NIRP Research for Policy Series 8

Market dependence of pastoralists in Kenya and Israel

A.A. Degen, A. Nunow, A.F.M. Zaal, D.A. Otieno and J.C. Hoorweg

Colophon

NIRP Research for Policy Series

Part 8: Market dependence of pastoralists in Kenya and Israel

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Contents

Preface

This study encompasses a comparative analysis of pastoral groups in Israel (the Bedouin) and Kenya (the Somali and Maasai). Besides their way of living, these groups share the problems of increasing land constraints, grazing restrictions and growing dependence on the food market. Without improved pastoralism and livestock production, they will not be able to ensure a satisfactory livelihood and continue their traditional way of life. This study aims to generate new insights into the dynamics of pastoral systems and to enhance the understanding of pastoralist values. It thus lays a solid foundation for reviewing policies on pastoralism and strategies for increasing the financial return from pastoral herds.

The study was funded by the Netherlands-Israel Development Research Programme (NIRP), which aims to encourage development-related research focused on socio-economic and cultural change. Being policy-oriented in nature, NIRP aims to make the results of research accessible to anyone interested in solving the problems investigated. The target groups for such knowledge include policy makers, representatives of non-governmental and donor organisations, and the scientific community. With this aim in mind, the Publication Board has launched the NIRP Research for Policy Series as a channel for the publication of "user-friendly" summaries of more than 30 scientific reports.

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I. General information

I.1 Framework of the study

Pastoralist populations in East Africa find themselves under increasing pressure, and policies are needed to strengthen pastoral economies. In Kenya, pastoral people like the Maasai in the Southwest and the Somali in the Northeast, face the consequences of structural and social changes, such as reduced access to land and water, changes in livestock ownership, increased demands on labour and increased population. The 75% of the country that consists of arid and semi-arid lands (ASAL) can be made productive, however, only through some form of livestock production. For this reason, and to prevent the further marginalisation of the some 1.5 million pastoralists, the Kenyan government has embarked on a policy of integrated development of arid and semi-arid lands. The current ASAL policy focuses on the development of livestock and crop resources, infrastructure improvements, human resource development and drought management (Republic of Kenya, 1988c, 1992a and 1992b). Food security is an extremely important issue in this connection. In present-day Kenya, substantial proportions of rural people's diet are purchased, and a similar trend exists among pastoralists. Because of lack of employment or other economic activities, the purchasing power required for this has to be realised mainly from the sale of livestock. Only improved or semi-commercial pastoralism offers opportunities to assure a satisfactory livelihood and the necessary food security, while preserving the traditional way of life. To make pastoralism a viable alternative, however, requires cost-effective methods to raise the production of animals and animal products and to create effective and reliable marketing channels.

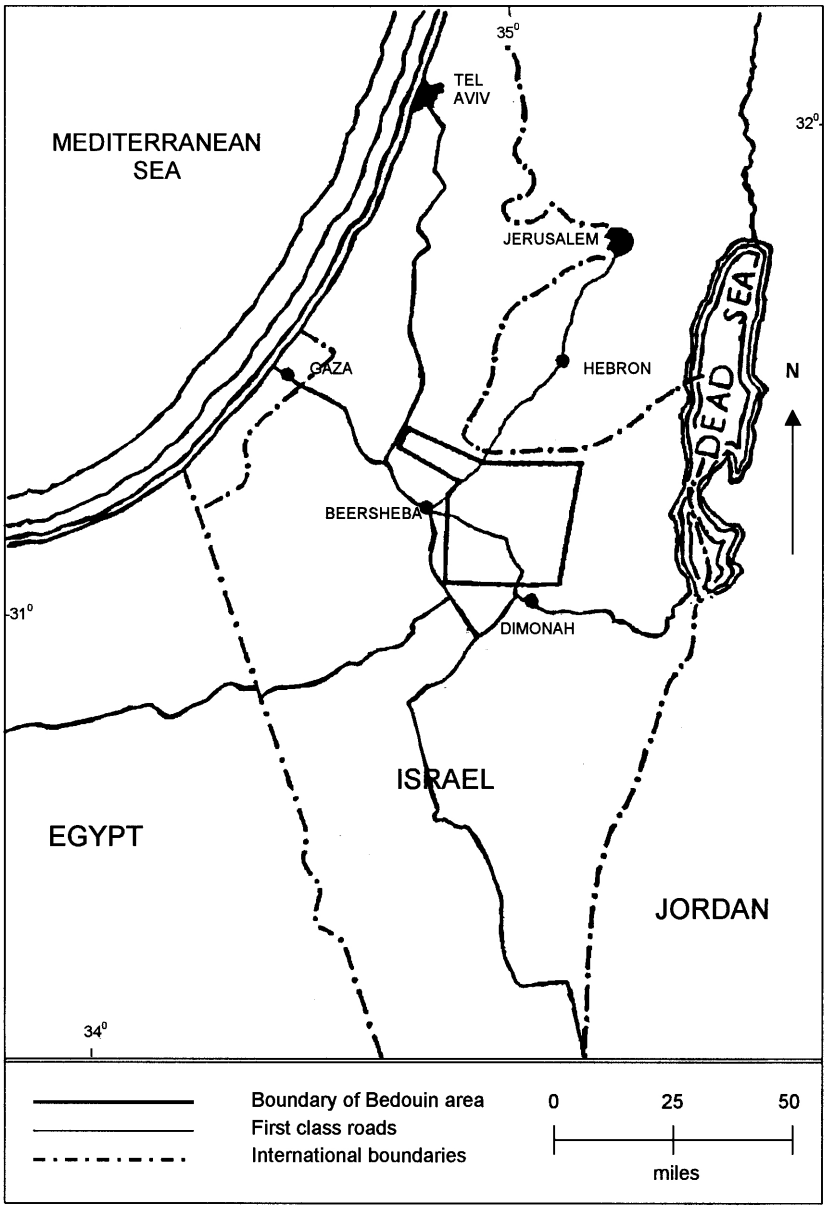
The general expectation underlying this study is that, in caloric terms, positive terms of trade exist between livestock and grains. The pastoral economies of the Maasai in the Kajiado District and the Somali in the Garissa District were studied from this perspective in order to examine livestock offtake from pastoral herds and the flow of grains into these

areas. A comparative analysis was also made of the Bedouin in the Negev desert of Israel, as their experience with intensified and increasingly market-oriented livestock production may be relevant to the situation in Kenya.

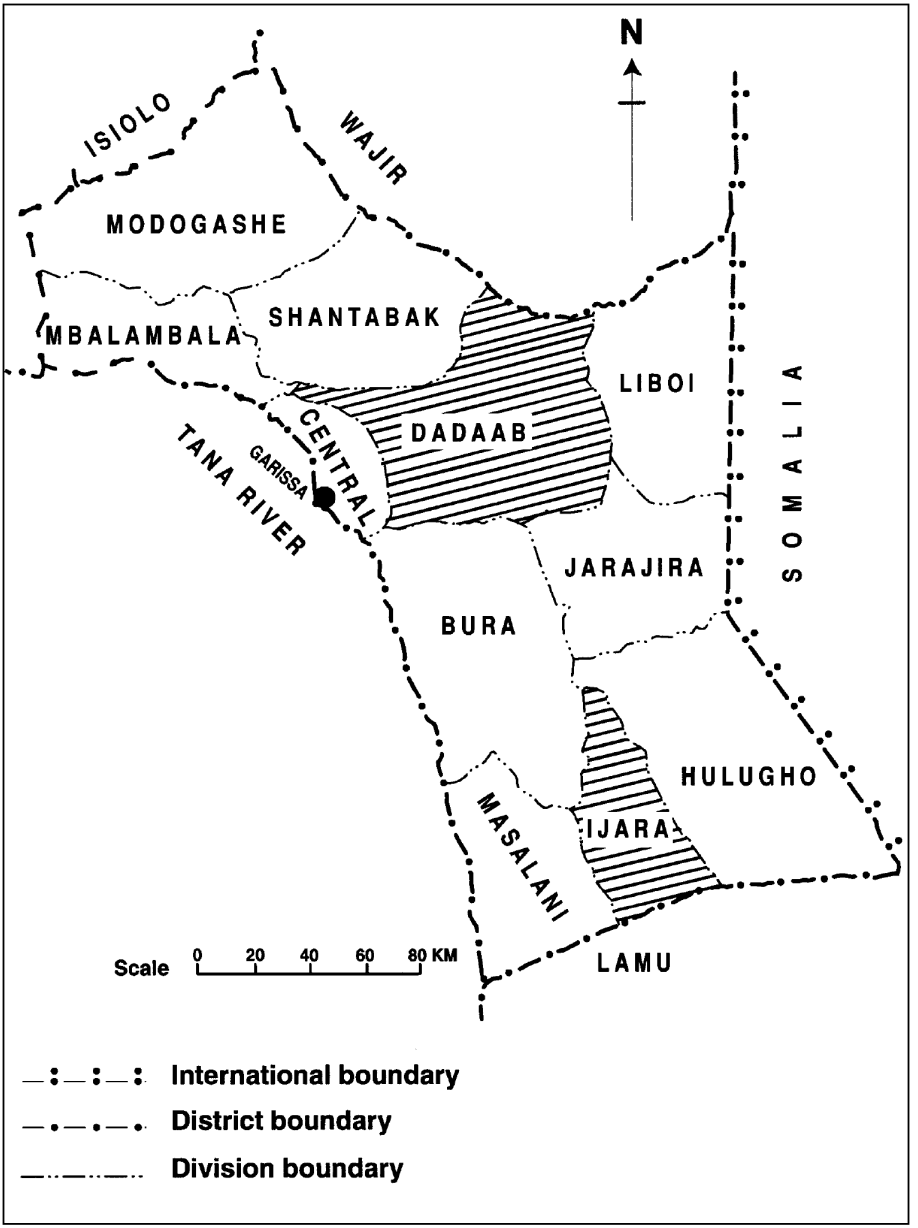
The Negev (Hebrew for south or dry land) is a triangular-shaped area of 12,500 km^2 situated in the south of Israel, with its apex lying at Eilat (Map 1). Fieldwork was carried out in a radius of approximately 20 km around Beer Sheva, where annual rainfall amounts to about 200 mm. The areas north and west of Beer Sheva are sown under rain-fed conditions with winter grain crops such as wheat and barley and, to a lesser extent, spring and early summer crops such as sorghum, melons and sunflower. By contrast, land use south and east of Beer Sheva is limited almost exclusively to grazing. The area is home to about 104,000 Bedouin, of whom about 64,000 have settled in officially established settlements, and some 40,000 are living in spontaneous settlements. The latter are hamlets based on tribal and family affiliation, which emerged as dispersed settlements without any systematic order, and with no clear communal character or settlement structure.

Pastoral livestock rearing among the Bedouin declined greatly during the 20th century, because of stronger central government control, increased cultivated areas, urban growth and greater pressure on available land. This has forced many Bedouin into a more sedentary form of agriculture, which includes more intensive livestock production (mainly sheep and goats) with use of more productive breeds.

Garissa District in the North-East Province of Kenya has an area of about 43,931 km^2 and borders on the Republic of Somalia to the east (Map 2). Garissa town, the regional capital, is about 400 km from Nairobi on an all-weather road, but the rest of the road network is poorly developed with roads becoming impassable during the rains. The area is hot (20.5-40˚C) and dry, with torrential and erratic rainfall totalling between 400 and 500 mm per year. The southern divisions, nearer to the coast, receive relatively more rainfall than those in the north. The actual population of Garissa District, the majority of which is nomadic, might be well over 200,000 people. The mean population density is about three people per km^2, but is much higher in the central and southern divisions and much lower in the north. The Somali pastoralists in the region derive their livelihood from livestock and livestock products. They are generally nomadic and move with their animals as dictated by the availability of pasture and water.



Map 1 The Negev showing the approximate area of the siag (after Marx, 1967)



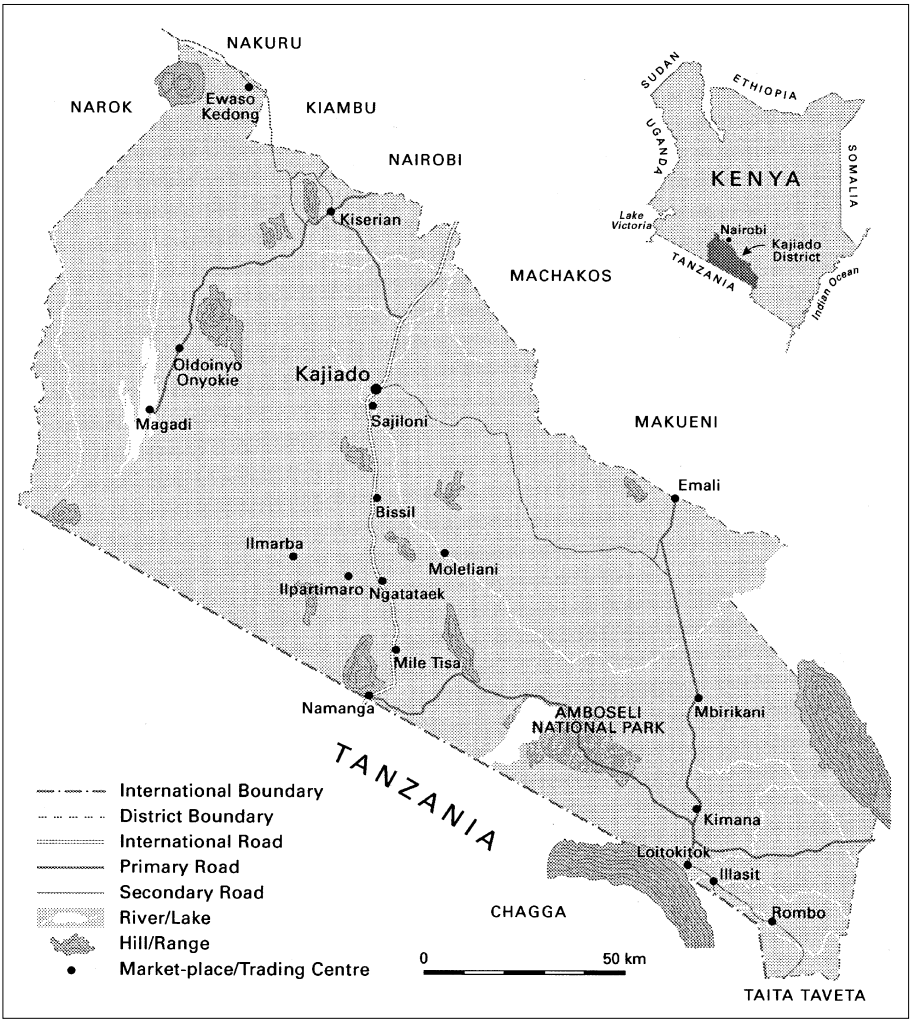
10 *Map 2 Location of the Garissa District*

In periods of drought, such as the severe ones of 1980/82, 1991/93 and 1996/97, they move to neighbouring regions. These include some regions in Somalia and Ethiopia with which pastoralists from northeastern Kenya historically have close clan relationships. As a result of the severe droughts of the early 1980s, some Somali pastoralists moved into cultivation through irrigation using the Tana River waters (Nunow, 1994). Some of these people have since restocked and returned to nomadic pastoralism, but some have divided their labour between farming and livestock rearing. In addition, a group of pastoralists who lost all their livestock through the droughts of 1991/93, or who were left with insufficient stock for subsistence, moved to towns and trading centres to survive on wage labour and food relief. Although they still see themselves as pastoralists, they have little chance of re-establishing their pastoralist way of life in the near future.

The Kajiado District, where the Maasai pastoralists whom we studied live, covers an area of 21,105 km^2 and borders the Republic of Tanzania to the south (Map 3). The district capital, Kajiado, is situated about 125 km from Nairobi along the tarmac road to Tanzania. The area is generally hot and dry, with an average annual rainfall of between 500 and 600 mm, often falling in showers. Kajiado District had an estimated population of 337,500 people at the end of 1994 (Republic of Kenya, 1993b). The mean population density is about 16 people/km^2, varying from 28/km^2 in the north (Ngong) to 8/km^2 in the south (Magadi). The Maasai in Kajiado District live near Kenya's main consumption centres and have specialised in livestock production. Pressure on their resources (grazing land and water) is increasing severely, as a growing number of people from highly populated areas buy land in the district, settle there and start cultivation. At the same time, the Maasai population and their herds are also growing in number, and the number of animals in the herds has probably never been so high. Because of population growth in the district and increasing demand from nearby and more distant consumer centres, the markets for meat and milk are expanding.

I.2 Objectives and research questions

The objective of the research was to study pastoral economies in Kenya, notably the Maasai in the Kajiado District and the Somali in the Garissa District, in order to examine livestock offtake from pastoral herds and the flow of grains into these areas. Another objective was to make a comparative analysis of the Bedouin in the Negev desert, Israel, to see whether their experience with intensification and commercialisation of livestock production could be relevant for Kenyan pastoralists.



Map 3 Location of the Kajiado District

The corresponding research questions were the following:
1. What are the socio-economic and demographic characteristics of livestock production in the respective study areas?
2. What are the characteristics of pastoral households in terms of herd ownership, economic differentiation, income and expenditures?
3. What are the structure and features of the market for livestock products?
4. What are the structure and features of the market for grains?
5. What is the exchange rate between livestock and grains in the three livestock economies?
6. What are the future prospects of the pastoral economies in the study?

I.3 Hypotheses

The underlying hypothesis in this research is that semi-commercial livestock production in pastoral areas can improve food security at the household level. It was expected that:
- the exchange rate between livestock products and grains – the caloric terms of trade (CToT), see Box 1 in Section I.5 – will generally be favourable;
- pastoralists will be able to survive on smaller herds, but that it will be necessary to increase the production of livestock and livestock products for greater food security;
- it will be necessary to improve the marketing structure in order to expedite the outflow of livestock products and the inflow of food commodities.

I.4 Theoretical orientation

The two pastoralist groups in Kenya, the Maasai in the Southwest and the Somali in the Northeast, are exposed to similar constraints, *i.e.* inadequate grazing lands during the dry season, insufficient access to water sources and labour shortage. Solutions have to be found to minimise these constraints. The groups also differ in a number of important characteristics, including their herd composition, land tenure systems, social organisation, dietary habits and market development.

Several studies have been made of pastoralist livestock production and commercialisation in the Somali Republic (Abdulahi and Jahnke, 1990; Glantz, 1977; Little, 1989b; Poulsen, 1990; Samatar, 1987, 1992a, 1992b; Samatar *et al.*, 1988; Swift, 1979; Baumann *et al.*, 1993). There are fewer studies of this type on the Kenyan Somali (Merryman, 1987). It became evident from these studies that the marketing of cattle and small livestock from the inland areas towards Mogadishu and Kismayo was well developed, with a chain of

small traders, intermediate traders and exporters. Commercial milk production was also widespread and well organised, mainly by women (Herren, 1990, 1992; Little, 1989a, 1991).

With regard to the Maasai, extensive studies by the International Livestock Centre for Africa carried out some 10-15 years ago showed the high productivity of the system, considering the existing wildlife densities (Bekure *et al.*, 1991; ILCA, 1983; King *et al.*, 1982, 1985; Leeuw and Peacock, 1982; Leeuw and Tothill, 1990; Peden, 1984). The opportunities for increased offtake, however, were considered to be limited because of lack of marketing options (Bekure *et al.*, 1982; Bekure and Chabari, 1986; Evangelou, 1984a, 1984b; ILCA, 1983; Williams, 1990). Some authors emphasised the importance of the traditional values attached to animals that influence the possibilities for greater offtake (Galaty, 1981, 1982).

Studies during periods of droughts and conflict have highlighted, in particular, the working of the pastoral system (Campbell, 1978, 1979, 1991; Grandin and Lembuya, 1987; Little 1987b) and the relations between herders and farmers. In general, the farmers supply grains to livestock producers on favourable terms of trade (Kerven, 1992; Little, 1983, 1987a, 1992). The marketing of milk by women appears to be on a limited scale.

The land issue has recently received much attention, as it is likely to be one of the main constraints in the future (Grandin *et al.*, 1989; Pasha, 1986). Control over land resources among the Maasai is seriously threatened through the subdivision of group ranches. Many younger producers no longer have access to land and land is being sold to outsiders (Bekure and Pasha, 1990; Republic of Kenya, 1988a, 1988b). Group ranches are being subdivided and individual ranches are being created with individual title deeds, which has many adverse effects (Rutten, 1992). Those Maasai who were members of a group ranch received an individual ranch.

Among the Somali, land is communally owned, and the processes of land alienation and privatisation described above are still rare, but here, access to water poses a serious problem. The development of irrigation agriculture along the Tana River has denied pastoralists access to pasture in the dry season and to watering places. The increasing number of trading centres in former watering points makes this situation even worse.

Although both groups are highly dependent on livestock, the composition of their diet differs. The Maasai prefer livestock products, especially milk, while the Somali consume animal products and grain in equal proportions. There is no available research on the dietary practices of the Kenyan Somali, but there are data on the food consumption and nutritional status of the Maasai (Bekure *et al.*, 1991; Homewood and Rodgers, 1991; ILCA, 1983;

Nestel, 1989; Nestel and Geisler, 1986). Seasonal shortages were reported, but in general, it appears that a more diverse diet has been achieved through improved trade and the purchase of other foods with a higher nutritional value.

I.5 Elaboration of the research and methodology

As we have said, the expectation was that semi-commercial livestock production in pastoral areas can improve food security at the household level and that, therefore, more people should be able to subsist from the herds. This hypothesis was first examined by analysing the exchange rates between livestock products and food commodities, particularly grains. Terms of trade were expressed in monetary and caloric values and it was expected that the caloric terms of trade (CToT – see Box 1) would be favourable to livestock producers. In order to test this, information was collected on the volumes of livestock products and grains traded in different years and seasons.

Box 1 Caloric terms of trade (CToT)

The CToT represents the ratio of energy that can be purchased in meat to the energy that can be purchased in grain. This value, which depends on the costs of meat and grain and the metabolisable energy yields of each, can be important in deciding whether to purchase grain or meat. In general, more metabolised energy can be purchased in the form of grain than in the form of meat, for an equivalent amount of money. The ratio is high with a combination of low grain costs and high meat costs and, in contrast, is low with high grain costs and low meat costs. Maize is usually the grain used for comparison in Kenya, as it is the most common one traded, and it yields approximately 3,200 kcal/kg. In Israel, wheat is the grain used for comparison, with a similar yield of 3,200 kcal/kg. For small livestock, that is sheep and goats, it is assumed that an average animal yields 13 kg of meat and 2,000 kcal/kg. This takes an average of about 1,600 kcal/kg for goats and 2,500 kcal/kg for sheep. For cattle, it is assumed that an animal yields 150 kg of meat and 2,000 kcal/kg. To calculate the CToT in each of the three cases, livestock prices as well as grain prices need to be known.

In order to obtain a full understanding of the relationship between market dependence and food security, this information was put in a broader perspective through a survey of the existing market structure for both livestock and food, particularly grains.

Data were collected at the district, market and household levels. Environmental, demographic and socio-economic background information, as well as production and trade statistics, were obtained from an examination of existing scientific literature, project reports, government records and annual reports. The market structure and features were studied through visits to markets and observations *in situ*, surveys of selected markets and

of livestock traders, butchers, grain traders and retailers in these markets.[1] Interviews with elders, group discussions and household surveys provided information on household characteristics, livestock and crop production and management, market access and orientation and food consumption and purchases.

For the household survey, an intensive approach was used in the Negev study. Six Bedouin families were selected for intensive study and visited 1-3 times a week over a two-year period. A questionnaire was used to record household characteristics, material and livestock possessions, labour division and access to land. Once this was established, all management practices related to sheep production (*e.g.* breeding programme and feeding regime) and all financial transactions involving the sale of sheep food purchases were recorded.

Table 1 Sampling and weighting procedure by location and wealth category in the Garissa study

Wealth category	Sample listing			Sample studied			Weighting	
	Dadaab	Ijara	Total	Dadaab	Ijara	Total	Factor	n (%)
0-20 cattle	44	34	78 (71%)	32	22	54	1.14	62 (70%)
21-80 cattle	10	19	29 (26%)	7	16	23	1.00	23 (26%)
81+ cattle	1	2	3 (3%)	1	2	3	1.00	3 (4%)
Total	55	55	110 (100%)	40	40	80		88 (100%)

The Garissa household survey was carried out in two divisions (Dadaab and Ijara). In each division, 55 Somali households were visited and their essential characteristics listed. From these households, 40 were selected in each division on the basis of livestock (cattle) ownership and physical accessibility for interviewers. All the results have been weighted to correct for the sampling procedure, resulting in 88 weighted households based on 80 cases (Table 1). Subsequent interviews covered a wide range of household and livestock characteristics such as household composition, herd size, grazing patterns, water rights and social norms relating to livestock production. Follow-up information, for which the households were revisited up to five times bimonthly, mainly concerned herd dynamics (*i.e.* offtake and additions), income, expenditures and prices of livestock and grains.

[1] The number of livestock traders, brokers and butchers interviewed amounted to n = 102 in Garissa District and to n = 100 in Kajiado District. In Garissa District, 60 retail traders operating in the three markets of Garissa, were also interviewed. In Garissa, a survey was held among 34 grain traders. The equivalent number was n = 106 in Kajiado, where there are ten market centres.

In the Kajiado survey, both men and women were asked to provide data on income and expenditure. Questions on income referred to the month prior to the interview and those on expenditure to the week prior to the interview. Apart from monthly recall questions, single-round surveys were done to obtain information on household size, characteristics and wealth, income sources and migration history in 1993, 1994 and 1995. Open interviews were held with various people on their life as a pastoralist, on the structure and performance of the market system in the district and the role of the market in household livelihoods. Households were selected in two steps. First, three group ranch areas were selected where the pressure on resources was relatively high, and then a transect of each ranch was selected, where every second household was included in the sample. This procedure resulted in a sample of 153 households, involving 1,024 people (Table 2).

Table 2 Sample composition in the Kajiado household survey (Maasai study)

Group ranch area	Former group ranch members		Households sampled		Number of people	
	Number	Percentage	Number	Percentage	Number	Percentage
Olkarkar	95	7%	34	22%	249	24%
Osilalei	763	59%	80	53%	522	51%
Partimaro	445	34%	39	25%	253	25%
	1,303	100%	153	100%	1,024	100%

The statistical analysis included household parameters and market characteristics. As the project entailed three studies in different geographical areas, the results of the three cases will be described separately in Part II. The Bedouin study will be presented first, because the experience in this setting will provide a background for the later findings and provide – wholly or partly – a possible scenario of what may follow with pastoral societies in Kenya.

II. Results

II.1 Bedouin pastoralists in the Negev District (Israel)[2]

II.1.1 The Bedouin livestock economy

When Israel conquered the Negev in 1948 and the Bedouin were placed under military administration, most were translocated from former tribal areas to live in a closed area in the north-eastern part of the Negev, called the *siag*. It is an area of 1,100 km^2, only about 10% of which was formerly occupied by the Bedouin. It is estimated that the Bedouin cultivate up to 400 km^2 of the *siag*, sowing mainly barley. The rest of the area provided limited grazing possibilities for the estimated 70,000 animals (mainly small ruminants and some camels) (Israel Bureau of Statistics, 1964). Because meat was in demand and prices relatively high in Israeli markets, the Bedouin increased their flocks by every means possible, including bringing in animals from Jordan. In the mid-1950s, the number of animals was too large to be maintained exclusively in the *siag*. Consequently, the Bedouin were permitted to use pastures outside the reservation.

Ben David (1988) estimated that about 10,000 people derive their livelihood mainly and 25,000 partially from livestock (11% and 29%, respectively). Assuming that these percentages have remained relatively constant, we estimate that 11,000 and 30,000 Bedouin, respectively, derived their livelihood mainly or partially from livestock in 1997. This estimate is reasonably close to the estimate of 40,000 Bedouin living in spontaneous hamlets (see Section I.1).

The changes that have taken place since 1948 have turned the Bedouin pastoralists of pre-Israel times into marginal pastoralists today. Two important characteristics of current Bedouin pastoral activity in the Negev are evident. First, pastoralism can be practised mainly on the margins of other agricultural activities, on fallow and aftermath fields and in uncultivable

[2] This section is based on the work of Prof. A.A. Degen. Detailed information on this study can be found in Degen, Benjamin and Hoorweg (2000).

areas. Secondly, it has become a marginal occupation for the Bedouin population, as only about 10% (1,000 families) derive their livelihood from raising sheep. They mainly practise a seasonal type of herding, in which the flocks are kept near the homestead during the winter and moved to grazing areas up to 50 km away from the homestead during spring and summer. Rules and regulations governing their herding practices, however, strictly limit flock movement to available grazing areas.

Flocks are officially recognised as being owned by household heads.[3] This may not mean their outright possession, but rather their responsibility for taking decisions on the management of the flock. Each household is usually related to others in a complex of alliances, obligations, reciprocal relations and clan obligations. Some members of the household (wives) and extended family (sons) may own some animals from the flock and these are considered their property (Abu-Rabia, 1994; personal data). Each household is considered a patriarchal unit, in which the household head or elder male makes all the decisions on flock management for all members of the family who may own some of the animals in the flock. As a family-operated enterprise, wages are not paid (except where shepherds are hired) nor are expenses and income shared among family members.

Bedouin usually raise Awassi sheep, a fat-tailed breed raised in the Middle East since Biblical times. Awassi are described as good walkers, resistant to disease and heat, but less so to cold and humidity (Mason, 1967). It is a strong sheep, which is well adapted to the desert. This breed can use the driest pasture and tolerate long periods without water (Degen, 1977; Degen and Shkolnik, 1978). It is considered a triple-purpose breed raised for meat, milk and wool. In Israel, the Awassi yield 40 to 60 kg of milk per lactation period under extensive conditions (Hirsh, 1933; Mason, 1967) and 350 to 400 kg under intensive conditions (Finci, 1957). They produce about 2 kg of coarse carpet wool annually (Mason, 1967).

Bedouin also own black goats of local origin for subsistence use and some donkeys for local transport and herding. In addition, a few camels can be tethered for milk and some chickens are kept for eggs and meat. Numerous

[3] Traditionally, the Bedouin live in a male-dominated society. For as long as women with children were not the direct recipients of National Insurance maternity, child and, later, old-age benefits, men were the only providers and controllers of all sources of income. Bedouin women's lives are centred around the raising of children, maintenance of the home, weaving carpets and tent materials, embroidery, milking sheep and goats, making milk products and caring for young lambs and kids.

pigeons are raised, too. A few cows (artificially inseminated) may be kept for milk and calves, and an occasional horse for riding (prestige).

The number of sheep in the Negev was estimated at 70,000 in 1961, a number which increased to about 300,000 today (Table 3). Officially, 150,000 sheep are registered with the Ministry of Agriculture's Veterinary Services, but it is generally estimated that this is only about 50% of the actual number of sheep owned by Bedouin. Household heads often register some of the animals in the name of family members and/or deliberately underestimate the number of animals in their flocks to the government veterinary authority (compulsory for vaccination against contagious diseases). It also appears that total holdings are underestimated and not registered.

The increase in flocks is rather surprising, as in the late 1980s, many Israeli agricultural cooperatives (*kibbutzim* and *moshavim*) abandoned sheep raising because of rising costs of inputs and falling prices of sheep.

Table 3 Number of sheep raised by the Bedouin in the Negev between 1961 and 1997

Year	1961	1974	1988	1997
Number of sheep (x 1,000)	70	130	140-250[a]	150-300[a]

[a] The lower number is the one registered at the Ministry of Agriculture; the higher value the one estimated by various government officials involved in Bedouin affairs.

II.1.2 Flock size, composition and management

The average flock size of the six Bedouin families in spontaneous settlements who were intensively studied was estimated at 61 to 176 sheep per family.[4]

In families living in spontaneous hamlets, unmarried daughters shepherded animals, while wives and, occasionally, husbands and sons helped.[5]

4 This corresponds well with the available statistical data. The present Bedouin population is about 104,000, of whom 64,000 live in municipalities and 40,000 in spontaneous hamlets. On average, there are ten people per Bedouin household. Of those living in spontaneous hamlets, 10,000 people, or 1,000 families, raise sheep as a primary source of livelihood. Total sheep ownership was estimated at 150,000-300,000 head. Not all of these are owned by pastoralists. There are about 6,400 non-pastoralist families living in municipalities and about 3,000 non-pastoralists living in spontaneous hamlets. It was estimated from interviews that 35% of the municipal families own about 12 sheep each, giving a total of about 27,000 head. Half of the non-pastoralist families in hamlets have about 25 sheep each, totalling about 38,000 head. Thus, the number of sheep held by pastoralists is about 85,000 to 235,000 head, or 85 to 235 per family.

5 The households investigated consisted of a husband, 1-4 wives and 8-21 children. Married sons establish households close to their fathers, but their families live as separate units and manage their finances separately. Unmarried children are their mothers' responsibility and were therefore considered part of the parental household.

Since girls now attend school (education is compulsory by Israeli law), the family labour force has been reduced. When needed, shepherds from the administered territories were hired at 130 dinars (1 dinar = US $ 1.30) per month. None of the sons plan to raise livestock as a livelihood, although many maintained small numbers of animals within the parental household flock or near their homes. Wives owned animals and either kept them with the main flock or corralled at home. Husbands decided when and where to graze, when to corral the main flock at home and when to sell or buy sheep. However, wives were often quite vociferous in decision making. Husbands were responsible for flock movement, either by foot or by truck, to distant pasture sources. They were also responsible for such aspects of the everyday management of the flock as providing drinking water (by either piped water or tractor-drawn water tanks) and other essential supplies.

Each year, household heads apply to the Government Land Authority for grazing areas. Permits issued by the Bedouin Affairs Department of the Ministry of Agriculture limit flock movement to these areas to about nine months during spring and summer. Flocks were kept at the homestead for about three months during the late summer and winter. The black goats were restricted to the confines of the household as a result of the 'Black Goat' law of 1977 because grazing black goats were believed to destroy the vegetation. Permits were issued only after flocks had received mandatory veterinary vaccinations.[6] Consequently, veterinary care became a compulsory and important expense in the flock management budget.

Grazing permits allowed flock movement from approximately mid-February to October. The Ministry of Agriculture issues these permits in conjunction with the Government Land Authority in Beer Sheva that stipulates the designated areas and exact dates for grazing. The grazing period allowed depends on the condition and availability of pasture. In spring, the grazing areas were usually lands in the control of the Jewish

6 During each year of the study, all animals had to be vaccinated against foot and mouth disease and rinderpest (at a cost of US$ 0.65/sheep and US$ 0.35/sheep, respectively), and ewe lambs against brucellosis (US$ 1.35/lamb). In addition, the flock had to be checked for brucellosis. The government veterinary services took sheep tested positive for brucellosis for slaughter. Compensation for these sheep amounted to US$ 150/ewe and US$ 91 for her lamb (if there was one). If 10% or more of the flock was tested positive for brucellosis, the whole flock was slaughtered. The number of sheep with brucellosis in the households studied ranged between three and seven per flock. The optional recommended treatments at present (not for a grazing permit) are clostridium vaccination (US$ 1.05/sheep) and deworming (US$ 1.35/sheep). The former was done by government vets; the latter by the Bedouins and/or private vets.

National Fund (mainly forests), the army and the Land Authority. Payment for these sites was minimal and based on flock numbers. Arrangements were also made to graze land under private control, such as that of *kibbutzim* or *moshavim*. These dealings had to be registered with and approved by the Ministry of Agriculture. In these cases, fields were mainly rented for summer grazing consisting of cereal aftermath and weed-infested winter fallow. Payment varied, depending on such factors as quality and quantity of the feed available for grazing. Bedouin were not able to graze their animals outside their permitted areas. Land Authority officers, known as the 'green patrol', control this. During the study, part of one of the flocks was moved outside its permitted area. These sheep were confiscated and quarantined in corrals controlled by the government veterinary services. The owner paid quarantine costs and a mandatory fine to release the animals.

Drought with poor pasture availability occurred in 1995/96 and 1996/97. This forced two families to sell their sheep (US$ 156/sheep) during the fieldwork period. Two other families were added to the sample to maintain the number of households under study.

No grains were harvested during the two years of this study. In the first year, the animals grazed down the crops – wheat and barley – in June-July, and in the second year the fields were harvested and baled as good-quality straw.

Only one family milked sheep during 1995/96 and none in 1996/97. Labour shortage was given as the main reason for not milking. Yields of milk were approximately 20 kg per day over a two-month period between February and March, for a total of 1,200 kg. The wives, who usually do the milking, processed the milk into yoghurt (*laban*), butter (*samne*) and a hard, dry cheese (*afig*). The *afig* was stored for future consumption. It was estimated that 200 kg of *samne* and the same amount of *afig* were made for home consumption, but occasionally the women sold some. *Samne* was sold for about US$ 10.6/kg and *afig* for about US$ 7.3/kg.

All the sheep were hand-sheared before the summer. The wool yield was 1-2 kg/sheep, averaging about 1.5 kg/sheep. The husband did most of the shearing, often assisted by wives, children and a shepherd (if employed). There was little demand for coarse carpet and the wool was used for blanket and pillow filling. Very few tents were made of wool and no wool weaving was observed during the study. Instead, tents were made from burlap bags and carpets were hand-woven from colourful, synthetic material.

Besides the droughts of 1995/96 and 1996/97, there were other problems in sheep management and the marketing of animals during the study period. First, the Administered Territories were closed for security reasons much of the time, thus preventing buyers from the territories from entering Israel. This was a serious setback, as these buyers purchase most of the Bedouin sheep and sell them in the territories. In addition, shepherds from the territories could not continue to be employed, because Israeli law forbids them to stay overnight in Israel. There was also an outbreak of foot and mouth disease in 1996/97, which prevented animal movement and therefore sales outside the homesteads. In spite of this, there were secret movements and sales. These factors, together with the droughts, resulted in lower sheep prices and in higher grain and fodder prices.

II.1.3 Economic differentiation, income and expenditure

Table 4 presents information on the family status, lamb production and income from sheep/lamb sales for six Bedouin families, observed in 1995/96 and 1996/97. There were approx. 130 breeding ewes per household, with a range from 61 to 176, and 2-4 rams. Lambing occurred mainly between November and March, but continued throughout the year, as rams grazed with the ewes. Of the ewes which lambed, 2.5% produced twins. Each flock produced an average of 120 lambs for the two years of the study, and 105 of these survived. Thus the lambing rate over the two years was 93%, and the lamb mortality was 12.5%. Of the surviving lambs, 68 were sold at 3-5 months of age, which mainly covered expenses. Of the rest, 15 ewe lambs were kept as replacements for ewes that died, were sold or slaughtered, while 20 lambs were used as presents and for traditional slaughter. Sick animals are never slaughtered for home consumption but sold whenever possible. All these parameters differed little over the two years and were also quite stable for the four individual households that were present during both years. The income from sheep sales was also stable for the two groups in the two years, at NIS 31,000 (US$ 9,394), but the variation among individual households was considerable.

Table 5 presents information on the expenses incurred in sheep production. Again, the average figures are fairly constant over the two years. The expenses are also fairly constant for individual cases, except the expenses for land rental, which varied considerably from year to year. Most of the expenditure was on animal feed (60%), followed by land rental (20%), wages (8%) and veterinary costs (7%). On average, expenses were NIS 23,500-25,800 (US$ 7,121-7,818) and constituted about 80% of the incomes, although this

Table 4 Family status, lamb production and income from sheep sales for six Bedouin households[a] in 1995/96 and 1996/97

1995/96	A	B	C	D	E	F	Mean
Wives (#)	2	2	2	3	1	2	2.0
Children (#)	14	19	21	23	8	7	15.3
Non-married children (#)	7	9	10	11	4	7	8.0
Sheep (#)[b]	125	140	176	61	112	110	120.7
Sheep tested with brucellosis (#)[c]	5 + 5	3	1	7	6 + 3	4	4.3 + 1.3
Lambs (#)	120	127	180	49	98	96	111.7
Lambing rate	1.00	0.93	1.02	0.91	0.92	0.91	0.93
Lamb mortality (%)	9.7	13.2	12.4	7.1	14.2	12.4	12.0
Sheep mortality (%)	0.08	1.5	1.1	3.7	5.1	5.2	2.4
Lambs sold (#)	65	83	91	23	70	69	66.8
Sheep sales (#)[d]	29,250	37,350	40,950	10,350	31,500	31,050	30,060
Labour	relative's son	shepherd daughters,	2 wives, 2 daughters, shepherd	2 wives, daughter	wife, children	wife, children	
1996/97	**A**	**B**	**C**	**D**	**G**	**H**	**Mean**
Wives (#)	2	2	2	3	4	2	2.5
Children (#)	14	19	21	23	15	7	16.5
Non-married children (#)	7	8	6	11	7	7	7.7
Sheep (#)[b]	116	140	174	101	131	175	139.5
Sheep tested with brucellosis (#)[c]	NC	NC	NC	NC	NC	4	4
Lambs (#)	135	124	160	90	125	143	129.5
Lambing rate	1.16	0.89	0.92	0.89	0.95	0.83	0.93
Lamb mortality (%)	10.4	19.1	12.4	14.1	10.2	17.0	13.0
Sheep mortality (%)	0.09	3.6	1.7	3.0	3.1	11.6	3.7
Lambs sold (#)	82	75	72	40	86	66	70.2
Sheep sales (#)[d]	36,900	33,750	32,400	18,000	38,700	29,700	31,590
Labour	relatives's son	shepherd	2 wives, 2 daughters, shepherd	2 wives, daughter	wife, daughter	mother, brother, sisters	

[a] Only four of the studied families (A-D) were present in both years.

[b] Number of sheep including those tested positive for brucellosis.

[c] Testing of sheep of these households for brucellosis was from October – January in 1995/96 and 1996/97. Those tested in 1995/96 were not checked (NC) in 1996/97. Bedouin were compensated with NIS 480/ewe and NIS 300/lamb for sheep tested positive for brucellosis.

[d] New Israeli Shekels (NIS) at US$ 1 = NIS 3.3.

varied from household to household. In some households, expenses surpassed incomes (C in 1995/96 and D in both years); in the most favourable cases expenses were only 55% and 61% of incomes (E in 1995/96 and F in 1996/97) and in all other cases it was more than 67%.

Table 5 Expenses of sheep production of six Bedouin families[a] in 1995/96 and 1996/97 (NIS)[b]

1995/96	A	B	C	D	E	F	Mean
Veterinary costs	2,100	1,800	2,300	750	1,320	1,220	1,582
Wages	2,100	2,800	6,300	0	0	0	1,867
Land rental	5,600	5,900	6,100	2,300	5,500	1,100	4,417
Water	750	750	750	400	750	400	633
Animal feed	15,000	13,000	17,000	9,000	13,000	16,000	13,833
Tractor and fuel	2,200	1,400	1,200	800	800	500	1,150
1996/97	**A**	**B**	**C**	**D**	**G**	**H**	**Mean**
Veterinary costs	1,700	2,200	2,250	1,210	1,610	2,260	1,872
Wages	2,100	3,500	7,000	0	0	0	2,100
Land rental	4,000	6,500	5,000	4,000	3,500	8,500	5,250
Water	400	750	750	400	500	800	600
Animal feed	14,000	13,000	17,000	13,000	14,000	15,000	14,333
Tractor and fuel	3,400	1,400	2,000	1,000	1,600	500	1,650

[a] Four of the families (A-D) were present in both years.
[b] New Israeli Shekels (NIS) at US$ 1 = NIS 3.3.

Table 6 Net income on NIS[a] from sheep production for six Bedouin families[b] in 1995/96 and 1996/97

Season		A	B	C	D	E/G	F/H	Mean
1995/96	Sheep sales	29,250	37,350	40,950	10,350	31,500	31,050	30,060
	Livestock expenses	27,750	25,650	33,650	13,250	21,370	19,220	23,482
	Net income	1,500	11,700	7,300	-2,900	10,130	11,830	6,578
1996/97	Sheep sales	36,900	33,750	32,400	18,000	38,700	29,700	31,590
	Livestock expenses	25,600	27,350	34,000	19,610	21,210	27,060	25,805
	Net income	11,300	6,400	-1,600	-1,610	17,490	2,640	5,685

[a] New Israeli Shekels (NIS) at US$ 1 = NIS 3.3.
[b] Four families (A-D) were present in both years.

The average balances were NIS 6,578 (US$ 1,993) and NIS 5,685 (US$ 1,753) per annum, respectively, for 1995/96 and 1996/97 (Table 6). This does not include lambs used for social purposes and home consumption. Net income varied from a negative income to NIS 17,490 and, within individual households, there were large fluctuations from year to year. In fact, large fluctuations were the rule, rather than the exception, as was also found by Ginguld (1994) who studied nine Bedouin flocks over one year.

The highest net income was realised not by the largest flock, but rather by an average-sized flock (E in 1996/97). However, the lowest net income

(negative balance in both years) was realised by the owner of the smallest flock (D), who was still building up his flock.

II.1.4 Markets for inputs, livestock and foodstuffs

To maintain their flocks and cultivate crops, Bedouin must have access to grazing areas, supplementary feeds (straw, bran, hay, grains), seeds, agricultural contractors for cultivation, harvesting and transport. They also must have outlets to market their produce. In addition, they must have access to retail markets for essential human foodstuffs.

Personal connections are important for acquiring grazing sites. Some Bedouin have managed to establish long-standing friendly relations with *kibbutzim* and *moshavim*, the main growers of small grain winter crops, that enable them to lease aftermath grazing areas long before the summer grazing season begins and even at favourable rentals. With time, these relationships have become solidly based on mutual trust and benefit. Others have managed to establish similar favourable relations with the authorities responsible for issuing permits for livestock grazing movement, such as the Ministry of Agriculture's Bedouin section, the army and the Jewish National Fund's forestry service. The ability to establish these long-term relationships feeds needed security into a grazing system marked by risk factors such as natural drought and changing governmental policies that constitute a serious uncertainty in livestock management. These relationships may also have subsidiary advantages, such as the possibility of purchasing and transporting baled straw and hay at competitive prices, and employment opportunities in agriculture, forestry, guarding and even in tourism. Bedouin with such established relationships enjoy special status within hamlets, as they can take some of their extended family members with them to their grazing sites or assist them by acting as intermediaries in acquiring permits for grazing sites and preferential employment (Abu-Rabia, 1994).

Apart from the above input sources and their own cultivated areas, inputs such as straw, hay and grains are purchased to a large extent from large-scale Palestinian (from the West Bank and Gaza) and Bedouin traders, who can also deliver purchases to the homestead. Long-term relationships may be established with these traders as a means of financial assistance in the form of extended credit or even loans. For instance, inputs may be purchased on the basis of agreements to sell lambs, kids and mature stock to the traders *in lieu* of cash payment. Bran, an important feed input, is purchased directly from grain mills usually found in one of the seven municipal localities. These unofficial transactions are favoured because no written records are

kept by either the traders or the buyers, and thus are kept hidden from tax authorities.

Bedouin pastoralism, from roughly the mid-1950s, changed relatively quickly from an essentially subsistence and self-contained economy into the money-dependent market economy that exists today. Nearly all transactions take place on a purely cash and carry basis, that is, the ability to buy and sell depends on the ready availability of cash. This situation appears to have arisen out of the Bedouin's desire to keep their income secret from tax and other government authorities. Hence, money received from all sources of income is kept in cash by household heads and by those women eligible for maternity and child benefits. Household heads may use money, over and above that needed for managing flocks and cultivating crops, for the purchase of items such as sheep and goats, gold jewellery, tractors, mobile water tanks, trailers and open-decked pick up vehicles. All of these are in high demand by Bedouin and, as such, are regarded by them as easily liquidated assets.

To market their produce, Bedouin livestock raisers have no official marketing channels such as those available for agricultural enterprises in Israel (*e.g.* milk, poultry, fruit and citrus marketing boards). The absence of any organised marketing venue and lack of any drought compensation effectively debars the Bedouin from financial assistance such as credits and guaranteed prices. They are rarely, if ever, able to negotiate bank loans or overdrafts. In addition, Bedouin buy their agricultural inputs individually. Large processing mills and factories, as well as *kibbutzim* and *moshavim* therefore prefer to sell their products to large traders or through marketing boards.

Livestock is sold mainly to other Bedouin households, including members of the extended family, for traditional purposes such as religious holidays (*Id el-adha*, holiday of the sacrifice), weddings, births and circumcisions. Some livestock is also sold to traders, often Palestinians. These sales eliminate transport costs and keep the transaction secret, as Israeli veterinary supervision (apart from a transport permit) is eliminated. Sons, who need sheep, may buy them from their fathers. Serious bargaining can then take place to the extent that a son may go elsewhere to buy sheep if the price is not favourable.

Sheep are also sold at weekly markets (*shuks*). Markets are held in Beer Sheva, Tel Sheva and Rahat. Most of the buyers are traders from the Palestinian administered towns of Dahariyya, Hebron and Gaza. These traders must have permits from the veterinary services in Beer Sheva in order to transport their livestock to their towns. A much larger *shuk* is held

in Dahariyya. However, sheep and goats that are brought there by Israeli Bedouin with transport permits cannot be returned because of Israeli contagious disease regulations and Bedouin therefore do not use this market for livestock trade.

Retail purchases of household commodities and perishable foods are made in the nearest markets, often in Beer Sheva at the municipal fruit and vegetable market. Storable foodstuffs, such as tea and sugar, are bought in bulk either at the markets or at grocery stores that specialise in catering to Bedouin. Flour, the basic Bedouin foodstuff, can be bought in 50 kg bags, but is mainly bought as wheat from traders who deliver purchases of about a ton directly to the homesteads. The Bedouin store the grain and have it milled as needed at the nearest mill throughout the year, often returning with bran for their livestock.

There is also trade in handicrafts. Women buy materials and thread from which they make carpets, embroidery and dresses. They also sell milk products such as yoghurt, butter and hard white cheese.

II.1.5 Caloric terms of trade

The following calculations are based on lamb, goat and wheat prices in Israel and their respective energy yields. During the study period, a fat lamb of about 40 kg (22 kg meat) was sold for approximately US$ 170, while a 30 kg goat (16 kg meat) was sold at US$ 110. These prices have remained rather stable. At the same time, the wheat price increased steadily from US$ 135/ton in 1995 to US$ 365/ton during 1996/97 and has dropped to US$ 275 today. Assuming that a kg of sheep meat yields 2,500 kcal of metabolisable energy, a kg of goat meat 1,600 kcal and a kg of wheat 3,200 kcal, then the cost of energy from wheat can be compared with an equivalent energy cost of meat. At US$ 135/ton wheat, the ratio of meat energy to wheat energy (equivalent market cost per kcal) is 1:71 for sheep and 1:97 for goats. At US$ 365/ton wheat, these ratios are 1:27 for sheep and 1:36 for goats. These ratios are much higher than those found in the subsistence livestock economy practised in Kenya where the ratio averages about 1:10 and where maize is used for comparison with cattle meat. Moreover, Israel's CToT fluctuates more than that in Kenya, mainly because of fluctuating grain prices. Meat prices are relatively stable in both countries, as is the price of maize in Kenya, but the price of wheat fluctuates greatly in Israel. This is because Israel is a big wheat importer and thus sensitive to world market conditions. In contrast, Kenya is mainly self sufficient in maize (except in drought years) and consequently prices are mainly subject to internal socio-political control.

II.1.6 Prospects for the future

Grazing restrictions are imposed upon the Bedouin and land conflicts are common. Why therefore do Bedouin persist in raising sheep for their livelihood?

The maintenance of their traditional lifestyle remains important. Economic difficulties and high unemployment in the wage labour market may also provide some of the answer. The retention of a few flocks may be a rational choice as a supplement for those who are financially stressed, providing families with milk and other dairy products for personal consumption. Thus, maintaining some sheep acts as a hedge against the risk of unemployment and, if sheep raising does become more profitable, it would be easy to start this enterprise (Dinero, 1996). Moreover, as pointed out by Ginguld, Perevolotsky and Unger (1996), Bedouin have a decided advantage over other sectors in raising sheep, namely, cheap labour available in most households, cheap inputs in that marginal land is used and little investment in equipment.

A reason given by the married sons of the household heads was that their fathers had no other expertise and, because of their age, no other occupational options. For their part, the married sons unanimously stated that they would not continue to raise sheep after their father's demise.

Another reason for raising sheep given frequently by Bedouin elders, researchers and officials is that agro-pastoralist activities enhance Bedouin claims to land ownership by their continued land occupancy. This inherent attitude of the Bedouin was reinforced by the Land Procurement Act of 1980 which acknowledged, for the first time, the need to compensate Bedouin for expropriated land if they were not allowed formal ownership and residence on the land they claimed, or if they were evacuated.

About 40% of the total Bedouin population live in spontaneous hamlets. Although sons are reluctant to continue the pastoralism of their fathers and 75% of the inhabitants of the hamlets earn their livelihood from sources other than agro-pastoralism, these non-pastoralists are not relocating to existing municipal localities and, in fact, may be resisting urbanisation. Dissatisfaction with the urbanisation alternative may result from high unemployment rates and drug abuse among the Bedouin youth, the high crime rate, the liberalisation of women, the low standard of public services, tribal mixing and low alternative employment opportunities (Abu-Saad, 1996). This might lead to permanent settlement in some hamlets and there are signs of that the state is ready to recognise and legalise spontaneous settlements (Meir, 1997). The integration of many spontaneous hamlets into the national water supply network further illustrates the recent changing state policy towards the spontaneous hamlets.

Furthermore, there has been a change in the state's previous negative approach of reducing the Bedouin's agro-pastoral economy to one of slowly recognising it as a positive national economic resource. It has been realised that these holdings are being maintained by market processes that today include those of the areas under the control of the Palestine Authority in the former occupied territories. As such, they are an important economic factor in the current peace process. It is well known that the sharing of the region's water resources will entail radical changes in Israel's agricultural policy in the near future. Of paramount importance in this respect is Israel's plan to use recycled sewerage water for irrigating the Negev's industrial crops and to restrict sweet-water irrigation to edible crops grown under 'protected agriculture' conditions (glass and polyethylene structures). This will result in an increase in the area used for dry-land (rain-fed) winter cereal crops and, with it, a corresponding huge increase in straw and aftermath availability that can be utilised by Bedouin livestock.

In sum, it would appear that household heads persist in raising sheep mainly to maintain their Bedouin traditional lifestyle, as a claim to the land, as additional income, including household dairy products and meat and as a form of investment. The future of most Bedouin would appear to be integration into the Israel urban economy while at the same time attempting to maintain their cultural traditions. A relatively small, but stable, number of households will continue to practise agro-pastoralism as a means of livelihood.

II.2 Somali pastoralists in the Garissa District (Kenya)[7]

II.2.1 The Somali livestock economy

Nomadic livestock rearing accounts for over 90% of the population's livelihood in Kenya's North-Eastern Province and is primarily subsistence oriented. Settlement and herding patterns are dictated by the availability of pasture and water. In the northern divisions, the livestock system is based on camel and cattle production. The south is unsuitable for camel rearing, due to the higher incidence of the tsetse fly. Here, cattle raising is combined with some rainfed cultivation. Year-round crop production can be practised only along the Tana River, where irrigation is possible.

In 1995, there were 440,000 head of cattle and a slightly higher number of small livestock (Table 7). Livestock was decimated by the droughts that

[7] This section is based on the work of A. Nunow. More detailed information on this study can be found in Nunow (2000).

occurred in 1991/93 and 1996/97. This forced a large number of pastoralists to move into urban centres and refugee camps to benefit from food aid provided by government and NGOs. The absence of food relief in the south emphasised the need for pastoralists to grow food for themselves.

Table 7 Livestock production in Garissa District, 1991

Animal	1991	1992	1993	1994	1995	1996	1997	1998
Cattle	700,000	280,000	373,000	440,000	440,000	352,000	334,400	350,000
Shoats[a]	600,000	250,000	298,000	420,000	462,000	314,400	209,590	227,000
Camels	74,263	60,000	73,320	74,000	77,700	69,930	62,960	63,500
Poultry	12,500	15,600	17,000	13,500	15,000	-	-	-
Donkeys	3,764	3,200	3,648	4,200	6,300	6,370	5,370	6,270
Beehives	400	450	510	608	680	-	-	-

[a] Sheep and goats.
Source: Republic of Kenya 1997.

Camels are raised mainly for milk, which Somali pastoralists perceive as the most important food resource. Trade in milk has never been widespread and, in the traditional system, was even considered a curse on the animals. This has changed, however, and the sale of milk nowadays is an enterprise conducted by both rich and poor pastoralists. As in many other pastoral communities, Somali women are usually responsible for milk and the disposal of milk products, while men are responsible for herding and the disposal of live animals.

Although camels are the most important livestock because of their milk production, cattle, sheep and goats are the major subsistence and cash animals. There seems to be a rising trend in sale of animals, which may be indicative of a move towards a semi-commercial livestock production system.

The Somali pastoralists usually roam over a wide expanse of land, sometimes extending as far as southern Somalia. However, in recent years, more and more of them have settled semi-permanently in locations for longer periods than in the past. Of the households surveyed, only five (two from Dadaab and three from Ijara) or 7% of the total, had lived for less than one year in the place where they were interviewed. Most of them (65%) had remained there for longer than three years. The pastoralists in Ijara are more sedentary than those from Dadaab, as pasture and water are generally better in the south.

II.2.2 Herd size, composition and management

The difference in livestock systems between the northern and southern divisions is reflected in the results of the surveys in Dadaab (the north) and

Ijara (the south). While Dadaab pastoralists keep all species of livestock, there are no camels in Ijara because of the presence of the tsetse fly. However, in the population surveyed, only three households in Dadaab owned camels – 20 head in all. Only 20% of the Dadaab households in the survey owned cattle, while this proportion reached 45% for the households surveyed in Ijara. In all, nearly two-thirds of the households did not have large livestock and relied on small livestock.

The Somali are known to be reluctant to disclose the number of their animals, especially cattle. Some indication of livestock ownership and herd sizes was obtained by asking for ranges of male and female stock and mature and immature animals instead of absolute numbers. These ranges were then converted into centre values (Table 8). As can be seen from the table, the Ijara pastoralists had larger herds on average than their counterparts in Dadaab, both in terms of cattle (26.3 *vs*. 16.7 head per household) and small livestock (40.8 *vs*. 29.4 head per household). The relative number of mature and lactating females is high in both locations (67% in Dadaab and 44% in Ijara), which can be considered positive in terms of both herd growth and food security.

Livestock production in Garissa district and, indeed the rest of northern Kenya, faces a number of problems, including lack of security, wild animals, livestock diseases, poor pastures and inadequate water supplies for both humans and animals. Lack of security is reportedly the single largest problem facing the respondents, especially those in the north of the district. In total, 33 households (38%) mentioned insecurity as a constraint on livestock production – 26 were from Dadaab and only 7 from Ijara. The problem of wild animals was the second constraint on livestock production and mentioned by 30 households (34%). Lions, hyenas and other predators seem to affect Dadaab and Ijara equally. Livestock diseases, the third major limitation on livestock production, were mentioned by 22% of the cases, all from Ijara. This is mainly because of the Boni forest in the Ijara area, with its heavy infestation of tsetse fly. Although both the pastures and water are better in the south, the tsetse makes camel rearing impossible and increases the costs of rearing cattle and small livestock. Livestock health costs are generally high – 75% of the households gave a figure of Ksh. 1,000 (US$ 17) as the minimum cost for drugs per head of cattle per year. In Ijara, 32% of the respondents mentioned drug costs of at least Ksh. 3,000 (US$ 50) per head of cattle per year, compared with only one household from Dadaab, confirming the difference in health conditions between the two divisions.

II.2.3 Economic differentiation and income

The two survey populations in Dadaab and Ijara were analysed for economic differentiation in terms of TLU per household. This measure is most widely used in Kenya (Peden, 1984). One TLU is equivalent to 1.42 head of cattle or 10 hair sheep or goats. Camels, cattle, donkeys and small livestock were expressed in TLU, resulting in an average TLU per household for Dadaab and Ijara of 15.5 and 22.6, respectively (Table 8). This corresponds with 2.57 and 3.33 per capita, respectively.

The distribution of TLU per household and per capita for each area (Table 9) confirms the meagre subsistence basis of most households. The majority of households (63%) have less than 20 TLU. The figures per capita show even more clearly that the majority of households have less than the 4 TLU per capita needed for subsistence. With 87% of the households below this minimum, conditions in Dadaab seem to be worse than those in Ijara, where 78% of the households have a TLU/capita ratio below subsistence requirements.

Table 8 Household herd structure and composition (n = 88)*

	Camels		Cattle		Small livestock		Total in TLU	
	Total	Per hh	Total	Per hh	Total	Per hh	Total	Per hh
Dadaab (n = 45)								
Males, mature	10	0.23	117	2.6	303	6.8	123	2.7
Females, mature	15	0.33	330	7.4	503	11.3	296	6.6
Males, immature	7	0.15	143	3.2	217	4.8	129	2.9
Females, immature	7	0.15	162	3.6	291	6.5	149	3.3
Total	39	0.86	752	16.7	1,314	29.4	697	15.5
Lactating animals	15	0.33	234	5.2	326	7.1	211	4.7
Ijara (n = 43)								
Males, mature	0	0.0	146	3.4	242	5.6	126	2.9
Females, mature	0	0.0	615	14.2	882	20.4	519	11.9
Males, immature	0	0.0	197	4.6	317	7.3	170	4.0
Females, immature	0	0.0	179	4.1	327	7.5	158	3.6
Total	0	0.0	1,137	26.3	1,769	40.8	973	22.6
Lactating animals	-	-	260	6.0	403	9.3	9.3	5.1

* Weighted results.

Income sources other than keeping livestock are minimal among the groups studied (Table 10). Not only are the external resources minimal, but it is also clear that there is little relationship to cattle wealth. With the exception of the lowest wealth category, the distribution of external resources over the different wealth categories corresponds fairly well with the distribution of households over the wealth categories, which confirms that livestock is still

the main basis for wealth among the Somali pastoralists. Data for the lowest wealth category suggest, however, the emergence of a group of impoverished households.

Table 9 Distribution of Tropical Livestock Units by area[a]

TLU	TLU/Household					TLU	TLU/Capita				
	Dadaab		Ijara		Total		Dadaab		Ijara		Total
	n	%	n	%	n		n	%	n	%	n
0- 9.9	14	32	9	21	23	0-0.9	8	18	2	5	10
10-19.9	23	52	17	39	40	1-1.9	16	35	17	41	33
20-29.9	3	7	5	12	8	2-2.9	7	16	5	12	12
30-39.9	2	4.5	7	16	9	3-3.9	8	18	8	20	16
40+	2	4.5	5	12	7	4-5.9	2	4	4	10	6
						6+	4	9	5	12	9
Total[b]	45	100	43	100	88		45	100	43	100	88

[a] Weighted results.
[b] Totals may not match, due to weighting and rounding.

Table 10 Households with other economic activities than livestock keeping, by wealth category (%)

TLU	n	Other economic activities	
		Yes (n = 32)	No (n = 56)
0- 9.9	17	12	23
10-19.9	17	13	23
20-29.9	17	19	20
30-39.9	20	28	20
40+	17	28	14
	88	100	100

II.2.4 Livestock trade

It is partly through trade and exchange that the pastoral system has survived and flourished for thousands of years. Pastoralists, even those who did not have much demand for supplementary food, usually sold or exchanged animals for goods they could not produce themselves, such as tea, sugar, tobacco and clothes (Markakis, 1993), as well as for the payment of dowry or to strengthen social relations. Pastoral communities and regions differ, however, in their level of participation in the market. Unless they are under pressure to purchase food or critical inputs such as veterinary drugs, the pastoralists' participation in the market depends mainly on their proximity to the market.

Income from livestock is usually from livestock sales, sale of hides and skins, milk and, occasionally, *ghee* in years of good rainfall. Major livestock

markets include urban centres at Garissa, Nairobi, Mombasa, Lamu, Athi River and Dagoretti. There are also smaller trading centres where livestock is sold, but these do not operate permanently and prices are lower than in larger markets. Milk is usually consumed locally and its sale is only seasonal. Hides and skins are marketed outside the district for use in leather tanning (Poulsen, 1993).

Trade actors include brokers, livestock traders and butchers. They form a complex network, in which each group is dealing with multiple partners (Table 11). The brokering business entails taking a herder's animals to sell for a commission and paying him afterwards. Brokers thus usually buy from producers and sell to traders and butchers. Livestock traders usually buy animals from producers and brokers equally for resale to other traders and brokers, locally or in distant markets of Nairobi and Mombasa. Some of them also sell to butchers, but the latter prefer to buy directly from producers, in order to save the commission charged by traders and brokers.

Only 10% of the butchers deal with all kind of animals. Almost half of them (45%) deal with cattle. The animals are slaughtered immediately or later, when meat is in short supply. The latter usually occurs when there are distant traders – mainly Kamba – in town. Some 29% of the butchers are engaged in the camel trade, while another 16% deal in small livestock. Butchers usually share the meat of the larger animals, *i.e.* cattle or camels, with other butchers. They usually sell their meat to individual customers, small kiosks, and hotels and other institutions in Garissa town, such as schools, hospitals, army and police canteens. In Dadaab, butchers also supply substantial amounts of meat to refugee camps.

In recent years, animals have been sold mainly to purchase foodstuffs. This is partly to compensate for insufficient milk and is partly attributable to increased sedentarisation and the consequent need to meet additional costs such as school fees, self-help contributions (*harambee*) and clothes. Most households in the survey (91%) sold animals occasionally, which was understood as 'whenever they needed cash'. A few households sold animals on a regular basis, seasonally or monthly. Sometimes, animals were not exchanged for money, but for whatever they needed. Exchanging livestock was also practised. A pastoralist in Dadaab, for instance, exchanged 25 goats and 15 sheep for a 4-year old female camel. Such exchanges were never fixed, but mutually agreed upon by both parties.

Most respondents indicated that livestock was sold for the purchase of food and non-food items (67% or 59 households). Of these households, 35 were

Table 11 Importance of trading partners for the trade actors interviewed (%)[a]

	Brokers (n = 30)	Traders (n = 33)	Butchers (n = 39)	Total (n = 102)
Buying from				
Producers	80	33	92	69
Brokers	-	33	3	12
Traders	20	12	5	12
Non-response	-	22	-	7
	100	100	100	100
	(n = 30)	(n = 33)		(n = 63)
Selling to				
Producers	-	3	-	2
Brokers	-	49	-	25
Traders	53	36	-	44
Butchers	27	12	-	19
Others	10	-	-	5
Non-response	10	-	-	5
	100	100		100

[a] Based on a survey among 102 trade actors.

Table 12 Annual net offtake per household for each location (1996; average numbers per household)[a]

Location	House-holds	Cattle				Small livestock			
		Average herd size	Heads sold	Heads bought	Net offtake	Average herd size	Heads sold	Heads bought	Net offtake
Dadaab	40	18.8	1.4	0.3	1.1 (6%)	32.9	3.7	0.7	3.0 (9%)
Ijara	40	28.4	1.5	0.3	1.2 (4%)	44.2	3.3	0.7	2.6 (6%)
Total	80	23.6	1.5	0.3	1.2 (5%)	38.6	3.5	0.7	2.8 (7%)

[a] Non-weighted results.

from Ijara and the remainder from Dadaab. Another 20 households (23%) sold livestock to solve family and 'complex' problems, such as the payment of *diya* (blood money) and compensation for rape or unauthorised elopement with a girl.

In times of crisis, the 'least valuable' animals were sold first in 64 cases (73%). The 'least valuable' animals were those poor in milk production, with a history of multiple abortions, with permanent injuries or disabilities, castrated bulls and those that were more vulnerable to dry spells. Another 20 households (23%) mentioned small livestock as priority sales. All the households that mentioned small livestock were from Dadaab, showing the relative importance of small livestock in that area.

The north generally is more involved in the market, because of easier access to the main market in Garissa town. When asked about the existence of buyers, 67% of the households answered affirmatively. Most of the households who said that there were no buyers were from the south. Table 12 provides information on the number of livestock traded during the study period.

It has been argued that pastoralists are responsive to price increases and tend to increase offtake accordingly (Republic of Kenya, 1986). This is confirmed by the survey, in which respondents mentioned poor prices as the main factor affecting livestock trade. But price fluctuations and lack of security were also mentioned as a constraint on livestock marketing. Insecurity is particularly rampant in the north of Garissa because of the increased infiltration of illegal arms into the area from Somalia after the overthrow of President Siad Barre in 1991. In Dadaab, all households mentioned refugees as a cause of the deterioration in security. In the south, where there are no refugees, the situation is better. How prices and volumes of livestock traded fluctuate, even in the relatively short time span of two years, is illustrated in Table 13. The table shows that there are also considerable regional differences in the prices and numbers of cattle traded.

Table 13 Head of cattle and small livestock traded and prices per animal (Ksh.)[a] by month and location

Month	Garissa				Dadaab				Ijara			
	Cattle		Small livestock		Cattle		Small livestock		Cattle		Small livestock	
	Head	Price	Head	Price	Head	Price	Head	Price	Head	Price	Head	Price
March '96	1,048	5,184	1,754	1,454	26	6,250	748	809	37	3,386	104	756
June '96	1,165	5,678	2,785	980	32	6,919	1,019	1,050	44	4,230	163	581
September '96	1,774	4,750	3,357	853	92	4,403	3,520	708	29	4,097	95	659
December '96	1,886	5,729	3,771	1,158	104	6,210	2,325	914	33	3,863	114	522
March '97	4,313	5,667	5,629	668	118	4,131	2,680	738	58	7,121	200	581
June '97	3,313	5,837	7,449	655	144	5,008	2,571	729	33	4,749	269	526
September '97	5,211	4,800	9,875	772	108	4,781	645	718	165	3,940	513	456
December '97	2,977	5,528	6,755	765	95	6,305	1,300	947	88	5,759	245	601

[a] Ksh. 60 = US$ 1.

Some concern has been expressed that increased marketing may break down traditional social security through the individualisation of livestock and livestock products. In the traditional system, several related people could have an interest in a single animal. Commercialisation, on the other hand, tends to place the household head at the centre of decision making,

independently of his kinsmen and relatives. Moreover, milk which is now increasingly being marketed, was traditionally given free to the poorer households (Dahl and Hjort, 1976). It is also feared that increased commercialisation may adversely affect food security through shifts from camel or cattle raising – the backbone of food production among sub-Saharan pastoralists – to small livestock production, which is said to be more market adapted. Although cattle and camels are not necessarily superior to small livestock, they produce milk and usually fetch higher prices than small livestock. Increased marketing could also marginalise women, with men taking over the sale of milk, hides and skin, and appropriating the proceeds. This could have profound implications for food security, since women play a crucial role in household food security and management. Women usually control the income they obtain from selling milk, hides, skins and *ghee*, and use it to purchase foodstuffs for the entire household. Men, on the contrary, often use their incomes for non-food items, such as clothes, diesel for the borehole generator to water the animals and repayments of debts.

II.2.5 The grain trade

In Garissa District, the National Cereals and Produce Board (NCPB) and the Kenya National Trading Corporation (KNTC) act as the major stores for the provision of foodstuffs. Some wholesalers, who have their own stores, also bring in grains and other cereals, but they are frequented less, because they charge higher prices than government stores.

Little, if any, of the traded grain is grown locally. Most of it is brought in from the agricultural centres outside Garissa district. As Garissa town is the only town connected by tarmac road to the rest of the country, it serves as the point of entry for grains into the district. Given the logistical problems of supplying the remote divisions and locations and the prohibitive transport costs, most traders find it convenient to do their trading in town rather than in outlying centres.

A survey among all 34 grain traders – 21 men and 13 women – revealed that most of them operate from the central market, with a few on the outskirts of the town. The grain trade in Garissa is dominated by the local Somali, with very few traders from other communities. The Somali do not have a long history in grain trade. In fact, the devastating 1991/93 drought was more or less the genesis of the Somali grain trade on a substantial scale. The majority of the grain traders (94%) trade maize grain, while 25% sold maize flour as well. Most grain traders also deal in other commodities, such as rice, vegetables and beans. Three quarters of the respondents sold at least three

of these commodities. The volumes they trade are fairly low considering the size of the local population. The pastoralists among the traders tend to sell higher volumes during the dry season, when less milk is available and households consume more grains than milk.

The grain trade seems to be an increasingly popular business that is attracting more and more traders. Asked about their plans for the future, 44% of the respondents expressed the wish to expand their grain trade and 15% would like to replicate their business elsewhere. The others would like to diversify into other economic activities in order to avoid putting all their eggs in one basket. The number of grain traders tends to increase during droughts and when there is too much relief food being distributed in the area.

Table 14 Food prices by location (Ksh.)[a]

Month	Maize meal			Maize grain			Rice		
	Garissa	Dadaab	Ijara	Garissa	Dadaab	Ijara	Garissa	Dadaab	Ijara
March '96	12.80	20	30	10.25	17	25	31.70	40	45
June '96	12.80	20	30	10.25	18	25	31.70	40	45
September '96	13.50	25	30	10.80	20	25	33.40	40	45
December '96	13.50	25	30	10.80	20	25	33.40	40	45
March '97	14.25	25	35	11.40	20	30	35.15	40	50
June '97	14.25	30	35	11.40	25	30	35.15	45	50
September '97	15.00	25	40	12.00	23	30	37.00	40	50
December '97	15.00	30	45	12.00	20	40	37.00	45	65

[a] Ksh. 60 = US$ 1.

The prices of maize grain, maize flour, rice and sorghum depend on several factors, including seasons, the availability of relief food, locations and the seller. The prices of these products are often lowest in Garissa town and increase with distance and decreasing accessibility from the town (Table 14). In most cases, the traders claimed to earn about Ksh. 5 (US$ 0.08) on every kilogram of maize grain, maize meal, rice and sorghum sold, but the profits depend on the source of their commodities and the frequency of purchases. When purchases are made daily – which is the case for 71% of the traders – no storage costs, such as paying a night watchman, need to be incurred. Generally, the costs associated with grain trade include transport, loading and off-loading costs, county council fees, rent and wages of employees and attendants, if any. These costs seemed to be higher for those who had an average daily turnover by volume of more than 50 kg.

Pastoralists usually buy foodstuffs from trading centres nearby. Even when animals are taken for sale to distant markets, the cash is brought home for the purchase of commodities in local trading centres. The price of maize

meal has not been favourable in the area, and most households complained that prices were high or very high. Food prices in the area are normally in inverse proportion to the amount of relief food that is brought in and distributed. In most cases, minimal relief food is taken to the south of the district, which is also much farther from the main administrative centre of Garissa, so that food prices tend to be higher than in the north. Many families in Dadaab area in the north have enrolled themselves as refugees in the local camps and they obtain free foodstuffs like the refugees. Such households do not have to buy much food, at least while the refugees are present.

II.2.6 Caloric terms of trade

The ratio of energy that can be purchased in meat to the energy that can be purchased in grain (CToT, see Box 1 in Section I.5) for Garissa can be found in Table 15.

As Table 13 showed, the prices of cattle and small livestock were similar in Garissa and Dadaab and lowest in Ijara. The price of maize, however, was highest in Ijara, intermediate in Dadaab and lowest in Garissa (Table 14). There was no trend of livestock prices over the study period but the price of maize increased steadily during this period. Consequently, there was a tendency for the CToT to decrease in all three districts over time, the decrease being greatest in Ijara and least in Garissa (Table 15). In Ijara, the cost of energy obtained from maize approached the cost obtained from cattle. Overall, the highest ratios were in Garissa, where they averaged 7.8 and 11.2 for cattle and small livestock, respectively. Somali pastoralists apparently preferred small livestock to cattle for slaughter and so a higher price was demanded per kg of animal.

Table 15 Calorific terms of trade by location and type of livestock

Month	Cattle/Grain			Small livestock/Grain		
	Garissa	Dadaab	Ijara	Garissa	Dadaab	Ijara
March '96	8.3	5.9	2.2	19.4	6.4	4.0
June '96	9.1	6.2	2.7	13.1	7.8	3.1
September '96	6.9	3.5	2.6	10.1	4.7	3.5
December '96	8.3	5.0	2.5	14.1	6.1	2.8
March '97	8.2	3.3	3.8	8.1	4.9	2.6
June '97	7.8	3.2	2.5	7.4	3.9	2.3
September '97	6.4	3.3	2.6	8.6	4.2	2.0
December '97	7.4	5.0	2.3	8.5	6.3	2.0
Average	7.8	4.4	2.7	11.2	5.3	2.8

II.2.7 Prospects for the future

Certain preconditions have to be met for the commercialisation of livestock to occur and be successful. The size of the herds has to be large enough to allow for a sizeable offtake. Livestock markets should be efficient in terms of accessibility and prices. Grain markets should also be efficient in terms of distribution and price setting. In Garissa District, these conditions are not present. Although the reported district numbers of almost half a million cattle and the same number of small livestock are high, household figures give a different picture. In fact, the foremost feature of this research is that the current livestock resources of the Somali pastoralists are meagre – in contrast to the Maasai – and insufficient for households to subsist. The average ratio of 20-30 TLU per household falls below the minimum requirement for subsistence and more than half the households fall even below this figure and live in sufferance.

The reasons for the low stocks are a series of droughts in 1980/82, 1991/93 and 1996/97 and persistent problems such as lack of security and cattle raids, predation by wildlife, livestock disease, diminishing rangeland, poor pastures and insufficient water. There has been a scramble for farm plots near the river banks that can be irrigated in order to secure rights to land that can ensure survival in the event of loss of the herd (Baxter, 1993; Nunow, 1994). Trading centres have generally been increasingly established near existing watering points. Formerly, grazing close to wells was restricted to dry seasons, when animals were relatively weak and could not travel long distances to water. This is no longer possible and the pastoral lands continue to diminish. Because of the low animal stocks, increased offtake could even undermine the very basis of survival by reducing the herds further.

Income sources other than livestock keeping are scarce. Some pastoralists have turned to crop farming, charcoal burning, firewood collection, casual labour and cottage industries. But, as has been observed elsewhere, the extra incomes do not seem to lead to wealth accumulation. The number of impoverished households is expected to grow even more quickly. This group in fact already exists, namely, the many households on the outskirts of Garissa and in refugee camps elsewhere. These pastoralists found themselves unable to continue with pastoralism after the droughts, either because of insufficient livestock or total loss of stock. Most of these households moved into towns and trading centres in order to benefit from relief food from government and NGOs and casual employment. A local NGO (Mikono International) estimated that some 185,000 displaced pastoralists (about 23,000 households) live in villages around Garissa town. Others live in refugee camps elsewhere. A survey carried out in July 1997 among 50 displaced pastoralists in Garissa

town – 39 male and 11 female heads of households – revealed that none of the households had any livestock in the *bulla* (village) or elsewhere. Nearly all the households (96%) had lost their livestock to either the drought in the previous year (1996) or to a combination of drought and diseases. Most of them (70%) had settled in the *bulla* after July 1996. The households originated from all over Garissa district. The majority (76%) said they were better off in the *bulla* than in the rural camps, where they experienced hunger and were unable to move on with the others because of total lack of animals. They receive relief food, medicines and material assistance from various NGOs and supplement this with some cash income from such activities as casual labour, mat making, charcoal burning and firewood gathering. Half of the displaced households have no plans for the future and the large majority considered themselves better off than during the previous years. This is a depressing situation and it is likely that the 20-25,000 households currently settled around Garissa have seen their last days of pastoralism and will probably never resume their previous lifestyle.

The above gives a rather bleak picture. On the other hand, such conditions could theoretically accelerate any trends towards livestock intensification and commercialisation described in the earlier review. Sadly, this appears not to be the case for a number of reasons.

- Most of the impoverished households no longer have any livestock left and are not in a position to partake in livestock improvement in any form. The number of these households is apparently already high.
- Of the households with livestock, the majority have such low numbers that both the absolute and the percentage offtake remain low. The net offtake rates for cattle were 6% and for small livestock 8%. This is only half or one third of the offtake rates generally considered feasible
- and much less than realised by the Maasai in Kajiado.
- For the households that are in a position to sell substantial numbers of animals, the marketing infrastructure for livestock and livestock products is poor. This is shown by the small number of divisional centres where livestock markets are organised and the fact that there are large differences in livestock prices between markets. The number of livestock traders is small, although this could easily change if livestock trade were to take off. There is little flow of market information into the remote areas. The number of grain sellers is scattered and widely dispersed. This substantially increases the costs of transport for both livestock going out and grains coming in. In general, except for special conditions, this depresses the prices of livestock in outlying areas

(certainly of small livestock, less so of cattle) while raising the price of grain in the same areas.

Although the caloric terms-of-trade are still positive, they sometimes approach one in remote areas at certain times of the year. At such times, there is little advantage in livestock-grain exchange, because of imperfections of the market and the physical effort needed to effect exchange. It would appear that the Somali would have to include irrigated agriculture to supplement livestock production in order to buffer fluctuations in livestock numbers.

II.3 Maasai pastoralists in the Kajiado District (Kenya)[8]

II.3.1 The Maasai livestock economy

The social and economic life of the Maasai is strongly defined by livestock transactions, both within and outside the household (with other households or traders). Animals are commonly given as gifts. Cows are given away, for instance, as dowry to the father of the bride and to women for their milking herd or for herding, while goats of an improved breed are predominantly given to men for breeding, herding and trading.

With over 880,000 head of cattle, 970,000 sheep and almost 900,000 goats in 1995, Kajiado District has the second largest livestock population in Kenya after the neighbouring Maasai district of Narok. It was estimated to have 7% of all the beef cattle, 8% of all the sheep and 5% of all the goats in the country. With a Maasai population of almost 160,000[9], this would mean an average of more than 6 TLU per person, suggesting that the average Maasai household is self-supporting in livestock-based foods. In reality, livestock ownership is unevenly distributed, and many Maasai have insufficient animals for this type of self-sufficiency (Zaal and Dietz, 1995).

With these herd and flock sizes, their growth and the net offtake (both commercial and non-commercial) should be high in absolute numbers. Theoretically, with offtake percentages of 12% for cattle and 30% for small livestock, more than 100,000 head of cattle and more than 560,000 head of small livestock should be available for consumption and trade. Alternatively, they may be used to increase the herd. The Maasai households, as was also

8 This section is based on the work of A.F.M. Zaal. More detailed information can be found in Zaal (1998).

9 Based on the population census of 1989, and assuming a growth rate of 3% since then. This is probably too low; at a growth rate of 4% the number should have reached about 185,000.

confirmed in the survey, consume relatively large amounts of meat (Zaal and Dietz, 1995).

II.3.2 Herd size, composition and management

Ownership of herds is usually spread among several people. The herd usually belongs to the man, who obtained most of his animals as a young man and through inheritance from his father. However, he usually gives a number of animals – both cattle and small livestock – to his wife or wives, for the milk supply of them and their children. Six or seven cows are usually considered enough for this purpose, but not everyone has so many lactating females. Sons in the household also have a number of animals, in pre-inheritance or acquired through various jobs. Young men are usually active in brokering and livestock trade. The herd may include some animals of friends or contemporaries who want to spread their herd to avoid diseases in their own area. Or it may include young cows of a friend who wants to breed them to a particular bull. Some women also own small livestock and even cattle given to them as gifts when they married, to 'win them over'.

Table 16 Livestock ownership per household by type of animal and location (n = 150)

Location	Cattle		Goats		Sheep		Donkeys		TLU		
	Total	Per hh	Total	Per hh	Total	Per hh	Total	Per hh	Total	Per hh	Per cap.
Olkarkar (n = 34)	2,410	71	1,093	33	1,740	53	53	2	2,020	59	8.1
Osilalei (n = 78)	5,767	74	2,824	36	2,771	36	237	3	4,788	61	8.9
Partimaro (n = 38)	1,796	47	1,613	42	1,778	47	86	2	1,664	44	7.2
Total (n = 150)	9,973	66	5,530	37	6,289	42	380	3	8,472	56	8.3

The characteristics of livestock ownership among the groups surveyed are given in Table 16. The absolute figures are high by most standards and so are the ratios of TLU/capita. Assuming an average household size of 7, the TLU/capita would be 8, or twice the number theoretically needed for a purely pastoral life, based on the consumption of pastoral foods only (Zaal and Dietz, 1995).[10] Figures for the district as a whole are slightly lower and have, on occasion, been much lower in the recent past. After disastrous droughts it

10 The figures, especially those of Osilalei, are influenced by extreme cases. The household with the largest number of animals in Osilalei owned more than 1,000 head of cattle, 350 head of goats, and almost 500 head of sheep. In all, it owns more than 800 TLU, which is well above the average. Without this household in Osilalei, the figures would be 61 cattle, 32 goats, 30 sheep and 3 donkeys per household or 51 TLU per household, which is between the figures for Olkarkar and Partimaro. This corresponds reasonably well with figures found by Rutten (1992) and White and Meadows (1981).

was, for instance, 3 TLU/capita in 1962, while it was around 4 TLU/capita after the droughts of the early 1970s, late 1970s and late 1980s. In the early 1990s, a ratio of about 6 TLU/capita was assumed. In other periods of Maasai history, the ratio was higher, *e.g.* 20 TLU/capita in 1912, 15 TLU/capita in 1943 and 10 TLU/capita in 1960. This means that the Maasai have successfully gone through periods of decline during which droughts and diseases decimated the herds and through periods of rapid and continued growth of the herds. This is rather remarkable in view of the general stagnation that seems to be found in other parts of the country and in other countries with pastoral populations (Zaal and Dietz, 1995).

Table 17 Livestock herd composition per household by location (1994/95)

Location	Cattle				Goats and sheep		
	Herd (head)	Zebu (%)	Sahiwal[a] (%)	Boran[b] (%)	Flock (head)	Maasai (%)	Improved[c] (%)
Olkarkar (n = 34)	71	25	27	48	86	10	90
Osilalei (n = 78)	74	23	38	39	71	68	32
Partimaro (n = 38)	48	94	4	2	88	64	36

[a] Most upgraded animals are crosses between the improved Sahiwal breed and local types of Zebu. These crosses are multi-purpose animals with improved milk and meat production, but more susceptible to diseases and less resistant to drought and migration.

[b] Boran, another improved breed, is mainly found in the drier areas. This category includes crosses between Boran and local Zebu.

[c] Usually Somali Galla goats and Dorper sheep. Improved sheep include crosses between Dorper and Maasai hair sheep.

Table 17 shows the proportion of improved breeds in the various locations. The figures show that most improved breeds are to be found in the northerly Olkarkar area. This area is more market-oriented than the more traditional southern part (Partimaro), because it is located near the main road between Nairobi and Mombasa, and has long-established relationships with colonial and independent government institutions. The share of improved breeds decreases with increasing distance from the more commercial northern parts. In Osilalei, the share of improved breeds in cattle is similar to Olkarkar, but the flocks of small livestock seem to be mainly of traditional breeds.

The investments that go into upgrading the herds are substantial. Apart from the capital to buy improved breeds (often from places at a considerable distance from Kajiado District such as Naivasha breeding station), these animals need regular access to water and better maintenance. This means higher costs, such as for veterinary care. Improved breeds are generally

less capable of walking long distances, so a nearby source of water is necessary as well.

II.3.3 Economic differentiation, income and expenditure

The distribution of animals is highly skewed, especially in Osilalei and less so in Olkarkar (Table 18). In the table, households with a TLU/capita up to 4 (or 28 per household) are classified as a poor family, households with 4-10 TLU/capita (or between 28 and 65 per household) as a middle range family, and households with a TLU/capita of 10 and more (or above 65 per household) as rich. The table shows that Partimaro households are the poorest, whereas in Osilalei there is a small group of extremely wealthy herd owners, having more than 200 TLU/household. In Olkarkar, the wealth distribution is less skewed than in the two areas further south. This is in contrast with earlier studies (Zaal and Dietz, 1995; Dahl and Hjort, 1976; Homewood, 1992) and points to a possible development in a commercialising pastoral society. After a period of increasingly unequal distribution, the district may be entering a new phase in which wealth is more equally distributed, or at least more normally distributed.

Table 18 Household herds by location and wealth category, in TLU

Location	Wealth category[a]	Number of households	Total TLU
Olkarkar	1	7	19.4
	2	18	46.7
	3	9	116.1
Osilalei	1	40	15.6
	2	23	43.6
	3	15	210.5
Partimaro	1	16	12.1
	2	13	42.2
	3	9	103.1

[a] 1 = 0-4 TLU/capita; 2 = 4-10 TLU/capita; 3 = 10+ TLU/capita.

In the past, the usual way of obtaining goods was barter, by which livestock and livestock products were exchanged for ironware, beads and various other goods (Kerven, 1992). Today, however, cash is needed for maize meal (the staple food for the Maasai after milk), dry goods (including tea and sugar) and livestock inputs. This cash income comes mainly from the sale of animals and animal products. 'Other incomes', in cash includes money from the sale of manure, milk, hides and skins (very little, as this is usually a women's source of income), honey and honey beer (also very little by men), meat (little) and gifts. Manure and honey are sold only in Osilalei. Honey is sold locally, while

manure is sold to Kamba who purchase it for sale in Machakos and Makueni.

Men control most of the sales and purchases, as they are responsible for livestock production and maize meal, so their income is reviewed first. Table 19 presents figures on their monthly livestock income and livestock expenditures. The value of cash transactions is derived from the sale of animals and the price obtained for these animals. Expenditure on livestock can be high, as outbreaks of diseases require veterinary medicines and pesticides to combat ticks and worms. Sometimes herd boys have to be hired and, increasingly, payment is asked for grazing on the land of a private ranch. Finally, salt is a regular expense.

Table 19 Average cash incomes and expenditures of men from livestock (Ksh./month)[a]

Location	Wealth category	Number of households	Gross income	Livestock purchases	Livestock inputs	Net income
Olkarkar	1	7	3,740	968	1,200	1,572
	2	18	6,078	3,014	1,557	1,507
	3	9	17,018	5,134	2,823	9,061
Osilalei	1	40	3,987	1,455	1,599	933
	2	23	92,929	3,954	3,141	2,197
	3	15	16,754	5,163	5,436	6,155
Partimaro	1	17	5,318	346	2,505	2,467
	2	13	12,355	6,316	5,664	375
	3	9	23,665	7,345	7,077	9,243

[a] Ksh. 60 = US$ 1.

The table shows that gross cash incomes increase – not surprisingly – with wealth in all areas. Similarly, expenditure on livestock increases with wealth, that is, livestock purchases and livestock inputs. The net cash incomes from livestock show a similar picture. The differences between 'poor' and 'wealthy' are consistent and large, but there are variations particularly as regards the 'middle' group in Partimaro, which seems to have unreliable data.[11] The net income of men from livestock varies from Ksh. 933 (US$ 15.50) among the poor group in Osilalei to Ksh. 9,243 (US$ 154) among the wealthy group in Partimaro.

Table 20 shows the income from men and women combined. Women have limited options for acquiring money. They can sell animals (specifically

11 The middle groups in Olkarkar and Partimaro do not quite fit the pattern. In Olkarkar, this group has about the same income as the 'poor', which is confirmed by the expenditure figures. In Partimaro, the middle group has a very low income because of very high expenditures on livestock and livestock inputs, but the net income does not tally with the reported expenditures and should therefore be treated with caution.

acquired for that purpose), hides and skins (given to them by the men who have slaughtered the animals), and milk. Their net cash income from livestock ranges from Ksh. 13 (US$ 0.22) among the poor group in Osilalei to Ksh. 613 (US$ 10,22) among the middle group in Olkarkar. In the group ranches of Olkarkar and Osilalei, women from wealthier households generally have higher incomes than women in poor households, mostly because the sale of hides and skins increases with wealth. In Partimaro, in contrast, women from poor households had the highest cash incomes. A severe dry season in the year of the survey caused the women from poor households to seek additional income, mainly from the sale of charcoal. This is usually a sign that there is a severe problem with incomes.

Table 20 Average cash incomes of households by location and wealth category (5/94-4/95; KSh./month)[a]

Location	Wealth category	Number of households	Men			Women			Grand total
			Net livestock income	Other income	Total	Net livestock income	Other income	Total	
Olkarkar	1	7	1,572	329	1,901	308	80	389	2,290
	2	18	1,507	673	2,180	613	37	651	2,831
	3	9	9,061	3,011	12,072	497	118	615	12,687
Osilalei	1	40	933	512	1,445	13	22	35	1,480
	2	23	2,197	611	2,808	38	27	66	2,874
	3	15	6,155	747	6,902	112	18	131	7,033
Partimaro	1	17	2,467	1,046	3,513	147	629	777	4,290
	2	13	375	783	1,158	201	182	383	1,541
	3	9	9,243	1,034	10,277	119	81	200	10,477

[a] Ksh. 60 = US$ 1.

Apart from cash income, women have an important source of income in kind from milk, which they control and use for the family's food consumption. Total milk production per household per day varies throughout the year, and depends on a large number of factors. The poor households had an average production of 3.4 litres per day, which, in terms of calories, is enough to feed one person. Households in the other wealth categories had more milk, with 11.5 litres and 8 litres for the middle range and wealthy households, respectively. These amounts are enough to feed four and three people, respectively. These quantities imply that almost half the people in the households have to rely on bought food and that the wealthiest households rely more on purchased foods than the middle range category.

Apart from the expenditures on livestock, cash income is spent mainly on food. Maize meal is the most important staple food, but occasionally also beans, rice and tea, usually with a lot of sugar and milk, are consumed.

Table 21 Average expenditures of households by location and wealth category (5/94-4/95; KSh./week)[a]

Location	Wealth category	Number of households	Men			Women			Grand total
			Household needs	Other needs	Total	Household needs	Other needs	Total	
Olkarkar	1	7	500	283	783	177	39	216	999
	2	18	494	336	830	198	50	248	1,078
	3	9	2,588	1,009	3,597	256	49	305	3,902
Osilalei	1	40	593	314	907	67	17	84	991
	2	23	594	727	1,321	166	93	259	1,580
	3	15	897	1,047	1,944	121	44	165	2.109
Partimaro	1	17	1,209	402	1,611	225	36	261	1,872
	2	13	2,668	928	3,596	123	38	161	3,757
	3	9	2,421	935	3,356	202	13	215	3,571

[a] Excluding livestock purchases and livestock inputs; Ksh. 60 = US$ 1.

Non-food expenses include cooking oil, clothing, kerosene for lighting, soap and detergents, medicine, tobacco, transport, schooling, and taxes. Gifts are very important as well. Food and drinks can be bought in restaurants, and people may spend a lot on them.

In absolute terms, expenditures are high, especially when compared with average incomes in the formal sector in Kenya.[12] The differences between the various locations and categories are quite large (Table 21), with a ratio of 1:4, but not as large as the wealth ratio between the wealth categories and group ranches. In terms of stock ownership in TLU, the most extreme ratio between the richest and poorest household category is 1:14, found in the Osilalei group ranch area. In all cases, the wealthier the household, the higher the expenditures, with one minor exception.

The expenditures of women are extremely low and go mainly on household needs, such as clothing, food in small restaurants, sugar, transport, and kerosene (in that order). Other items include tea, soap and detergents, cooking oil and gifts to schoolchildren. Livestock inputs rarely appear as items on which women spend money and cultivation even less. Nor are the

12 It should be noted that the expenditures are given in weekly figures – because they were collected over a weekly period – but that the earlier income data were presented in monthly figures, because they were collected on a monthly basis. Data suggest that the estimated monthly expenditures are higher than the incomes, especially among the poor groups. This phenomenon has also been observed elsewhere in household income/expenditure surveys. This implies that the figures must be read in relative rather than absolute terms. In addition, the figures for the middle group in Partimoro must be interpreted with caution, as the reported net income does not tally with the reported expenditures.

differences between the various wealth categories in the three group ranches very large in absolute terms. Women in the middle range wealth category spend more than women from the wealthy households, while the poorer women spend least of all. This indicates that the complaints voiced by women about their reduced control over milk sales and their isolation from the market may have affected the wealthier group most.

II.3.4 Livestock trade

Commercialisation has been a feature of the Maasai economy since the early 20th century. There is a lively trade in animals at local, regional and national levels. Within the district, the Emali and Bissil livestock markets are the most important, attracting animals from a wide area and supplying important consumer markets within and outside Kenya. The numbers traded in 1995 ranged between 350 and 1,100 head of cattle per day for Emali, and between 310 and 850 head per day for Bissil. Several other local markets exist, the relative importance of which usually changes over the years, the seasons, and even over weeks.

The most important outside markets are Machakos and Makueni Districts to the north, Nairobi and, to a lesser extent, Mombasa (animals for consumption). There is little livestock export from Kenya to neighbouring or overseas countries, at least not in official statistics.[13]

As in the Somali case, trade actors include livestock producers, brokers, traders and butchers, who sell cattle (51%), small livestock (10%) or both (39%). Camels have only recently been introduced into the District and are not sold. Few donkeys are sold in the markets. With the exception of butchers, most respondents in the trade actor sample were Maasai. There are more non-Maasai among the butchers (35%), mostly Kamba and Kikuyu. The relations between the various categories are quantified in Table 22. Livestock producers who want to sell animals go to the nearest market place and give the animal to a broker or sell directly to a trader. Traders buy from producers, brokers and other traders, and sell to either traders or butchers

13 Much of the livestock export is not visible in statistics, because it occurs without the required export permits, traders' licenses and health certificates. In general, there are more animals imported than exported, mainly from Tanzania where prices are lower (the difference in price of an animal between the nearest border market town of Tanzania – Lumbwa or Ilompua, some 30 km from the Torosei border – and the region of Mbulu, at 200-250 km distance, may be up to Ksh. 1,000 or US$ 17). Respondents in the trade actors survey estimated the number of animals taken across the border at between 100 and 700 a week in the area between Meto and Namanga.

Table 22 Importance of trading partners for the trade actors interviewed (%; n = 103)[a]

	Brokers (n = 53)	Traders (n = 28)	Butchers (n = 22)
Buying from			
Producers	75	49	34
Brokers	23	49	47
Traders	2	2	19
Total	100	100	100
Selling to			
Producers	4	11	0
Brokers	3	0	0
Traders	48	33	0
Butchers	35	50	39
Slaughterhouse owners	8	6	35
Customers	2	0	26
Total	100	100	100

[a] Based on a survey among 103 trade actors. The scores are weighted for the participant's trading partners in order of importance: the most important trading partner is given more weight (3) than the second (2) and the third (1).

in the consumer markets, using their own money to buy animals. Livestock producers may also buy from each other, for example, when one offers a heifer, or when someone needs a certain animal that he wants to give in a ceremony. Usually, however, these animals are obtained through exchange with neighbouring producers.

Traders may buy animals for resale at the same market place either the same day or later. Some traders have specialised in buying animals in one market, and bringing them to larger regional or national markets where prices are higher. With the recent establishment of slaughterhouses along the main roads in Kajiado District, some traders no longer bring live animals to the market places near Nairobi, but slaughter them in the district and take the carcasses to butcheries near Nairobi. Small pick-up trucks ("meat matatus") can be seen speeding along the Namanga-Athi River road with carcasses in a container in the back. Traders deal mostly with cattle (64%). Few specialise in the small livestock trade (4%), while 32% deal with both.

There are also many brokers operating at markets as well as in cross-border trade with Tanzania.[14] They obtain animals – cattle (49%), small livestock (13%) or both (38%) – with the promise of paying the price obtained

14 A favoured method for brokers who own a small herd is to take their herd across the border for grazing, take over animals brought there by a colleague, and walk them back across the border with their own herd. The animal brought in – unnoticed by government monitors – are subsequently sold to traders at practically all markets.

later, less a commission, which is negotiable. This usually implies that the money is returned after the sale is concluded. It is characteristic of this group that they deal with animals entrusted to them, and that – in contrast to traders – they operate without much capital of their own. There is usually a relationship between the broker and the producer, since the producer wants to minimise the risk of theft. They are often contemporaries or belong to the same neighbourhood.

Butchers are also involved in trade, as they buy animals in markets to sell the meat in the course of the market day. They usually operate at local markets, but some of them also slaughter animals destined for the hotels or university institutions in Nairobi, for example. Fifty percent of the butchers trade in both cattle and livestock, while 41% and 9%, respectively, specialise in either cattle or small livestock.

Although most actors can easily be classified in one of the categories, there may be considerable overlap between them, since individual brokers also trade, traders herd and butchers trade. Livestock marketing is not the main source of income for all traders. Other economic activities reported were herding, cultivation, wage labour, the building trade, or tending a hotel, bar or shop. About half the brokers and two-thirds of the traders in the trade actor sample primarily depended on trade. Among butchers, herding or other economic activities were less prevalent.

Annual offtake per household depends on various factors. As noted above, the wealthiest producers are more market-oriented. Distance to the market also plays a role, especially in the case of high performance breeds, which are less able to walk over large distances. The number of animals that can be traded is further determined by strategic alliances with other individuals, such as sharing of animals, pre-inheritance pledges of animals, loans of animals from and to people in potential drought refuge areas, and placement of animals in disease-free areas. Such alliances imply that quite a number of animals in the herd cannot be taken and simply sold off. Commercial offtake may be further affected by such developments as loss from diseases. This is partly because fewer animals are available for sale and partly because such animals are often eaten, thus reducing food needs and the need for money to buy food. In Osilalei and particularly Partimaro, commercial offtake was reduced following the distribution of food aid through the government and churches.

Table 23 Annual net commercial offtake per household by location (1994/95; average numbers per household)

Location	Households	Cattle				Small livestock			
		Average herd size	Heads sold	Heads bought	Net offtake	Average herd size	Heads sold	Heads bought	Net offtake
Olkalkar	34	71	16.8	7.4	9.4 (13%)	86	21.0	5.0	16.0 (19%)
Osilalei	79	74	9.6	7.0	2.6 (4%)	71	11.3	8.7	2.6 (4%)
Partimaro	38	47	8.5	3.9	4.5 (10%)	88	4.0	1.2	2.8 (3%)
Total	151	67	10.9	6.3	4.6 (7%)	79	11.6	6.0	5.7 (7%)

The net offtake (animals sold minus animals bought) in absolute numbers was 319 head of cattle and 444 goats/sheep in Olkarkar; 208 and 204 in Osilalei, and 177 and 108 in Partimaro, respectively. Allowing for the fact that the herd sizes differed for the three group ranch areas (Table 23), commercial offtake in Olkarkar was relatively high. In percentages of the herds, commercial offtake figures for cattle and goats/sheep were 13% and 19% in Olkarkar, 4% and 4% in Osilalei, and 10% and 3% in Partimaro, respectively.

Table 24 Monthly number of cattle transactions by location and wealth category (average/household)

Location	Wealth category	n	Commercial transactions					Trans. in kind		All transactions	
			Selling	Buying	Turn-over	Net offtake	Net/yr (%)	Out[a]	In	Turn-over	Net
Olkarkar	1	7	0.4	0.1	0.5	0.3	17%	0.2	0.3	1.0	-0.26
	2	18	0.6	0.2	0.8	0.4	9%	0.3	0.2	1.3	-0.57
	3	9	1.7	0.7	2.4	1.0	9%	0.3	0.4	3.1	-0.93
Osilalei	1	40	0.4	0.2	0.6	0.2	15%	0.2	0.4	1.2	-0.01
	2	23	1.0	0.8	1.8	0.2	5%	0.5	0.2	2.5	-0.45
	3	15	1.7	1.2	2.9	0.5	2%	1.2	0.3	4.4	-1.50
Partimaro	1	17	0.4	0.0	0.4	0.4	40%	0.2	0.1	0.7	-0.52
	2	13	1.1	0.7	1.8	0.4	11%	0.6	0.0	2.4	-0.95
	3	9	1.3	0.6	1.9	0.7	7%	0.8	0.0	2.7	-1.47

[a] Given away, slaughtered, lost.

The average monthly numbers of animals that households sold, bought and transacted in kind are given in Table 24 for cattle and Table 25 for small livestock. The net result of all transactions is negative in all cases. For all wealth categories, more offtake from the herd is used for commercial than for non-commercial transactions, with richer households consistently selling more animals. The same does not apply to animals being bought in relation to animals being given: poor households receive more animals than they buy.

If these figures are representative for the district, and assuming that the livestock herds are still exclusively in the hands of the approximately 26,400 Maasai households living in the district, in 1994/95 the Maasai bought a total of 171,070 head of cattle and sold about 266,100 head of cattle. The difference, a net commercial offtake of about 95,000 head of cattle, would relate well with the estimated number of cattle in the district: between 900,000 and 1 million (based on figures presented in Republic of Kenya, 1993). A net commercial offtake of 10% is high for pastoral conditions.

Assuming the weighted average price of an animal to be Ksh. 9,000 (US$ 150) (based on averages at the Kajiado District market; data from the Market Information System of the Ministry of Agriculture and Livestock Development), the commercial offtake from cattle alone would mean an income of Ksh. 855 million for the district's Maasai population as a whole. Ksh. 482 million can be added to this amount, from the commercial offtake of small livestock (about 400,000 head, with a weighted average price of an animal assumed to be Ksh. 1,200 (US$ 20).

Table 25 Monthly number of small livestock transactions by location and wealth category (average/household)

Location	Wealth category	Number of households	Commercial transactions					Trans. in kind		All transactions	
			Selling	Buying	Turn-over	Net offtake	Net/yr (%)	Out[a]	In	Turn-over	Net
Olkarkar	1	7	0.8	0.2	1.0	0.6	17%	1.8	0.3	3.0	-2.26
	2	18	1.4	0.5	1.9	0.9	14%	1.7	0.2	3.8	-2.39
	3	9	1.5	0.1	1.6	1.4	10%	2.3	0.4	4.0	-3.48
Osilalei	1	40	0.8	0.8	1.6	0.0	0%	1.2	0.4	3.1	-0.89
	2	23	1.0	0.6	1.6	0.4	6%	2.5	0.2	3.9	-2.68
	3	15	1.3	0.7	2.0	0.6	3%	2.8	0.3	5.1	-3.06
Partimaro	1	17	0.6	0.2	0.8	0.4	13%	0.6	0.1	1.5	-0.83
	2	13	0.1	0.1	0.2	0.0	0%	1.3	0.0	1.5	-1.27
	3	9	0.6	0.0	0.6	0.6	3%	1.3	0.0	2.1	-1.62

[a] Given away, slaughtered, lost.

Average cattle and small livestock prices as reported by households are presented in Table 26. The margin between animals bought and sold is between Ksh. 1,600 and 3,340 (US$ 27-56), except for improved breeds of cows, for which people paid even higher prices than they received. The difference between small livestock bought and sold (Ksh. 266-345 or US$ 4,45-5,75) is smaller in absolute terms than for cattle, although as a percentage of the prices paid, they are comparable at between 31 and 35 percent. An exception was improved sheep for breeding, which were bought at high prices. In general, prices do rise with household wealth.

Table 26 Average prices in Ksh. of cattle and small livestock by type and breed (May '94 – April '95)[a]

	Mature males		Immature males		Cows		Heifers		Goats		Sheep	
	Impr.	Zebu	Impr.	Zebu	Impr.	Zebu	Impr.	Zebu	Impr.	Maasai	Impr.	Maasai
Selling	11,372	12,032	8,617	n.a.	7,768	7,235	7,931	7,416	1,432	1,275	1,281	1,088
Buying	9,598	10,432	5,277	4,912	7,835	5,910	5,821	4,845	1,087	941	1,378	822
Difference	1,774	1,600	3,340	n.a.	-67[b]	1,325	2,110	2,571	345	334	-97[c]	266

[a] household survey.

[b] The negative result for cows is caused by high buying prices for certain breeding cows in Bissil (Partimaro group ranch members paid high prices) and the low selling prices at Emali (where Olkarkar group ranch members sold most of their cows). Olkarkar respondents bought few improved breeds of cows.

[c] The negative result for improved sheep is due to the extremely high prices paid for some improved breeds in Olkarkar group ranch which were used for upgrading the flock. Prices of Ksh. 2,500 to 3,500 for a ram were not uncommon.

Poor producers usually sell more regularly than wealthier producers, and do not make good use of opportunities for profit in the market place. Not only are their selling prices lower, but so is their margin.

II.3.5 The grain trade

Table 27 gives an idea of the food balance in relation to maize, with estimates of total population figures, and estimated consumption of maize, set off against local production. The figures show that the dependence of Maasai producers on the market is still rather limited and that the deficit of maize is small. The Maasai still derive most of their energy intake from livestock. The consumption of maize – usually consumed in the form of maize meal or *ugali*, a stiff porridge – depends almost entirely on the absence of the preferred meat and milk. As long as people have milk-producing animals – preferably cattle – they will buy only small amounts of maize or maize meal. However, not all Maasai residents have enough milk during the rainy seasons, let alone during the dry season.

Assuming no maize is grown by Maasai (although they do grow some, but only in small quantities), all 8,375 tons of maize theoretically needed will have to be bought from the proceeds of livestock sales and other income. However, as livestock ownership in Kajiado is unequally distributed, a large group of relatively poor people may have to rely heavily on the market for their food. At the same time, a small group of rich people may want to consume maize out of preference. As this maize is not covered by production in the district itself – which was estimated at 50,000 tons in 1993 (Republic of Kenya, 1993a) – it will have to be brought in.

Table 27 Estimated maize production, consumption and deficit in Kajiado District (1995)

	Maasai	Non-Maasai	Total
Sub-population size[a]	185,040	173,450	
Maize consumption (as % of total consumption)	15	85	
Maize consumption/yr (tons)[b]	8,375	45,790	
Total consumption of maize/yr (tons)			54,165
Total maize production/yr (tons)[c]			50,000
Total maize deficit/yr (tons)			4,165

[a] Based on the population census of 1989 (Republic of Kenya, 1994) assuming annual growth rates since then of 4% (Maasai) and 7.5% (non-Maasai).
[b] Estimates based on findings by Nestel (1985) and Homewood (1992).
[c] Estimated production for 1993.

Most of the maize produced by non-Maasai is sold to traders and the NCPB, who sell it to millers in Nairobi and Nakuru. The milled product is then sold to wholesalers, who sell to retailers and the public, who may be the same persons who produced the maize. Traders and retailers not only import the maize, but also play an important role in the process of converting maize grains to maize meal.

A long tradition of trade existed between Masaai livestock producers and Kamba, Kikuyu and Chagga grain producers (Kerven, 1992). Maasai women used to barter milk and other animal products (skins, hides and ghee) for grain and other items such as beads, cloth, household utensils, decorative materials and salt. With the expansion of administrative centres during the colonial period, however, small shops and wholesale shops were established by Asian and Somali businessmen, who monopolised the wholesale trade of grain and controlled the prices.

Some shops and wholesale businesses are still in the hands of long-established Somali and Asian retail traders, but other ethnic groups have also established themselves in the retail business. In the study sample, there were Kikuyu (38%), Maasai (26%), Kamba (21%) and Somali (14%). In the bigger trading centres, Kikuyu and Kamba dominate the retail sector. Maasai retailers are mostly found in the smaller, remote trading centres. Wholesalers are male; retailers predominantly male (60-80%) and small grain sellers on the markets are almost exclusively female. In general, it can be said that the smaller the trading centre, the smaller the scale of business, and the more informal the trade, the more likely it is that women will be involved.

Table 28 gives the prices of selected foodstuffs in different trade centres spread over the District, at longer and shorter distances from Nairobi,

Kajiado and the Tanzanian border. The price differences are rather small and seem to be caused largely by transport costs. For example, the prices of maize grains are lowest in Illasit and Rombo, near the production areas. The prices of maize meal, by contrast, are lowest in Nairobi, Kajiado and Bissil, which are locations where wholesalers influence market prices, and where the product has come from millers in Nairobi and Nakuru at relatively low prices. Tea is cheapest in Nairobi and again in Bissil, and most expensive away from these places, in Illasit and Rombo.

Table 28 Prices of food products by location, March-May 1994 (Ksh/kg)[a]

Food item	Nairobi	Kiserian	Kajiado	Bissil	Namanga	Emali	Illasit	Rombo
Whole maize	17,5	18	20	17-25	15-20	20	10	12-13
Maize meal	20,5	21-22	20-24	18-22,5	24-25	24	25	24
Beans	33,3	30	n.a.	38-40	35	31	30	28
Sugar	37,0	40-45	44-50	35-40	40-45	38	40	38-48
Tea	19,0	21-22	20-22	18-22	20-22	22	22	22-24
Cooking fat	76,0	80-92	80-100	80-95	85-100	90-96	90	90-96

[a] Prices for tea are not per kg, but for a 100 gr. package. For cooking fat, the range of prices for the cheapest and most expensive brands are given.

Sources: Republic of Kenya 1995 and 1996; Livestock Marketing Division and Market Information System of the Ministry of Agriculture and Livestock Development; authors' own survey.

The trading system seems to be efficient most of the time, but prices may differ considerably over short distances when there is a high demand for transport. Transport costs are then set at monopolistic levels, forcing traders depending on these means of transport to increase their prices.

The terms of trade are generally less favourable if livestock and animal products are not traded at the same market as where the maize meal is bought. Households with few members, older people and those people living further away from the market centres often depend on brokers and retailers for their sale and purchase of animals and grains. They either lack the strength, the labour or the time to go to the market place themselves. A broker then meets the producer near the latter's home, takes the animal for sale and returns with a relatively low price for the animal, for which he has to be given a commission as well. The producers then have to buy maize meal in the area where they live for higher prices. The less favourable terms of trade are only partly compensated by the lower transport costs they have to incur compared with more mobile people, who need to transport larger supplies of maize meal by car.

An individual's actual cost of living thus depends on the specific products and the amounts bought. Generally, the prices asked for maize meal in the

various trading centres are near the cost price, which would indicate the efficiency of the system for this product. The marketing system is relatively efficient overall. The profit may seem small or even be absent in some cases, but it must be remembered that most shopkeepers, apart from maize meal, also sell other products such as sugar, tea, cooking fat and soap. Although competition can be stiff in the bigger trading centres, quite reasonable profits can be made from these products.

II.3.6 Caloric terms of trade

In 1990, one head of cattle was sold for Ksh. 3,000 (US$ 50), on average, for which 600 kg of maize could be bought. In caloric terms, this comes to a ratio of 7:1. In 1980, one head of cattle was sold for 800 kg of maize, yielding a CToT of 9:1. In 1975, one head of cattle was equivalent to about 300 kg of maize meal, representing a CToT of only 3:1, one of the lowest in recent decades.

Table 29 Caloric terms of trade by location and type of livestock

Month	Cattle/Grain			Small livestock/Grain		
	Emali	Sajiloni[a]	Bissil	Emali	Sajiloni	Bissil
September '93	5.8	3.4	7.7	n.a.	4.8	5.2
December '93	10.3	4.6	6.8	n.a.	11.1	6.2
February '94	6.4	4.4	5.1	n.a.	4.3	4.8
May '94	8.7	4.7	4.8	n.a.	6.4	8.4
September '94	8.6	6.9	8.0	n.a.	7.6	n.a.
December '94	9.5	6.2	7.6	n.a.	8.3	n.a.
March '95	n.a.	7.0	n.a.	n.a.	9.4	n.a.
June '95	n.a.	7.2	n.a.	n.a.	8.9	12.6
September '95	16.0	10.7	14.5	n.a.	15.3	19.0
December '95	17.5	11.6	15.9	n.a.	18.9	15.0
Average	10.3	6.7	8.8	n.a.	9.5	10.2

[a] Near Kajiado town.

The quarterly caloric CToT over a two-year period (1993-95) are given in Table 29. There are considerable variations between markets, between livestock and over time. There is a general increase in CToT over time, favouring the pastoralists, with a rapid rise at the end of 1995. The Garissa time series starts only in 1996, but the CToT in Kajiado are more favourable than in Garissa. The three Kajiado locations are all situated on tarmac roads within 2-3 hours of Nairobi. Their geographical accessibility is better and differs less than in Garissa District. Consequently, the variation in CToT at different markets is less than in Garissa. The CToT are most favourable in Emali, which is situated on the Nairobi-Mombasa road. They are more

favourable in Bissil than in Sajiloni, although the latter market is next to Kajiado town and nearer to Nairobi. Possible reasons are the fact that the number of livestock traders in Bissil was very high and that the demand for production animals (in contrast to animals for slaughter) was higher in Bissil. Small livestock generally have more favourable CToT than cattle, as was also found to be the case in Garissa, although the difference in CToT in Kajiado (25-30%) was less than in Garissa, where the difference was twice as large.

II.3.7 Prospects for the future

As we mentioned in relation to Garissa, certain preconditions have to be met for livestock commercialisation to occur and to be successful. The size of the herds should be large enough to allow a sizeable offtake. Livestock markets should be efficient in terms of accessibility and prices. Grain markets should also be efficient in terms of distribution and price setting.

In contrast to Garissa, these conditions are by and large present in Kajiado. With an average of more than 6 TLU per person, livestock wealth in Kajiado District is considerable and greater than in Garissa District. Wealth is also apparent from the high percentages of cattle within the herds and flocks and the high percentages of improved breeds found in many parts of the district. Female cattle still form about 65% of most herds, which is typical of pastoral systems. As we have seen in the previous sections, the marketing infrastructure for livestock is by and large in place, too.

Nonetheless, land constraints and grazing restrictions, as a consequence of land nationalisation and privatisation, will necessitate changes in order for cattle production to continue in its present form. In essence, the number of cattle will have to be reduced. The wealthy Maasai are coping with the situation by undertaking a programme of upgrading their herds and thus improving productivity. This will allow for more production from fewer animals. The poor Maasai do not have the means to upgrade their herds and will eventually be forced to reduce the size of their herds and thus production.

II.4 Conclusions

The number of TLU/capita indicates the wealth of the household and whether the household can survive on livestock only. It has been suggested that a TLU/capita of 4 is the minimum number required. Comparing the three cases, only the Maasai seem to have enough cattle and marketing opportunities for pastoralism to be feasible. Approximately 58% of them are above the minimum of 4 TLU/capita. For the Somali, this percentage amounts to 17% and none of the Bedouin is above the minimum. In fact, the Bedouins' TLU/capita (sheep only) averages less than 2, but the very favourable CToT

– ranging between 27:1 and 97:1 depending on the wheat prices – may compensate for the low TLU/capita in this group. In general, however, sheep production – practised as a seasonal type of herding on the margin of other agricultural activities – is a marginal occupation among the Bedouin. Grazing restrictions, land conflicts and lack of marketing channels seriously limit the prospects for improvement.

For the Somali, nomadic livestock rearing is the main economic activity for over 90% of the population. Animals include camels, sheep and goats, poultry and donkeys. Besides drought, grazing restrictions and a poor marketing structure limit the prospects for pastoralism. Ranging between 2:1 and 9:1, the CToT was favourable among the Somali, but the lowest of the three cases. With a CToT ranging between 3:1 and 9:1, the Maasai occupied an intermediate position. This was, however, the only case in which the market seemed to function more or less appropriately.

The market for livestock was rather similar in the two Kenyan cases. In both instances, there is a complex network of trade actors, including producers, livestock traders, brokers and butchers. The Maasai had no real marketing problems, but in the Somali case, price fluctuations and lack of security hindered the marketing of animals. The conditions at the grain market also differ among the two groups. The Somali have to pay high or very high prices for maize and maize flour, while the Maasai can buy it almost at cost price. The Maasai also depend less on the market for food than the Somali. The Bedouin case stands apart. Bedouin buy their basic food (wheat floor) as wheat from traders, who deliver it in bulk at the homestead, where it is milled when needed throughout the year. The sheep are sold to other Bedouin households, to Palestinian traders or at weekly markets.

In all the three cases, the pastoral groups are feeling land constraints and grazing restrictions. This will necessitate changes in order to allow livestock raising to continue. It is envisaged that the Bedouin will turn more towards rain-fed agriculture below the 220 mm isohyet and incorporate different degrees of intensification and modernisation of flock management. The future of most of the Bedouin would appear to be integration into the Israel urban economy while maintaining many of their cultural traditions. A relatively small, but stable number, of households will continue to practise agro-pastoralism as a means of livelihood. The wealthy Maasai are undertaking a programme of upgrading their herds of cattle, goats, sheep and donkeys in order to improve productivity. This will allow for more production from fewer animals. The poor Maasai do not have the means to upgrade their herds and will eventually be forced to reduce production. The Somali have

neither the option to reduce TLU/capita because of the low productivity of their livestock, nor the ability to upgrade their animals, because of the expense. The solution for this group appears to be the inclusion of irrigated agriculture to supplement livestock production.

III. Discussion

III.1 Scientific relevance

This multi-disciplinary study provided new insights into the dynamics of pastoral systems by a comparative analysis of three pastoral groups (Bedouin, Somali and Maasai) who increasingly face land constraints and grazing restrictions. It contributes new knowledge of the emerging marketing operations in the pastoral areas of Kenya, making it clear that the issues of market dependence and food security are closely intertwined. The integration of findings at district and household levels provides insight into the value systems of pastoralists with regard to exchanging livestock for grains.

III.2 Recommendations for further research

Further research may focus on either livelihood strategies or livestock production. In the first case, suggested topics are:

- the resource base and future strategies of pastoralists who are no longer able to keep livestock in sufficient numbers;
- the dynamics of socio-economic differentiation among pastoral households and the effects on future commercialisation;
- the potential contribution of women to the impending transformation of pastoral households; and
- the impact of increasing camel production on the Maasai culture and its effects on the range and pastures grazed by other livestock.

With respect to livestock production, suggested topics for further research include:

- the effect of precipitation on primary production as the main determinant of (a) the number of livestock the pastoralists can maintain; and (b) the offtake levels that can be achieved;
- seasonal changes in pasture availability and the effects on animal numbers and animal productivity;
- the effect of environmental factors and livestock breed on milk and meat production.

III.3 Practical applicability

The results of this study are of direct use both to the pastoral communities studied and technical personnel of the relevant ministries working in the study areas. The respective governments are expected to use the findings to review their pastoralism policies and to formulate strategies for increasing the marketed offtake from the pastoral herds. This may contribute to semi-commercial production and improved food security, improved quality of herds and reduced degradation of grazing areas. In the case of Kenya, the study may also help in making requests for bilateral assistance from the Netherlands, Israel and other possible sources, for programmes to improve the pastoral economies of the Maasai and the Somali.

IV. Recommendations

In Kenya, subsistence livestock raising is becoming less viable and, by and large, will no longer be able to ensure the food security of the populations concerned. There is a trend among pastoralists and other rural people in Kenya to purchase increasing portions of their diet. This requires sufficient purchasing power which, in the case of pastoralists, can be realised mainly from the sale of livestock and only to a limited extent from employment and other economic activities. Alternatives to subsistence livestock farming include sedentarisation with various forms of agro-pastoralism and out-migration to rural centres and cities in search of employment. These alternatives are not attractive because of the ecological consequences, the existing economic constraints, and from the perspective of the pastoral households themselves.

The traditional pastoral system has proved to be self-sufficient but, under the changing conditions, there is a need to increase production. Improved pastoralism or semi-commercial pastoralism offers opportunities for assuring a satisfactory livelihood and the necessary food security, while preserving the pastoralists' traditional way of life. To make pastoralism a viable alternative, however, requires improved livestock methods that will lead to increased production of animals, animal products at low costs, including those related to animal health, improved breeds, and better utilisation of water facilities.

Greater possibilities for trade and barter are also needed. Improved marketing fits in well with current thinking on drought relief through strengthening the purchasing power of the population rather than through food distribution. Repeated experiences in the past have shown that pastoralists are not necessarily reluctant to enter the cash economy, but ever since the first trials during the colonial period, marketing arrangements and prices have proved to be a bottleneck. Effective and reliable marketing channels are needed to ensure sufficient linkages with the cash economy, not only in order to be able to sell livestock products, but also to purchase grain and other food and consumer goods when needed. This requires an

adequate network of trading points, stability in supply and demand, and favourable terms of trade between livestock products and food commodities (grains), particularly in terms of caloric exchange rates. To increase the market benefits that accrue to the pastoralists, more efforts should also be made to make current market information available to them. With this information, they could determine the most opportune time and place to sell animals.

The general expectation underlying this research was that positive terms of trade exist between livestock and grains in caloric terms and that improved marketing channels will bring about further improvements in food security for pastoral groups in Kenya. In this respect, the experience with pastoralists in Israel is relevant. It was seen that pastoral livestock rearing among the 100,000 Bedouin in the Negev desert, declined greatly during the 20th century, because of a stronger central government, increased cultivated areas, urban growth and more pressure on available land. This has forced many Bedouin into a more sedentary form of agriculture and they have developed an intensive livestock grazing system that may give insights into possible future scenarios in Kenya. This agriculture includes more intensive livestock production (mainly sheep and goats) in which there is some grazing on natural pasture, but also includes the use of aftermath after grain harvest, and provision of hay, straw, or grain when necessary. The latter may be cultivated by either the pastoralists themselves or purchased. Livestock production was further increased by the use of more productive breeds.

To enhance policy and planning for the Garissa and Kajiado Districts, it is recommended that seminars be organised with the involvement of producers, government representatives at national and district levels, NGO workers and researchers. Previous seminars of this type in other projects have been successful, particularly as a means of disseminating information and formulating policy and planning measures.

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Appendix 1

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Appendix 2

Follow-up of the project: capacity building and project-related publications

The project contributed to the institutional and staff development of the School of Environmental Studies of Moi University. The school expanded its field of expertise and involvement in an urgent national development priority, namely that of arid and semi-arid lands. The staff development has benefited senior and junior staff, both in their field of expertise and in research methods among pastoralists. Dr. Dima was to be the senior staff member but he resigned his position with Moi University during the first year of the study and went abroad. Prof. Otieno, the Dean at the time, assumed his responsibilities. Nunow, the junior researcher, received his PhD degree from the University of Amsterdam and then joined the staff at the School of Environmental Studies. He is bonded to teach for a minimum of three years. The Israeli and Dutch researchers, likewise, improved their field of research expertise. The project also resulted in further research collaboration among the respective researchers and their institutions.

Publications:

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