dam 1 year after the birth of the calf. Most herders claimed that lactation stops about one month after successful mating, but some maintained that a pregnant camel can also continue to lactate, but not in useful quantities (cf. Hashi, 1984). It seems that if a dam becomes pregnant, weaning comes more or less naturally, as dams run dry or begin to resist suckling. Calves insisting strongly are weaned by the same more forceful methods as reported by Elmi (1989). If the dam does not become pregnant, the herder has to decide whether to allow the calf to continue to suckle, or whether to wean it. This seems to depend on the condition of the calf. In the sample, divergent strategies were recorded. However, a majority of herders claimed that when preparing a dam for mating, it is good to wean the calf. A few allowed the calves to continue to suckle for more than 12 months, or even more than 18 months, but then milk yields are insignificant in any case.

Reports on camel milking in Somalia have mostly claimed that camels are milked twice a day, in the morning and evening (Hussein, 1987; Elmi, 1989). Hashi (1984) agrees but adds that more frequent milking is possible "during favourable periods in early lactation". The information collected in Yaq Bariweyne clearly shows that the decision-making is more sophisticated than suggested by such general statements. Table 3 shows the milking frequencies recorded in two phases of the 1989 *jilaal*. These figures reflect what informants claimed to do with their milking camels in general; individual camels may however be treated differently.

Table 3. *Frequency of camel milking per day, jilaal 1989*

Percentage of Households Milking	Height of Jilaal	After First Rains
1x/day	40	10
2x/day	35	45
3x/day	25	45
	100 (N=54)	100 (N=30)

At the height of *jilaal*, 40 percent of households had reduced milking to once, mostly in the morning, while 35 percent continued to milk twice. However, many informants milking twice made it clear that they only took small amounts in the evening, often less than a quarter of the mornings amount. This was expressed by saying that in the evening, they took only for *cadees*, milk to whiten the tea. Nevertheless, about a quarter of households still milked their camels three times, taking at least a small amount for direct consumption at lunch time. There was no clear correlation of this pattern with any single variable such as wealth, asset composition, or family size. After the first rains, the large majority increased the milking frequency. Most informants with whom the pattern was discussed claimed that in the wet seasons and at least in the first part of *hagai*, camels would be milked three times if conditions allowed. Even then, the morning and evening milkings are the main milkings, while at lunch time offtake is smaller, and often for the direct consumption of herders. In the above sample, the frequency of milking was positively correlated with total reported offtake per head and day; camels being milked three times yielded about 25 percent more than those being milked once.

While the proportion of lactating females can be expected to be between 15 and 22 percent of the total herd, the proportion of females actually milked is lower, as not all lactating females can always be milked for human consumption. At the height of the *jilaal* dry season of 1989, the proportion of milked females in the sample was 14 percent. In any case, the difference between the proportion of lactating and milked camels should be taken into account in overall (e.g. national) estimations of camel milk production, at least for the drier half of the year.

Actual Camel Milk Offtake

Unfortunately, the literature on camel milk production is controversial and often muddled by a failure to distinguish between two different issues: total (milked-out) yield and actual offtake for human consumption that still allows the calf to survive and grow. The following paragraphs deal only with actual offtake.

As it was not possible in this study to measure milk offtake, the following discussion is based on informant assessments. The producer estimates were expressed in terms of standard tins (*kombo*) of about 800 ml. As milk is sold by the *kombo*, producers had no difficulty at all in expressing daily offtake in this unit. Producer estimates were highly consistent, which suggests that the information is quite reliable.

Reported Offtake in *Jilaal* 1989

Table 4 summarizes the offtake reported by camel owners during three phases of late *jilaal* 1989 (late March to late April). Offtake at the height of the dry season was very low, less than 1 litre/dam/day if calf survival is to be insured. However, milk production, and thus potential offtake, increased quickly with the onset of the wet season. Within 3

Table 4. *Reported daily milk offtake per dam in late jilaal 1989 in litres, by wealth rank**

Wealth Rank	Height of Jilaal Pasture dry	After first showers Trees/bushes greening	After first good rains Pasture fair
Rich	0.9	1.4	2.7
Medium	0.9	1.3	2.1
Poor	0.9	2.0	3.8
Mean	0.9	1.5	2.8

*Wealth ranks of equal size, based on camel ownership only

weeks, mean offtake increased three-fold. In the driest phase, there was not much difference between wealth ranks. When conditions improved, poorer herders immediately grasped the opportunity of increased offtake (and of higher milk sales), medium-ranked households increased offtake, but apparently left more to the calves, while rich owners could afford to increase offtake for consumption without the need to stress the milking camels.

Estimated Offtake in Lowest and Peak Seasons

About 25 herders were asked to estimate the potential offtake (without impairing the calf) for the height of the *jilaal* dry season, and for the peak production season in late *gu* or early *hagai*. A difference was made between camels with and without a calf (*igar*), and between average milkers and exceptional milkers (called *hoor*).

While an actual *jilaal* offtake of 0.9 litres/day was reported, potential offtake was estimated at 1.2 litres/day. We can therefore expect an offtake of about 1 litres/day or below from a study area camel in the *jilaal* season. In the peak season, the estimated offtake for human consumption was in the area of 4 litres/day. The potential offtake from an *igar* camel was estimated to be 75 percent above that of a camel with calf at the peak season, but in the dry season the difference was estimated to be small.

From exceptional milkers (*hoor*) an offtake about 75 percent above that of average camels can be expected. In *igar* camels, the difference between an average milker and an exceptional milker (*hoor*) is not so marked. This is due to the fact that although all the milk of an *igar* can be taken for consumption, the yield (milked-out) was said to be smaller without the stimulation of the calf. In general, producer estimates tie in well with the yields of exceptional milkers reported by Hussein (1987).

Potential Annual Offtake per Dam

On the basis of the data given above and using a simple linear model of seasonal variation, the potential offtake/dam/annum amounts to 600–700 litres. Unfortunately, comparative data on camel milk offtake for human consumption are scarce and not based on field measurements under traditional circumstances; not surprisingly, estimates vary widely. The calculation for the study area is rather high among available estimates (see Willby, FAO, Government of Somalia, cited in Green and Jamaal, 1987; Hashi and Mahamud, 1988). However, it compares well with the precise measurements of Evans and Atkins (1987) who assessed how much could be taken off on their Kenyan ranch without significantly slowing calf growth. It is possible that pastoralists take more milk and allow for slower calf growth as long as the calf's health is not impaired.

Given the results reported above, the daily offtake of camel milk which is possible in the traditional system is rather low and far from the exaggerated figure of 5 or more litres/day, even in the driest seasons, which was circulating in Somalia at the time of the study. In particular, the assumptions made in the milk-production modelling by Hjort and Hussein (*ibid.*) seem much too optimistic. When the present study data on camel productivity and potential milk offtake are inserted into their model, the number of camels necessary to feed a model family more than doubles from 28 to 68 head, a number few Garre and Gaaljacel households could rely on.

4. Camel Milk Sales

Milk Delivery

In order to sell camel milk, producers have to bring it to one of the collection points along the roads in the area. Generally, the sale of milk is women's work, even if men who happen to go to one of the collection points for other purposes may occasionally carry milk for sale. In the dry season, milk sales can partly be integrated into the female routine of fetching domestic water from water points along the same roads (such as Yaq Bariweyne, Madahmarudi, or Leego).

In other places and periods, special milk-sale trips have to be made.

Camps are usually quite far from sales points and distances covered for milk sales are considerable in all seasons. In *jilaal* 1989, camel milk was brought for sale to Yaq Bariweyne from as far as 25km. The labour demand in selling milk is therefore high, and a number of households could not sell milk at certain times not only because of the distance, but because they lacked the human resources to carry the milk. Within camps, rotational arrangements are common, with single households being alternately responsible for carrying and selling all of the camps milk. The selling of milk certainly has a considerable impact on household labour allocation.

Proportion of Households Selling Camel Milk

Tables 5 and 6 present the proportions of households which reported selling camel milk in the four seasons from *gu* 1988 to *jilaal* 1989. Of course, camel milk sales depend heavily upon the rainfall and pasture conditions, and could be quite different in another year.

In any season, more than half of the households sampled were selling milk, but more did so in the dry seasons, especially in *jilaal*. Table 6 details the same set of data, and takes a closer look at the seasonal pattern of milk sales at the household level.

Over a-quarter of the households sold milk throughout the year, and over half of the households sold milk during more than half of the year. Conversely, only an irrelevant minority of less than 1 percent claimed to have never sold milk during 1988/89. Among the households selling milk in two or three seasons, the large majority sold in both dry seasons or at least in *jilaal*. Households who could afford to sell only in one season did so in one of the dry seasons. Only very few households sold milk only in one of the wet seasons. These households were either very rich, and only occasionally sold some wet season surplus, or so poor that they had an idiosyncratic herd composition (and milk production).

These results suggest that camel milk sales are not a reaction to a wet season surplus, but to a dry season need for cash, in order to buy grain food and sugar. In order to test this hypothesis, an attempt was made

Table 5. *Proportion of households selling camel milk, by season, 1988/89(N=88)*

Percentage of Households selling milk	gu	hagai	deyr	jilaal
	56	64	58	83

Table 6. *Seasonal pattern of camel milk sales 1988/89 (N=88)*

Percentage of Households Selling Milk in	4 Seasons	3 Seasons	2 Seasons	1 Season	Never	TOTAL
Both Dry Seasons	28	17	9	-	-	54
Jilaal Dry Season	-	7	9	11	-	27
Hagai Dry Season	-	2	5	5	-	12
No Dry Seasons	-	-	<1	5	<1	7
TOTAL	28	26	24	21	<1	100

to ascertain the amounts which different wealth strata were selling in 1988/89.

Amounts and Proportions Sold in 1988/89

In *jilaal* 1989, 117 camel owners were asked to report the amount of milk they currently sold out of their total offtake. In Table 7, the period of recording has been divided into two phases in order to show the increase in both production and sale after the first rains.

The table shows that households do indeed sell a higher a proportion of their production, the scarcer it is. The fact that three-quarters of the camel milk was sold at the height of the dry season begs the question of the nutritional impact of sales, which will be discussed below.

At the height of *jilaal* there was not much difference between wealth ranks in the proportion of camel milk sold. The amounts, however, differed considerably. Rich households consumed three times more than the poor (even if we take the larger size of rich households into account), but still managed to have a higher sales rate. The reaction to the increased offtake possible after the first rains is interesting and shows the place of milk sales within household strategies. The rich households could reduce their sales rate, and at the same time increase both their consumption and their sales. The medium-ranked households considerably reduced their sales, both absolutely and proportionally, but increased their consumption to the level of the rich; in other words, they were willing to at least temporarily reduce their cash income and drink the highly valued camel milk. The poor households just managed to keep their low level of consumption, but increased their sales rate to generate the necessary cash income.

An interesting supplementary note to this table is that in the period before the rains, 12 percent of households claimed to sell all their camel milk, only keeping very small amounts for whitening their tea (*cadees*). All of these households were only milking once, early in the morning. They were either fairly rich, and substituted goat milk for camel milk in their consumption, or very poor, and consumed no milk during this season.

In order to get an idea of milk sales over the year, 88 herders were asked to estimate the amounts they had sold in each season during 1988/89. The result is shown in Table 8. It shows both the average amount sold by those actually selling, the proportion of which is decreasing in the wetter seasons (see above), and the average of all households.

Not surprisingly, the average amount sold increased in the wet seasons (*gu, deyr*) although *deyr* and *hagai* had been atypical in 1988; while *hagai* was above average in rainfall, *deyr* was considered as below normal. The increase in sales (market output) in the wet seasons was however not dramatic. It suggests that many households sell

Table 7. *Sale and consumption of camel milk (in litres) in jilaal 1989, by wealth rank*

Wealth Rank	Before First Rains			After First Rains		
	Amount Sold (l)	Amount Consumed (l)	Percent Sold	Amount Sold (l)	Amount Consumed (l)	Percent Sold
Rich	5.1	1.8	80	6.7	2.8	70
Medium	2.3	1.0	70	1.8	2.7	40
Poor	1.4	0.6	70	2.4	0.6	80
Mean	2.9	1.0	74	3.4	1.9	63

Table 8. *Average amounts sold by season (in litres) in 1988/89 (N=88)*

	jilaal 1989	deyr 1988	hagai 1988	gu 1988
Average of households actually selling	2.9	4.3	4.2	4.9
Average of households in the sample	2.7	3.6	3.7	4.0

milk with a target income in sight, i.e. when the income from milk is sufficient to procure the daily necessities of grain, sugar, tea and some basic consumer goods, they do not sell further milk, but drink it themselves. If we look at the average amount sold over the whole sample including households not selling milk, the seasonal fluctuation was even less, as the increase in the amounts sold was balanced by the decline in households selling at all. On the basis of producer estimates of sales, there was only a 50 percent increase from the lowest market output in *jilaal* to the peak market output in *gu*/early *hagai*.

The Importance of Milk Sales in Cash Incomes

Given the time constraints of the study, a reasonable estimate of total income was only possible for a sample of 21 households. Although income assessments based on single recall interviews are highly problematic, the result nevertheless underlined the high importance of camel milk sales in the study area. In 16 of the 21 sample households (76 percent), milk sales clearly dominated over all other income sources. In two other cases, milk sales and other incomes generated comparable amounts of cash. In the remaining three cases, camel sales dominated over milk sales. However, in two of these cases, the households concerned were very wealthy, and income from milk sales was still considerable in absolute terms.

The Impact of Milk Sales

In discussions about the development of the Mogadishu-based milk trade network in the study area, camel owners made it clear that its inception was due to the tarmacing of the Afgooye-Baydoa road in the early 1970s. Although the livestock losses in the disastrous drought of 1974/5 (called *dabardheere*) increased the reliance on milk sales, most camel owners were adamant that milk sales were preferable to livestock sales, as the former did not deplete the herds. At the same time, they also agreed that even prior to the road surfacing, the demand for a number of goods had been increasing among the pastoralists, and the new road then also increased the supply. In the words of many elders, "people wanted to sell milk to buy sugar, clothes, medicine, and other 'things of the town'". This final section aims to trace the impact of the commercialization of milk on the local socioe-conomic system.

The Impact on Camel Management and Productivity

Most informants maintained that camel milk sales had not radically altered their way of life, but on the other hand agreed that camp movements now tended to take the location of milk collection points into account. Interestingly, many talked about camel milk sales in terms of a trade-off between the interests of people and of camels. In the words of one elder: "Selling milk is good for people, but it is bad for camels" (Ahmed Usman, 14 April, 1989).

The disadvantage for camels was seen in the need to stay nearer to villages, where pasture is less abundant due to fields, charcoal clearings, and high livestock densities. In terms of productivity, this has resulted in camels being weaker and thus more susceptible to disease, mainly in the dry seasons. According to many herders, mortality has become higher and fertility lower; it has become more difficult to successfully mate camels. Interestingly, there was a common complaint about the proliferation

of charcoaling sites, not so much because of forage, but because camels tended to tread on thorns in these places. Of course, it is impossible to verify all these claims in the absence of any baseline productivity data.

The Impact on Camel Use and Ownership

Within the limited time, it was impossible to gauge whether milk sales have had an impact on the ownership of camels or on the inheritance pattern. However, there readily emerged one domain where herders felt a change had taken place; this was in the practice of lending a milking camel to a needy friend or relative, called *hirmansi*. In a *hirmansi* loan, a milking camel is given for an unspecified period, depending on the situation of both giver and receiver. If the receiver has enough lactating camels when the *hirmansi* dam runs dry, it is often returned or claimed back; if not, it is left with the receiver for another pregnancy cycle or even longer. The calf may then be returned before the mother.

Most elders claimed that *hirmansi* had become rarer, but they disagreed about the reasons. A minority linked its decline to declining camel numbers in general, but a majority linked it to the commercialization of camel milk. People were said to have become more reluctant to give out milking camels for use, as they now wanted and needed the cash from sales. Another frequent opinion was that, at the same time, the circle of people to whom one would give *hirmansi* had contracted to a close agnatic and affinal core.

Within a sample of 19 owners with which *hirmansi* was discussed, 8 had given out a total of 14 camels. Overall, only 4 percent of the mature females in the sample herds were on loan for milking. More than half of *hirmansi* loans had been given within a close agnatic core. It is clear that a reduction in security mechanisms like *hirmansi* can in the long run undermine the drought recovery potential of many households. There were however no signs that the decline in *hirmansi* was decisive, or that it was part of a wider erosion of social networks that are important for pastoral survival.

The Impact on Labour

It has been mentioned that bringing camel milk to the collection points and selling it is a women's task. As milk sales do not in any indirect way reduce demands on female labour, we can assume that women generally have to work more than before, and are more often away from the camp on the long daily sales trips. Unfortunately, it was only possible to talk about this issue with men. Not surprisingly, they did not feel that the women's work load had increased, nor did they complain about any negative secondary impacts of the diversion of more female labour towards milk-selling activities.

The Nutritional Impact

It was obvious that the increase in milk sales had changed the dietary patterns of the pastoralists of the study area. They certainly consumed more sorghum and sugar than in the past, and rice had also become appreciated. The focus of this section is the impact on domestic milk and protein consumption, especially in the most difficult *jilaal* season.

Table 9 shows the proportion which camel milk contributed at the height of *jilaal* 1989 to the recommended daily intake (RDI) of calories and protein defined by the FAO/WHO (FAO 1973). Of course, many households have additional access to small quantities of goat milk, even in the dry season, and to unknown amounts of meat from both voluntary and emergency slaughter. The caloric requirements above the level provided by milk and meat from livestock are met by grains (mainly sorghum) and to a considerable extent, sugar.

At the height of the dry season, camel milk was clearly not a staple food. Its contribution to the daily energy requirements was very small. Without sales, this proportion could have been about three times higher, but would still not have reached a third of requirements. However, the low energy intake from milk could easily be made up with sorghum bought from the

...ts or produced in one's own field. At ... 1988/89 level of sales, the contribution ... camel milk to protein requirements was ... below 35 percent of the recommended level. However, if it is assumed that at least half of the energy deficit is covered by sorghum, the total daily intake of protein was assured even for the poor households.

Conclusion

The Garre and Gaaljacel are examples of pastoral communities heavily integrated into national markets, even though they may at first sight seem very remote and unaffected. As in many other such systems, the distribution of (agro)pastoral resources is very skewed, so that the herds of the poorest third of the population are not sufficient for these households to survive on them alone. With regard to camel husbandry, it has been shown that performance is fairly low; in particular, parturition intervals are very long, depressing the proportion of lactating females in the herd to only 15–20 percent.

*Table 9. Contribution of camel milk to recommended daily intake (RDI) of energy and protein in Jilaal 1989, with and without milk sales, by wealth rank**

Wealth Rank	Percent Contribution of Camel Milk to RDI of Energy		Percent Contribution of Camel Milk to RDI of Protein	
	With Sales	Without Sales	With Sales	Without Sales
Rich	10	35	35	130
Medium	5	20	25	75
Poor	>5	15	15	50

*The number of people per household have been converted into "Average Adult Male Equivalents" (AAME) based on FAO conversion rates (Nestel, 1985). The recommended daily intake (RDI) for one AAME was assumed to be 2520 kcal and 30g protein per day (FAO, 1973). Camel milk has been assumed to contain about 600 kcal/litre, although it might be even lower in the dry seasons (Galvin, 1984) and 2.7 percent protein (Mohamed, 1985).

Although the contribution of milk to energy and protein intake was low in a *jilaal* like that of 1989, the overall intake seemed sufficient, even for the poor. In general, the conversion of milk calories into grain calories by sales was favourable. In *jilaal* when the necessity to buy grains was highest, 1 kcal of milk bought up to 8 kcal of grains, and in the preceding wet season, gu, this rate was over 1:3.5. It was difficult to assess whether the terms of trade had significantly changed over time. For the period up to the mid-1980s, Green and Jamal (1987) have found a generally favourable development of the terms of trade between milk and pastoral consumer goods, mainly grains. From 1986–1989, however, the price for sorghum had increased five-fold, while that of camel milk had only doubled.

The camel milk offtake which is possible from Garre and Gaaljacel herds is also low; it fluctuates between 1 and 4 litres/day/dam over the seasons. At least in the dry seasons, camel milk is not a staple food; in 1989 it contributed less than 10 percent of daily energy requirements in rich households, while poor households consumed almost no camel milk. In the large majority of households, camel milk sales were the dominant source of cash income to buy sorghum, sugar, and other daily necessities. Sales were proportionally highest in the dry

season when milk was most scarce; then, even rich households sold 70 percent of their camel milk production.

Almost all herders agreed that their market integration had been voluntary and that selling milk was preferable to selling livestock. Nevertheless, there is evidence that the reduced mobility of camel herds has negatively affected their reproductive performance. Almost certainly, the regular sale of milk has increased the work load of women, and it has negatively affected the loaning of milking stock to needy kin and friends. As the caloric terms of trade between milk and grains have been generally favourable, a direct negative impact of milk commercialization on household nutrition could not be shown, even though the contribution of camel milk to protein intake sank below 35 percent in the *jilaal* of 1989, even in wealthy households.

Finally, the Garre and Gaaljacel households have become dependent on a rather fragile commercial marketing system. It is very probable that the milk supply to Mogadishu has broken down with the heavy fighting which has devastated the capital since 1991, leaving the Garre and Gaaljacel to their own devices. As this paper is published, famine and starvation are widespread in Somalia and the Garre and Gaaljacel may be among the victims.

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