Surviving pastoral decline: pastoral sedentarisation, natural resource management and livelihood diversification in Marsabit District, Northern Kenya Deel: "Vol. I"

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Livestock pastoralism is an important traditional mode of economic production for many groups in sub-Saharan Africa. Traditionally, the use of communally shared rangeland resources and the predominant human reliance on livestock subsistence production are two characteristic features of pastoral herding economies (Torry 1973; Robinson 1985; O’Leary 1985). However, over the years and more so in the recent past, the continued decline in livestock holding per capita has confronted livestock herders with a shortfall in livestock-based subsistence production (Little 1983; Dietz 1987; Fratkin & Roth 1990; Oba 1994; 1997; Mbogoh 1997; Dietz & Salih 1997; Zaal 1998, Salih et al. 2001). A downward trend in livestock assets has had major implications for livestock economies and the food security situation of pastoral households in particular. External factors such as raids and disease epidemics impoverish people through disproportionate herd loss and changes in herd compositions, which perpetuate inter-household inequality, increase the number of herd-poor households, as well as widen the households’ gaps in cash or material income (Hogg 1986; Fratkin & Roth 1990; Oba 1997). Although trade is an old practice among pastoral setting, new strategies to cope with herd loss have emerged: larger households need more marketed livestock off-take in order to smoothen out shortages in current consumption and to meet a wide range of other financial obligations. As a result, pastoralists have been driven into greater dependence on the cash market for food security. In order to gain a thorough understanding of this dependency on the cash market, this chapter pays attention to trends in livestock production and trade. The changes in livestock numbers over time are important for an understanding of the performance of the livestock sector and the contribution it can make towards the welfare of pastoral households. We therefore firstly present trends in livestock population at national level, to provide the national context in which livestock production in Marsabit District evolves. We then continue with the dynamics of livestock production in Marsabit District and in Kenya as a whole, presenting time series data on slaughters, hide and skin production, livestock off-take rates and trade and exports. The subsequent section deals with the economics of livestock trade, with a focus on the role of trade in pastoral household economies and the (relative) livestock prices. We thereby also pay attention to the livestock and grain price ratios and caloric terms of trade. Presenting data from the household survey,
we then provide insights into the trade in milk. Next, we present some trends in livestock trade, to end up with observations concerning the future prospects for livestock trade.

Livestock production dynamics in a national perspective

*National livestock population trends*

Kenyan rangelands support over 25 per cent of the Kenya's human population and over half of the country's livestock population. The livestock sector contributes 10 per cent to the gross domestic product (GDP).

The dynamics of the livestock populations at national level are regulated by six primary variables: births, deaths borne out of natural causes such as rains, droughts and cross-border livestock losses to raids\(^1\), domestic slaughters, exports and imports.\(^2\) The changes in the main livestock populations in absolute numbers, slaughter data and exports since 1961 are available from the official FAO database. Our presentation of the livestock national data is restricted only to these latter variables.

The graph in Figure 10.1 reports livestock population trends in absolute numbers for the three main types of livestock over the last 40 years. The cattle and small stock (sheep and goats) numbers show oscillating trends in growth. If one examines the entire period, the goat population experienced a growth rate of 1.3 per cent (from about 5 to about 8 million) per year, sheep of about 1 per cent (from about 4 to 6 million), cattle of 1.6 per cent (from about 7 to 14 million) and camels an annual growth rate of 2.2 per cent (from about 0.4 to 0.8 million). Especially the cattle and small stock numbers grew gradually during the 1960s, with small stock populations being higher than cattle populations. The small stock population started at a higher level than cattle in the 1960s, but experienced a decline in the late 1960s when it fell below cattle populations. This started a continuous downward trend in small stock populations until 1974 when it reached its ebb and afterwards started to experience a positive growth. The decline in small stock numbers might be accounted for by goat diseases reported during this period and the adverse effect of the 1974 drought in the country around this period. The small stock numbers underwent the highest increase in the late 1970s and early 1980s. In particular between 1976 and 1982 the small stock experienced an annual growth rate of 10.0 per cent, while cattle and camel populations grew by 2.4 per cent and 1.0 per cent,

\(^1\) In the case of most of the pastoral groups living along national borders such as the Turkana, Pokot, Gabra and Dassanech, raids and counter raids frequently occur and they are often associated with huge numbers of 'herd losses' to the neighbouring countries. Such incidents of livestock 'losses' are hardly ever recorded, although sometimes such cross-border livestock losses to raids can have a substantial effect on the livestock population each year. For example, in one of such raid between the Gabra and Dassanech in March 1997, the Gabra claim to have lost 2,000 head of cattle, 10,000 small stock and 350 donkeys (KHRC 2000). In only this single raid, the Gabra suffered cattle losses of 1.4 per cent and small stock losses of 1.3 per cent, relative to the district cattle and small stock population of 1997. Additionally, various groups may also bring in animals from other groups across national borders such as Ethiopia and Sudan. We have every reason to believe that such losses are not unique to the Gabra pastoralists only, but rarely receive attention in popular reports. The losses do, however, clarify the point we are making.

\(^2\) The information on most of these variables is scant or completely missing. For many years, the goats and sheep imported total no more than two-digit figures and there is no data available for other years. Cattle import numbers declined considerably from 40,000 head in 1961 to 10,000 in 1975 and to about 100 head of cattle by 1986. Since information on these variables is lacking for a number of years, they are not subject to any further analysis in the chapter.
respectively. Between 1976 and 1979, small stock and cattle populations even grew by a higher rate of about 18 per cent and 6 per cent per year, respectively. Cattle populations show the highest growth rate of 6.7 per cent per annum between 1980 and 1984.

Figure 10.1
National livestock population estimates, Kenya, 1961-2001


The small stock population surpassed the cattle populations in 1977, but slows down in growth rate in 1978. The cattle and small stock populations experienced steady and favourable growth rates between 1987 and 1991, while growth levelled out up to 1999. The camel populations show a very gradual increase of about 2 per cent growth over the entire period compared to small stock and cattle. The number of camels grew most rapidly by 4.9 per cent between 1961 and 1969, and again by 6.5 per cent per year between 1982 and 1986. While for most of the years the camel population gradually increased, the largest dip occurred in 1982. Relative to other animal types, camel populations further show the least downward trend over the entire period under review.

The trend of cattle population, in our view, traces out the probable livestock dynamics in the course of time relative to small stock and camels. The specific reasons that led to rapid growth of livestock populations in the late 1970s and early 1980s are not available from the literature, but our guesses are split between four reasons:

1. The effects of drought that saw losses of large numbers of animals and emigration of herds outside the district in the preceding periods.
2. The severe effects of 1974-76 droughts and outbreak of small stock diseases (especially among goats) on livestock populations.
4. Government recognition that the livestock on the shared rangelands of Kenya, especially in the arid and semi-arid lands (ASAL districts), is an economic resource (in contrast to the traditional view which favoured farming resources) and the consequent improvement of registration of livestock numbers in the late 1970s. This recognition was soon followed by the ‘official’ mushrooming development initiatives of the District Focus in Rural Development Strategy at the grassroots level in the districts from 1983 onwards.
From secondary sources we know that Kenya as a whole experienced a series of droughts in 1965, 1969-71, 1974-75, 1979/81, 1983/84, 1991/92, 1996/97 and 1999-01. All these had severe negative effects on the livestock economies and the pastoralists alike. Contrary to this, despite minor dips in 1984 and 1991 for small stocks and 1996/97 for cattle and small stocks, the above graph does not support a link between drought years and dips in livestock populations in the country. Instead, a close inspection of the figure generally shows an upward trend of livestock populations, especially after 1977 despite the droughts. As from the late 1970s, there was a growing recognition in government circles and an emphasis in development policies on the important contribution of arid and semi-land resources to the national economy\(^3\) (MDDP 1979). A greater focus was also placed on the economic contribution of the ASAL areas, where most of Kenya’s livestock populations are found. It would be safe to note that the upward trends in the livestock numbers may be due to the improved collection of livestock information in the country. Even so, the last decade of stagnation in the livestock populations, affecting cattle and small stocks particularly, may largely be attributed to extensive droughts, diseases outbreak and the recent, excessive El Niño rains of 1997/98 and the post El Niño drought of 1999/2001 that had a severe effect on the country.

**Figure 10.2**

The graph shows low sheep slaughter figures of 1,500 to 2,000 head until 1989. A sharp increase and fall in sheep slaughters occurred during the periods 1989 to 1992, and again from 1996 to 2001. Whilst average sheep slaughters are around 2,000 head per year, the slaughter numbers in 1991 were about 14,000, rising to 12,000 in 1998. The number of goats slaughtered also increased in the latter period. However, the highest fluctuation in slaughter

\(^3\) As a result of this acknowledgement, the government of Kenya created the Ministry of Rehabilitation and Development of Arid, Semi-Arid and Wastelands in 1989 (Keya 1998: 10).
numbers is related to goats. The years 1972, 1979, 1992, 1998, 2000 and 2001 stand out as peak years for goat slaughters of 10,845, 10,158, 16,363, 15,264, 14,760 and 26,223 respectively. In the other years, goat slaughters averaged about 4,000 head per year.

National livestock population estimates in absolute TLU and per capita measures

An estimate of livestock populations in standardised TLU terms gives us an idea of livestock wealth holdings at national level, while the TLU per capita gives an indication of livestock holdings per person. Figure 10.2 shows the trend in absolute TLU and per capita measures for livestock populations in Kenya based on the ‘official’ FAO population database.

The livestock populations in absolute TLU and per capita measures generally show rising and falling trends, respectively, with peaks and depressions in the TLU. The absolute TLU measure at national level increases gradually from 1961 to 1978. Overall, while the absolute livestock TLU increases at an annual rate of 1.6 per cent over the entire period, the livestock TLU per person decreases at a continuous rate of 1.7 per cent per year. The substantial upward change in TLU measures between 1978 and 1980 corresponds to dry years of below average rainfall in the country. There are two possible reasons for a rapid rise in TLU measures between 1982 and 1984. First, this could be accounted for by high weights assigned to camels and cattle. During this period, cattle and camel populations increased by 9.6 per cent per year and by 8.0 per cent per year over the same period – between 1982 and 1984. Second, the increase may be attributable to improved information collection in the livestock-dominated arid and semi-arid districts of Kenya. For example, ASAL development programmes started throughout Kenya in 1982.

In addition to the possible improved livestock data collection system, it is apparent that the periods of dips in the TLU trends of 1964, 1970, 1977, 1981/82, 1993 and 1996/98 correspond to the years of drought in the country or the years thereafter. In this regard, this is an acknowledgement of the fact that droughts negate livestock growth and threaten the viability of the pastoral households and their basis of subsistence production and form of lifestyle.

The standardised livestock counts in TLU per capita have frequently been used to estimate the minimum level of livestock holdings necessary to provide adequate nutrition to an individual from livestock for subsistence production. As stated in Chapter 4, roughly 4 TLU per person is considered to be a threshold level of livestock holding to sustain an individual based on caloric needs (Roth & Fratkin 1990; Dietz & Salih 1997). The data shows that the TLU per capita at national level always remained below one unit. In the present context, however, the national TLU per person needs to be interpreted with considerable caution. The use of the total national (human) population to derive a per capita measure rather than the pastoral populations only, who depend largely on the livestock sector, gives only an idea of the national scenario with respect to the TLU per capita. In other words, the use of national TLU per person blurs uneven population (both human and livestock) distributions, takes no

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4 The standardised livestock tropical units (TLU) are based on the comparison of either the average live animal weight per animal species (i.e. the food requirement approach) or the biomass of the fodder consumed per average animal (i.e. the ecological carrying capacity approach). We use a conversion of 1 camel equivalent to 1.2 TLU, 1 cattle = 0.7 TLU and 10 small stock (sheep and goats) = 0.1 TLU (Lusigi 1983; cf. Dietz & Salih 1997: 29), that is inclined towards the food requirement approach.

5 Dietz & Salih (1997: 29) give a detailed range of TLU measures per capita that are sufficient to support an individual independently or together with complementary production injections from grains or manufactured foodstuffs.
account of differences in regional livestock holdings and makes it impossible to assess the critical level of TLU per person in more detail. What is clear though is that the national livestock wealth per capita has halved in the last 40 years, while the total livestock numbers have almost doubled. Livestock numbers apparently could not at all keep track of the rapid increase of Kenya’s population.

*Pastoralism as a primary livelihood option in Kenya’s arid and semi-arid lands*

Kenya relies on agriculture for lead foreign exchange earnings and employment. However, only 7 per cent of Kenya’s total land area of 569,650 km² receives reliable rainfall that supports crop production (Country Watch 2003: 1), while an additional 5 per cent of the area is able to support crop production during years of adequate rainfall. The remaining vast tracts of Kenya’s land surface area (over 80 per cent) are arid and semi-arid lands (ASAL) (Pratt & Gwynne 1977; ODA 1996). The ASAL areas support 25 per cent of the human population in Kenya and about 50 per cent of the country’s livestock (ODA 1996). In addition, most of the country’s protected areas (national parks and game reserves) are located in the ASAL and are havens of biological diversity (Pratt & Gwynne 1977; KWS 1990).

Pastoralists mostly inhabit the ASAL areas of Kenya, and they account for about 15 per cent of the country’s total population.⁶ They either directly or indirectly derive a significant share of their livelihoods from the livestock sector. The pastoral groups occupying the ASAL areas keep about 45 per cent of the total livestock in Kenya (Aklilu & Wekesa 2002). Some estimates indicate that the livestock and related resources contribute between 20-25 per cent to the GDP. This is in addition to the sector’s unknown contribution to the rural income and subsistence production. The pastoral area is home to most livestock populations and contributes almost 60 per cent of Kenya’s national beef demand (Aklilu et al. 2002: 1). Livestock alone contribute about 10 per cent to Kenya’s agriculture GDP and make up about 3 per cent of the total Gross National Product (GDP).

The arid lands of northern Kenya cover 60 per cent of the Kenya’s land area, and are home to an estimated 1 million (semi-) nomadic people (Bruce & Mearns 2001). As already outlined in Chapter 4, Marsabit District is part of the ASAL area (Schwartz et al. 1991), characterised by erratic rainfall with high mean rainfall variations (Bake 1984). The livestock sector makes a critical contribution to the economic production of the district. In this chapter we focus on the importance of the livestock sector to the domestic and national economy and its role in human welfare.

*Measuring the importance of livestock-related resources*

In addition to their obvious production of a flow of goods and services, livestock have a whole range of economic, political, social, institutional and cultural functions among herding communities (Baxter 1994; Morton & Meadows 2000; Turner & Williams 2002). Before dealing with total off-take in the following sections, we will therefore first examine the livestock variables related to total off-take.

Generally, there are three main off-takes for livestock from the level of kraal, village, regional and district levels (or from an even higher hierarchical level):
- animals may be slaughtered for a number of reasons, including home consumption;

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⁶ The human populations in the arid areas of Kenya in turn make up over 80 per cent of Kenya’s rural population (ODA 1996; Southgate & Hulme 1996).
natural death, although animals may occasionally be consumed as a result of natural factors that lead to death; and
- movement across borders.

Firstly, animals slaughtered for one’s own food needs (e.g. meat), ceremonies and ritual sacrifices or by a butcher for commercial local food sale may (partly) be eaten. Secondly, animals may die because of diseases, natural causes or killed by predators. Some of these animals may again be eaten depending on the circumstances of their death. At times, animals stray from the herds and get lost, meaning that they cannot be traced. Thirdly, cross-border animal movements may arise from the usual migratory pattern of herders and their herds (which are very difficult to track). Alternatively, animals move across boundaries for the purpose of sale and may then, in turn, be used for breeding purposes, draught power or for slaughter. The cross-border animal movements may take place in neighbouring areas (or zones) in order to supply meat to the urban population, or for exports across international borders such as into Somalia, Ethiopia and Saudi Arabia.

The difficulty of documenting all these off-take variables poses challenges as regards trailing livestock dynamics and assessing livestock-based resources, such as exports, hide and skin production. These resources are considered in this chapter despite the doubts surrounding their accuracy. In particular, we contrast the use of either hides and skins or animal slaughters as a proxy for assessing livestock off-take rates.

Trends in livestock production in Marsabit District

Trends in livestock slaughters
As said, slaughter is one of the ways in which livestock contributes to food security, either at the household level or through market channels in order to feed the urban dwellers. In other words, an increase in animal slaughters can be perceived as a growing measure of the way they contribute to households’ food needs and the provision of caloric requirements. Examining the general trend between 1972 and 2001, there was a marginal increase with 72 heads of cattle slaughtered per year, 294 goats and 22 head of camel (Figure 10.3). As regards sheep, there was a marginal increase of 392 head per year. However, the livestock slaughter figures illustrate wide fluctuations over the years, especially in the case of small stock of goats and sheep. As a result, the average annual changes in the livestock slaughter figures or any other variable so far considered are subject to the initial and terminal period values used in the calculations of rate of change.

The graph shows low sheep slaughter figures of 1,500 to 2,000 head until 1989. A sharp increase and fall in sheep slaughters occurred during the periods 1989 to 1992, and again from 1996 to 2001. Whilst average sheep slaughters are around 2,000 head per year, the slaughter numbers in 1991 were about 14,000, rising to 12,000 in 1998. The number of goats slaughtered also increased in the latter period. However, the highest fluctuation in slaughter numbers is related to goats. The years 1972, 1979, 1992, 1998, 2000 and 2001 stand out as peak years for goat slaughters of 10,845, 10,158, 16,363, 15,264, 14,760 and 26,223 respectively. In the other years, goat slaughters averaged about 4,000 head per year.

Cattle slaughter numbers were modest when compared to small stock. From 1973 to 1990, the cattle slaughter numbers averaged about 2,000 head per year. However, the years 1978 and 1979 recorded the lowest number of cattle slaughters of 641 and 845 respectively,
compared to all the other years. The number of cattle slaughtered increased to over 3,000 head during the period 1992 to 1994 and in 1998 (4,811 heads) and 2001 (6,282 head). With less than 1,000 head per year, the figures relating to camels show the lowest number of slaughters relative to other animals. In general, the camel slaughter numbers are the lowest compared to cattle and small stock.

As shown, there is a clear increase in the number of animals slaughtered in the course of time, although the trend is unclear for small stock because of high fluctuations in the slaughters. This applies particularly to the period after 1977, the time when apparently there was an improvement in the collection of livestock information in the district. In retrospect, the mean cattle slaughtered increased from about 1,400 head between 1977 and 1979, to 2,200 head in the 1980s and increased again to 3,200 head between 1990 and 2001. Over the same period, the average numbers of small stock slaughtered changed from 830 head, to 5,600 head to 16,990 head respectively. Similarly, the mean number of camels slaughtered has increased from 129 head to 184 and to 799 since the 1990s. Moreover, between 1977 and 2001, the average number of animals slaughtered was about 2,330 head of cattle, 11,400 head of small stock and nearly 500 head of camels per year.

The latter increase in the number of slaughtered animals shown by the graph is due to the de-stockling programme in the district carried out by European Union (through the Community Development Trust Fund – CDTF) and Food and Agriculture Organisation of the United Nations (FAO) through the Anglican Church of Kenya – Marsabit Development Office (ACK-MSO) church (MDAR 2000: 32). The latter slaughter increases resulted from the 1999/2001 drought intervention efforts to salvage the remaining animal value to provide meat, especially as a source of animal protein for vulnerable households. Over the years, it has become apparent from the slaughter data that those years during which Marsabit district experienced droughts show marginal increases in cattle and small stock slaughters. The data on camels does not reveal such a clear trend or association with the years of drought as the figures for cattle do. The animal slaughter data shows a considerably wide spread around the mean (i.e. coefficient of variation) of about 61 per cent for cattle, over 90 per cent for goats.
and sheep and 100 per cent for camels. These proportions also demonstrate the excessive fluctuations in slaughter numbers across animal species: with camels having the greatest variations and cattle the lowest. The mean deviations in the number of animals slaughtered again confirm the unreliability of the information on the animals slaughtered.

Weighted-slaughter assessment

It may be useful to draw up slaughter weight assessments based on the slaughter data. By doing so, we will obtain annual fluctuations of measured meat availability over the years. In order to determine an aggregated value of total meat production, that is an estimate of availability of cold dressed weight, weightings have to be applied. To start with, suppose that a camel provides 150 kg of consumable meat, cattle about 100 kg and small goat or sheep stock about 20 kg of edible meat when slaughtered. We estimate the mean per capita meat production for the district as a whole at 9.8 kg per person in 1972, 8.5 kg per person between 1976 and 1979, 2.7 kg of meat per person in the 1980s and 4.5 kg of meat per person per year between 1990 and 2001. Again, the mean increase in meat production per capita during the latter period is partly accounted for by de-stocking interventions and partly by droughts. Based on these mean values, the district-level annual meat production per capita hardly grew being 1 per cent (0.06 per cent per year) between 1977 and 2000. This is much lower than the rate of growth of the human population.

If we examine animal off-take using slaughter and export figures we find mean off-take rates of 5 per cent for cattle, 8 per cent for small stock and hardly 1 per cent for camels. Yet, in the livestock literature, ‘normal’ household level slaughter and sales off-take have been estimated at about 25 per cent for small stock and 10-15 per cent for cattle (see Dahl & Hjort 1976; O’Leary 1985). Again the contradiction in the figures is consistent with our earlier remark that many of the animals slaughtered for home consumption, especially by pastoral households, remain largely uncollected. In this particular case, the extremely low mean annual meat production casts serious doubts on the reliability of registered animal slaughters as regards deriving off-take rates.

Hide and skin production in Marsabit District

Hide and skin production is closely related to the livestock slaughter. Figure 10.4 shows noticeable changes and trends in hide and skin production over the years. Despite the fact that hides and skins are marked by years of rise and fall in production, there is a general tendency of increase until 1990. More explicitly, cattle hide and goatskin production realised an annual increase of 6 per cent and 2.3 per cent per year between 1972 and 1999. Over the same period, the numbers of sheepskins dropped by a mean rate of 0.2 per cent per year. Thereafter the hide and skin production increased slightly. Information on the production of camel hides is available for two periods only: between 1979 and 1987 and again between 1992 and 2001. During these periods, the production of camel hides increased at an average rate of about 7 per cent and a decrease of 8 per cent per year, respectively. These results are also confirmed by a statistical measure of spread: the coefficient of variations (cv). Small

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7 We omit other years because of potential outlier problems. Moreover, this subsection only provides an illustrative example and does not deal that much about with the accuracy of the estimates.

8 The average weight of a cattle hide is estimated at about 5 kg per piece and a camel hide at about 7 kg per piece (MDAR 1991). Cattle hides are sold in grades per kilo, i.e. by weight per grade, while camel hides and skins of goats and sheep are sold in grades per piece.
stock exhibited a lower variation in skin production (a cv of about 51 per cent for goats and 54 per cent for sheep) as opposed to cattle hides, which varied by about 81 per cent. The magnitude of these variations indicates a non-normal pattern of distribution in hide and skin production over the years.

Cattle hides exhibit levels of production of about 18,000 hides per year, throughout the entire period. Between 1985 and 1995, increases in average annual hide production of about 25,000 hides were recorded. Records on the production of camel hides are generally tenuous. However, during the 1990s there was low but continuous hide production of about 1,000 hides per year.

Figure 10.4
Hide and skin sales, Marsabit District, 1966-68, 1972-2001

Until 1968, the hide and skin production figures for Isiolo and Marsabit districts were combined. The number of hides and skins sold in Marsabit District alone, based at least on the recorded cases, would have been lower than reported here.

Goat and sheep skin production levels were higher than those of hides. These production levels are, however, characterised by higher fluctuations between and over the years. While there is evidence of a generally increasing trend in skin production, the years of drought in the district (e.g. 1974-75, 1983/84, 1991/92 1996/97 and 1999/2001) in particular show peaks of significant hide and skin production. These increases in hide and skin production are attributed to small stock deaths caused by drought rather than ordinary slaughters. Thus, the years of high small stock deaths (animal losses) are also associated with high production of hides and skins. This remark is important in terms of the contribution of cash returns on skins to the household requirements at a time when livestock prices are normally low. To illustrate this point, during the years of drought in the district mean hide values reported were around 0.2 million Kenyan pounds in 1974-75, 0.4 million pounds in 1984, about 8 million pounds in 1991/92 and 1.5 million pounds during the 1999/2001 drought period. The situation is similar in the case of small stock. Although the marketed values (or prices) of the hides and skins

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9 Much earlier, in the late 1940s, between 20 and 30 cattle hides were reportedly sold per month and this was considered as normal sales per month by the Boran in the district (MDAR 1948).

10 Neither do we find any association between hide and skin production values and rainfall amounts.
are not higher than in other years, the need for households to trade in these products is clear from the export hide and skin production off-take rates (see Table 10.1).

However, other forces apart from drought influence hide and skin production and sales as well. For example, the total volume of hides and skins sold between 1979 and 1982 shows a declining trend. This was largely due to a ban on the exportation of hides and skins (Marsabit District Development Plan, 1979: 29). The restriction imposed on hide and skin exports meant a lack of competitive markets and, as a result, hides and skins were sold locally at lower prices. The low prices served as disincentives to hide and skin sales in the district. This resulted in lower volumes of skins sales particularly for goats and sheep between 1978 and 1982 and sales numbers dropped by about 26 per cent and 14 per cent respectively. In addition to this, the increase in hide and skin production around 1984 was attributed to livestock deaths caused by the severe 1983/84 drought. As mentioned earlier, this drought also caused livestock losses of about 40 per cent in the district.

**Hide and skin off-take rates as a ratio of livestock numbers**

Livestock off-takes are commonly the sum of animals slaughtered and exports expressed as a percentage of livestock numbers. Almost every time this ratio is used, it transpires that the number of animals slaughtered is higher than hide and skin production, otherwise this ratio under-estimates off-takes (see Raikes 1981). In the case of Marsabit, we find mean off-takes of about 7 per cent for cattle hides, 20 per cent for skins (goats and sheep) and almost 1 per cent for camel hides. Contrasting these mean rates with those of slaughters, we find means of about 1 per cent off-take for cattle, 2 per cent for small stock and 0.4 per cent for camels. The mean hides and slaughter off-take rates are significantly different for cattle and small stock ($t_{26, 0.001}=2.78$), and for camels ($t_{18, 0.05}=1.73$). Given that hides and skins are by-products of either slaughter, exports or another cause of animal loss from the herds (see Dietz et al, 2001: 1996), hide and skin production can be expressed as a ratio of cattle and small stock numbers (Figure 10.5). In addition, the hide and skin off-takes serve as a proxy for investigating changes in livestock numbers in the course of time.

**Figure 10.5**

*Cattle hide and skin off-takes, Marsabit District, 1972, 1976 – 2001*

![Graph showing hide and skin off-takes over years](image)

**Notes:**

a. *Cathid-offtake* stands for off-take of cattle hides.

b. *Skin-offtake* stands for skins off-takes.
Skin off-takes were subject to wide fluctuations throughout the year. From 1982 to 1990, off-take trends tended to increase. This trend demonstrates that there was a general increase in skin production and also that off-take rates are high during the years of drought in the district. The exceptionally high skins off-take of about 45 per cent in 1996/97 might have largely been caused by the 1996/97 droughts in the region.

A close examination indicates that the trends shown by this graph are almost identical to those of livestock off-takes considered in the previous section. The figure shows hide and skin production, which may also be a proxy for livestock mortalities. Until the drought of 1984, there was an increase in off-takes of small stock especially between 1976 and 1979. The decline in off-takes started around 1979 following the disease epidemics that killed most of the small stock and may also be due to droughts in the following years (especially the 1979-1981 droughts). As a result, there was a low off-take of goats and sheep between 1980 and 1983 (due to lack of skins) and the off-take collapsed to about 5 per cent in 1982. Thereafter, there was an increase in off-takes probably because of flock recovery. As from 1984, there has suddenly been a much higher off-take of small stock and for the first time a drastic increase in cattle off-take can be vividly seen.

Afterwards, between 1985 and 1990 cattle off-take remained at 5 to 10 per cent, while small stock went through fluctuations, but still maintained high off-take rates. The off-take peak years like 1984 and 1985 received below average rainfall and by 1986, therefore, there were few small stock animals left. Moreover, in 1991, drought-shocked livestock populations and small stock off-takes dipped from 35 per cent to 15 per cent. This time, small stock off-takes started to drop while the off-take for cattle was very high. This year became a turning point in the livestock populations and the livestock sector’s production performance in the district. Presumably as a result of high livestock death rates and loss of skins due to the 1991/92 droughts, skin off-takes dropped to 1986 and 1977 levels of 15 per cent. Consequently, there was low household skin production and people resorted to selling cattle hides as a substitute. This brought about the highest growth rate (26 per cent per year), as well as the highest mean off-take rates (17 per cent) between 1991 and 1994. As from there on, households broke away from their heavy dependence on subsistence livestock production to a more active reliance on the cash market. The years 1993 to 1995 had about normal amounts of rain and it was during this period that herds were expanded. Unfortunately, although three years was enough for total small stock recovery, it was not long enough to ensure the complete recovery of cattle herds.

Yet, there were the severe droughts later in the decade (in 1996/97) that decimated livestock populations and hindered herd recovery. This also increased the need for households to access the cash market in order to survive. Rainfall failure and the effect of drought caused small stock populations to decline and goats and sheep off-takes rocketed to about 45 per cent. The cattle population never recovered from previous droughts. The 1996/97 droughts were soon followed by unusually heavy 1997/98 rain shocks (i.e. El Niño) which killed large herds due to a combination of rain showers and cold weather coupled with weak animals and later severe outbreaks of diseases (MDP/GTZ, MoALD & ALRMP, 1998).

In general, Figure 10.5 appears to show an increase in cattle hide off-take, at an annual increase of about 11 per cent between 1984 and 1994. Although there is a later decline in off-takes of cattle hides from 1994 to 2001, these levels (about 10 per cent) are still comparable to
the late 1980s level. Additionally, if one considers the entire period, hide and skin production increased by 0.64 and 0.68 per cent per year. Whether these upward changes are desirable is doubtful and a lot depends on forces underlying the causes of these changes and final outcome.

The 1991/92 and 1996/97 droughts, unusually high 1997/98 rains and again the 1999/2001 droughts were a real acid test for livestock recovery. However, the very close proximity in time of these episodic shocks and the heavy livestock death rates associated with them basically resulted in inadequate herd recovery time. Today, comparing the relative weight of livestock exports as a fraction of the numbers, we find rates which are three times lower for cattle and almost at par for small stock in comparison to the early 1990s. Thus, the effects of these recurrent shock factors have resulted in the current structural calamity in the livestock sector in the district. The production of the livestock sub-sector is today more vulnerable than in the late 1980s and will generate greater incentives for embracing the market economy and thus the emerging importance assigned to Kenya’s economy. The shown increased pattern of hide and skin off-takes over the years might tell a story about growing commercialisation of livestock products: in this case of hides and skins at district level. Moreover, the recent increased humanitarian assistance flows of emergency food aid and de-stocking intervention efforts already show the extent of regional vulnerability and a greater demand for the continued provision of humanitarian assistance.

Looking at the hide and skin production figures presented in this subsection and comparing the production data with livestock numbers allows us to test the reliability of livestock off-take rates. Livestock off-take rates can be assessed by either using hide and skin and slaughter figures or using slaughter and export figures, each weighted by the population of the relevant herd type. As we have shown, hide and skin figures show a higher rate. The fact that hides and skins can only come from slaughters demonstrates the unreliability of slaughter data recorded in the official reports. For this reason, hide and skin figures and not slaughter figures will be used here to calculate off-take rates.

**Livestock off-take rates for Marsabit District**

Livestock off-take rates are commonly analysed by expressing the sum of livestock exports and slaughters as a percentage of the population of a given animal type. In such a case, hide and skin production figures are often lower than slaughter figures. In the case of Marsabit there seems to be problem with the data since the figures for hide and skin production are higher than the slaughter figures. We therefore decided to use hide and skin production figures as a proxy for animals slaughtered. Moreover, no hides and skins can be produced without animals being slaughtered. Therefore, livestock off-take rates may be analysed using hide and skin production rather than using slaughter information. The reason why we opted for the use of hide and skin production estimates is that these are basically slaughter by-products and because the lower slaughter figures, relative to hide and skin figures, suggest inaccuracies in slaughter records.

Given the position of Marsabit District on the international boundary with Ethiopia, the high hide and skin production record might not necessarily reflect a general lack of slaughter data. There is a chance that these products were brought across the borders without being registered. Similar cross-border animal entries into the Kenyan side might not have been reported as imports. However, we feel this information might partially compensate for the substantial domestic livestock slaughters in the rural pastoral areas by the many pastoral
households that are never marketed and go unrecorded as well. We therefore prefer to use hide and skin production instead of the commonly used slaughter numbers, along with export figures to estimate livestock off-take rates (Figure 10.6).

Figure 10.6 shows low camel off-take rates relative to small stock and cattle. The off-take rates for camels were higher in the 1990s relative to the earlier periods and yet the off-take rates remain at less than 3 per cent per year. The figure also shows a consistent and gradual increase in cattle off-takes from 1977 to 1994, although there were also years in which off-take rates dropped. 1994 had the highest cattle off-take rate of about 32 per cent. From 1995 onwards, cattle off-take rates declined to about 10 per cent per year, except in 1998 when the off-take rate reached about 16 per cent.

Trends in small stock off-take exhibit sharp fluctuations from one year to the next. That is, up and downwards oscillation patterns of off-take rates are typical for small stock over the years and for most years the off-take level remained above 15 per cent per year. Once again, the years of drought in the district, alluded to earlier, indicate peaks in small stock off-take rates. At the end of the data period, small stock and cattle off-take rates are at par, at about 10 per cent. Neither does using slaughter and export figures for this period help us to obtain better off-take rates. The low animal off-take rates could be explained partly by decimated livestock populations in the district and partly by the distribution of emergency relief food for humanitarian assistance during these years.

**Figure 10.6**
Livestock off-takes, Marsabit District, 1972, 1977-2001

![Graph showing livestock off-takes](source: Composed from data from the Marsabit annual reports, various years.)

During the last 25 years, mean cattle off-take rates of about 2 per cent were recorded between 1976 and 1979, 5 per cent during the 1980s and close to 15 per cent from 1990 to 2001. Similarly, small stock off-take rates were about 21 per cent between 1976 and 1979, and again during the 1980s, while the mean rate was around 25 per cent between 1990 and 2001. These off-take levels are moderately high compared to the 12 per cent to 15 per cent off-take for cattle and 25 per cent for small stock reported in numerous publications on pastoral studies (see Little 1983; Fratkin & Roth 1990; Fratkin et al. 1999; Dietz & Salih 1997; Zaal 1998; Nunow 2000; Dietz et al. 2001). Additionally, although camel off-takes are
relatively low, they also show an increase in the proportion of camels marketed in the district. Overall, cattle off-take was subject to an annual growth rate of 0.7 per cent per year, small stock of about 0.41 per cent per year and camels 0.08 per cent annually for the entire data period.

Although these trends might still give an under-estimation of annual off-takes, hide and skin production figures most probably reflect superior off-take rates than those that would have been acquired if animal slaughter figures had been used instead. The problem of under-estimation arises because most of the animals slaughtered for home consumption by the pastoral households usually go unrecorded. Neither are all hides and skins marketed, meaning that these quantities are partly undocumented as well. In addition, most of the pastoral households' massive livestock losses resulting from droughts, cross-border raids and herd losses, disease epidemics and torrential rains after prolonged dry spells are often unaccounted for in the reports as well. The irregularities inherent in the official records not only cast doubt on the reliability of the data sources, but also question their usefulness as a basis for policy decisions at the higher echelons of the government in the country.

Trends in cattle and small stock off-takes, using slaughter figures
Comparing the sum of specific livestock slaughters, expressed as a fraction of the number of relevant livestock type, reveals the relative importance of livestock data for assessing slaughter numbers. In contrast to the preceding section, we used hide and skin figures instead of slaughter figures to obtain the proportions of livestock off-take rates. The main reason, we argue, is that slaughter figures give considerably lower off-take rates. By way of a comparison we will demonstrate in this subsection how cattle and small stock off-takes of the local slaughters for meat production perform poorly in reflecting these ratios in the selected years (Table 10.1).

Table 10.1
Animals slaughtered and off-takes based on slaughter figures in selected years

<table>
<thead>
<tr>
<th>Year</th>
<th>Cattle</th>
<th>Off-take (%)</th>
<th>Small stock</th>
<th>Off-take (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. slaughtered</td>
<td></td>
<td>No. slaughtered</td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>2,189</td>
<td>6.4 (6.4)</td>
<td>7,120</td>
<td>6.9 (16.2)</td>
</tr>
<tr>
<td>1977</td>
<td>2,734</td>
<td>2.6 (2.3)</td>
<td>4,952</td>
<td>2.6 (17.6)</td>
</tr>
<tr>
<td>1981</td>
<td>2,207</td>
<td>1.8 (1.8)</td>
<td>6,200</td>
<td>2.3 (12.3)</td>
</tr>
<tr>
<td>1984</td>
<td>1,244</td>
<td>2.2 (3.8)</td>
<td>2,681</td>
<td>1.9 (30.9)</td>
</tr>
<tr>
<td>1986</td>
<td>2,026</td>
<td>2.1 (9.5)</td>
<td>5,147</td>
<td>2.8 (15.4)</td>
</tr>
<tr>
<td>1991</td>
<td>1,274</td>
<td>3.4 (12.1)</td>
<td>8,483</td>
<td>8.7 (32.9)</td>
</tr>
<tr>
<td>1996</td>
<td>1,918</td>
<td>4.5 (10.9)</td>
<td>9,794</td>
<td>5.1 (26.2)</td>
</tr>
<tr>
<td>1999</td>
<td>1,951</td>
<td>3.4 (10.0)</td>
<td>17,075</td>
<td>3.0 (9.9)</td>
</tr>
<tr>
<td>2000</td>
<td>2,850</td>
<td>4.3 (7.2)</td>
<td>27,758</td>
<td>7.1 (12.4)</td>
</tr>
<tr>
<td>2001</td>
<td>2,412</td>
<td>4.0 (13.9)</td>
<td>26,180</td>
<td>9.3 (29.8)</td>
</tr>
</tbody>
</table>

Note:

a. The figure between brackets is the off-take rate obtained on the basis of hides and skin production, instead of animals slaughtered.

Source: Data extracted from Marsabit District Annual Reports, various years.

 Livestock off-take (i.e. commercial) rates are usually obtained by adding together exports and slaughters, expressed as a percentage of the total population of the specific animal type in question. In this chapter we question, however, the reliability of the slaughter figures. We will deal with export off-take later in this chapter.
The off-takes obtained using data on slaughtered animals are moderate, both for cattle and small stock. This off-take rate ranges roughly between 2 per cent and 6 per cent for cattle and between 3 per cent and 9 per cent for small stock. The shares of animal off-takes are consistently lower than those assessed on the basis of hide and skin production, for both types of animals. Interestingly, this table reveals two important points. First, if small stock off-takes are computed with skin production the figures were always higher than those for slaughters and cattle off-take computed with hide production reveals a sharp increase after the 1983/84 droughts. The cattle off-takes had already shot up to about 11 per cent in 1985 and remained relatively high thereafter. In addition to heavy cattle losses suggested by this result around 1984, there seems to have been a change in household behaviour towards the marketing of hides in contrast to previous years. Second, we also observe a rather high number of skins marketed in the district as from 1991, except in 1999. This low off-take might perhaps be due to the increased quality of the animals after the 1997/98 El Niño rains. As we argue, small stock slaughtered for home consumption or other domestic purposes such as rituals and ceremonies are typically not recorded in the official reports. We can also note here that the slaughter-based off-takes remained far below the hide and skin off-take rates even with increased de-stocking interventions prompted by the 1999/2001-drought crisis. Such interventions, however well-intentioned, can hypothetically suppress ‘normal’ household coping responses to crisis situations, especially when coupled with the issuing of emergency relief food. This may partly be the reason for the present cattle and small stock off-takes being close to the levels of the early 1990s.

Our main point here, however, is that the table demonstrates the high probability of inaccuracies occurring when slaughter records are used for deriving livestock off-take rates. There is an additional argument against the use of slaughter figures for calculating livestock off-take. The slaughter off-take rates for domestic use and marketing within the district are substantially higher than the off-take rates for trading outside the district (cf. Figure 10.6 and Table 10.1) – another component of livestock off-take (cf. footnote 11). However, hide and skin off-takes are much more important for export than slaughter off-takes. Taking both arguments into account, we therefore prefer to use hide and skin production estimates instead of slaughter figures to calculate livestock off-take.

*Animal slaughters at national level*

The other important variable for assessing the contribution of the livestock sector to human welfare and food needs is the number of slaughters. Figure 10.7 reports slaughter data for the main livestock types at national level on the basis of the registered slaughters only. Generally, the cattle and goats slaughters both grew at an annual rate of about 2 per cent over the entire period (cattle from 0.9 to 1.9 million and goats from 1.4 to 2.9 million). The sheep slaughter lags behind cattle and goats in growth but increased at an average rate of change of 1.1 per cent annually (i.e. from 1.3 to 2.0 million). The figure shows an increasing trend in registered cattle slaughters over the last 38 years, with dips in slaughters during 1975, 1981 and 1998. The slaughter numbers for goats show more fluctuations than cattle and sheep slaughters during the years under consideration. Indeed, goat slaughters show a standard deviation of about 622,000, a deviation of about 375,000 for sheep and a deviation of about 434,000 for cattle. The number of goat slaughters grew faster during the period between 1977 and 1979 than the other years: an annual increase of about 16 per cent per year. In addition, goat slaughters were higher than for cattle and sheep between the years 1961 and 1973, and
afterwards between 1983 and 1999. During this latter period goat slaughters grew at a rate of 3.4 per cent per year, while cattle slaughters grew by about 1.0 per cent and sheep slaughters by 2.6 per cent per year.

Figure 10.7

Notes:
- Catslaught denotes number of cattle slaughters.
- Gtslaught denotes goat slaughters.
- Shpslaught denotes sheep slaughters.


The slaughter figures reveal high and positive correlations of 0.98 for cattle, 0.85 for sheep and 0.84 for goats with the absolute animal numbers, which are all significant at 99 per cent confidence level (one-tailed test). This implies a similar degree of association between animal slaughters and their absolute numbers with a strong positive degree of association. That is, an increase in animal numbers will be associated with an increase in the slaughter numbers. While these results show high correlation coefficients in relative terms, cattle have a higher correlation coefficient than sheep and goats. These results do not, however, explain any causal effects between the livestock absolute numbers and their slaughter figures.

The slaughter figures, however, show a negative (weak) correlation with national export numbers. The corresponding correlation coefficients are -0.36 for cattle (significant at p<0.024), -0.51 for sheep (significant at p<0.002) and -0.70 for goats (significant at p<0.001). This does not mean, though, that an increase in livestock exports is associated with a decrease in slaughter numbers. It might only mean that internal (or local) slaughters and export off-takes compete for livestock numbers, but they do not influence or cause each other. On the whole, a wide range of other factors might be responsible for the shift and allocation problems of livestock numbers between the national slaughters and international exports. For example, peoples' tastes and preferences, market prices, range of social influences, prices of substitute of livestock meat all might influence this allocation mechanism. On the basis of the correlation results, the degree of association between animal slaughters and the animal numbers is of a higher relationship than the degree of association between animal slaughters
and their export numbers. This result reflects a relatively higher importance of the animal slaughter in the local market than to their contribution to international marketing (exports). Hence, with other factors constant, a higher local demand for slaughter animals might reduce the number of international marketing of livestock through exports.

The economics of livestock trade

In this section we highlight the economics of livestock trade, focusing respectively on the role of trade in pastoral household economies and (relative) livestock prices. We further look at the local markets in the region and the price differentials between them, while we will also consider the fluctuations in monthly prices and the factors affecting them. Since information on prices only becomes meaningful when compared with the prices of commodities that traders or herders will buy after selling the animals, the last two subsections will look at the market price ratio and caloric terms of trade for meat and grain (maize) respectively.

The pastoral trade as a choice or necessity

Trade is a norm among herding communities. However, commercial trade can be seen as a double-edged practice that informs both choice and necessity and this is of interest to our research. The earliest available records link the reasons for livestock trade to the need to obtain ready cash in order to pay poll-tax. This does not mean, however, that trade is a new phenomenon to the pastoral groups, but it was perhaps done for different reasons. Trade is as old as the pastoral sub-sector (see Baxter 1952; Kerven 1987, 1992). As indicated in the archival sources, livestock was the only export from Marsabit District and the selling of stocks, hides and skins was the only means through which most tribesmen could obtain cash to pay their tax (MDARs, various years). For a similar reason livestock trade was, therefore, recognised as being of vital importance to the district (MDAR 1947: 11). Hence, in the past, the forms of trade undertaken by the pastoral households were borne out of exchange needs peripheral to the food needs for the most part.

In this regard, it is not surprising that the pastoral communities in the region did not make particularly good use of the livestock off-take encouraged by government. Apparently, the reluctance of the herding communities to sell animals is also differentiated across the types of livestock they rear:

“All tribes were willing to produce sheep and goats in large quantities for sale, but they were not willing to bring cattle and did all they could to avoid losing their camels, in spite of the fact that the Rendille possess more camels than their country can carry without serious deterioration” (MDAR 1947: 11).

This comment indicates three important features related to livestock sales: the readiness of pastoralists to cash small stock; their reluctance to sell camels and the colonial view on the environmental impact of pastoralism. By then the Rendille were rich in herds and the reason for the colonial government to support increased trade in livestock was in part linked to assumed adverse consequences of the livestock numbers on the natural environment.

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12 As we pointed out in Chapter 4, the Boran paid the poll tax and kept their tax receipt as evidence of their access rights to rangeland resources in Marsabit, while they also paid tax in Ethiopia for similar reasons.
Additionally, some observations by the colonial administration emphasise great resistance by camel herding groups to part with one:

"Whenever the question of selling off camels to the Meat Marketing board is raised, the Rendille look wooden and say they haven’t got any, the Gabra make out a long story about the camel being man’s best friend, the motor car of the desert and Banks of England all rolled into one" (MDAR 1948: 19)

As we will argue in this book, the resistance towards selling of camels may be fuelled considerably by the complex trust system that governs its ownership rights. Moreover, owing to the nature of the trust arrangements that govern camels, selling a trust camel is tantamount to a violation of social contracts upon which loaning arrangements are founded. Also, the selling of trust animals potentially damages one’s reputation and the social trust on which future herd transfers are anticipated.

The colonial administration had different attitudes towards different pastoral groups (then called ‘native tribes’), who in turn differed as regards the main livestock species kept. The Rendille and Gabra are camel herders and the Boran and Samburu kept cattle. Like the camel herders, the cattle keepers were also unwilling to sell cattle at that time (MDAR 1947: 11), as well as to engage in trade. The administration encouraged the ‘local people’ to engage in trade and the Rendille were ‘quite pathetic’ in trading, perhaps because they possessed a large herd of camels and were less inclined to trade (MDAR 1937: 20). From the reports, the ‘Alien Somalis’ (from outside the province) were the main livestock traders in the district (MDAR 1937). The number of Somali traders was initially controlled and they were expelled from the district in 1940 (MDAR 1940: 7). The Burji and Konso mainly lived on the mountain and they were allocated shamba plots to cultivate (MDARs 1948, 1960) and produce vegetables to fulfil local demand. The fact that several reports refer to maize exports out of the district perhaps suggests low pastoral reliance on maize and the groups traded mainly in tobacco and coffee berries (MDAR 1937: 20). The administrations had clearly different opinions on the ethnic groups and used these to influence local people’s means of sustenance. Other internal dynamics were occurring independent of the administration. According to the reports, a section of Ariaal followed Samburu customs while the majority preferred to follow the Rendille (MDAR 1948). However, today more Rendille celebrate Samburu ceremonies, adopt their attire and speak the Maa language (Spencer 1973, 1998; Fratkin 1998; see also Chapter 4).

In spite of the negative thoughts, the pastoral attitude towards trade has evolved over time. Today, trade is borne out of necessity and livestock sales make a significant contribution towards household needs within the livestock economy. Despite the differences underlying

13 The same year a livestock market started and a butchery was built on the mountain.

14 This confirms our earlier remark that the need for trade in order to generate profit was low. The scanty livestock data shows that most pastoral groups had, on average, large livestock wealth (see for example Baxter 1952; Sobania 1979; O’Leary 1990).

15 These items were imported from Meru (around Mt. Kenya). Loin was also bought by the local people, often imported from Aden, and a few times from Mogadishu (MDAR 1939: 30). Similar trade behaviour has been described between Konso from Southern Ethiopia (Dirre) and Gabra and between Rendille and Meru (see Torry 1973; Spencer 1973). This is evidence that the pastoral communities interacted with other communities in the past for the purpose of trade.

16 The various reports also point out the fluidity and ambivalent social relationships of attacks, raids and friendship between the groups, especially among the main pastoral groups (see under ‘Internal tribal affairs’, various years).
the reasons for livestock sales today and in the past, similar constraints apply to the participation of households in the cash market in Marsabit today. As also pointed out in the 1950s 'the greatest disincentives to the livestock marketing were the great distance involved between market facilities, a lack of water en route and the possibility of non-sale at that market and the resultant losses involved in returning the stock to Marsabit' (MDAR 1952: 57). Added to these marketing problems were the quarantine restrictions imposed on the movement of livestock owing to diseases (e.g. the foot and mouth disease) (MDARs 1957: 47; 1959: 40), which reduce livestock sales, especially outside the district. The effect was that export of livestock outside the district reduced (MDAR 1957: 2). These problems continue to restrict livestock marketing in many pastoral arid areas in northern Kenya even today (Nunow 2000).

**Average livestock export prices for Marsabit District**

The price of livestock is an important signal when assessing the level of market integration of the pastoral communities. However, market prices can play only a limited role in judging the rate of animal sales as a result of deficient records of livestock export values over the years. Another problem inherent in aggregate marketed animal values or prices reported in annual reports is the unreliability of secondary figures which seriously questions the usefulness of animal values or prices reflected by such data. The prices reported here have been derived from export values of the animals exported (Figure 10.8). Without any claim regarding the accuracy of the data, the figure below reveals a very scant pattern of average livestock prices for Marsabit District.

**Figure 10.8**

Average livestock prices, Marsabit District

![Average livestock prices, Marsabit District](image)

*Note: Ksh 20 = 1 Kenya pound (K£).*

*Source: Composed from data from the Marsabit annual reports, various years.*

The prices are reported in transformed log form for scaling purposes\(^{17}\), and thus they measure price elasticities (dimensionless unit). The main interest here is the price behaviour

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\(^{17}\) The alternative is to adjust prices in line with time-varying inflation, in which case deflated prices also have little meaning to herders because deflated prices do not correspond to the nominal price that herders actually observe or observed. However, it is worthwhile to examine price behaviour in a historical perspective.
over time rather than real or nominal prices. Although there are serious gaps in average price levels over the years, most of the years prior to 1990 reveal ‘dots’ of low animal prices compared to the 1990s. The years after 1973 in particular exhibit a clear upward trend in livestock prices, especially for cattle and small stock. The 1990s show high average prices and high fluctuations in average camel prices. This average price situation may be both the result of major inflation problems in Kenya (see section on trends in livestock trade below) and market behaviour. Unfortunately, the scant nature of the datasets does not permit much more to be said about average price trends.

Livestock market prices have a significant influence on the income of the pastoral households. Despite the fact that little data on livestock export prices is available, the graph clearly indicates livestock price volatility. The unstable changes in the export prices reflect the unreliability of the livestock markets. The high fluctuation patterns of animal prices (especially for camels) call into question the reliability of the market prices for inducing the pastoral household sale of livestock in response to excess demand. This is because, in the absence of market price incentives, livestock producers are likely to sell animals mainly in times of need in order to meet targeted food needs. These times of need often coincide with dry seasons or droughts, when the physical condition of the animals is poor and their marketed prices depressed. In support of this, there are significant negative correlations between rainfall and cattle, and again between rainfall and small stock export prices. The association is not significant for camels, although it is, as expected, negative (-0.77, p>0.65). This demonstrates that market prices have negative influences on livestock assets and pastoralists’ source of income.

Spatial and temporal price differences between livestock markets in Marsabit District

The livestock marketing literature provides evidence that when pastoral households have insufficient herd size to meet subsistence production, they increase their livestock market off-take to finance food and other cash-based needs. This subsection investigates the extent of livestock price differences across the market sites and presents monthly patterns of livestock prices at the study sites. Owing to extremely low cattle sales in the lowlands, more focus is placed on changes in small stock prices across the study sites and price differentials for small stocks between the study sites.

Table 10.2 shows the average prices and animals sold at the markets of Marsabit, Maikona and Korr. The figures are pooled mean values and they conceal considerable differences in livestock prices. Although the pooled mean prices suffer from aggregate bias, the table gives an indication of livestock trade volume and a general impression of livestock prices across the study sites. The differences in available data across the sample sites are due to information-collection hitches that have been discussed in Chapter 3. Notwithstanding this, the table reveals some points worth noting.

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18 The correlation coefficients are -0.53 between rainfall and cattle export price (p<0.006), and -0.44 between rainfall and small stock prices (significant at p<0.022).

19 How livestock marketing data at the market level was collected is described in Chapter 3.
The type of animals sold at each market differentiates the livestock markets. Marsabit is clearly an important market centre for all the animal types and handles the largest volume of cattle sales. The Maikona market trades the smallest volume of small stock and more sheep are sold at the Korr market than at the Maikona market. Maikona market handles fewer cattle sales per month and the average cattle price is higher (about 18 per cent) compared to Marsabit. The average small stock prices are systematically lower at Maikona and Korr compared to Marsabit and sheep prices are also lower at Korr than at Maikona and Marsabit, the price difference being about 27 per cent and 35 per cent, respectively. The cattle prices are higher at Maikona (39 per cent) and Marsabit (26 per cent) compared to Korr. The goat price differences between Marsabit and Maikona, and Marsabit and Korr, as well as the sheep price difference between Marsabit and Maikona are all about a moderate 11 per cent. The differences in the volume of livestock sales and the market price differentials are largely attributable to the markets’ competitiveness (number of livestock traders) and the relative access to means of transport.

The table also demonstrates that not all animals brought to the market are sold on the same day. Unsold animals are usually returned home. Of the number of animals mentioned in the table, almost one-fifth of the cattle brought to Marsabit markets and 5-8 per cent of the small stock remained unsold. Korr reports higher proportions of unsold goats (18 per cent) and sheep (about 27 per cent) compared to both Marsabit and Maikona. At the Marsabit and Maikona markets less than 10 per cent of the goats and sheep were unsold, while the percentage of unsold small stock at Maikona was relatively lower. The ratio of unsold animals is indicative of the market risk faced by the pastoral households and – because the sale of livestock is motivated by household demand – of the needs that remain unfulfilled. Our observations revealed that animals returned to the market from a previous sales attempt usually fetch low prices. This is because traders often use a previously unsuccessful sales initiative as an excuse to bargain for low prices, to which the herder might be susceptible due to desperation. An inherent feature of such trader behaviour is that households are subject to market price risks.

Figure 10.9 reflects the differences in average monthly market prices received by herders per animal type and across the study sites. Marsabit is the main livestock market of the three
study sites, and in the region. The animal flows are always from the rural markets to Marsabit markets but not the other way round. The average monthly cattle prices show fluctuations of

Figure 10.9
Average monthly livestock prices

a. Average monthly cattle prices for Marsabit markets

![Cattle Price Chart]

b. Average monthly goats prices, per sample site

![Goat Price Chart]

c. Average monthly sheep prices per sample site

![Sheep Price Chart]

Notes:

a. On x-axis 9-97, for example, indicates livestock prices for September 1997.

b. The scripts Mbt-, Mai- and Kor- denote Marsabit, Maikona and Korr sites, respectively.

c. The acronyms gtprice and shprice stand for goats and sheep prices, respectively.

between Ksh. 6,000 and 10,000 and the overall average price is about Ksh.7,400 per month (Figure 10.9a). The monthly cattle prices averaged Ksh. 6,830 in 1997, Ksh.7,070 in 1998 and Ksh.7,980 in 2000. Relatively speaking, the cattle prices seem to be more favourable for livestock producers in 2000 compared to 1997 and 1998.

The small stock prices exhibit different fluctuations and obvious differences across the study sites (Figures 10.9 b and c). These price differences between the markets give an insight into the price margins across the markets. The small stock prices are lower at the lowlands sites (Maikona and Korr) compared to the mountain (Marsabit markets). In 1998, the small stock prices were about 47 per cent lower for goats and 24 per cent lower for sheep at Maikona relative to Marsabit and they were nearly 35 per cent lower in the case of goats and 63 per cent lower in the case of sheep at Korr compared to Marsabit (although this only applies to the months during which data is available at all the sites). The spatial market price disparities in 2000 are again higher for sheep between Marsabit and Korr (89 per cent) compared to the difference between Marsabit and Maikona (51 per cent). The differences in the lowlands are almost the same for goats at roughly 27-28 per cent with reference to the mountain. Thus, on average, we expect higher price differences between Marsabit and Korr compared to Marsabit and Maikona and we expect sheep prices to be lower than prices for goats. The differences between goat and sheep prices are attributable mainly to a higher demand for goat’s meat compared to mutton. The distance to Marsabit is likely to account for the lag in transmission of market price signals which therefore keeps prices in the lowlands lower. The degree to which price signals are transmitted between the markets influences the price margins between them. When price signals in one market (the main market) take a long time to affect other linking markets, the longer it will take for prices to respond and adjust to changes in the prices in the other markets. In this regard, the relatively better means of transport available to Marsabit-Maikona markets and the related flow of livestock marketing information may cause smaller price differences in comparison to Marsabit-Korr price differences.

The differences in the market prices may also be attributed to traders’ (e.g. brokers, middlemen and the main traders) practices on the market, which distort prices (see below). Thus, the various market players and changes in livestock supply and demand influence the price margins portrayed here. Hence, the livestock producers face different prices across the sites and the marketing margins reflect transaction costs (including transport charges) of trekking or trucking animals from one market to another. However, the price differences between the lowlands and Marsabit are much higher than the cost of trucking animals, suggesting, in the static sense, that the markets are spatially not integrated.

The literature suggests that a trend towards lower livestock price differentials between locations for comparable animals is a sign of market integration. The more constant price margins are, the more one can claim that the markets are integrated. Thus, the spatial price

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20 However, livestock producers gain little from annual price differences if inflation is taken into account. The consumer inflation in Kenya were 11.2 per cent in 1997, 6.6 per cent in 1998 and 9.9 per cent in 2000 (Flint 2003: 6), which indicates that the herders are worse off in purchasing power than in 1998.

21 For example, it costs Ksh. 20 to truck a goat from Maikona to Marsabit, but the seven months average price difference was over Ksh. 500 in 1998.

22 The spatial market prices for a similar commodity are in static sense tested by the coefficient of price correlation between markets. The stronger the correlation coefficients between markets, the greater the degree of integration implied by high coefficients (see Ravallion 1986; Fafchamps et al. 1998). It has been shown, however, that this does not hold in the dynamic sense (see Ravallion 1986). Our main concerns here
differences for small stock indicate an absence of market integration and short-term segmentation of the markets across the sites. In this connection, small stock markets are inefficient in the short-run, as suggested by the lack of spatial market integration. Korr has comparatively lower small stock prices and this is clearly reflected in poor marketing facilities and poor access to the livestock market. The price differentials across the sites in turn suggest that livestock sellers face different levels of market price risks.

In temporal terms, the small stock prices were higher in 1998 compared to 2000 and the prices were also higher in 1997 relative to 2000, at each market site. For example, in 2000 average goat prices were one and a half times lower at Maikona than in 1998 and almost twice as low at Marsabit and Korr. The temporal price differences are lower for sheep at all the three sites.

The dry season, or end of the dry season, is usually the riskiest period for the herders in terms of livestock susceptibility to stress and household food availability. Although the livestock prices fluctuate widely between the sample markets and across the animal species, certain similar changes in the livestock prices are discernable. For example, Marsabit offers better livestock prices compared to the lowlands sites and goats fetch a relatively higher price than sheep. The figures show that seasonal factors also have significant effects on the livestock prices, thereby causing price variations. The dip in livestock prices in January 1998 resulted from the heavy El Niño rains, which caused a breakdown in infrastructure and a tying up of traders’ circulating capital in animals. The dip in cattle prices in June 2000 (a 28 per cent fall) was a result of increased cattle supply after a break in the distribution of relief food, which caused a rise of about 36 per cent in maize price on the mountain. Thus traders’ behaviour, access to the market, the efficiency of transmission of marketing information, seasonal factors and public provision of emergency relief food all seem to affect livestock prices.

The underlying factors that determine livestock prices

Under a perfect market situation so to speak, animal prices are determined by the interactions between forces of demand and supply. Normally this is scarcely the case at the real markets, where livestock markets operate imperfectly and diametrically opposed interests of producers and traders distort potential supply-demand interaction prices. We followed the livestock marketing days of the studied sites for a couple of weeks and months. The idea was to acquire an understanding of the functioning of livestock markets in general and human behaviour in setting livestock prices in particular.

On the days when the number of livestock supplied to the market is relatively high (and there is either a fixed or low number of traders) the livestock prices usually plummeted. Such changes are prompted by swings in the demand and supply relationship. The number of traders on the market varies from one day to another and this creates a thinning of the market, when both the number of traders at the market and competition there decrease. The changes

are price margins and the changes in terms of trade across the sample markets rather than investigating markets price integration in a dynamic sense.

23 Aklilu et al. (2002: 13) report similar differences between 1998 and 2000 Nairobi prices, with the 1998 prices being at least twice as low as the 2000 prices for cattle and sheep, while there was no data on goat prices in 1998. The goats and sheep prices are higher in 2000, but cattle prices are slightly higher in 1997, compared to 1997 prices.

24 It is rare for all livestock traders to be present at the local markets. However, we counted about 45 livestock traders and about ten petty traders selling tea and chapatti at the market sites.
in the number of effective buyers and fluctuations in the number of animals offered for sales, or both, create large swings in the livestock prices. Of special interest to the pastoral households is the fraction of unsold animals which indicates cash demand-induced livestock sales that often result in unfavourable livestock prices for the herders. In other words, the livestock sales are driven by producer needs and this also highlights our prior expectation that low per capita holdings require households to increase their marketed off-takes. This does not seem to match demand and animal prices are depressed as a result.

These are not the only things, though. The livestock markets are full of distortions that restrict the competitive buying and selling of animals. The traders greatly influence the setting and, in most cases, the direction of change of the animal prices. They determine livestock prices through trade collaborations among themselves. For example, a trader who brings animals to the market site will start negotiating prices. If these price negotiations fail to generate a price that is acceptable to the seller, a non-bargaining sanction will be imposed on the animal(s) in question by other traders. Such trade collaborations between the brokers, middlemen and the main livestock traders determine the way they deal with herders. It is clear that the livestock traders have overlapping interests of earning a high brokerage or ensuring a high price margin when re-selling animals on the same market, or elsewhere. Thus, lower animal prices are better for the traders. Another cooperation binding the traders, which results in lower animal prices, is the development of personal familiarity between brokers, middlemen and the main traders. Such social symbiosis does not exist between traders and herders because the members of these groups are constantly changing.

The middlemen and brokers regularly negotiated animal prices on behalf of the main livestock traders (with reasonably sufficient capital) and often consulted them on the final price decision. By doing so, the brokers and the middlemen ensured themselves satisfying brokerage fees for the animals sold, established social bonds in the livestock-trading enterprise and instilled trust and confidence. The fact that the traders frequently interacted at the market resulted in the implementation of informal insurance arrangements (cf. Dercon 1999; Dasgupta 2002; Fafchamps 2002) and allowed low-capital traders to earn an important share of their income. As regards interpersonal confidence and trust between low and high capital traders, we observed on several occasions that the brokers/medium-capital traders represented the main livestock traders and bought animals when the latter traders took animals to the end markets.

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25 On the mountain, we identified three types of livestock traders (or market players) on the basis of the capital outlay. First, the brokers who had very little capital of their own but made use of opportunities to negotiate animal prices for other traders or herders and thereby earn commission (this was about Ksh. 20 in 1998). At times, the brokers earned commission from both traders and herders, depending on the double-edge role they play in setting the final price. Second, there were the middlemen who had small or medium-sized amounts of financial capital. This group bought animals and sold them either at the same market on the same day, or moved the animals upon purchase to another market to earn trade price margins. The third group comprises the traders with medium-sized or relatively large financial capital outlays. This group bought animals (at times using the other type of traders) to trade between Marsabit and the terminal markets. Other actors on the market are butchery operators. This group works closely with the livestock traders while livestock traders sometimes run their own butchery (see Nunow 2000 for similar type of traders in north-eastern Kenya).

26 Seen through the lens of social capital, there is an important dimension to the livestock marketing, besides monetary returns on livestock trading enterprise. Here we define social capital as "the structure of relations between traders and among traders", which is the basis of human occupation and economic earning (Coleman 1990, cited in Pretty & Ward 2001: 211; wording slightly rephrased to suit out context)
Owing to the numerous traders' malpractices, animal prices are often depressed and as a result the livestock prices fail to reflect the interaction conditions between demand and supply. Thus, even when there are many traders on the market and supply of animals is low traders still draw on manipulative practices to force animal prices down.

Apart from the trade behaviour used by the traders, a number of factors interplay to influence livestock prices\(^\text{27}\), namely ceremonies and religious celebrations and natural factors. Following the daily livestock sales, we observed that traders make use of delaying tactics as a powerful trade sanction to wreck herders' impatience and resort to acceptance of low prices offered by the buyers. Moreover, the days on which the traditional ceremonies take place – such as sorio and almado (see O'Leary 1985 and Tablino 1999 for details) which are observed three times in a year – customarily require the presence of own herds and household members at their home residences. In addition, religious festivities such as \textit{Id-ul-fitr} and Christmas that are celebrated with meals comprising substantial amounts of meat, affect livestock prices because animals are relatively over-supplied to the market in anticipation of large purchases. The actual days on which religious and traditional festivities take place have 'mirrored-effects' on livestock supply to the market and animal prices. Whereas fewer animals are supplied to the market on the days of traditional ceremonies and ritual, more animals are supplied to the market on the days leading to the religious festivities. Thus, on the days of traditional ceremonies, animal prices rise and, in case of the latter, animal prices plummet with almost no animal sales on the actual days on which religious events take place.\(^\text{28}\) Also, the factors like El Niño rains and wet and dry seasons (or droughts) affect livestock prices because animals are relatively over-supplied to the market in anticipation of large purchases. The dry seasons are stressful times for household food insufficiency, especially in the case of food from animal sources. Today, it is common for greater numbers of animals to be supplied to the market when schools are opened and when school fees need to be paid. As a result, animal prices fall in relative terms at such times.

\textit{Livestock and grain price ratios}

The monthly livestock prices discussed above become more meaningful when compared with prices of the commodities that livestock sellers (mostly herders) exchange for animals. In the available literature, the market price of each group's important commodities (cereal and livestock prices) is commonly used to compare terms of trade and the relative purchasing power between farmers and pastoralists as price level changes (Dietz 1987; Zaal & Dietz 1999). The patterns of price ratios between commodities of interest are usually used to understand the pattern of change in livestock marketing. The terms of trade between cattle and maize are prices of cattle expressed as a ratio of maize prices for a given period, or over each time period being considered. This ratio forms one of the strongest arguments for pastoral

\(^{27}\) Another occasional and an influential factor in livestock prices and herders welfare is government trade and health concern regulations resulting in a ban on animal movement (Chabari & Njiru 1991; MDARs various years). This is usually prompted by diseases outbreak, and as a result government imposition of a ban and restriction on livestock movement, causes oversupply of livestock to the local markets, and tying traders' working capital in livestock (on-hooves). The consequence of such regulations is an adverse fall in animal prices and herders exposure to market price risk.

\(^{28}\) One way to capture influences of these events is to use daily moving average prices. Using monthly or yearly data might eclipse the importance of such days' influence on livestock prices. Fr. Paul Tablino (in collaboration with Katelo Abduba and Guyo Sake) publishes a Marsabit Calendar yearly (since the last five years), which covers important annual events and ceremonies of the main ethnic groups (see Chapter 3).
households to decide in favour of livestock marketing. This argument is backed up by caloric food values, especially the differences in carbohydrates contents between meat and grain, commonly maize grain (Dietz 1987; Fratkin et al. 1999).

Figure 10.10 tells the recent tale of the cereal/meat price ratio for Marsabit District. The local market prices per kilogram of cereals and meat are used to derive relative price ratios (expressed as a percentage), which are a mean value for the entire district. It follows from this figure that the relative cereal/meat price ratio fluctuates between various quarters, with peaks especially in the second and third quarters of 1994, the third quarter of 1996 and the first quarter of 1998. The ratio remained relatively stable in 1995 and in the first two quarters of 1996. A cereal/meat price ratio of 66 per cent in the first quarter of 1996, for example, means that pastoral households on average required 66 per cent of the price of a kilo of meat to obtain a kilo of cereals. Overall, the bad news is the growing comparative disadvantage that herders would face, in relative cereal/meat price terms, through the sale of livestock, while the grain sellers (or farmers) would benefit. This is very clearly portrayed by the trend line. In the following subsection we will analyse how this relative purchase power evolves when expressed in caloric terms.

Recent changes in livestock-maize caloric terms of trade
In this section, we use the caloric terms of trade (Tc) rather than the meat-grain price ratio to compare the terms of trade between livestock and livestock products and grains. The caloric terms of trade is expressed in the caloric food content of meat and grains measured in

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29 Here, the cereal/meat price ratios are calculated from average animal prices divided by maximum life weights, which is questionable. In the next subsection we will analyse the terms of trade in caloric terms based on a more realistic weight of consumable meat for each animal type.
equivalent units\(^{30}\) (kg) (Dietz 1993; Zaal 1998; Nunow 2000; Dietz et al. 2001). Prior to the information reflected in Figure 10.11, the earliest work on the cereal/meat ratio was reported by the UNESCO-IPAL project in the district between 1976 and 1983 (Dietz et al. 2001). Based on this source, the meat/cereal caloric ratio was estimated as being about 4 to 1 in 1983, and the milk/cereal caloric ratio at about 6 to 1. This shows a relative advantage, in caloric terms, for milk sales over the sale of meat. It is worth noting that these caloric ratios have been adjusted for the caloric food value of the commodities, in this case milk, meat and cereals (maize is commonly used), per gram. These food value adjustments make these estimates differ from the results reflected in Figure 10.10.

Based on data from the UNESCO-IPAL project in the area, the terms of trade, expressed in caloric value, were between 1 and 2 during the period 1984/87. This Tc value may be extremely low partly because of the severe drought in 1984, which might have considerably reduced animal prices and thus worsened (caloric) terms of trade. The caloric terms of trade were in the range of 4.4 to 4.8 for the exchange of cattle against grain on the mountain during the 1996/97 droughts (Dietz et al. 2001: 219); the (caloric) terms of trade being slightly lower at between 3.8 and 4 for the exchange of cattle against maize meal at Maikon in the lowland. However, the livestock-grain terms of trade vary between animal types and are also sensitive to market price fluctuations, which are volatile at times. In comparative terms, cattle and goats fetch better market prices than camel and sheep because their meat is often in less demand (own market price observations). The caloric terms of trade improved to about 6 for grain and about 5 for maize meal in the 1997/98 period. The caloric terms of trade and meat/cereal price ratios suggest favourable terms of trade for the pastoral households embedded in livestock sales. Both estimations support the argument that livestock marketing offers herders a competitive edge/advantageous terms-of-trade to smoothen out shortfalls in their subsistence production by selling livestock and buying grains.

Figure 10.11 shows the changes in the monthly Tc between livestock and maize prices and allows a comparison of the Tc between farmers and herders. The Tc for cattle fluctuates between low values of 2.6 in January 1998 and 2.4 in June 2000, which coincides with the time of El Niño rains and breakdown in the road infrastructure and a cut in relief food distribution, respectively. The high Tc values of around 6 were realised during the period following the El Niño rains, except for May 1998. Comparing cattle prices (Figure 10.9) and terms of trade illustrations (Figure 10.11a) show different patterns for November 1997, February 1998, and March and September 2000. Whereas there was a more proportionate increase in the price of cattle (18.6 per cent for cattle against 15.4 per cent for maize) in Nov. 1997 relative to October 1997, the price of maize increased more proportionately relative to the price of cattle (28.6 per cent rise for maize against 5.8 per cent increase in cattle) in September 2000 relative to August 2000. The former changes reflect the favourable terms of trade for the herders (a Tc increase from 3.2 to 3.4), and the latter developments were favourable for the farmers (a decline from 3.7 to 3.1). The improved terms of trade (increase from 3.2 to 5.2) for the herders in April 2000 was caused by a fall of less than 3 per cent in the price of cattle, which was associated with a 40 per cent fall in the price of maize. The increase in the Tc from 3.9 in February 1998 to 6.5 in March 1998 was due to an 11.2 per cent

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\(^{30}\) Here we assume that a kilogram of maize contains 3,500 kcal, a kilogram of beef about 2,300 kcal, goat meat about 1,500 kcal and sheep meat (mutton) about 3,000 kcal (see also Dietz et al. 2001; Zaal & Dietz 1999).
Figure 10.11
Monthly caloric terms of trade (Tc) between livestock and maize-grain

a. Monthly caloric terms of trade for cattle, Marsabit Mountain

b. Monthly caloric terms of trade for goats, per sample site

c. Monthly caloric terms of trade for sheep, per sample site

Note:
a. The animal prescripts Mbt-, Maik- and Kor- refer to the sample sites Marsabit, Maikona and Korr in that order.

increase in the price of cattle and a fall of about 33 per cent in the price of maize to the advantage of the herders. The changes in the monthly commodity prices, however, reveal
wider fluctuations in maize prices relative to cattle prices and this, in turn, reflects relatively stable cattle prices compared to maize prices.

The above-mentioned months of February, March and September are usually critical for the pastoral households in terms of animal body conditions and low household subsistence livestock production. The months border with the end of the dry seasons (September-October) and the beginning of the wet seasons (November, February-March) and at such moments cash income from livestock sales is likely to cushion households better against cyclical changes in food supplies. The rest of the months show similar patterns of Tc values and cattle prices, which indicate comparable changes in the maize and cattle prices.

The average Tc was 2.3 for goats and 3.2 for sheep in Marsabit and about 2 for goats and 2.8 for sheep in Maikona in 1997. If we examine only the months we have data for at all the three sites, the average Tc were about 5.4 for goats and 6.2 for sheep in 1998 on the mountain. These measurements were lower in 2000, being 1.3 for goats and 2.9 for sheep. The Tc measures were 2.0 for goats and 2.8 for sheep in 1998 and 1.1 for goats and 2.1 for sheep in 2000 at Maikona. At Kor, the Tc was 1.8 for goats and 1.7 for sheep in 1998 and 0.6 for goats and 0.9 for sheep in 2000. On the basis of these results, sheep have higher Tc compared to goats on the mountain and in the lowlands, except for Kor in 1998. In this particular case, the goat price is so much higher than the sheep price that the caloric differences between goat and sheep meat are offset. Again, the Tc for small stocks were lower in 1998 and in 2000 at the lowland sites compared to the mountain. The goats and sheep Tc were about three and two times lower at Maikona and Marsabit respectively in 1998 and they were almost identical in 2000. The Tc for goats and sheep were three and almost four times lower, respectively, at Kor compared to Marsabit in 1998 and again about two and three times lower in 2000. The fluctuations in the market conditions and livestock prices represent a market price risk on the basis of comparative livestock-grain food value traded by the farmers and the herders. Thus, in inter-temporal terms, the fall in Tc in 2000 did not favour the livestock sellers (mainly herders) at all the sites, but favoured the maize sellers instead.

The analysis of price level changes is useful for an understanding of the terms of trade between livestock sellers and maize traders. From the Tc analysis and monthly changes in the livestock prices, we find wider margins for Tc across the sites compared with the monthly price differences. Thus, even though these comparisons show lower small stock prices at the lowland sites, the much lower Tc values at the lowland sites compared to the mountain show that the maize price is more important for an understanding of price differentials across the sites. This means that maize prices cause more market heterogeneity compared to livestock prices across sites. The Tc differences also reveal the crucial role of access to markets and of market price risks faced by rural households and clearly show the most vulnerable locations across the set of sites. The relative changes in the livestock prices discussed earlier and the caloric terms of trade emphasise that the market prices clearly disadvantage small stock producers and has a negative effect on the critical risk factor of the livestock markets in pastoral areas. Thus, we can easily identify Kor communities as the most vulnerable group because the prices of livestock they trade in lost most value relative to maize prices.

It would be correct to generalise from these results that an increase in the Tc between cattle and maize means a relative increase in the purchasing power for the herders compared to the grain traders. This can result either from an increase in the price of cattle (or small stock), a decrease in the price of maize, or both. Conversely, a decrease in the Tc between cattle and maize means a relative increase in the purchasing power for the grain trader (or farmers)
relative to the herders, or sellers of the cattle. Such changes in the terms of trade can result either from an increase in the price of maize, a decrease in the price of cattle, or both.

A share of animals sold on the markets meets local demand for meat, through slaughters. Thus, the butchery outlets play an important role in the livestock marketing enterprise. While maize prices widely fluctuate between months, the nominal meat prices (for beef, goat or mutton) in Marsabit town stagnated at about Ksh.100 per kilo of meat over the 1990s and 2000. This perhaps reflects low demand for meat in the recent years, or shows that meat is supplied without dramatic increases in the livestock price. Meat is mostly sold with bones, except when beefsteak is occasionally sold at a higher price than beef with bones. Other animal products like offal, liver, kidney, sheep-tail-fat etc. are sold separately from meat. We can assume that a cow weighs about 160 kg when dead, and that goats and sheep each weigh about 20 kg (see Lusigi 1983 and Peden 1984, 1987 for Marsabit; and Toxopeus 1996 for the Maasai region). Additionally, based on our survey of livestock prices we will assume that the highest cattle price recorded is about Ksh. 9,700 at the Marsabit markets, Ksh. 1,600 for goats and about Ksh. 1,100 for sheep (say an average of about Ksh. 1,350 for small stock of goats and sheep). Using these estimates, the gross minimum market margins are Ksh. 6,300 for cattle and Ksh. 650 for small stock. That is, the difference between the price received by herders (or pastoralists) and the price paid by consumers. Thus, the gross profit accruing to the butchery enterprise is about 39 per cent higher in the case of cattle and 33 per cent higher in the case of small stock than the average monthly livestock prices. These crude estimates show that butchery enterprises reap substantial benefits from livestock marketing. This may also suggest that traders, including butchery owners, control livestock prices since high animal prices would potentially reduce their after-sale price margins.

The livestock marketing information reveals the critical role that access to markets plays in influencing livestock prices and the differentiated market price risks faced by livestock sellers, particularly the pastoral households in the lowlands. Thus, the market can enable or block household attempts to compensate shortfalls in the food situation and also finance other needs through the cash market. Access to a market and market price risks raise a serious concern at a time when the pastoral households possess livestock per capita below the sufficiency level for food needs, which is when they should be more motivated to increase marketed livestock off-take. Any future effort to improve marketing efficiency, stabilise producer prices and improve the income of the pastoral households will be a move in the right direction.

**Livestock marketing and transaction costs**

Marsabit is geographically far (500 km) from the big urban meat markets like Nairobi. The poor infrastructure and distortions in the marketing channels, such as numerous police checkpoints en route and illegal payments at roadblocks, hinder livestock marketing and reduce the profits of the traders. These charges block the smooth functioning of the livestock markets. In 1998, the truck-owners variably charged Ksh.30,000 to 40,000 per trip to the end-markets and this accounted for about 80 per cent of the total livestock marketing costs. Our estimates show that the total costs of trucking cattle is about 14 per cent of the terminal sales

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31 Chabari & Njiru (1991: 120) report the cost of trucking livestock to Nairobi as being 70 per cent per head of cattle and 54 per cent for small stock of the total marketing costs.

32 Estimates carried out by Adan & Dietz (April 1998, Marsabit). These costs include trucking charge, costs in Nairobi of food and accommodation, payment to the turn-boy overseeing cattle on the truck and illegal
value of cattle and that Nairobi prices are twice as high as the average Marsabit price. In the case of small stock, traction costs account for 80 per cent of the total transport cost, while the total transport costs are about 11 per cent of the terminal sales value of small stock. The terminal market sales value of small stock is one and a half times higher than Marsabit prices. According to Aklilu et al. (2002) the cost of trucking animals from pastoral areas of northern Kenya to the terminal markets was between 25 and 40 per cent of the livestock trading enterprise (ibid, p. 1). The producer’s share in the retail price in Kenya is around 47 to 52 per cent, depending on the butchery outlet. These figures emphasise the significance of the costs of trucking animals in the livestock trade and also in determining trader’s returns on the livestock marketing.

The changes in the local livestock market prices are occasionally triggered by the prices in end markets like Nairobi and thus impose an aggregate risk on the local markets. This happened through the conduct of the traders. The Ministry of Agriculture/Marsabit Development Programme (MoA/MDP) disseminated Nairobi livestock prices in Marsabit town for some time. The aim of doing so was to bridge the information gap between traders and producers and to improve livestock prices at the local markets. Following this dissemination, the traders were better informed about changes in animal prices at the end market and asymmetric market information was passed between traders and herders. This effort inadvertently created a stage for the traders to misinform herders and bargain for low animal prices, especially when prices in the end market fell. The bulletin provoked a systematic risk as the traders use prices in the end market to their advantage by potentially influencing the livestock prices at the local markets. This beats the aim of the bulletin to improve traders’ and herders’ access to the livestock prices information, and thus to improve livestock prices at the local markets.

At this point, it is interesting to reflect on the caloric terms of trade and the livestock-grain price ratios discussed earlier. The livestock-grain price ratios show an upward trend over time. These ratios are derived from the quarterly figures of livestock and grain (usually maize) prices for the district as a whole (Figure 10.10), or aggregated over different markets sampled. Therefore, the livestock-grain ratios do not reflect spatial differentiations in market prices and, in an economic sense, do not bring out winners and losers in the livestock-grain trade interaction. A critical note is, however, that our own market-based livestock and maize prices show a contradictory pattern (Figure 10.11). Although, on average, we see positive caloric terms of trade between livestock and maize across the markets, the terms of trade fluctuate with the relative changes in livestock and maize prices at the study sites. The terms of trade are clearly more favourable for the livestock producers in 1998 and a drop in terms of trade can be noticed in 2000. Animal prices were higher in wet years (like in 1998) when livestock sales took place only for targeted needs and hardly for food. Similarly, there were low animal prices in drought years (severe drought in 2000) because of high livestock supplies to the market and also due to the poor physical condition of the animals. Hence, the 1997, 1998 and 2000 livestock and maize price levels reflect the interplay between livestock supply and demand. The magnitude of caloric terms of trade for cattle, sheep and goats confirm our prior expectations. The result more importantly emphasises the critical role played by access to market and means of transport in determining and differentiating winners and losers in the barrier charges en route to Nairobi. The cost of trucking animals alone accounted for about 12 per cent of the cattle sales value in Nairobi. In most cases, the livestock trader and truck owner are different persons.
livestock-grain interactions between spatial livestock markets. In this case, Marsabit has relatively better access to infrastructure, more livestock traders and promises superior terms of trade. At the lower end of the scale lower livestock prices and terms of trade (*i.e.* high maize prices) are in evidence at Korr, with its poor access to markets and low livestock demand. The differences in the livestock prices may be influenced not only by on-going distribution of relief food in 2000, but also by the effectiveness with which it is delivered and distributed.

At this point, it is more important for us to seek an answer to the question of whether the Kenyan economy ably supported the need for increased commercialisation of the livestock through exports outside Marsabit District. To focus on this point, the following sections examine figures for livestock exports as a proxy for the demand for meat within the wider national economy context. We will focus on two outlets, *i.e.* the option for livestock exports outside the District but within the country and the outlet provided by potentially favourable international terms of trade. The subject matter of demand-for-meat is, thus, both a domestic and international one.

Household trade in milk

Milk is an important livestock subsistence product since it makes a significant contribution to human welfare in livestock-based economies. The amount of milk reserved for calves, kids or lambs also directly affects calf, kid or lamb recruitment (*i.e.* the annual addition of new animals to a herd) and thus the time path of herd growth. However, a fall in herd holdings and the subsequent decline in per capita subsistence production may influence a household’s milk allocation decisions between household milk consumption and the share of milk marketed. This section considers the level of milk production, the share of milk sold by the households, the contribution of milk sold to the household income and the calories obtained from the available milk in relation to livestock wealth levels.

*Household trade in milk on the mountain*

More than half (*i.e.* 55 per cent) of all households with milk-producing animals on the mountain owned less than 8 TLU/household in 1998 (Table 10.3). The household size increases from the lowest to the highest wealth classes in the moist zone – a pattern which does not apply to the dry zone. The households on the mountain in the two middle wealth classes (*i.e.* 8.1-40 TLU/household) sold much more than those in the other wealth classes and the poorest livestock owners sold the lowest quantities of milk. In the dry zone much more milk was sold compared to the moist zone, except for the lowest wealth class. While the households in the middle wealth classes in the moist zone sold about 83 and 78 - 300 ml cups of milk per month, their counterparts in the dry zone sold about 130 and 275 cups of milk, about one and a half and four times more. The differences in the amount of milk sold between

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33 The households without animals (see Chapter 7) are excluded from the analysis of milk production and marketing.

34 Most milk was sold either by women or unmarried girls among the study groups (see Fratkin & Smith 1995).

35 We carried out these investigations within wealth classes and compared them between classes. However, the reader is reminded that our results should be interpreted with caution because of differences in sample sizes (*e.g.* for household size, dairy animals etc.).
Table 10.3
Average household size, milk-producing animals and sale of milk on the mountain per wealth class

<table>
<thead>
<tr>
<th>Site (n)</th>
<th>&lt; 8</th>
<th>8.1-16.0</th>
<th>16.1-40</th>
<th>40.1+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moist</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average household size</td>
<td>5.5 (68)</td>
<td>6.3 (34)</td>
<td>7.1 (17)</td>
<td>9.3 (3)</td>
</tr>
<tr>
<td>Average number of milk-producing cattle</td>
<td>1.7 (65)</td>
<td>3.5 (34)</td>
<td>4.9 (17)</td>
<td>3.3 (3)</td>
</tr>
<tr>
<td>Average number of milk-producing small stock</td>
<td>1.0 (65)</td>
<td>0.6 (34)</td>
<td>1.3 (17)</td>
<td>--</td>
</tr>
<tr>
<td>Potential milk production (in litres)</td>
<td>36.6 (65)</td>
<td>70.3 (100)</td>
<td>100 (128.7)</td>
<td>--</td>
</tr>
<tr>
<td>No. of cups of milk sold</td>
<td>16.4 (65)</td>
<td>83.2 (34)</td>
<td>78 (17)</td>
<td>33.2 (3)</td>
</tr>
<tr>
<td>Milk sold in litres (% of prod.)</td>
<td>4.9 (13.4)</td>
<td>25.0 (35.5)</td>
<td>23.4 (23.4)</td>
<td>10.0 (7.7)</td>
</tr>
<tr>
<td>Cash income per month (Ksh.)</td>
<td>2,441.18</td>
<td>2,176.47</td>
<td>3,941.18</td>
<td>4,333.33</td>
</tr>
<tr>
<td>Milk proceeds (% of cash income)</td>
<td>82 (3.4)</td>
<td>416 (19.1)</td>
<td>90 (9.9)</td>
<td>166 (3.8)</td>
</tr>
<tr>
<td>Calories obtained/capita (% Kcal.)</td>
<td>4.0 (6.0)</td>
<td>5.0 (7.5)</td>
<td>7.6 (11.2)</td>
<td>8.9 (13.2)</td>
</tr>
<tr>
<td>Dry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average household size</td>
<td>5.7 (32)</td>
<td>5.4 (15)</td>
<td>6 (11)</td>
<td>8.0 (1)</td>
</tr>
<tr>
<td>Average number of milk-producing cattle</td>
<td>2.5 (32)</td>
<td>5.1 (15)</td>
<td>7 (11)</td>
<td>2.0 (1)</td>
</tr>
<tr>
<td>Average number of milk-producing small stock</td>
<td>2.9 (32)</td>
<td>2.8 (14)</td>
<td>11.0 (11)</td>
<td>40.0 (1)</td>
</tr>
<tr>
<td>Potential milk production (in litres)</td>
<td>58.8 (65)</td>
<td>112.2 (188.1)</td>
<td>177 (177.0)</td>
<td>--</td>
</tr>
<tr>
<td>No. of cups of milk sold</td>
<td>10.4 (32)</td>
<td>130.4 (15)</td>
<td>274.8 (11)</td>
<td>140.4 (1)</td>
</tr>
<tr>
<td>Milk sold in litres (% of prod.)</td>
<td>3.12 (5.3)</td>
<td>39.1 (34.9)</td>
<td>2.4 (43.8)</td>
<td>42.1 (23.8)</td>
</tr>
<tr>
<td>Cash income per month (Ksh.)</td>
<td>2,218.75</td>
<td>3,000</td>
<td>4,090.91</td>
<td>7,000</td>
</tr>
<tr>
<td>Milk proceeds (% of cash income)</td>
<td>52 (2.3)</td>
<td>652 (21.7)</td>
<td>1,374 (33.6)</td>
<td>702 (10.0)</td>
</tr>
<tr>
<td>Calories obtained/capita (% Kcal.)</td>
<td>6.8 (10.1)</td>
<td>9.5 (14.0)</td>
<td>13.2 (19.6)</td>
<td>11.8 (17.5)</td>
</tr>
<tr>
<td>Moist</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average household size</td>
<td>7.0 (61)</td>
<td>7.9 (28)</td>
<td>7.5 (17)</td>
<td>9.8 (4)</td>
</tr>
<tr>
<td>Average number of milk-producing cattle</td>
<td>0.9 (53)</td>
<td>1.1 (24)</td>
<td>2.8 (14)</td>
<td>2.3 (4)</td>
</tr>
<tr>
<td>Average number of milk-producing small stock</td>
<td>0.4 (48)</td>
<td>0.7 (21)</td>
<td>1.8 (12)</td>
<td>0.7 (3)</td>
</tr>
<tr>
<td>Potential milk production (in litres)</td>
<td>7.5 (49)</td>
<td>14.4 (24.6)</td>
<td>24.6 (20.4)</td>
<td>--</td>
</tr>
<tr>
<td>No. of cups of milk sold</td>
<td>13.6 (49)</td>
<td>11.5 (21)</td>
<td>12.6 (12)</td>
<td>15.0 (4)</td>
</tr>
<tr>
<td>Milk sold in litres (% of prod.)</td>
<td>4.1 (54.7)</td>
<td>3.5 (24.3)</td>
<td>3.8 (15.4)</td>
<td>4.5 (22.1)</td>
</tr>
<tr>
<td>Cash income per month (Ksh.)</td>
<td>2,060.17</td>
<td>2,888.89</td>
<td>2,996.67</td>
<td>12,500</td>
</tr>
<tr>
<td>Milk proceeds (% of cash income)</td>
<td>135.1 (6.6)</td>
<td>122.4 (4.2)</td>
<td>113.8 (3.8)</td>
<td>150 (1.2)</td>
</tr>
<tr>
<td>Calories obtained/capita (% Kcal.)</td>
<td>0.3 (0.5)</td>
<td>1.0 (1.4)</td>
<td>1.9 (2.9)</td>
<td>1.1 (1.7)</td>
</tr>
<tr>
<td>Dry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average household size</td>
<td>5.8 (35)</td>
<td>6.9 (14)</td>
<td>6.6 (14)</td>
<td>6.0 (1)</td>
</tr>
<tr>
<td>Average number of milk-producing cattle</td>
<td>0.4 (33)</td>
<td>0.9 (14)</td>
<td>0.7 (14)</td>
<td>2.0 (1)</td>
</tr>
<tr>
<td>Average number of milk-producing small stock</td>
<td>0.3 (35)</td>
<td>0.1 (14)</td>
<td>0.9 (14)</td>
<td>--</td>
</tr>
<tr>
<td>Potential milk production (in litres)</td>
<td>3.3 (35)</td>
<td>6.9</td>
<td>6.3</td>
<td>30</td>
</tr>
<tr>
<td>No. of cups of milk sold</td>
<td>6.0 (35)</td>
<td>17.1 (14)</td>
<td>8.6 (14)</td>
<td>60.0 (1)</td>
</tr>
<tr>
<td>Milk sold in litres (% of prod.)</td>
<td>1.8 (54.5)</td>
<td>5.1 (74.3)</td>
<td>2.6 (41.0)</td>
<td>18 (60)</td>
</tr>
<tr>
<td>Cash income per month (Ksh.)</td>
<td>1,871.88</td>
<td>2,157.14</td>
<td>3,757.70</td>
<td>3,500</td>
</tr>
<tr>
<td>Milk proceeds (% of cash income)</td>
<td>61.5 (3.3)</td>
<td>154.3 (7.2)</td>
<td>85.7 (2.3)</td>
<td>900.0 (25.7)</td>
</tr>
<tr>
<td>Calories obtained/capita (% Kcal.)</td>
<td>0.2 (0.3)</td>
<td>0.2 (0.3)</td>
<td>0.4 (0.6)</td>
<td>1.4 (2.1)</td>
</tr>
</tbody>
</table>

Notes:
- All figures are monthly values, except for the number of milk-producing animals. Values in brackets are the number of households with milk-producing animals, unless otherwise indicated in brackets in column 2.
- a. hh is the abbreviation for household.
- b. All figures are monthly values, except for the number of milk-producing animals. Values in brackets are the number of households with milk-producing animals, unless otherwise indicated in brackets in column 2.
- c. Milk sold in 300 ml cups per month.
the zones translate directly into a higher income earned from the sale of milk and a higher contribution of milk earnings to the monthly cash income for households in the dry zone.

The potential milk production\textsuperscript{36} is estimated on the basis of the wet and dry season's average milk yields\textsuperscript{37} for each animal type. The potential milk production directly relates to herd sizes (\textit{i.e.} wealth ranks) in 1998, except for the highest wealth class in the dry zone. This may be because of the differences in the composition of the household herd sizes and the splitting of herds. The households in the two middle wealth classes on the mountain report a high percentage of milk off-takes (expressed in Table 10.3 as a proportion of the potential milk production) compared to other classes. The households in the less than 8 TLU/household wealth class in the moist zone report a higher ratio of milk sold as a fraction of the potential milk production than those in the highest wealth class, but in both zones households in this class show much lower earnings from milk sales compared to those in the highest wealth class. Thus, there were major differences in milk off-takes across the wealth levels on the mountain in 1998.\textsuperscript{38} Relating milk production to the average household size reveals a low contribution of milk to the required calories per household member. This is more apparent among the poorest households than among households in the two highest wealth classes.

In 2000, more than half of all the households on the mountain owned less than 8 TLU per household as well. The average household sizes increased compared to 1998. There were high increases in household sizes for the herd-poor households in the moist zone which are in the two lowest livestock wealth categories (+27 per cent and +25 per cent) and low increases for the herd-rich households in the two highest livestock wealth categories (+5.6 per cent and +5.4 per cent). Households in the two middle wealth classes in the dry zone reported the highest household size increases (+28 per cent and +18 per cent), while those in the poorest rank increased by 2 per cent and households in the wealthiest class decreased by 25 per cent. The household size increases, especially among the middle wealth households, may be attributed to the fact that the survey period coincided with school holidays, when the students remain with their parents. The relatively low increase or fall in the household sizes in the dry zone can possibly be attributed to migration of household members with herds to other places. In addition, movement of household members between households of different wealth classes in order to smoothen out differences in resources may cause changes in household sizes.

In the dry zone, the only household that was in the highest wealth rank sold the highest amount of milk, followed by the households in the middle wealth classes. The households in the lowest wealth class in the dry zone state high milk sales relative to the middle wealth

\textsuperscript{36} The potential milk yield is conditional on, among other factors, seasons (wet or dry) and the length of lactation period (O'Leary 1985). In this respect, the Gabra and Boran use the words \textit{ch'onele} and \textit{irman} for animals in long and short periods of lactation, respectively. These terms are used for milk-producing camels and cattle, but not for milk-producing small stock.

\textsuperscript{37} The Marsabit Range Management Handbook (Schwartz \textit{et al.} 1991: 76) gives an average daily milk production of 4 litres for camels, 2.5 litres for cattle and 0.45 litres for small stock daily. These estimates do not give milk production according to seasons, although milk production varies between seasons. To obtain potential milk production (in litres per month), we use milk yields of 2.5 litres for camels, 1.3 litres for cattle and 0.23 litres for small stock daily in the wet season. In the dry season we use 1.2 litres of milk for camels per day, 0.5 litres for cattle and 0.08 litres for small stock. These figures are valid for the study area (O'Leary 1985; Fratkin 1991, 1998: 75) and livestock production in Eastern Africa (Dahl & Hjort 1976; Pratt & Gwynne 1977).

\textsuperscript{38} For the mountain zones as a whole, the quantities of milk sold and herd sizes correlated positively in 1998 (\textit{i.e.} r = 0.250; p<0.001 for the moist zone and r = 0.507; p<0.0001 for the dry zone) and only in the moist zone in 2000 (r = 0.360; p<0.001).
classes. This class realised, however, the lowest milk production, while the highest milk production was realised by the wealthiest household in the dry zone and the second highest by the households in the 16.1-40 TLU/household wealth class in the moist zone.

As Table 10.3 shows, milk production decreased considerably in 2000 compared to 1998. The total potential milk production decreased by 80 per cent in the moist zone and by about 91 per cent in the dry zone in 2000 compared to 1998. In 2000, there was substantial marketing of the (little) available milk. In this regard, the lower wealth classes on the mountain sold a substantial share of the available milk and there was an increase in the proportion of marketed milk by the lowest and highest wealth classes between 1998 and 2000.

On the income side, the return on milk sales fell substantially for all wealth categories between 1998 and 2000, except for the households in the poorest wealth rank and those in the highest wealth rank in the dry zone. Relatively speaking the earnings from milk sales increased for the poorest group on the mountain between 1998 and 2000, both in absolute amounts and as a share of average cash income per month, while it decreased for the other classes (ignoring one household in the dry zone). This indicates a higher reliance of the poor households on small amounts of available milk in order to earn income. Indeed, our informants pointed out that it is better to sell the little milk available to buy maize grain (or posho – maize flour obtained by grinding maize grains) than to consume it at home, because it is insufficient for the household members anyway. This makes a lot of sense in terms of higher caloric contents (nutritional value) of grain compared to milk, and the positive (caloric) terms of trade.

The milk production reduced substantially in 2000 as a result of severe drought in the study area. Consequently, milk sales increased on the mountain in 2000 and, coupled with mean increases in household sizes, the contribution of milk to the calorie intake of the households dropped very much. The households' milk production met very low proportions of the households' caloric food needs across the wealth categories (Table 10.3). As this table shows, the contribution of milk to the required calories per person in the poorer households is lowest in the dry zone on the mountain. In the moist zone, however, household sizes are larger and the contribution of milk to the required calories is slightly higher than in the dry zone: 1.4 per cent and 0.3 per cent per person per month respectively for the 8.1-16.0 TLU/household wealth class. With no more than 3 per cent of the required calorie intake per person per month at most, even at higher wealth levels milk contributes little to the needed calories of the household members. One may argue that these households are agro-pastoralists and are therefore likely to rely less on milk for their required calories. Yet, hardly any crop yields were realised on the mountain due to the severe drought in 2000. Thus, the low milk production equally challenges household efforts to meet necessary caloric requirements and

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39 Although the average household incomes decreased among households in all wealth levels between the survey periods, the amounts of milk income increased in 2000 compared to 1998. Two points are worth noting here: firstly, the increases in milk income reflect the important contribution of milk sales to the incomes of the rural household households. Secondly, the households are more likely to benefit from milk sales through relative changes in milk prices compared to maize prices (terms of trade), which also adjust for inflation.

40 The milk available for home consumption is the difference between potential milk produced less the amount of milk sold. This is converted into required calories per month and adjusted for household size. An average individual needs about 2,250 calories daily or equivalently 67,500 calories per month; a measure that is commonly used in Kenya (HRSSD/CBS, 2000: 5). In this section, we also assume that a litre of milk contains about 700 calories (see Dietz et al. 2001: 197).
imposes additional constraints on incomes earned from other sources which perhaps are spent on milk.

In relative terms we see a higher fall in the contribution of milk to the caloric needs of the households in the dry zone between 1998 and 2000. For example, milk contribution to the required calories fell by 5.5 per cent for the poor (i.e. less than 8 TLU/household) households in the moist zone and by 9.8 per cent in the dry zone. Similarly, the contribution of milk to caloric intake per person fell by 11.5 per cent for the households in the highest wealth class in the moist zone and by 15.4 per cent in the dry zone. Thus, the contribution of milk towards the household’s caloric needs fell between the surveys and it fell harder for households at all wealth levels in the dry zone compared to those in the moist zone. On this note, we expect more milk caloric constraints imposed by the low milk production in the dry zone. We are also aware that these households realise low crop yields even during years of average rainfall (see Chapter 12). The data reveals apparent differences in milk production, incomes from milk sales, and fulfilled caloric needs across the zones with changes in the livestock production. The herd-poor households are likely to face stronger constraints under a downturn in production.

Household trade in milk in the lowlands

In 1998, the average household sizes were about six people for Maikona and five persons for Korr, except for the 8.1-16 TLU/household wealth class. The latter class had averages of four people in Maikona and six people in Korr. The average number of milk animals in 1998 directly corresponds to the wealth ranking at both sites, with one exception (Table 10.4) with households at low wealth levels having fewer milk-producing animals and those at high wealth ranks having more milk-producing animals. We found no such relationship between the number of milk animals and wealth class on the mountain. Similarly in 1998, the quantity of milk marketed and the potential milk production increased with rising wealth ranks at both sites. The number of milk-producing small stock includes sheep, the milk production of which is reserved primarily for lambs. We therefore expect the sale of sheep milk to be minimal. Thus, while the number of milk-producing sheep might inflate the number of milk-producing small stock, the marketed small stock milk might be limited largely to goat’s milk. A higher milk production at higher wealth levels naturally follows from the herd size and the higher milk sales by the herd-rich households reveal their greater involvement in the cash market.

The households in Korr show much higher milk sales at all wealth levels compared to those in Maikona. The households in the two lower wealth levels in Korr sold about 83 per cent and 56 per cent of their potential milk production. The corresponding shares were about 21 per cent and 15 per cent in Maikona. Thus, the poor households’ participation in the cash market through milk sales is much greater for the households in Korr compared to those in Maikona. Interestingly, despite a higher proportion of milk sales in Korr, milk accounted for a lower proportion of the monthly cash income than was the case in Maikona for the poor

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41 This result is valid except for significant positive correlations between the quantities of milk sold and herd size for the households in the lowest wealth class (r = 0.316; p<0.005 for moist zone and r = 0.395; p=0.013 for the dry zone) in 1998 and the lowest wealth class in the moist zone (r = 0.330; p<0.010) in 2000. The fact that the relatively poor households often have a higher ratio of milk-producing animals in relation to the total herd suggests that milk sales on the mountain are a manifestation of herd poverty.
households. This may suggest that the poor households in Korr rely more on other sources of cash income than households in Maikona do.

The proceeds from milk sales in the lowlands increased in absolute terms with wealth rank, except for the 8.1-16.0 TLU/household class in Maikona. The share of milk earnings in the monthly cash income decreases with wealth in Maikona and increases with wealth class in Korr if we combine the two lowest wealth classes into one and the two highest wealth classes together. This may suggest a high reliance of households in Korr on other sources of income and greater integration into the cash economy or it may be a sign of relative herd poverty. We also observed earlier that the households in Korr had a lower level of livestock wealth compared to those in Maikona. The relatively high milk sales by households in the lower livestock wealth levels clearly confirm that marketed milk is inversely related to herd wealth.42

The milk sale has obvious implications for milk consumption by the individual household members. For example, households in the highest wealth class in Maikona met about 69 per cent of the caloric needs per person through own production in 1998, while the poorest households met only 13 per cent of the calorie needs. Similarly, the caloric requirements met through milk production were about 36 per cent for households in the highest and only 2 per cent for those in the lowest wealth classes in Korr. The households in Korr with a higher milk sale acquired fewer calories from their milk production compared to the households in Maikona. This result is consistent at all wealth levels. That is, the households at lower wealth levels in the lowlands have a lower calorie intake per person through milk production and those at higher wealth levels have a higher calorie intake. The households in Maikona report having more milk-producing animals (hence a higher milk production) at all wealth levels compared to those in Korr.

In 2000, the settled households in the two lowest wealth classes in Maikona as well as those in the two lowest and in the highest wealth class in Korr had average household sizes of five people. Households in the 16-40 TLU/household wealth class had an average household size of four people in both Maikona and Korr, and households in the highest wealth class in Korr had a size of about seven people. There were very few milk animals in 2000 in the two research sites at the lowlands and as a result there were limited milk sales and the available milk had largely been bought. A relatively larger portion of the households in the lowest wealth rank bought milk: about 37 per cent of the households in Maikona and 24 per cent of the households in Korr.43 This suggests that the herd-poor households use income from other sources to buy milk. In absolute amounts, households in Maikona spent more money on milk in 2000 compared to those in Korr and the same applies to the households in the highest wealth class relative to the lower wealth classes. In Korr, the expenditures on milk (expressed as a ratio of household expenses on food) apparently increase with herd wealth. The expenditures on milk take up a moderate share of the total expenditures on food in Maikona and Korr, which indicates low milk consumption. In 2000 it is interesting to note that household expenses (or consumption) on food for most wealth classes exceeded the monthly

42 In this regard, herd size and the quantities of milk sold significantly correlate in Korr \(r = 0.456; p<0.017\), but not in Maikona \(r = 0.182; p>0.204\). There is no correlation between the variables for any of the individual wealth classes at both locations (and the sample sizes are also too small to calculate these correlations).

43 These correspond to 18 households in Maikona and 11 households in Korr that bought milk in 2000.
cash income, except for the households in the 16.1-40 TLU/household class in the lowlands. This suggests that households purchase and consume goods on credit, or from savings.

The milk bought is often used for making tea rather than for direct consumption. On the basis of potential milk production (less the amount of milk sold) and a certain fraction of the amount of purchased milk which is used for direct consumption, it can be seen that the available milk provides a limited number of calories. The households in Korr were able to acquire an extremely small proportion of the calories required (at most 3 per cent) from the available milk in 2000, except for one household in the highest wealth rank which acquired about 22 per cent of the required calories per capita per month, most of it through own milk production. Households in the rich and poor wealth categories are also hardly able to meet the required calories on the basis of the milk available. Although this might be rather ambivalent, it is probable that the rich might have little milk because of a lack of milk animals at home. Instead they are likely to have better access to other assets to finance the purchase of other

Table 10.4
Average household size, milk animals and milk sale in the lowlands, per wealth class

<table>
<thead>
<tr>
<th>Site (n)</th>
<th>Wealth class (TLU/hh)</th>
<th>&lt; 8</th>
<th>8.1-16.0</th>
<th>16.1-40</th>
<th>40.1 +</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maikona</td>
<td>Average household size</td>
<td>5.5 (4)</td>
<td>4.0 (5)</td>
<td>5.6 (19)</td>
<td>5.6 (12)</td>
</tr>
<tr>
<td></td>
<td>Average number of milk-producing cattle</td>
<td>--</td>
<td>2.0 (1)</td>
<td>2.4 (5)</td>
<td>8.4 (7)</td>
</tr>
<tr>
<td></td>
<td>Average number of milk-producing camels</td>
<td>1.3 (3)</td>
<td>1.8 (5)</td>
<td>4.0 (19)</td>
<td>5.6 (11)</td>
</tr>
<tr>
<td></td>
<td>Average number of milk-producing small stock</td>
<td>12.0 (4)</td>
<td>16.8 (5)</td>
<td>33.3 (19)</td>
<td>60.3 (12)</td>
</tr>
<tr>
<td></td>
<td>Potential milk production (in litres)</td>
<td>89.1</td>
<td>121.1</td>
<td>245.4</td>
<td>396.9</td>
</tr>
<tr>
<td></td>
<td>No. of cups of milk sold</td>
<td>37.2 (3)</td>
<td>37.2 (3)</td>
<td>43.6 (13)</td>
<td>54.0 (4)</td>
</tr>
<tr>
<td></td>
<td>Milk sold in litres (% of prod.)</td>
<td>18.6 (20.9)</td>
<td>18.6 (15.4)</td>
<td>21.8 (8.9)</td>
<td>27 (6.8)</td>
</tr>
<tr>
<td></td>
<td>Cash income (Ksh.)</td>
<td>750</td>
<td>1,000</td>
<td>1,763.16</td>
<td>1,875</td>
</tr>
<tr>
<td></td>
<td>Milk proceeds (% of cash income)</td>
<td>397.2 (53.0)</td>
<td>373.2 (37.3)</td>
<td>452.2 (25.6)</td>
<td>540 (28.8)</td>
</tr>
<tr>
<td></td>
<td>Calories obtained/cap. (% Kcal.)</td>
<td>9.0 (13.3)</td>
<td>17.9 (26.6)</td>
<td>28.0 (41.1)</td>
<td>46.2 (68.5)</td>
</tr>
<tr>
<td>Korr</td>
<td>Average household size</td>
<td>4.8 (9)</td>
<td>6.0 (8)</td>
<td>4.8 (11)</td>
<td>5.4 (9)</td>
</tr>
<tr>
<td></td>
<td>Average number of milk-producing cattle</td>
<td>1.0 (1)</td>
<td>3.0 (1)</td>
<td>2.0 (4)</td>
<td>3.5 (2)</td>
</tr>
<tr>
<td></td>
<td>Average number of milk-producing camels</td>
<td>1.0 (4)</td>
<td>1.7 (6)</td>
<td>2.6 (9)</td>
<td>4.9 (8)</td>
</tr>
<tr>
<td></td>
<td>Average number of milk-producing small stock</td>
<td>5.5 (8)</td>
<td>10.7 (7)</td>
<td>19.0 (11)</td>
<td>27.1 (9)</td>
</tr>
<tr>
<td></td>
<td>Potential milk production (in litres)</td>
<td>49.4</td>
<td>99.9</td>
<td>146.2</td>
<td>257.7</td>
</tr>
<tr>
<td></td>
<td>No. of cups of milk sold</td>
<td>102.8 (3)</td>
<td>140 (3)</td>
<td>147.2 (8)</td>
<td>178.4 (8)</td>
</tr>
<tr>
<td></td>
<td>Milk sold in litres (% of prod.)</td>
<td>41.1 (83.2)</td>
<td>56 (56.1)</td>
<td>58.9 (40.3)</td>
<td>71.4 (27.7)</td>
</tr>
<tr>
<td></td>
<td>Cash income per month (Ksh.)</td>
<td>2,277.78</td>
<td>2,312.50</td>
<td>1,509.09</td>
<td>2,833.33</td>
</tr>
<tr>
<td></td>
<td>Milk proceeds (% of cash income)</td>
<td>500 (22.0)</td>
<td>700 (30.3)</td>
<td>761.2 (50.4)</td>
<td>897.6 (31.7)</td>
</tr>
<tr>
<td></td>
<td>Calories obtained/cap. (% Kcal.)</td>
<td>1.2 (1.8)</td>
<td>5.1 (7.6)</td>
<td>12.7 (18.9)</td>
<td>24.2 (35.8)</td>
</tr>
</tbody>
</table>

44 We assume that children of 6 years and under (accounting for 22.4 per cent of the total human population (GoK 2001b: 2.25) consume a considerable parts of the milk produced or bought in pure or sour form. We further assume that this proportion is equal across the wealth levels.
### II. Milk sales in 2000

<table>
<thead>
<tr>
<th>Location</th>
<th>Average household size</th>
<th>Average number of milk-producing camels</th>
<th>Average number of milk-producing small stock</th>
<th>Potential milk production (in litres)</th>
<th>No. of cups of camel milk sold(^c)</th>
<th>Milk sold in litres (% of prod.)</th>
<th>Cash income per month (Ksh.)(^d)</th>
<th>Milk (camel) proceeds (% of income)</th>
<th>Expenses on food only (Ksh.)(^d)</th>
<th>No. of cups of milk bought(^b)</th>
<th>Milk expense (% of expend.)</th>
<th>Calories obtained/cap. (% Kcal.)</th>
<th>Expenses on camel milk (% of expend.)</th>
<th>Calories obtained/cap. (% Kcal.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maikona</td>
<td>5.0 (29)</td>
<td>4.9 (10)</td>
<td>4.3 (4)</td>
<td>6.7 (6)</td>
<td>--</td>
<td>--</td>
<td>1,657.70</td>
<td>--</td>
<td>2,091.40</td>
<td>19.6 (18)</td>
<td>27.9 (7)</td>
<td>37.5 (2)</td>
<td>60.0 (2)</td>
<td>--</td>
</tr>
<tr>
<td>Korr</td>
<td>4.5 (15)</td>
<td>4.9 (8)</td>
<td>4.1 (12)</td>
<td>5.0 (4)</td>
<td>--</td>
<td>--</td>
<td>1,783.30</td>
<td>--</td>
<td>2,286.70</td>
<td>21.9 (11)</td>
<td>30.0 (4)</td>
<td>38.6 (7)</td>
<td>90.0 (1)</td>
<td>--</td>
</tr>
</tbody>
</table>

**Notes:**

a. All figures are expressed per month, except for the number of animals in milk. The figures in brackets denote the number of households, except for those specified in brackets under column 2.

b. Milk was sold or bought in 500 ml cups in Maikona in 1998 and in 2000 and in 400 ml cups and 300 ml cups in Korr in 1998 and 2000 respectively.


d. Income from milk sales is in Kenya shillings (Ksh.) per month.


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food on the basis of which they can meet their calorie needs. The large household size and the high share of expenditures on milk support this assertion. The poor might be disadvantaged by low milk availability and limited assets with which they can complement livestock production. That is, the herd-poor households lack fall back resources and might be restrained as regards financing the calories needed through alternative or complementary sources. Households in the middle wealth classes in Maikona meet about 16 per cent of the needed calories, either through own milk production or milk bought.

The sale of low-calorie milk to purchase high-calorie maize grain in return is one of the central reasons for advocating pastoral commercialisation (Little 1983; Fratkin & Roth 1990; Zaal & Dietz 1999; Dietz et al. 2001). In this respect, the gain from milk sales can be
understood better in terms of relative changes in milk and maize grain prices. First, one needs to take account of the differences in the quantities of milk sold across the sites and between the surveys, against which relative changes in maize prices can be compared. The share of milk earnings in the household income gives a good indication, but is a poor criterion because of the differences across the sites and changes in household monthly income. Thus a superior measure is the absolute amount of milk income.

The milk markets on the mountain and in the lowlands are segregated and the amount and prices per unit cup of milk vary. As a result, milk exhibits spatial price variations (in addition to price variations between seasons). Yet milk from different animal types commands the same prices at each market. The amount of milk proceeds is, on average, higher for the relatively herd-rich households and lower for households at lower livestock wealth levels. This evidence consistently shows up when we aggregate the first two lower wealth classes into one, and the two upper wealth classes into another.

Since maize and also milk prices are the same at each site, any difference in total earned milk income across the wealth levels is the result of differences in quantities of milk sold. In terms of maize prices, milk prices doubled in Marsabit and Korr and increased by 50 per cent in Maikona between 1998 and 2000. The average prices of maize grain, a commodity that households commonly trade for milk, increased by about 66 per cent in Marsabit and about 44 per cent in Korr, but fell by about 7 per cent in Maikona. The more proportionate increase in milk prices compared to maize prices is likely to benefit milk sellers from higher wealth classes more than the poorer households because of their higher milk income, even though the sale of milk might generate critical income for the poor households. In particular, the more proportionate increases in milk prices at the sample locations mean that the poorer households are more than compensated in milk sales as a result of less proportionate increases in grain prices, but not in terms of income from the sale of milk.

Normally, there is competition between the use of milk produce for calves, for marketed off-take and for home consumption. The way potential milk production is allocated to these different uses has implications for home consumption and the marketed off-take, and influences the survival of calves and herd growth. The relatively low milk sales among households in the high wealth class either means that they reserve more milk for calves or use the milk for home consumption, or both. Probably the herd-rich households reserve sufficient milk for calves because their herds are large enough to satisfy their food needs and they can also sell ‘surplus’ livestock if cash is needed. The option of allocating milk to calves for herd maintenance or increase has a significant effect on the time path of herd growth through natural recruitment and influences the viability of livestock-based economies.

The relatively wealthier households in the lowlands also derive more calories from milk sales compared to the households in the lower wealth ranks (Tables 10.4). In addition, they might take advantage of their relatively high milk income to purchase high-calorie grain; an

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45 In general, milk is either sold daily to any bidding buyer, where sale is characterised by payment on the spot, or supplied to a household on informal contracts. The latter arrangement is governed by an unwritten contractual agreement and payment for milk delivered daily is settled at the end of the month. The informal milk contract and monthly payment of the bill (mabill as it is called in Swahili) point at the existence of some sort of mutual trust in the sale of milk. The trust and contract arrangements are intended to stabilise intra-seasonal fluctuations in milk prices for the producers (thus help to stabilise income from milk) and the postponement of daily milk expenditure in favour of other commodities that can be bought.

46 In 1998, the average maize prices per kilo tin were Ksh. 9 in Marsabit, Ksh. 15 in Maikona and Ksh. 18 in Korr. These prices were respectively Ksh. 45, 26 and 26 per kilo in 2000 (authors’ surveys 1998 and 2000).
option which provides them with additional calories as compared to the poorer households.\textsuperscript{47} Despite the low numbers of milk-producing animals in the lowlands in 2000, the rich households clearly compensated low milk yields through milk purchases and thus were better able to supplement the required calories than the poor. As a result, the rich herd owners have a comparative advantage in relation to the availability of milk either through the absolute amount of cash income or the use of milk income to purchase the required calories. The quantity of milk bought (and thus calories obtained from purchased milk) in the lowlands in 2000 seems to confirm this. The low milk sales by the herd-rich households, in turn, make more milk available for human consumption or for calves. This shows that the welfare of pastoral households is closely related to milk production and that household decisions about the allocation of milk affect the amount of consumed milk and caloric intakes by both humans and animals. The household milk extraction and consumption decisions therefore have serious consequences for herd growth (via better chances of calf recruitments), a household’s food security and human health (Fratkin \textit{et al.} 1999; Bradford 1999: 99; Oba 2001). In relation to the latter, it has been pointed out that the consumption of animal products (including milk) in human diet assures an adequate content of essential minerals, particularly calcium for which milk is an excellent source, and vitamins (Bradford 1999: 99). The impact of household milk production and consumption on human health and herd growth directly correlates with livestock wealth. First, the downside of high milk sales among households in the low wealth ranks suggests that less milk is reserved for calves, which leads to reduced calf survival rates and thus a low chance that the households will climb out of herd poverty. Second, low milk consumption at household level, especially among children, causes malnourishment and impairs a healthy child’s growth, including mental development. The latter is, in our view, the most worrying negative effect of the settlement around water points which usually is accompanied by high milk sales and low milk purchases (Nathan \textit{et al.} 1996). The negative human health effects once nomads settle points to one of the most critical concerns in development efforts by the state or local NGOs.

\section*{Trends in livestock trade}

This section addresses various trends in livestock trade. Below, we will first examine the potential outlet for effective livestock marketing linked to the national level. This option primarily addresses marketing incentives for livestock exports outside Marsabit District. In connection with this, the question arises of whether the Kenyan economy offered favourable conditions for absorbing the growing need for the commercialisation of livestock by the pastoral sector of Marsabit District. Regionally, there is an indication that circumstantial cross-border livestock trade takes place through Ethiopia (Aklilu \textit{et al.} 2002: 2). Although cross-border trade is generally not supported and is particularly difficult to estimate, Marsabit is seemingly a net importer of ‘unofficial’ livestock trade volumes\textsuperscript{48} (Aklilu \textit{et al.} 2002; 48)}

\textsuperscript{47} This points out that milk indirectly provides higher calories through milk income than we report here. In fact, these calories may have a bearing on income from milk across all wealth levels.

\textsuperscript{48} Livestock trade to Ethiopia happens because of the pastoral mobility that takes vendors closer to the cross-border livestock markets in Ethiopian, and occasionally it is borne out of an excess number of livestock at the source place, rather than because of opportunistic use of cross-border livestock price differentials. The fact that more livestock from Ethiopia, which are not reported as official exports, enter Kenya through Marsabit and are not recorded there as imports directly inflates livestock export numbers outside Marsabit.
Chabari & Njiru 1991). Still, the Nairobi markets of Dagoreti (mainly for cattle) and Kariobangi (invariably for small stock) are the major terminal livestock markets for Marsabit (Chabari & Njiru 1991: 115). These markets are thus the most important outlet of livestock marketing in Marsabit and sources of subsequent national exports, which will be addressed in the second subsection. Next, we compare national export and slaughter, while we will analyse livestock off-take at national level in the last subsection.

**Animal exports outside Marsabit District**

The importance of the livestock sector for the national economy can be judged from its contribution to the Gross Domestic Product (GDP). At district level, livestock and hide and skin exports outside the region reflect the contribution of the livestock sector to the national economy. Figure 10.12 shows livestock exports outside Marsabit District. The export figures show high variations for cattle, camel and small stock of goats and sheep between 1946 and 1999: with discontinuity in the data over a number of years.

**Figure 10.12**


Note:

a. Small stock denotes combined number of goats and sheep exports outside Marsabit District.

Source: Composed from data from the Marsabit annual reports, various years.

The reported numbers of cattle exports outside the district are low before the 1960s compared to the later years. Despite gaps in the data of animal numbers exported outside the district, there are marginal tendencies of increases in export figures in the course of time. From the mid-1940s to 1960, cattle export figures were in the range of 500 to 2,000 head per year. Between the early 1970s and the mid 1990s, cattle exports were between 4,000 and 10,000 head. Annual cattle exports were lowest in 1976 (164 head), 1982 (1,626 head) and 1983 (1,959 head). The low cattle export figures in 1976 were blamed on the serious droughts of 1974/76 in the district (Chabari & Njiru 1991), while 1983 was also a drought year in the

District. Additionally, regional cross-border trade in grains is an important source of increasing food security in the Greater Horn of Africa (FEWS, 24 Feb. 1997). The cross-border market integration makes an important contribution to food security, but again often undocumented, between Marsabit and Moyale (Ethiopia). For example, Ethiopia, despite traditionally dubbed a food deficit country, exported maize grain totalling to 200,000 MT to Kenya in 1996/97 alone (ibid.).
district. On the contrary, the highest number of cattle exports was 24,736 head in 1990 and about 11,000 head of cattle in 1988, 1991 and 1995.

The export of small stock also shows wide yearly fluctuations. Based on the available data, the highest number of exports was about 79,500 in 1991. The maximum small stock export was about 79,500 in 1991, followed by 30,800 in 1996 and 30,900 in 1988. Interestingly, the small stock exports outside the district reached about 35,000 in the late 1940s and 30,000 in the late 1950s to 1960; even higher than mean exports in the later decades. On average, cattle exports clearly show increases in export trends; the average exports per year were about 530 head of cattle between 1946 and 1960, 6,400 head annually in the 1970s, 4,900 head of cattle per year in the 1980s and 8,100 head of cattle per year from 1990 to 2001. Over the same periods, small stock exports were 23,400, 12,600, 18,100 and 25,600 per year on average, respectively.

The camel export numbers are scant and only available for a continuous period between 1993 and 1999. Over this period, annual camel exports dropped from 110 to 20 camels, indicating an average annual decline of 28.4 per cent. More generally, camel exports were extremely low and even non-existent for many years. This could be attributed to a number of factors including low demand for camel meat that, as a result, is responsible for perpetuating poor market prices for camels and a complex system of ownership rights that govern camels among herders' groups in northern Kenya. As far as camels are concerned, the traditional institutions of ownership rights might serve as a constraint to marketing camels in the region. Although camels are readily bought and sold in neighbouring Somalia and Saudi Arabia, the Kenya government has not encouraged the marketing of camels. Over the period during which data was available, camel off-take rates (hides and export-based) show a tendency to increase. The rates were one-tenth of the district's camel population between 1979 and 1991 and in the region of 1 per cent between 1992 and 1995. From 1996 to 2001, the camel off-take rates were in the range of 1 to 3 per cent (with a peak in 1998 and a period mean of 1.4 per cent).

During the 1940s and early 1950s small stock experienced downward trends in export numbers and a later recovery up to 1960. The number of exports however remained at an average of about 20,000 head. The low level of livestock export in the early 1950s was attributed to the failure of the 1949 rains that reduced animal populations in the district. Around mid 1959, restrictions were imposed on all movements of all livestock types from Marsabit District due to local outbreaks of foot and mouth, anthrax, black-quarter and rinderpest disease amongst the livestock held by the pastoral groups in the region (MDAR 1959: 40). These restrictions were in force until 1960 and seem to have had an adverse effect on livestock movements and trade in particular. This particular case shows that imposition of quarantine serves as a bottleneck to livestock movement and marketing.

Small stock exports restarted at a moderate level of 10,000 sales in the early 1960s, and thereafter underwent years of export fluctuations of between 10,000 and 20,000 head up to the early 1980s. In 1979, quarantine 49 was again imposed on livestock movements following the outbreak of foot and mouth disease in Loiyangalani, Central and North-Horr Divisions. This resulted in reduced livestock exports outside Marsabit District. In the late 1980s, small stock seems to have experienced a rapid increase in export numbers. It is evident too that small

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49 See also Chabari & Njiru (1991: 118) for some specific times of impositions and uplifting of quarantines on livestock movements in the district from the mid 1970s through to the late 1980s.
stock export numbers increased considerably to 79,500 in 1991 and thereafter collapsed to what seems to be a 'normal' level of export until 1999. The livestock export numbers are characterised by generally high variations over the years. This is confirmed by coefficients of variation\textsuperscript{50} of about 74 per cent for cattle, 76 per cent for small stock and 93 per cent for camels. These figures indicate wide variations in the individual livestock export figures around the mean value.

The years 1988, 1989 and 1990 show an increase in the cattle and small stock export numbers outside the district. A number of reasons could be responsible for the increase in export numbers. Firstly, around May 1985, the Integrated Project in Arid Lands (IPAL-UNESCO project) started a livestock-marketing programme, with an objective to test the idea of holding marketing days at the end of every month in the trading centres of Illeret, Ngurunit and Korr. The underlying goal was to give the pastoral groups in the district a regular market and to encourage commoditisation of livestock capital through commercial sales. One incentive that certainly might have stimulated pastoral herd export from the mid 1980s to 1990 was the use of a weighbridge for determining animal weights and hence animal prices on the basis of live animal weights. The actual price was reached by multiplying the weight of a particular animal by a predetermined unit price per kilo of the live animal type concerned.

In 1986, the number of stock traders increased considerably by about 86 per cent (from 14 to 26), causing an increase in small stock prices. Owing to a significant reduction of slaughter animals during the year, many individuals were encouraged to enter the livestock market by price incentives. However, the fluctuations in livestock exports (and prices too) depend not only on competition among the local traders, but also very much on the supply and demand on the Nairobi meat market. Thirdly, the meat price in Kenya was decontrolled and the livestock market, which was initially under \textit{de facto} monopolistic power of the Kenya Meat Commission (KMC), was liberalised for competition in 1987 (MDAR 1989).

Droughts are more often associated with high livestock mortality (deaths), which in turn increases hide and skin production. The fall in livestock sales after 1990 could be due to the severe drought period which hit the district in 1991/92 and the same is true for the decline in livestock products such as hides and skins during the same period. In addition to this, the 1990/92 drought was said to be the main cause of high livestock mortality, coupled with the migration of livestock to Isiolo, Samburu and Ethiopia, and the government provision of relief food (MDAR 1993: 42).

In this respect, an important resource question concerns the state of the natural resources for supporting human and livestock populations, despite there being less livestock in the district, even in absolute terms (see Figures 4.11 and 4.12). Several factors could jointly be responsible for this phenomenon. Firstly, the low livestock numbers (and also exports) in the district after 1995 might partly be blamed on the splitting of Moyale and Marsabit Districts in 1995\textsuperscript{51}. Secondly, a comparison of the proportions of individual livestock species (in absolute numbers) in the district's total livestock population over time indicates lower shares for cattle and camels after 1992 and a growth in the share of the small stock compared to earlier years (cf. Figure 4.11 and Chapter 16 as well). Moreover, the share of camels in the overall livestock numbers reveals a more proportionate decline compared to the share of cattle. In the

\textsuperscript{50} A coefficient of variation measures the spread of data around the mean value. Statistically speaking, any set of data with a coefficient of variation of over 20 per cent is regarded as non-normal distribution.

\textsuperscript{51} Unfortunately, we have no data for Moyale District. However, the later estimation of the per capita TLU has been adjusted for the Moyale population.
light of high TLU conversion factors assigned to cattle, and even higher ones for camels, the fall in cattle and camel shares would indicate a proportionate decline in the district’s livestock wealth. A leading factor driving livestock numbers is, in our view, climate, especially recurrent severe drought in recent years (see Chapter 4 for details). The consequences of these droughts on human and livestock have been severe (Hogg 1986; Mbogoh 1997; MoALD&M, GTZ & ALRMP 1998; Aklilu & Wekesa 2002), and they have had more severe effects coupled with factors like heavy El Niño rains\(^\text{52}\) of 1997/98. The frequency and effects of the shock factors (e.g. drought, El Niño rains) induce herd mortality and cause setbacks as regards herd recovery\(^\text{53}\), which is slowest for camels, followed by cattle and small stock. However, there is no clear-cut link between the natural resource base and livestock populations. There is no evidence of livestock-induced rangeland degradation\(^\text{54}\), apart from localised denudation of areas around permanent settlements in the region. Thus, livestock numbers cannot simply be explained by the natural resources. The livestock population growth became of great concern over time, when contrasted with the rapid growth of the human population as indicated by a low per capita measure (see Figure 4.12).

Apart from effects of droughts\(^\text{55}\), diseases outbreak and government imposition of quarantine severely constrain livestock movements and exports, regional trade, livestock market initiatives and market competitiveness. Two of these factors relate to the government intervention in the marketplace and the behaviour of the pastoral communities when prevailing conditions permitted or limited animal sales. This is an intuitive judgement based on the interplay between forces of demand and supply. For example, the government provision of relief handouts reduced the need for the pastoral households to sell livestock on the cash market. At such times, the supply of livestock to the market, particularly animals which would otherwise be sold to meet households food needs, would be low and animal prices are therefore expected to be high. Secondly, during good years of rains when there is plenty of pasture around, the pastoral households might decide to increase their animal holdings. Both of these factors have a direct effect on livestock sales and thus on export numbers outside the district.

\(^{52}\) The term El Niño/Southern Oscillation (ENSO) is a phenomenon that includes more than rains. It is used to describe occasions when large positive sea surface temperature (SST) of Cold Water well up, which is rich in nutrients for fishery and birds, in the Peru Coastal current and northern Chile fail (see Takayabu et al. 1999; Timmermann et al. 1999; Anderson 1999; McPhaden 1999; Moy et al. 2002; Siegert et al. 2001). As a result, the sea becomes abnormally warm and causes the mass mortality of fish and birds. The ENSO events are associated with lower rainfall in Western Oceania, south-eastern Africa and north-eastern South America, for example. A similar climatic event is associated with higher rainfall in eastern Equatorial Africa. In this book the term ‘El Niño’ is used for the heavy rains of 1997/98 in the study area, Kenya as a whole (see Chapter 4 on rainfall) and Eastern Africa.

\(^{53}\) Some herders and our respondents pointed out that increased settlement of households has occurred in the region in or around rural centres, at the expense of care of animals. The strength of this assertion in explaining the current livestock population is unclear to us, but this could be crucial in conjunction with other factors such as insecurity.

\(^{54}\) The mainstream view in the livestock-rangeland degradation nexus is informed by the tenets of carrying capacity (CC) that postulate that beyond the CC level animals become prone to mortality through starvation in the drought years (see for example Oba 2000, 2001; Benhke, Scoones & Kerven 1993) and diseases in the wet years.

\(^{55}\) A drought directly affects livestock populations in the arid and shared rangelands, and in turn affects livestock sales in the years after the drought.
Livestock and animal exports at national level

The livestock export numbers for Kenya as a whole show different trends over the years and wide variations between animal types. On the basis of the animal types, the number of cattle exports declined at an average rate of 13.5 per cent per year over the whole period. There is no information on goat and sheep export figures for some of the years. In spite of this, while sheep exports dropped by an annual rate of 6.2 per cent over the first 30 year period, goat exports declined by a higher mean rate of 14.3 per cent over the same period (Figure 10.13). Goat exports show huge standard deviations of about 11,700, cattle about 4,700 and sheep about 17,000. The cattle exports show a moderate annual off-take of about 10,000 head up to 1973. From 1974 to 1981, cattle as well as all other animal species, show depressed trends in export numbers. The export numbers later improved by small margins and continued to do so until 1995.

For most of the years in the 1960s, goat exports remained slightly over 20,000 head per year. Goat exports fell sharply in 1965 by about 56 per cent and from the 1980s to 1999, they remained significantly lower than the years prior to 1974. Goat exports remained stable and average exports were close to 24,000 head until 1975 and the figure remained marginally above cattle exports. Thereafter, from 1980 onwards, the number of goats exported remained below 10,000 per year and below the number of cattle exported, except for 1988 and 1992. The sheep export figures show the widest fluctuations compared to cattle and goats, with an exceptionally high peak of 72,000 head of sheep exported in 1966. In relative terms, there was also a high number of sheep exports between 1969 and 1974, and again another upsurge in exports of 28,054 head in 1993. Occasional buyers from Arabian countries, where sheep are slaughtered for religious festivities (or rituals) could possibly have triggered the isolated high peaks of sheep exports revealed here.

As the figures show, there were fluctuations in the number of sheep exported and a general decline in goat exports over the years, with an exception of a high sheep export of about 28,000 in 1993 and a peak in goat export of about 20,000 in 1992. Cattle and small stock exports were about 10,000 and 5,000 head respectively after 1981. The years after 1995 show evidence of dwindling numbers of cattle and small stock exports. The probable reason for falling animal export trends could be traced to the inter-play of domestic demand and supply forces. In relative terms, whereas the livestock populations have seen dips and peak years of growth rates over the years, the human populations (hence domestic demand for livestock products such as demand for meat) underwent a more proportionate (continuous) increase over the same period (compare Figures 10.1 and 10.2). Noticeably, while cattle exports remained somewhat stable, except during the period between 1975 and 1980 and after 1993, there were fewer small stock exports in the period 1974 to 1994 than the periods prior to 1974.

At national level, however, there was often unrecorded cross-border trade in livestock by the pastoral groups such as the Pokot, Boran, Maasai, Gabra, Somali and Turkana, among others, with the neighbouring countries of Tanzania, Uganda, Sudan, Somalia and Ethiopia. In addition, cross-border ethnic raids and livestock ‘losses’ to the neighbouring groups across the border are usually not reflected in the official government documents. These bottlenecks in

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56 There is inconsistency in reporting goat and sheep data separately and together in the chapter. The split and combined patterns of reporting are influenced by information available from the relevant documents on goats and sheep.

57 I would like to acknowledge Fred Zaal’s useful comment and for sharing this particular explanation with me.
the livestock export figures reduce the reliability of the national livestock export reflected by the ‘official’ statistics such as the FAO database, from which these livestock numbers and related products are obtained. For this reason, the ‘official’ national livestock export figures reveal an underestimation of the livestock export outside the country. However, the rapid fluctuations in the livestock exports attest to the instability in the livestock marketing. As shown, after the mid-1990s the export of livestock dwindled to very low levels, or at least its registration does.

**Figure 10.13**

Notes:
1. Small stock refers to numbers of goat and sheep exports (left y-axis) and cattle exports (right y-axis).
2. Gtsexport denotes goat exports.
3. Shpexport is sheep exports.


**Figure 10.14**
National livestock export values, Kenya, 1961 – 2000

Notes:
1. *Catexvalue* denotes cattle export value.
2. *Gtsexvalue* refers to the value of goat exports.
3. *Shpexvalue* means the value of sheep exports.

The monetary earnings from live animal exports and animal products are measured in export values (in US$) and the national level results are shown in Figure 10.14 below. The values of cattle and small stock export show a decline over the years after the mid-1980s. This trend is much similar to the export numbers (see Figure 10.13). On the basis of these figures, the export values fluctuate widely from one year to another. However, the cattle export values declined at a mean rate of about 7 per cent between 1961 and 2001 (Figure 10.14). During the same period, the export values of goats and sheep also decreased at an annual rate of 8 and 4 per cent. Omitting those years in which there are no export values, it is clear that, whereas the economic returns on goats declined by about 9 per cent per year, sheep export values increased by an average of about 5 per cent per year between 1969 and 1999.

The cattle export values reveal an abnormally high mean deviation from the average, equivalent to a coefficient of variation of 200 per cent. Between the period 1980 and 1996, cattle exports fluctuated more recognisably between high and low values. Cattle export values were lowest in 1978/79, 1994 and the years after 1996. Between the 1960s and the late 1990s, cattle export earnings oscillated between US$ 500 thousand and 4.5 million. The cattle export earnings were subject to dramatic fluctuations and there are sharp contrasts in export values from one year to the next during the period to around 1986. Compared to the absolute numbers of livestock exports (Figure 10.13), the export values show corresponding trends between the numbers of animals exported and the monetary returns on the livestock off-take at national level (Figure 10.16), although the export values show a higher scale of fluctuations than the numbers. Indeed, this evidence is supported by a strong correlation coefficient of 0.747.58

Goat and sheep export values also show high coefficients of variations of about 100 and 200 per cent over the years respectively, but relatively lower deviations when compared to cattle. In general, small stock values were, for most of the years, less than US$ 500,000, except for sheep in 1967 and 1994, when these values were higher. Overall, sheep and goat export values exhibit many similar trends over time. It is apparent that the export values of cattle, goats and sheep have been low since 1995. We can safely argue that the absolute numbers of animals are not the only factor that determines their market (export) values. Other factors such as the global and regional market prices and Kenyan competitiveness in the global and regional markets come into play and have a major influence on setting market prices, from which livestock values are derived. The livestock export prices might influence the incentive for the pastoral communities or herders to increase their marketed off-takes, through sales. In addition, good market prices enable pastoral people to realise a favourable comparative edge from participation in trade when in need of non-livestock goods and foodstuffs from the cash market. A comparison of the overall pattern of trends in livestock export numbers and financial returns reveal a differentiated annual rate of change over time. The cattle export numbers and values plummeted at rates of 13.5 per cent and 13 per cent per year respectively. Although goat export numbers and values both declined, the average decline in export values is of a lower margin by 5.8 per cent (i.e. export values decreased at 8.5 per cent per annum and export numbers at 14.3 per cent). Whereas the export numbers for sheep decreased at an average rate of 6.1 per cent, the export values registered an average annual increase of 4.6 per cent over a period of 31 years.

58 This is significant at 99 per cent confidence level.
In this regard, the results show strong and significant relationships between export numbers and their export values for sheep ($r = 0.90$, $p < 0.001$) and for goats ($r = 0.93$, $p < 0.001$), in a one-sided test. These results show a positive and strong degree of association between sheep and goat export values and their export numbers, but do not reveal any causal relationships between the variables. In relative terms, the degree of association between animal export values and their export numbers is stronger for sheep and goats than for cattle. In general terms, the degree of association between marketed animal values and their export numbers is an important consideration for assessing the nature of livestock commoditisation and the integration of pastoral households in ASAL districts into the cash economy. This masks, however, the regional and even local variations in livestock off-takes among the pastoral groups and households. The question is how does this observed national export rate reflect on the market participation and integration by the largely pastoral households in Marsabit District, both at household and regional levels?

As we already alluded to earlier, the channelling of livestock towards a potential market in Ethiopia is a rather weak option for two reasons. There are only small differences in the prices of animals between the two countries which might act as an incentive and, in addition, meat costs almost exactly the same. Secondly, there is also a lack of government policies that promote regional and cross-border livestock trading. The potential livestock market in Ethiopia is not an option and we will not examine it in any further detail.

National export and slaughter compared

In addition to the preceding results, we also compared the relative proportions of animal exports and slaughters as a fraction of total livestock populations from 1961 to 2000 (Table 10.5).

<table>
<thead>
<tr>
<th>Year</th>
<th>Cattle</th>
<th></th>
<th></th>
<th>Goat</th>
<th></th>
<th></th>
<th>Sheep</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Export</td>
<td>Slaughter</td>
<td>No.</td>
<td>Export</td>
<td>Slaughter</td>
<td>No.</td>
<td>Export</td>
</tr>
<tr>
<td>1961</td>
<td>7,200</td>
<td>4,000</td>
<td>850</td>
<td>4,700</td>
<td>36,000</td>
<td>1,374</td>
<td>4,300</td>
<td>700</td>
</tr>
<tr>
<td>1971</td>
<td>8,900</td>
<td>13,987</td>
<td>938</td>
<td>4,150</td>
<td>25,000</td>
<td>1,175</td>
<td>3,850</td>
<td>49,383</td>
</tr>
<tr>
<td>1981</td>
<td>9,800</td>
<td>9,813</td>
<td>1,274</td>
<td>7,000</td>
<td>6</td>
<td>1,400</td>
<td>6,000</td>
<td>4,862</td>
</tr>
<tr>
<td>1991</td>
<td>13,500</td>
<td>7,012</td>
<td>1,870</td>
<td>8,000</td>
<td>--</td>
<td>2,800</td>
<td>6,500</td>
<td>105</td>
</tr>
<tr>
<td>1999</td>
<td>13,392</td>
<td>20</td>
<td>1,802</td>
<td>7,600</td>
<td>500</td>
<td>2,700</td>
<td>5,800</td>
<td>--</td>
</tr>
<tr>
<td>2000</td>
<td>13,794</td>
<td>--</td>
<td>1,874</td>
<td>7,700</td>
<td>--</td>
<td>2,850</td>
<td>5,900</td>
<td>--</td>
</tr>
</tbody>
</table>

Note: a. The livestock numbers and slaughter figures are in 1000s, and export figures in absolute numbers.


The table shows the relative importance of export and slaughter off-takes vis-á-vis the total livestock population. The slaughter numbers show a general increase, while export numbers show a decline. These trends are true for all the animal types. Whereas the exports accounted for less than 1 per cent of all the cattle, goat and sheep populations, slaughter figures account for about 13 per cent of the population for cattle and about 31 per cent for goat and sheep. The high slaughter rates in relation to the exports indicate the significant contribution of the livestock sector to domestic human food requirements in the Kenyan economy compared to the international economies through exports.
Livestock off-take at national level

An off-take rate for a specific animal type is the sum of animal export and slaughter figures, of any given year, expressed as a percentage of the total population of the specific animal type being considered. Figure 10.15 shows a steady increase in cattle off-take levels of about 10 per cent per year between 1961 and 1976, to about 13 per cent between 1986 and 2000. Over the years, the general increase in off-take rates can be attributed to a number of factors:

1. Improved reporting of the slaughter numbers, and perhaps exports as well;
2. A greater need (or willingness) to sell cattle (especially males) at an earlier age;
3. A greater willingness to sell cows at the end of their milk-producing lives.

Although getting closer to cattle off-take levels that are generally regarded as ‘rational’ or ‘economical’, it is still a bit below 15 per cent. Besides subsistence and commercial values cattle in arid Kenya also have important customary and social functions. They are customarily very important for subsistence production and other social values in arid regions among the pastoral communities, where large numbers of livestock populations can be found in Kenya.

In the 1960s, goats and sheep off-take rates were about 30 per cent per year. From 1989 to 2000, the off-take rates were between 32 per cent and 35 per cent. After 1987, the decontrolling of beef prices and liberalisation of the livestock market in Kenya might have accounted for the gradual and consistent increase in livestock off-take.

**Figure 10.15**
National livestock off-take, Kenya, 1961-2000

![Graph showing livestock off-take in Kenya from 1961 to 2000.](http://apps.fao.org/)

Notes:

- **a.** Cattofftake stands for cattle off-take.
- **b.** Gtsofftake denotes goat off-take.
- **c.** Shpofftake stands for sheep off-take.


Figure 10.15 shows that the highest increase in off-take rates affected sheep, up to a level of over 35 per cent between 1975 and 1978, while the lowest off-take rate was about 20 per cent in 1983. These variations in sheep off-takes correspond to the excellent years of rain in 1982 and drought in 1983 and the bad drought years of 1979/81 and 1984, which might have reduced sheep slaughters and export numbers. In general, cattle had a lower off-take rate compared to small stock over the entire period. The difference in animal off-take rates begs the question of the relative weight of livestock slaughters and export numbers in the off-takes.
This also highlights the contribution of the livestock sector to export earnings and domestic consumption (or local slaughters).

The future prospects for livestock trade

**Indicators of economic performance, Kenya**

There are several other indicators worth pointing out which can be used to assess the economic performance of an economy, in addition to the national level livestock data shown above. These may include gross domestic product (GDP), changes in the rates of inflation, official foreign transfer flows and general poverty measures over time, to mention but a few. A detailed consideration of these indicators is beyond the scope of the current study. An examination of just a few of these measures would suffice to illuminate the point made here. Devarajan *et al.* (2001) indicate a worsening of these indicators over the years. In order to demonstrate our point more effectively we selected the total aid flow to Kenya, the growth in the gross national product and foreign exchange rates over time. Figure 10.16 shows trends in total aid flow (including loan and grants) to Kenya since 1970.

*Figure 10.16*

Total aid flows (millions of US$), Kenya, 1979 - 1996

![Graph showing total aid flows](image)

*Source: Devarajan *et al.* (2001: 520).*

Figure 10.16 shows that the total aid flow to Kenya grew progressively until the mid 1980s and rose sharply from US$ 530 millions to a major peak of aid flows of over US$ 1,600 million in 1990. The aid-flow pattern depicted above reveals the relationships between Kenya and international money lending bodies. This relationship was evidently healthy from the early 1970s until 1990. Thereafter the relationship soured and the foreign aid flows took a downward turn. The minor peak in aid flows in 1995 followed the government’s move to complete the liberalisation of trade system through the Repeal of Exchange Control Act in 1995 (Devarajan *et al.* 2001: 516). Thus, over these years, the total aid flow was intended basically to be proof of the healthy ‘image’ of Kenya among the international aid agencies. Since 1990, the total aid flow (including loans and grants) dropped drastically from over US$ 1,100 million to only about US$ 400 million recently. This demonstrates the poorer economic
performance during the last decade. In addition to this, the international aid flow undoubtedly affected the internal economies of various government sectors and also had a negative bearing on the overall product.

As a reflection of the internal economic scenario, Figure 10.17 compares the strength of the Kenya shilling against the US dollar – an indicator of the purchasing power of the shilling – and the gross domestic product per capita. In addition to being a proxy for domestic purchasing power, the exchange rate influences the ability of an economy to purchase imported goods and generate turnover from exported goods.

As we would expect, the average GDP per person and foreign exchange rates move in opposite directions (Figure 10.17), therefore reflecting the economic downturn. On the basis of this figure, there was already an indication of a drop in GDP per capita in 1984 (a year of severe drought). The GDP measure dropped to its lowest level in 1993, after experiencing a continued decline since 1988. The economy then recovered slightly (measured in GDP per capita) until 1998 when it dropped at the end of the period. It is also clear that from here (about the early 1990s) the foreign exchange rate (US$) increased dramatically from less than 30 in the late 1970s to almost 60 in 1993. This trend corresponds negatively with the average GDP per person. A rise in foreign exchange rates is linked to a fall in the purchasing power of the Kenya Shilling. It is also clear that a deteriorating foreign exchange rate relates negatively with changes in the gross national product. In general, and over the entire data period, we note that, while the average GDP per person declined by 2.4 per cent annually, the US dollar gained value at a more proportionate rate of 3.5 per cent annually against the shilling. This is equivalent to saying that the Kenyan shilling lost value at a constant annual rate of 3.5 per cent. Thus, the domestic purchasing power of an average person in Kenya fell, while there was a higher likelihood of imported goods becoming relatively more expensive.

**Figure 10.17**
Real GDP and foreign exchange rate, Kenya, 1979 – 2001

Sources: Devarajan et al. 2001; World Development Report, World Bank, various years.

Besides the indicators used above, other economic pointers also reveal similar trends. According to the International Monetary Fund (IMF) (2000), overall poverty in Kenya rose
from about 45 per cent of the population by 1992 to over 50 per cent by 1997. Additionally, the real GDP growth rate dropped from 4.4 per cent per annum in 1995 to 1.6 per cent in 1998 and to the negative value of 0.1 per cent in 2000 (Kimalu et al. 2002, IMF 2003). The decline in the national economy also prompted a burgeoning gap between the poor and the rich in relative terms. By 2000, the lowest 10 per cent of the population only had access to 2 per cent of the national wealth, while the highest 10 per cent of the population commanded nearly 37 per cent of the total income, with a Gini coefficient of income of about 45 per cent. We could go on and on but the point has been made that the Kenyan economy performed poorly over the last 10 years or so. The economic stagnation means Kenya is among the most heavily indebted poor countries in Sub-Saharan Africa (IMF 2000). The effect of economic decline has been a worsening in public sector services such as schools, security, health and roads and a poor provision of social services.

The deterioration in the Kenyan economy seems to say a great deal about the political environment. In 1991, for example, when the average GDP was at its lowest, Kenya accepted a constitutional amendment to permit the formation of alternative political parties in Kenya ("multi-parties"). In the following year, Kenya held the first multi-party general elections since 1969, which were marked with a series of violent outbursts. In 1992, the then ruling party (KANU) printed enormous amounts of money (about US$ 15 million) before the election for its campaigns, which subsequently led to the depreciation of the shilling and interest rates rocketing to 70 per cent (Country Watch 2003; Githongo 1998; Throup 2003) and caused economic damage that lasted throughout the 1990s. Moreover, towards the latter period of the economic downturn shown by the indicators, Kenya held multiparty elections for the second time in 1997.\(^{59}\) In recent years, corruption has also been a fundamental factor in crippling the economy and there is now a serious need to put mechanisms in place that bring a halt to it.

The most severe time of decline of the GDP per capita, the upward spiral of foreign exchange rate (weak purchasing power of Kenya shilling\(^{58}\) against the hard foreign currency) and the poor foreign aid flow in particular coincided with the time at which the livestock wealth in Marsabit district (i.e. in TLU per capita) fell below the critical level. That was in 1991, when the TLU per capita wealth approached a threshold level of roughly 4 TLU per person. In effect, the national economy collapsed at the time at which the pastoral livestock economy of the district seriously needed its support. Regrettably, both have continued to perform poorly since and are yet to recover.

**The downside of Engel’s Law for Kenya’s demand for meat**

The previous sections have provided considerable evidence of livestock wealth decline in the livestock sector of Marsabit District and of Kenya as a whole since the late 1960s. The results indicate a decline in the pastoral performance of the livestock sector in the district, especially with reference to subsistence production requirements. In other words, the observed decline in livestock assets, measured in TLU per capita terms, may suggest low livestock contributions towards subsistence households production – the crisis in the system of pastoral production. These findings have major implications for the pastoral households and for wider regional development policies. The subsistence pastoral production failures confirmed by the

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\(^{59}\) A third multiparty election was held towards the end of 2002. The result of this election was important in that a new political party (an alliance of opposition parties) formed a new government. The general feeling, at least locally, is that the change in government leadership signals the start of an economic recovery.
preceding section motivated us to investigate the potential capability of the national economy to offer partial alternatives that may support the district’s livestock sector.

To put things in perspective and given the decline in livestock wealth of the households in the district, we will investigate a number of possible ways out of the livestock crisis. The pastoral households have, in theory, three options for escaping from the observed production failure on the basis of the subsistence livestock assets:

1. They could seek alternative economic production options that complement insufficient livestock subsistence production. If pursued, this option may combine a wide range of economic activities, to varying degrees, with livestock production. One of these probable options will include increased sedentarisation of the impoverished former-herding households in the region, mostly in response to this trend of falling livestock wealth. This has largely been discussed in the Chapters 4 and 5.

2. A large part of the surplus labour from the herding sub-population is likely to be compelled to migrate and be channelled into the urban labour market to seek both new sources of income and occupations.

3. In order to meet their needs, the households could engage in greater market integration through the demand-driven sale of livestock assets. Put another way, with falling TLU per capita below the subsistence level, there will be an increase in households’ demands to commercialise their livestock and livestock products. The increased livestock commercialisation would satisfy food shortages by making use of potentially favourable terms of trade. This option assumes that there is a greater need and outlet for the livestock-related products (e.g. for meat) and that the pastoral households would rationally optimise the existing comparative advantages in that they would rationally exploit the potential positive caloric terms of trade of livestock over grains (see Diets 1987; Zaal 1998; Fratkin et al. 1999; Nunow 2000). The options open to the pastoral households are discussed in the Chapters 11, 12 and 14 and also in Chapter 18 of this book.

Our main objective is to investigate the option for livestock marketing from Marsabit District and integration into the wider Kenyan economy. Thus, our aim here is to establish the relative attractiveness of the national market as a target for livestock, with particular reference to meat. The above section demonstrates that we need to keep in mind that the Kenyan economy experienced low economic growth during the last decade. Based on this result, our understanding of Engel’s Law is an important consideration.

Engel’s (first) Law states that the share of food in the total household budget declines as incomes rise (Zimmerman 1932; Deaton & Paxson 1998). This means that additional income is not spent on staple food, but is spent perhaps on durables. Hence, it has been suggested that improving economic conditions for the majority of the population results in faster growth of relatively luxury products, like meat. If economic conditions deteriorate, however, the opposite is true. That is, as real income falls, the demand for luxury goods in the total share of the household budget declines, on average (Benson 1996). In other words, as the average disposable income falls (the economy slows down) people become increasingly incapable of...

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60 In the light of Engel’s Law, three economically binding responses are prompted when household income rises: (1) the percentage of income spent on food declines; (2) the share of disposable income spent on housing remains constant; and (3) the ratio of income spent on other categories of goods such as savings, luxury or/and durable goods, recreation and education rises (see also Zimmerman 1932; Benson 1996). A time-series counterpart of Engel’s law is that the amount of expenditure on food declines as the economy grows. However, in this section we assess Kenya’s demand for meat using GDP income (measured per capita) as a proxy for purchasing power.
paying for meat and families are more likely to change their spending patterns. So the rapid population growth would result in increased demand for meat. If the economy stagnates or declines, the meat consumption per capita falls. The overall result is that the absolute meat market may still grow, but at much lower rates than the population growth. We will now examine the case of Kenya in terms of demand for meat. Here it is appropriate to examine national level total meat production (measured in per capita terms) and also the relative importance of the various livestock species in meat production (Figure 10.18).

**Figure 10.18**
Livestock meat production/capita, Kenya

From the data it appears that the per capita meat consumption was rather high from the early 1960s until 1974, when it dropped below 16 kg of meat per person per year. Then there was a peak in meat production from 1976 until 1980, especially for goat (and total) meat production. The high level of consumption of goat and total meat coincided with the coffee boom. This was driven by frost in Brazil in 1976/77, which caused coffee production failure and reduced the volume of coffee on the world market, thereby resulting in soaring coffee prices.\(^6\) The coffee boom led to a positive incentive for all the sectors of the economy,\(^6\) and the GDP growth rate rose from 5.6 per cent in 1976 to 8.2 per cent in 1977 and 7.9 per cent in 1978 (Dureval & Ndung’u 1999; Kinyua 2001). There was also a peak in the national livestock off-take during the same period. The boom also had a positive effect in terms of increased consumption of meat. The increased livestock meat intake, in particular, shows that meat is a luxury commodity in Kenya, which also supports the view that average meat consumption may decrease if the standard of living declines.

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\(^6\) During this period the price of coffee quadrupled (and the price of tea more than doubled). The period is also referred to as the coffee boom in Kenya.

\(^6\) The coffee boom also had a negative shock effect on the economy as inflation rates rose by 12 per cent in 1976 and 12.7 per cent in 1977.
After 1980, the average annual meat production stabilised at around 16 kg per capita until 1991, when it dropped below 15 kg. By way of an illustration\(^63\), in 1991 there were about 24 million people in Kenya and about 30 million people by the end of 1999. A total of 1.9 million head of cattle\(^64\), 2.4 million sheep and 2.8 million goats were slaughtered in 1991. Similarly, a total of 1.8 million head of cattle, 2.1 million sheep and 3.1 million goats were slaughtered in 1999. In addition to these animals, about 64,000 and 65,000 camels were slaughtered in 1991 and 1999, respectively. In terms of meat yields and based on the number of animals slaughtered, 247,000 metric tons of cattle meat (beef and veal), 59,480 metric tons of sheep and goat meat and 21,000 metric tons of camel meat were produced in 1991. Likewise, in 1999, 297,000 metric tons of beef (and veal) and 59,300 metric tons of sheep and goat meat and 19,500 metric tons of camel meat were produced. The total meat production\(^65\) from these animals alone was about 327 million kg in 1991 (and 13.64 kg of meat per capita) and 358 million kg in 1999 (and 11.93 kg of meat per capita). The annual meat production\(^66\) at national level, however, was about 393 million kg (and 16.2 kg of meat per capita) in 1991 and about 439 million kg (and meat consumption of 14.6 kg/cap.) in 1999 (see Figure 10.18).

Two remarks arise from these results. First, the average meat consumption has been around 14 kg of meat per person per year since 1992: equivalent to the amount of meat produced by a goat! This amount of meat intake is less than the average meat consumption in developing countries of 25 kg per capita in 1997 (Delgado et al. 2001: 2), by almost a factor two. Secondly, although the per capita annual meat production consistently fell between 1991 and 1999, the total meat production of cattle, small stock and camel decreased more than the fall in the total meat production in Kenya (1.73 kg/capita vs 1.53 kg/cap.), whereas the latter also includes meat from other animals (e.g. game meat). This shows the relative importance of other sources of meat as opposed to the meat of the main livestock species.

Between 1979 and 2001, the per capita production of meat decreased by 1.2 per cent per year, in contrast to 3.4 per cent annual growth in population. At the same time, the GDP per capita fell by 0.6 per cent per year. Thus, Kenya’s meat consumption fell because the population grew faster and the per capita GDP dropped more rapidly than the amount of available meat. The decline in total meat production per capita provides compelling proof of a decline in the share of consumer expenditures on meat. Evidently, the Kenyan economy revealed the negative side of the economic logic of Engel’s Law. Hence, Engel’s Law (Zimmerman 1932; Benson 1996; Zweimüller 2000; Perali 2001) seems to be the most abiding explanation for the observed phenomenon in the demand of meat, which implies a lower income elasticity of the demand for meat.

According to Delgado et al. (2001) and Bradford (1999), increases in the consumption of animal products are driven by growth in population, income and urbanisation and such growth is expected to continue into the years ahead (Delgado et al. 2001). At the moment, however, the population in Kenya is equally distributed between urban and rural areas. Yet despite the

\(^63\) The data used is taken from FAOSTAT database.

\(^64\) Note, cattle slaughtered production comprises beef and veal production.

\(^65\) On the basis of the meat produced, the average weight of 133.5 kg in 1991 and 154.8 kg in 1999 applied to cattle, 11 kg and 12 kg to goats and sheep respectively both in 1991 and 1999. Camel weights were 328.1 in 1991 and 300 kg in 1999 (estimates taken from FAOSTAT database).

\(^66\) The differences in meat production from the main livestock types (of cattle, small stock and camels) and the overall national-level were caused by yields from chicken meat, game meat and pig meat, among other sources. For example, Kenya’s production of game meat increased from 9,700 MT in 1991 to 13,000 MT in 1999 in absolute numbers (cf. FAOSTAT database).
fact that the urban population has grown, the demand for meat per capita has continued to decline (FAOSTAT 2003). Thus the Kenyan economy does not support the view that growth in the urban population increases demand for meat.

In a broader perspective, animal products provide, on average, 37 per cent of the food calories in the developing countries (Gilland 2002). The annual mean level of 14 kg of meat consumption provides less than 4 per cent of all the required per capita daily caloric intake in Kenya – set at about 2,250 calories per day – (HRSSD/CBS 2000: 5). This share is also lower than the minimum animal protein intake required of 40 g per capita per day (Gilland 2002: 50) by about 4 per cent. It has been shown that because livestock meat is rich in protein and micronutrients such as iron, zinc and calcium, reduced meat intake would increase deficiencies in minerals (Bwibo & Neumann 1999; Whaley et al. 2002). Based on this view, inadequate meat consumption and animal protein intake is likely to impact negatively on human health.

The demand for meat may also be affected by the distributional pattern of a nation’s wealth. This is based on the fact that consumers at different income levels have different expenditure behaviour and large fluctuations in income, savings rate and borrowing by a small segment of the population may only have a minor impact on the market for meat. Thus the degree of inequality in income distribution has an impact on the demand for meat because it affects the structure and the dynamics of demand. In classical economic theory, income redistribution from very rich to very poor consumers is beneficial for growth.

Declines in welfare measures like GDP per capita and related decreases in consumption expenditures lead to an increase in general poverty. General rural poverty is persistent in Kenya. Close to half of Kenya’s population lives below the poverty line (World Bank 1995; GoK 2001a; Geda et al. 2001), with more prevalence of poverty found in the rural areas than in the urban areas (HRSSD/CBS 2000). According to the Welfare Measurement Surveys (WMS), rural poverty was about 48 per cent in 1981/82 (HRSSD/CBS 2000). The share of the population living in the rural areas below the poverty line was about 46 per cent in 1992, 44 per cent in 1994 and roughly 53 per cent in 1997 (ibid. p.6). Indeed, Mukui (1994) reports increased income inequality between 1980s and 1990s in all rural districts of Kenya. Judging by the current economic state of affairs, there is little hope of improving their living standards in the immediate future. The situation is exacerbated by rapid human population growth rates relative to the stagnated economic growth rate in the last decade. Despite a decline in average income, given the high level of income inequality, part of the reduced livestock meat consumption may be attributed to the unbalanced distribution of income at the national level.

A note on meat consumption and other items
Thus far we have demonstrated that the Kenyan economy performed poorly in the recent past, in the sense that total aid flows were diminishing and the Kenyan shilling weakened against the US dollar. More importantly, we observed a decline in the average Kenyan’s living standard, measured as per capita gross domestic product (GDP). These trends together indicate a deplorable economic situation and stagnating human welfare services. The hard-hit national economy is having a major, negative effect on the average herd holding at Marsabit District level. In the light of mean herd size dropping below the critical sustenance level for food requirements, the households in the region will show a greater demand to push to increase marketed livestock off-takes in order to smoothen out shortages in livestock-based subsistence production.
There is compelling evidence of strong correlations between the poor performance of the Kenyan economy and low per capita demand for fresh meat. One thing that clearly showed up is that meat is a luxury commodity which most consumers stop purchasing as their disposable income or purchasing power declines. The question then arises as to whether the—apparently negative—impact that the demand for meat at national level has at district level increases the need for livestock marketing? What are the potential implications of these synergies on the household means of smoothing out the livestock-based subsistence production crisis? These questions concern the importance of average income (or GDP) on influencing livestock exports outside the district. Indeed, there is a significant, and negative, relationship between GDP per capita for cattle exports ($r = -0.65$, $p<0.0001$). This relationship is also negative for camel exports but insignificant ($r = -0.031$, $p>0.10$). Again, there is a significant correlation between foreign exchange rate, and off-takes rates of cattle ($r = 0.57$, $p<0.002$) and camels ($r = 0.828$, $p<0.0001$); emphasising an option for ‘external’ marketed livestock exports outside the district. This may also suggest that these animals are exported more than small stock, which is mostly targeted for domestic meat consumption.

With regard to development articulation, the ASAL areas were rather neglected for a long time and they only received priority attention for development in the late 1980s. This was the time when a new Ministry of Reclamation and Development of Arid, Semi-Arid and Wastelands was created in 1989, as well as the District Focus for Rural Development programmes (MDDP 1984; Nunow 2000: 42). The initiative to develop ASALs was soon followed by an economic downturn. The economic situation was aggravated by political instability, international pressure to embrace economic reforms, the economic liberation of consumer prices (including essential commodities) and the formation of a multi-party government. In the course of these crises, agriculture in general and food production in particular, were a low priority, which accounts for only 10 per cent of the budget appropriations (Aklilu, Irungu & Reda 2002). Moreover, the livestock sector is depicted as being only a minor element of the work carried out by the Ministry of Agriculture.

The poor economic performance has also had a negative feedback not only on agriculture, but also on the other sectors and on food production. One result of the slow-down in the economy was that the production of maize, the staple diet of most Kenyans, plunged to 22 million bags in 2000, 27 per cent of 1995 levels (CBS 2000). Kenya imported more maize, beans and cereals, but less live animals, making it a net importer of cereals during the last decade (FAO 2003 database). Inflation officially soared in the 1970s and 1990s but stabilised at about 2.3 per cent in 2001. This also reflects the weakness of the Kenyan shilling against foreign currency, at over 70 shillings to a dollar.

The present study finds the downside (or the negative) of Engel’s Law reflected in the demand for meat in Kenya. The per capita decline in demand for meat in Kenya and a very narrow prospect of cross-border livestock trade or external export outlets for livestock from Marsabit District, means that livestock marketing is not a sensible option for the pastoralists in Marsabit as regards escaping the livestock sector’s subsistence production stress and structural crisis. One can deduce from these results that the Kenya economy stagnates when the majority of livestock keepers were most dependent on it. Indeed, a recent monitoring survey reports that the majority of the pastoral households live below the poverty line (GoK 1998). Overall the decline in the Kenyan economy reduced demand for meat, and low meat

The market for specific livestock types may be separated with the total animal exports being expressed individually instead of as TLU wealth and related to the GDP per capita (proxy for purchasing power).
intake and stagnating livestock meat prices have unfavourable implications and are top policy issue for the incomes of the poor. This concerns, in particular, the issue of how to alleviate the poverty issues of the most vulnerable asset – poor pastoral households presently entrapped beneath the poverty line and deprived of food (Owuo 2000; Rioba et al. 2000). The evidence of reduced consumption of animal products is unfavourable for the income of the poor pastoral rural households that derive a higher share of their income from livestock compared to the relatively wealthy, urban-based households.

**A counter-argument**

The evidence of improvement in caloric terms of trade between livestock and grain at district level (see section on recent changes in livestock-maize caloric terms of trade) contrasted with the decline of the Kenyan economy (see section on the performance of the Kenyan economy) presents a counter-intuitive argument. Kenya has had a food insecurity problem at national level which has trickled down to district level particularly during the last decade. According to the WFP study (2001), Kenya has experienced either a neutral or downward trend in production of main crops of maize and beans since 1989 (De Haan et al. 2001: 8), which has been unable to keep pace with the increase in population. Food aid transfer is a common reactive response to a food insecurity situation (ibid., p.10). In this respect, Marsabit District alone received 1281.2 metric tons of food aid (mainly maize) with targets of over 80 per cent of the district’s total population during August 2000 (De Haan et al. 2001: 17). Such food aid interventions have a number of obvious benefits. For example, relief food aid improves the availability of (and also positively affects increasing access to) food in marginal pastoral areas and for acute vulnerable households, reduces demand for commercial maize and thus reduces local market prices of cereals (maize and beans) below the without relief average (UN-OCHA-Kenya July 2001: 2; UN-OCHA August 2001). The distribution of food aid is likely to reduce coping mechanisms of wood collection for sale and thus eases local environmental damage. Under such circumstances, the issuing of relief handouts may also postpone the sale of animals by households for food needs and thereby permit herd recovery and improve prospects of food security in the future (UN-OCHA August 2001: 4). To illustrate our main concern, the average prices of cattle on the Marsabit livestock market increased from Ksh.6,867.50 in June to Ksh. 8,021.60 in August 2000, thanks to the supply of relief food. In the same months, the price of maize remained stable at Ksh.14 per kg on the local market. The caloric terms of trade between cattle and maize grain, for example, improved at least in the short run by about 17 per cent between June and August 2000. The more proportionate increase in animal prices relative to maize prices improved the (caloric) terms of trade as was observed earlier. Moreover, the stable maize prices mean that the purchasing power of food-insecure pastoral households with low incomes is likely to increase through the sale of animals.

However, food aid distribution also has some negative effects on the local economy and human responses to food crisis. The supply of relief food may reduce incomes, affects income vulnerability of farmers and grain traders as well due to lower prices. The low grain prices, however, can potentially undermine households’ creative responses to the food insecurity situation. Additionally, programmes like food-for-work are designed for able-bodied people to work in return for food aid (or food wage) (see for example Humphrey 1998). Such schemes

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68 We assume a zebu cow provides about 100 kilos of consumable meat and 2,300 calories per kg of meat, and maize grain about 3,500 calories per kilo.
focus on public works, for example on building or rehabilitation of dams and roads. While the food-for-work schemes attempt to smoothen out deficits in food supply and also attempt to improve the local infrastructure, they fail to address the needs of the poorest without manpower within the target population, at least seen through a victims-centred perspective. On the whole, however, in the face of recurrent droughts and concomitant production shocks, the pastoral households in the area have become dependent on emergency relief food in the recent years. In retrospect, searching for a long-term programme for assisting and promoting self-reliance of the poor is a top priority of development efforts in the future.

Additionally, the positive terms of trade (Tc) for June and August 2000 (see above) and the positive meat/grain Tc calculated in this chapter are in favour of the herding households. The short-term (monthly or quarterly) changes in the grain/meat price ratios when aggregated across the local markets do not show specific site dynamics and thus hide spatial livestock and grain price differences. Such dynamics are clearly evident from spatial and temporal price differences (and fluctuations) and the associated (positive) caloric Tc faced by herders and the grain sellers across the sites studied. The upward trends of the grain/meat ratios and the monthly fluctuations of the caloric Tc across the markets show disagreements inherent in aggregating relative (livestock and grain) prices across the markets. Therefore, the spatial and temporal price differences and caloric terms of trade emphasise the need to study evolution of livestock and grain prices across markets. This means that aggregating commodity prices across markets masks price changes in specific markets and spatial market price risks faced by households. In addition to this we note that although the distribution of relief food has direct influence on the livestock and grain prices, these impacts can be strikingly different across the local markets.

Conclusions

Livestock pastoralism is an important mode of economic production for many groups in sub-Saharan Africa; a mode of production that also prevails among most of Marsabit District. According to the traditional definition, the pastoral households obtain most of their basic subsistence production and livelihood from livestock, namely cattle, goats, sheep and camels, which in turn depend heavily on the shared rangeland resources (Fratkin 1991; Perrings 1993; McPeak 1999). In other words, one of the features that distinguishes them from other systems is people’s considerable dependence on the livestock sector for their livelihood and direct herd exploitation of the common range resources, especially water and pasture.

Additionally, dry land Africa experienced a series of droughts in the recent past that resulted in heavy livestock deaths and caused uncertainty about prospects of the pastoral household (Fratkin & Roth 1990; Mbogoh 1997; Oba 1994, 2001; Dietz et al. 2001). For these reasons, droughts are extremely important phenomena that pose challenges to the economic production of the livestock sector in arid and semi-arid environments. Owing to adverse drought, rain and disease effects, among other factors, the herd sizes of many pastoral households have declined below the minimum number necessary for basic production (Dietz

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69 The characteristics of pastoral herd exploitation of the shared environmental resources (or communal regime of ownership rights) and the subsistence livestock modes of production that support human livelihood differ from private ownership rights of livestock ranching (Fratkin 1991) and occupation oriented forms of pastoral livelihoods that Zaal (1998) alludes to.
1987; Dietz et al 2001; Fratkin & Roth 1990; McPeak 1999). Similarly, other catastrophes such as raids and disease epidemics impoverished people through disproportionate household herd losses, changed herd compositions, perpetuated inter-households inequality and increased the proportions of herd-poor households, as well as widened the households' gaps in cash or material income (Hogg 1986; Fratkin & Roth 1990; Oba 1997). The many poor (former) pastoralists largely blame losses of their livestock on the effect of droughts. The significance of the variable factors such as drought and disease epidemics is their negative impact on herd growth and recovery after adverse shocks and thus family herds (Oba 2001). Coupling the changes in livestock numbers and secondary sources, the district level data presented in this chapter supports the finding that these factors affect the livestock assets.

On the basis of the above, it is evident that the economic contribution of livestock towards subsistence domestic production seems to have declined considerably and even more so during the last ten years than ever before. This is as shown by the less than 4 TLU per capita herd-wealth, which is the critical benchmark of herd wealth recommended in the literature for sufficient caloric food requirement (Dietz & Salih 1997; Zaal 1998). As a direct consequence of combinations of variable factor shocks, today the pastoral economy of Marsabit District, especially the livestock sector, seems to be facing strong challenges related to future viability that also puts the pastoral lifestyle at a crossroads. This has indeed been the case since 1991 when the livestock wealth per person measure of the district fell below the critical level of 4 TLU per capita.

These results raise the issue of the possible alternatives to match the remaining livestock holdings in order to fulfill the desired basic needs. In our view, the trends observed above of exports outside the district reflect the expected pastoral households' response to the above fall in the livestock wealth levels in the district. The generally upward trends in export, both absolute and in off-take rates, support evidence of households selling more animals to supplement the shortfall in subsistence livestock produce. Additionally, the slaughter and hides data support the upward trends of increased off-takes in the course of time. From the result, the peaks and dips in these trends show the nature of reliability of the cash market which is basically a sign of volatility.

The low per capita herd holdings stress production shortages in the livestock sector. When most pastoral households are confronted with low livestock assets, the cash market can potentially play two crucial functions. First, livestock marketing can be a deliberate strategy by relatively wealthy herdsmen to trade livestock assets for liquid cash to invest in other asset portfolios. A non-livestock investment creates asset diversification and a self-insurance mechanism, particularly if the latter correlates weakly to livestock assets. Examining the price (value) side of livestock exports and other products, the prices show wide temporal fluctuations. The highly variable market prices may lure rich herdsmen into market integration, but the market might not always be favourable in terms of livestock trading returns. This reveals a constraint in the process of livestock marketing. Second, there are obvious demand-driven livestock sales by households, often prompted by shocks in production such as during low milk yield or crop failure due to insufficient rainfall.

The apparent decline in livestock wealth, especially by livestock per capita, echoes the insufficiency of the pastoral households as regards meeting their own food needs. In this regard, the nature of livestock wealth distribution across households is important in the face of the overall decline in wealth. A detailed analysis of household herd sizes and livestock wealth differentiation (or inequality of herd holdings) at the household level is the focus of Chapter 7.
raises the question of the options pursued regularly by households to mitigate food insecurity. The district-level analysis presented in this chapter is important for framing the general livestock trends over time. In this regard, there are potentially few options open to the (former) pastoralists. In the face of a decline in pastoral household wealth, one option is to increase livestock marketing. This is widely viewed as an appropriate means of pastoral participation and integration into the wider monetary economy (Little 1983; Dietz 1987, 1993; Zaal 1998; Fratkin et al. 1999; Nunow 2000). As a result, selling livestock on the national market by making use of relatively high caloric terms of trade enables pastoral households to buy other food (mainly maize meal) from elsewhere. Generally, the caloric terms of trade for Kenya have been quite good over the recent decades and this may potentially be a partial way out. However, compared to other pastoral areas in Kenya, Marsabit is far from the main markets like Nairobi and Mombassa. The route is risky, infrastructure is poor and transaction costs are high (see Chabari & Njiru 1991; Barrett et al. 1998). The question also arises of whether the deplorable state of the Kenyan economy provides an enabling environment for commercial pastoralism for a far away area like Marsabit. That is why we examined the Kenyan economy and its demand for meat.

On the basis of our results, although the caloric terms of trade between livestock and grain prices remain positive, the terms of trade fluctuate with the relative changes in livestock and maize prices at the study sites. The livestock (grain) price differences are even substantial across the markets studied. Moreover, it transpired that access to market is a critical factor influencing market price risks faced by households across the study sites. At national level, the livestock populations seem to depict similar trends as those already observed for the district. This suggests that livestock dynamics at national level are affected by similar phenomena and therefore reflect changes in livestock populations at the district level. As shown, the TLU per capita at the national level is extremely low, as we would expect. This is because Kenya is an agro-based economy, heavily dependent on the production of primary agricultural produce both for domestic consumption and foreign market in order to earn hard currency. The national TLU per capita measure remains a poor proxy for the wealth of the nation. This is shown by a level of TLU per capita below one. At national level, we also find low and large fluctuations in cattle exports and a marked downward trend of small stock exports over the years. The wide changes in livestock exports are also reflected in the considerable variations in the livestock export values, as shown by both absolute price changes and spliced price indices.

The changed export values might suggest a growing demand for small stock meat domestically and unreliable cattle export markets. Either way, on the basis of the market price fluctuations, the cash market remains an unreliable avenue for instilling confidence in pastoral livestock marketing. This may in part be due to a gradual fall in the GDP per capita over time, as the market performance is tied to the domestic purchasing power of the people. Indeed, this seems to be confirmed by the upward trends in the national slaughter data (see Figure 10.7). In support of this, again, the slaughter off-takes show an ascending trend particularly since the

71 Another potential option for livestock marketing is cross-border trade, given the relative proximity of Marsabit to the Ethiopian border. However, due to the lack of better prices in Ethiopia, there is no incentive to shift trading partners. Moreover, the cross-border movement is even in the opposite direction, with Ethiopian livestock trading into Kenya. Suffice to note too, that the governments do not encourage cross-border trade because of restrictive border regulations and taxes involved, and thus cross-border livestock trade volumes are dubbed as unofficial, and often remain unrecorded (cf. Chabari & Njiru 1991; see also Holtzman & Kulhiba 1995).
early 1980s (Table 10.5), although the national off-take rates of goats and sheep remained above 30 since 1985. Despite the increase in domestic demand for livestock-based products, the livestock prices have not increased correspondingly. Thus, while evidence shows a growth in domestic demand for meat at the margin, this demand might be urban-population driven. Again, the livestock market prices might be influenced by internal factors, which in turn are subject to the performance of the Kenyan economy. This has continued to be poor over the last few decades, but has worsened particularly during the last decade.

Finally, in the light of total aid flows to Kenya, foreign exchange rates and GDP per capita, all the indicators reveal a poor economic environment at national level. Particularly at the critical point in time when the district livestock wealth plunged below a critical asset level, as measured in per capita terms, the Kenyan economy also took a downward economic dive. Coincidentally, 1991 was the most crucial year of the emerging structural crisis in the livestock sector. The TLU per capita fell below the critical level and the marketing of cattle hides rose at district level, while at national level average purchasing power dipped and foreign exchange rates gained considerably against the Kenyan shilling. Another point of considerable importance, based on the poor national economic conditions, is that the pastoral groups of Marsabit district and the livestock sector might not benefit adequately from the large urban demand for meat owing to poor road infrastructure and the high transaction costs involved in marketing livestock. The latter includes high animal transport charges because of the long-distance to the market, losses of animals en route due to death and other costs such as traders’ accommodation charges and animal night charges in Nairobi. On the basis of the economic indicators demonstrated in this chapter, the national level economy is, therefore, unable to bail the pastoral production system in Marsabit out of their livestock-based economic failure.

One question that remains unanswered concerns who benefits from the increased livestock marketed off-takes resulting from the decline in the livestock population in the region? This question is important and the following is an indication as regards the district level. First, our estimates show that proceeds from animals slaughtered for butchers were about 39 per cent higher for cattle and 33 per cent higher for small stock than the average monthly livestock prices in Marsabit town. These figures show that butchers gain substantially from livestock marketing. At regional level, we also estimate that total costs of trucking cattle are about 14 per cent of the terminal sales value of cattle and that Nairobi prices are two times higher than the average Marsabit price in 1998. The terminal market sales value of small stock is one and a half times higher than Marsabit prices. According to Akilu et al. (2002) the cost of trucking animals from the pastoral areas of northern Kenya to the terminal markets was between 25 per cent and 40 per cent of the livestock trading enterprise (ibid., p.1). The producer’s share in the retail price in Kenya is between 47 per cent and 52 per cent, depending on the butchery outlet. These findings emphasise the significance of the costs of trucking animals in the livestock trade and also of determining trader’s returns on the livestock marketing. Hence, profits from livestock decline mainly accrue to the local traders and truck owners.

Thus, the downtrends of livestock assets in the district entail, to a large extent, an obvious predicament for the pastoral households and production in the region. The results have major implications for the production of the study population and their livelihoods. It is precisely the crisis in the livestock sector and the options available to this sector following livestock wealth decline which form the main concerns of the present study. In the next chapter we will study the strategic mechanisms for spreading risks and the role that social security networks play in
this respect. The central question in relation to the resources is about the changes that have occurred in the pastoral economy and among pastoral households in northern Kenya in the recent past. We will examine the new opportunities available to people from pastoral backgrounds. In this respect, we will pay ample attention to farming as a complementary option to livestock keeping (Chapter 12).