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THE IMPACT OF WEALTH ON SMALLSTOCK PRODUCTION AND UTILIZATION
IN A PASTORAL SYSTEM:
MUKOGODO DIVISION, LAIKIPIA DISTRICT, KENYA

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THE IMPACT OF WEALTH ON SMALLSTOCK PRODUCTION AND UTILIZATION
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URS HERREN

ABSTRACT

Small ruminants have received very little attention in research and development as they are usually owned by smallholders and pastoralists with little influence and buying power. Moreover, they are often produced for subsistence purposes, their products are rarely marketed, and they are often cared for by women and children.

Smallstock in pastoral systems in Africa have been similarly neglected. The paper presents a case study of smallstock production in Mukogodo Division, Laikipia District, based on 14 months of fieldwork in the area in 1987/8. Mukogodo producers are poor in comparison with other pastoralists and the proportion of smallstock in their flocks is high.

Data presented cover both the productive performance of smallstock and their utilization by owners. Special attention is given to the influence of wealth on productive performance and on the socioeconomic strategies employed by producers, which are shown to differ considerably. It is maintained that without the knowledge of producer strategies that underlie aggregated figures (e.g. of commercial offtake or mortality), realistic planning and targeting of development interventions is not possible.

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Introduction

Various authors have over the last years commented that small ruminants (sheep and goats in most areas of the world, but also small camelids in South America) have received comparatively little attention both in research and development (e.g. Moris, 1986; McCorkle et al., 1987; Eicher and Baker, 1982). The reasons for this neglect are fairly obvious: 96% of the world's goats and 56% of the sheep are kept in LDCs. They are primarily owned by agropastoral smallholders or dryland pastoralists with little political influence and buying power. With the exception of sheep wool, few small ruminant products appear in the international markets, and also in domestic markets, their appearance is marginal or underrecognized. In many agricultural systems that include small ruminants, they constitute a sideline which is subsistence oriented or viewed as a stopgap activity in case the main enterprise fails. Moreover, it is often women and children who are in charge of small ruminants (McCorkle et al., 1987).

As a result, information on both animal science and socio-economic aspects of small ruminant production in Africa is still limited. Somewhat more surprising is the fact that smallstock have been even more neglected in African (and Kenyan) pastoral systems, where the importance of smallstock had been pointed out clearly for a long time (cf. Dyson-Hudson, 1972). Earlier research, both in the domains of anthropology (or socioeconomy) and animal production, as well as concomitant development programs have concentrated almost exclusively on cattle. Researchers and developers thereby inadvertently mirrored the cultural bias of pastoralists that often give low esteem to smallstock and very high regard to cattle. This misconception claims an uneconomic and wholly irrational relation of pastoralists to their cattle that has been disapproved time and again (Livingstone, 1977). Unfortunately, it has been widespread and influential in administrative and development discussions and has probably worked against attention to pastoral smallstock as well. Their relative importance in pastoral areas in Kenya is summarized in Table 1. It should be added that the proportion of largestock to smallstock can vary widely between years, usually as a result of drought.

More data on small ruminants in East African pastoral systems have been published over the last few years, both in the domains of social economy and animal production. To be mentioned are the results of the ILCA pastoral system study on Kajiado Maasai (Bekure, de Leeuw and Grandin, 1987), of the South Turkana Ecosystems Project (McCabe, 1985; Wienpahl

1984), of the Integrated Project on Arid Lands (IPAL) (Field, 1986) in Marsabit District and of other researchers (e.g. Homewood and Hurst, 1986). In spite of these studies the database remains limited and data are often incommensurable. It therefore remains difficult to assess pastoral smallstock production in a comparative perspective.

Table_1

District	Year	Smallstock/ person (TLU)	Largestock/ person (TLU)	% Liveweight in smallstock	
Turkana	1980	3.0	0.4	89%	a)
Marsabit	1980	2.3	6.5	26%	a)
Isiolo	1980	1.6	4.6	26%	a)
Samburu	1980	1.0	5.8	16%	a)
	1984			31%	b)
Narok	1980	0.8	2.8	22%	a)
Kajiado	1967	-	-	13%	c)
	1977	-	-	41%	c)
	1980/81	0.4	3.6	11%-15%	d)

Sources: a) Dyson-Hudson, 1980; b) Sperling, 1984; c) Njoka, 1983; d) Grandin 1985; White and Meadows 1981; Watson et al., 1982.

Recent research has pointed out the biologically superior adaptation of small ruminants (mainly goats) to arid and semi-arid environments in comparison to cattle (Moris, 1987). Their superiority comes to light even more clearly in times of drought, when they are very often the last resort for households to supply basic food and protein. Due to their potentially high reproduction rates they allow fast post-drought recovery and a chance for impoverished or marginalized herders to remain in the pastoral system. These characteristics are at the base of several rehabilitation projects that experiment with restocking pastoralists with smallstock.

Despite these figures, there have not been many development programs or projects in the pastoral areas of East Africa specifically aimed at improving small ruminant production. The following case study presents data on smallstock production and utilization in a pastoral area that is still struggling with the effects of the incisive drought of 1984. It focusses on the impact of differences in wealth on production and utilization. Such socioeconomic variables are still neither

sufficiently understood nor sufficiently considered in the planning of pastoral development efforts.

1. The setting

Mukogodo Division covers roughly 1,100 km² in the northeastern edge of Laikipia District. It also constitutes the northeastern edge of the Laikipia plateau. On its fringe, elevation drops from between 1,800 to 2,200 m to the lowlands of Isiolo District. The eastern third is characterized by a range of mountains, largely demarcated as a forest reserve of c. 280 km². Central Mukogodo is rugged hilly terrain with an acacia savanna vegetation. In the west, the relief is less steep; gently undulating hills, again with an acacia-savanna and open grasslands descend towards the Euaso Nyiro river which forms the western boundary of the Division.

Rainfall is unreliable and declines from east to west, from c. 700 to 400 mm/year with a bimodal distribution. Apart from the Euaso Nyiro and the Ngare Ndare which constitute the eastern and western boundaries, there are no perennial rivers in Mukogodo.

Mukogodo is a very discrete and isolated unit: in the south, the Division is bounded by largescale private ranches, which maintain a closed fence along the Division's perimeter. On the northern and eastern side, the land is officially a Livestock Marketing Division (LMD) holding ground which is however defunct and now sparsely settled by Samburu pastoralists.

Mukogodo Division in the present boundaries came into existence in 1936 with the demarcation of a "Native Reserve" intended to cater for a "Dorobo" population left behind on the northern Laikipia plateau after the northern Maasai had been deported from the area in the famous "moves" of 1914. Although the demarcation of the Reserve secured land rights for the Mukogodo groups, they lost two thirds of the land they had utilized in 1920, mainly the higher potential areas. The people of Mukogodo Division today refer to themselves as "Mukogodo Maasai", but consist of five distinct sections. These differ in historical background and social and ritual organization, although there exists a common "Maasai" denominator (for historical and anthropological details see Herren 1987). For the following discussion they are treated as one group.

The Mukogodo Maasai lost large numbers of their livestock in the consecutive droughts of 1981 and 1984. Since then, Mukogodo is regarded as a problem area characterized by outmigration, ecological problems and the need of intermittent famine relief operations.

2. Methodology

In 1987/8 I conducted a 15 month study of the socioeconomic strategies of households with different wealth and access to resources. Most quantitative data are based on a repeated monthly survey of a wealth-stratified sample of originally 34 and finally 28 households over 14 months. These data are supplemented by information gathered through specialized surveys, informal interviews, life histories and participant observation in the area (for a detailed outline of the methodology, see Herren 1988).

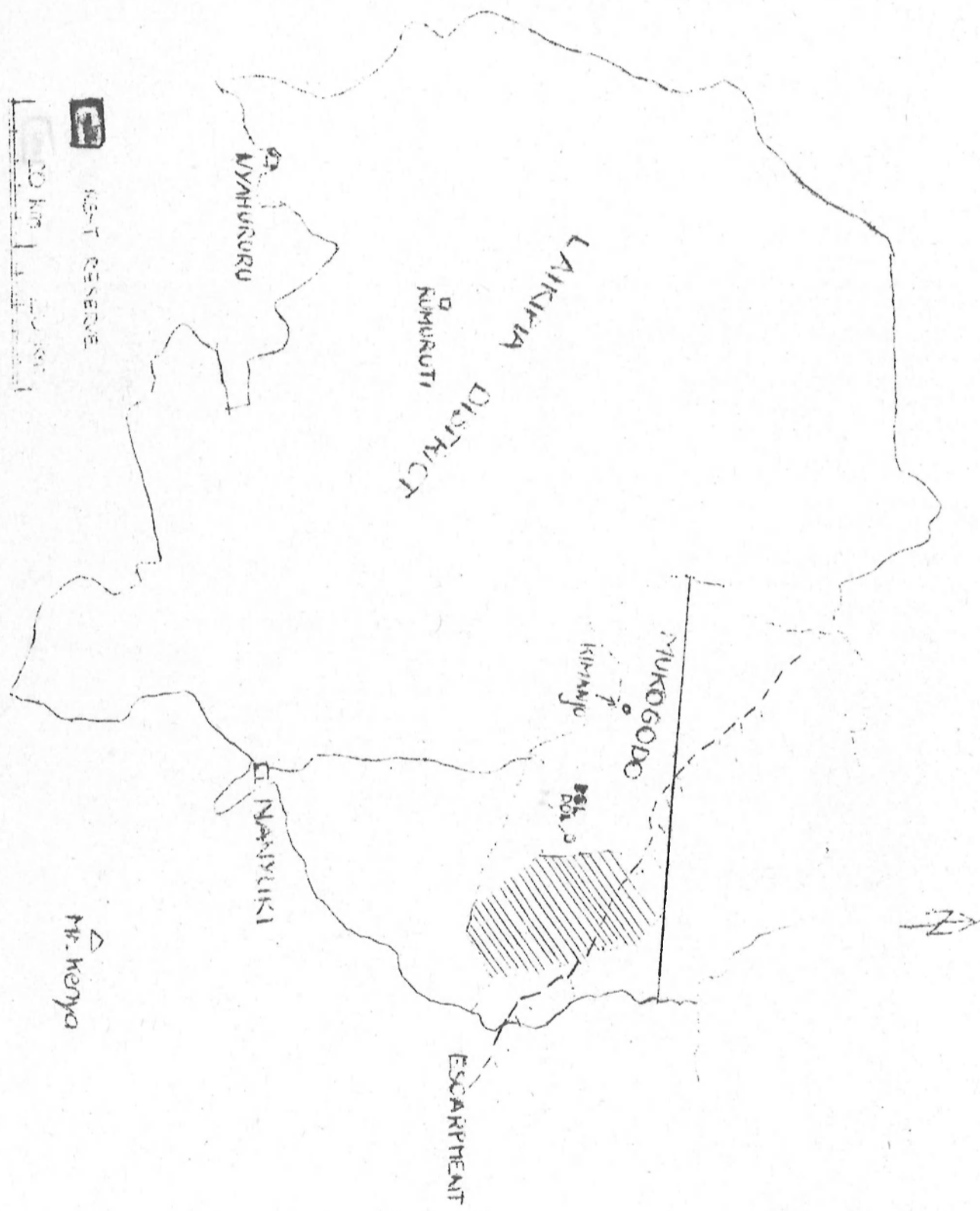
Studies of smallstock production under traditional smallholder management have generally proved difficult (for examples see e.g. Homewood and Hurst, 1986, McCabe, 1985 and Wienpahl, 1984), and this study is no exception.

One problem is pastoral mobility, which makes it logistically difficult to follow a large sample. In my case, four households moved out of my range. The other problem is summed up in a quote by an informant: "I cannot remember about smallstock. They are like majani (tealeaves)". In other words they are many, they are of rather low value, they are not counted as they come and go, they have a high turnover and daily management is to a large extent the business of women and children. Even apart from the reluctance of many pastoralists against counting their livestock, keeping track of births, deaths, management, diseases and transactions within a sufficient number of flocks is difficult and time-consuming. For aspects of smallstock production interview fatigue was especially high among wealthier owners with bigger flocks.

Adequate sample size therefore is and will remain a problem in pastoral studies. The methodology adopted has tried to counterbalance the smallness of the sample with careful sample stratification and by close acquaintance with the households involved. The reliable quantitative data on flock parameters (births, deaths, abortions) therefore are based on 21 households among which rich owners (and larger flocks) are under-represented. The sample includes 1040 goats and 350 sheep, kept in flocks of 13-127 goats and 4-32 sheep.

Given the ecological variability of savanna ecosystems within and between years and the unpredictability of disease, a study over several years would of course be desirable. In 1987/8 the rainfall recorded by the only raingauge in Mukogodo was near the longterm average, and the spacing was not exceptional. Mukogodo herders judged the year as neither particularly good nor particularly bad, although the "small rains" of Oct.-Dec. 1987 nearly failed in the westernmost part of the area. The data presented therefore represent what can be regarded as a "normal year". The whole economy was however still in a stage of recovery from the 1984 drought.

MAP: LAIKIPIA



3. Smallstock Production in Mukogodo - cultural basis and historical trend

Among Maa-speaking people (including the Maasai, the Samburu and the Mukogodo people discussed here), very high value is placed on cattle, and cattle largely dominate the public discourse. The possession and transacting of cattle are the underpinning of most of the socioeconomic relations important for social reproduction and survival. Cattle and their products are paramount in the rituals and ceremonies that structure Maa society and individual lives (see e.g. Galaty, 1983a, 1983b). Most Maa pastoralists therefore see themselves quintessentially as "people of cattle", even if a considerable portion of their domestic animal biomass is in fact kept as smallstock, as can be seen from Table 1.

The low cultural and emotional value of smallstock (which are like majani) notwithstanding, no Maa group has been able to do without them. Clearly mixed species production spreads the risk of losses to disease and predation. The advantage of smallstock, especially goats in drought survival and recovery has already been mentioned. Further, there are in fact a number of ceremonies that draw less public interest but are nevertheless important for the households involved, where the transaction and slaughter of sheep is necessary. Sheep fat is also considered essential for children, women after childbirth and many traditional medical treatments. For meat however, goat is preferred. Finally, smallstock are the "small change" both in the maintenance of social ties and in commercial transactions.

There can be no doubt that in the history of Maa speaking groups the species composition of the total herds has undergone constant change, with smallstock increasing in importance in times of drought, warfare or cattle epidemics. As an example it is clear that the Samburu were left with little cattle after the great African rinderpest epidemic of the 1890s and must have subsisted largely on their goats.

It is also misleading to regard the Maasai of the Purko-Kisongo cluster (living in Southern Kenya and Northern Tanzania), who have subsisted to a large extent on cattle during this century as the "pure" Maa pastoralists. Other Maa societies like the Samburu or the Laikipia. Maasai (that have disappeared as an autonomous entity in the 1980s), living in harsher environments have had or still have a more diversified economy with a larger role for smallstock. This is reflected e.g. in the name of southern Maasai for the Samburu, Loiborkineji, i.e. those of the white goats, or in Laikipiak clan names referring to smallstock.

The Mukogodo Maasai are no exception from this pattern. Their small sections definitely originated as dorobo groups that were clients to more powerful Maasai neighbors. Elders are

adamant that before the ageset of Merisho or Talala, initiated 1880 and 1895 respectively, Mukogodo sections did not possess cattle and subsisted largely on hunting and gathering. They had lost their cattle to epidemics, droughts or to more powerful enemies or had been hunter-gatherers as long as memory goes. It is equally clear however that all groups were at least in possession of smallstock and that the barter of honey and other products for the smallstock of their Maasai patrons was important.

All Mukogodo groups managed to procure cattle herds in the first two decades of the century by various ways, like the marrying of daughters to cattle herders or the exchange of ivory and smallstock. From the forties to the sixties, cattle must have dominated the Mukogodo economy; unfortunately government figures were usually collected for tax purposes and are therefore inaccurate due to evasion. Still, small stock remained an important item for barter with neighboring ranches or itinerant Meru or Kikuyu traders, who exchanged maize and beans, cloth, beads and tobacco. In an official census from 1942, 60% of livestock units were cattle and an estimate of the composition of the holdings of sample household heads for the late fifties cattle are about 80% of livestock units. By that time, the richer households had stopped keeping smallstock at all.

Cattle sales increased in importance after the start of auctions in 1957 by the African Livestock Marketing Organization (ALMO), while the barter of smallstock with itinerant traders had stopped in the early fifties.

Smallstock, especially goats proved their hardiness in the drought plus epidemic of 1964/5, when cattle had a high mortality. Informants agree that after this disaster, most households increased their smallstock holdings both absolutely and in comparison to cattle. This trend also has to do with a series of lower rainfall years and a vegetation change that favours browsers.

The balance was finally tipped in favour of smallstock in the droughts of 1981 and 1984. The combination of drought and outbreaks of East Coast Fever dramatically reduced cattle holdings and led to an overall impoverishment of Mukogodo producers, which is reflected in the high proportion of smallstock. The official censuses of 1982 and 1985, both taken after droughts with a very high cattle mortality report 70% and 63% of livestock units in smallstock. Today, only a insignificant number of households do not have smallstock, mostly for idiosyncratic reasons.

Table 2Composition of the Mukogodo herd

	head	LSU a)	% of total LSU
Cattle	15.200	10.800	45%
Smallstock	77.700	13.200	55%
Goats b)	50.500	8.600	36%
Sheep b)	27.200	4.600	19%

a) Livestock Units (LSU) were calculated by using conversion rates determined for Maasai herds by an ILCA study. Thereby one head of cattle is counted as .71 LSU and one head of smallstock as .17 LSU (Bekure, de Leeuw and Grandin, 1987).

b) As the wealthranking did not allow to discern goats and sheep, the figures are based on an extrapolation from the study sample.

The size and composition of the total Mukogodo livestock herd (excluding the area east of the forest) is presented in Table 2. The figures are based on an "informant wealthranking" exercise (cf Herren, 1988) and indicate an overall figure of 24,000 Livestock Units (LSU). Slightly more than half of the domestic animal biomass was kept as smallstock. In comparison to other pastoral groups this proportion only compares to the Rendille, Gabbra and Turkana systems that are all located in much drier areas. In comparison to other Maa speaking groups (cf. Table 1) this proportion is very high and reflects the post-drought poverty of Mukogodo producers.

4. The distribution of livestock holdings by wealthrank

As it is one of the basic assumptions of the whole study that differences in wealth (mainly in livestock) result in qualitatively different survival strategies of households, we have to look more closely at the distribution of livestock between them.

The following table presents comparative data on the average herds and flocks of households of different wealthranks.

TABLE 3:

Livestock holdings by wealth strata (Rich, Medium, Poor, Very Poor)

	Total	R	M	P	VP
Households per stratum (%)	100%	30%	30%	20%	20%
Average holding per household (LSU)	19	41	16	7	3
Proportion of total herd owned (% of LSU)	100%	63%	24%	7%	3%
Proportion of smallstock in Household Herds (% of LSU)	55%	49%	62%	71%	77%
Proportion of Sheep in Household Herds (% of LSU)	35%	42%	32%	27%	21%
Proportion of cash income from livestock production	58%	96%	59%	31%	63%

First it must be pointed out that Mukogodo pastoralists are generally poor in comparison to other groups. The average holding of 19 LSU per household compares unfavorably e.g. to the average of 48 of Galole Orma in 1981 (Ensminger, 1984) or the 156 of Maasai in South Kajiado group ranches (Bekure, deLeeuw and Grandin, 1987). The average holding of the richest twenty percent in Mukogodo is comparable to that of the poorest third in the Kajiado sample of ILCA (Bekure, de Leeuw and Grandin, 1987).

Moreover, the distribution is very skewed, the poorest 40% of the households owning only 10% of the total herd. For the current discussion it is of importance that the proportion of smallstock in the family herd increases with diminishing wealth. For the poorest 40% of the households, roughly three quarters of their domestic animal biomass is in smallstock. The proportion of sheep in household flocks decreases with wealth for a number of reasons to be discussed below.

5. Smallstock management

Sheep and goats are normally kept and herded together. Only a few households separated them for a short while during the height of the dry season. Herding is done by both boys and girls of rather young age, often not older than five years.

Children seem to be younger than in other areas, like Maasailand or Samburu. This is possible for three reasons: flock units are smaller, Mukogodo is rather densely populated (roughly 14 persons/km² compared to 6.5/km² in Kajiado) and predation by big carnivores is less of a problem. As a concession to the children, the large majority of the flocks come back to the homestead at mid day during most of the year. Adults frequently go to check on the flock during the day, or help with herding for some time. Because herds have to go farther and into more densely wooded areas, the age of herders increased towards the end of the dry season, often adults going themselves. Another problem at this time of the year is that sheep and goats have a different browsing/grazing speed, and sheep tend to be left behind and lost.

Kids and lambs up to roughly 5 months of age are kept around the homestead and are casually checked on by those present. More than half of the households owning cattle let older calves run with the smallstock, as their number is often too small to warrant separate herding.

Smallstock are watered every second day in the drier times of the year. After rains, when there is very green vegetation and pools of standing water, watering intervals may go up to a week, but come back quickly to the standard 1-day interval. Only few households that are near to the 4 boreholes in Mukogodo water smallstock daily. Finally, it should be mentioned that most households lobbed trees for the feeding of smallstock in the dry season, a job usually done by adults. It is clear that this can only be done effectively for small flocks.

Recently a few studies, especially the pioneering work of Sperling (1984a,b) have pointed out that few pastoral households are self-sufficient in labour. The same is true in Mukogodo. Smallstock labour is however much more considered a business of the owning household than labour for cows. In terms of herders, only 20% of households managed to do all cattle work with it's own labour, but 60% managed to do so with smallstock. The normal way of providing the labour necessary is the pooling of herds and flocks within one homestead (shared by roughly 2.5. households on average). Three quarters of households owning cows had mixed their own with those of others from the same homestead for herding, but only one quarter mixed smallstock. Nevertheless, bottlenecks do exist; the amount of labour available to a household is of course smaller at the beginning of the development cycle. Two newly married owners in the sample had no children, so they and their wives were forced to do much more "children's work" themselves.

As the joint herding of smallstock flocks is less common, and households have to rely more on their own labour, the bottlenecks tend to be much more severe in poorer households. Poorer men have less wives and children, so households are smaller

and have a higher absentee rate. While it was usually possible for them to find a satisfactory solution for the cows, herding labour for goats was often admittedly suboptimal, i.e. children were too small or had to work overly hard.

Three quarters of the households moved their homestead at least once during 1987/8, but rich people moved twice as much as the poor. While the movement decisions of richer people were generally determined by the forage conditions of cattle and the availability of domestic water, poor people rarely moved because of the smallstock. Their reduced mobility can be explained mainly by the need to remain nearer to shops and roads. Three quarters of the cattle-owners sent their cows to a satellite camp at least once during 1987/8, but only 15% did so with smallstock. As a consequence, smallstock of poorer people are less mobile and tend to remain in the most heavily utilized areas of Mukogodo.

6. Flock performance

A review of the literature for this paper has moreover shown that studies of pastoral flocks are very few. Comparable data are available from the pastoral systems study done by ILCA among Kajiado Maasai (Peacock, 1983; Wilson et al., 1982), from a survey in relation to the Baringo ASAL programme (Homewood and Hurst, 1986), from the South Turkana Ecosystem Project (McCabe, 1984; Wienpahl, 1984). The last has assessed flock production of a project-owned study herd, while the others have tried to follow production of smallholder herds under traditional management.

The indices used in the published material unfortunately vary considerably, and their choice, given the constraints on data collection mentioned in section 2, is often dictated more by the availability of data than by their appropriateness or comparability. Even indices that look straightforward, like mortality rates or kidding/lambing rates etc., are often calculated on different bases that forbid the conversion of different indices into each other and render results incommensurable. We are therefore in a weak position to assess the productivity of the Mukogodo system in comparison to other ASAL systems. I have not been able to gather many parameters interesting for the animal scientist, like e.g. weaning weights or parturition intervals, while other data are not reliable enough to allow quantitative statements.

6.1. Breeds and Breeding

This aspect has not been given systematic treatment, but has been discussed with knowledgeable ranchers nearby. Goats are generally of the "Small East African" type with significant Galla crossbreeding. Color is extremely variable and no color

dominates. Hair is short and rather fine. While most owners have their own breeding male carefully selected for strength and behavior, there is no breeding control for goats as herds of different owners mix freely during the day. Sheep are a mixture of 'Maasai', Somali Blackhead and Dorper. Again color varies a lot and the hair is coarse and medium in length. A few wealthy owners have purchased Dorper rams over the last years, but again, few owners have a definite breeding strategy. In sheep, aprons to prevent breeding are used by a small minority with the aim to concentrate lambing in the late rainy seasons, but with little effect. Aprons however have some prestige as being "modern". A handful of owners sometimes separated males, but rather to prevent disturbance in the flock during grazing and to protect pregnant ewes.

6.2. Flock structures

As in all pastoral systems, Mukogodo flocks of both sheep and goats contain a high number of females. Their fraction of the herd is comparable to other pastoral systems (Table 4). The fraction of females is higher than in Kajiado Maasai group ranches due to the general poverty of Mukogodo producers. Conversely, the proportion of castrates is smaller. This partly reflects the higher market integration of Mukogodo producers, partly the fact that they do not routinely castrate young males, but prefer to wait until they are sure that the replacement of the current breeding rams or bucks is ensured. Only one or two big castrates are kept as they can be easily exchanged or well sold in times of need.

Table_4

Flock Structure

	Goats Females	Castr.	Sheep Females	Castr.
Mukogodo	74%	7% e)	73%	9% e)
Kajiado Maasai a)	66%	25%	70%	19%
Kajiado Maasai b)	66%	10%	69%	15%
Kajiado Maasai c)	64%	-	68%	-
Turkana d)	76%	5%	76%	17%
Twareg (Mali) a)	78%	5%	70%	14%
Fulani (Mali) a)	79%	4%	74%	8%

Sources: a) Peacock 1982; b) Wilson et al. 1981; c) White and Meadows 1981; d) McCabe 1985; e) Estimate. Counted figures are slightly lower but underrepresent very young castrates.

Wealth has little influence on the proportion of females in Mukogodo flocks, but there may be significant differences in the age structure of females. As to males, rich people can afford to keep a higher proportion of castrates.

6.3. Reproductive performance

It has not been possible to collect the data necessary for the calculation of productivity measures like age at first parturition and parturition interval employed in standard indices. An indication is however given by the number of live births per breeding female per annum (annual reproductive rate).

In Mukogodo **goats**, the annual reproductive rate was roughly 1.06. While the figure for goats is still somewhat higher than results from Marsabit (0.69-0.78, Carles 1986), Baringo (0.56-0.82, Homewood and Hurst 1986) and Turkana (0.4, McCabe 1985), it compares unfavorably with the ILCA figure of 1.46 for Kajiado Maasai (Wilson et al. 1981) and with figures of 1.5-2.0 cited in Dahl and Hjort (1976). Even allowing for the underrecording of births (especially of kids dying soon after birth), this reproductive rate is low for an area with rainfall similar to Kajiado.

The factors affecting it cannot be fully assessed with the available data. One factor is the high incidence of abortions in goats. Abortions were recorded of 18% of breeding females, and this is probably still an underrecording. Abortions were either triggered by disease (CCPP probably being most important) or by the delay of the short rainy season of 1987 in western Mukogodo. If abortions could be reduced by half, the reproductive rate could reach 1.2.

The litter size recorded was 1.09, again somewhat better than in Turkana and Marsabit where twinning is practically absent, but below the litter size of 1.25 reported in Kajiado (Wilson et al. 1981) and way below Sahelian and Mid-Eastern litter sizes (Dahl and Hjort, 1976; Peacock, 1982).

In Mukogodo **sheep**, the annual reproductive rate was 1.24, in line with the 1.22 reported from Kajiado (Wilson et al., 1982) and figures in Dahl and Hjort, but considerably better than the 0.55 reported in Turkana sheep (McCabe, 1985). Abortions were recorded for 8% of the breeding females, mainly related to tickborne diseases and in western Mukogodo to emaciation in the late dry season.

Litter size was 1.04 in sheep, a low figure comparable to most other data for East Africa, but again considerably lower than Sahelian and Mid-Eastern figures.

In the sample, reproductive performance is positively correlated with wealth. While this is not entirely unexpected, the amount of variation cannot be fully explained nor the factors

behind it weighted. The lower reproductive rate of small flocks certainly has to do with a higher incidence of abortions and a smaller percentage of breeding females that are younger on average. While the number of breeding males to females was adequate throughout the sample, the breeding males of poor producers were often very young and possibly perform less well.

6.4. Mortality

It is not possible from the data to assess mortality in relation to age category (e.g. pre/post weaning). The yearly overall mortality of sample smallstock was 41% for goats and 37% for sheep. Given the fact that 1987/8 was not a particularly bad year, this seems high, especially for goats. On the other hand, given the variability of weather conditions and disease, it is difficult to talk of a "normal mortality" at all. Clear comparative figures of other systems in a comparable ecological zone do not exist to my knowledge.

Young stock had a high mortality as well. Of 457 kids born, 35% died while still counted as ilkuo (kids) by owners. These figures probably still underrepresent kids or lambs that died shortly after birth.

The following table shows a breakdown of deaths according to cause. For the diagnosis of deaths I had to rely on the owners' information. This was done by recording the Maasai terms. Ethnoveterinary data collected alongside were then discussed with veterinarians (thanks to John Young). The categories used in the table are therefore rather rough.

Table 5

Causes of death (% of total losses)	Goats	Sheep
All diseases	77%	62%
Tickborne diseases (lipis)	3%	29%
Intestinal diseases (enkorotit)	30%	30%
Lung diseases	8%	3%
CCPP (orkipei)	36%	-
Hunger/cold stress	3%	10%
Accidents	3%	2%
Predation	9%	12%
Lost	4%	3%
Unknown or unclear	4%	11%

In both sheep and goats, disease is the most important cause of death, responsible for 77% of deaths in goats and 62% in sheep.

Tickborne diseases do not heavily affect goats, but they are an important killer of sheep. This is also related to management practices. Only one sample household owned a spraypump during part of the study period. The common method is to wash the tickprone parts of the animals' bodies with a rag. Very often this is not done thoroughly, and animals that are difficult to handle are left out. It is evident that this method is less effective with sheep, which are also less easily and routinely deticked by hand. Although acaricides are commonly used, they are considered as expensive and are often more difficult to get than anthelmintics or antibiotics. During 1987/8, the tick load was lower in the wetter and higher areas in the center and east. Consequently, households in the East washed animals about 4x, those in the center about 5.5x and those in the west 9x. There is little difference between wealthranks in the frequency and amounts of acaricide used per stock unit. There is a problem of dosage, as very often acaricide is sold in softdrink bottles and is then diluted at random. I have come across cases where owners poisoned young animals with overdosed acaricide.

In both sheep and goats, intestinal troubles leading to diarrhea (enkorotit) are responsible for almost a third of deaths. In adult animals this seems to be related to high parasite loads, in kids and lambs the data suggest a high level of enterotoxaemia. Anthelmintics are commonly used but often the owners dewormed either when animals looked poor or when they could get hold of medicine, rather than in planned intervals. Smallstock were dewormed roughly twice in 1987/8. There was no difference between areas. Poor people dewormed significantly less often than medium and rich, but the amounts used per stockunit do not differ on average. Nobody in Mukogodo had a drench gun, but there were less dosage problems, as most medicine used is of one brand with well-known dosage. On the other hand, almost nobody was aware of the producer's warning against the use of milk and meat after deworming.

Mukogodo producers sustained high losses through CCFP in 1987/8. A vaccination against the disease exists, but has never been applied in the area. A few owners increased their management input to avoid affected herds, areas or water-points, but generally preventive action was considered to be too labour-intensive.

Most producers know well that CCFP and other diseases react well to an injection of Oxytetracycline. Although all sample households had their own syringe, the supply of antibiotics was very often inadequate and animals had to be left untreated, especially when many animals were affected in a

short time, as with CCPP. The rather unexpected consequence of the supply situation is that rich people had proportionally the highest losses to disease, although they theoretically had the resources to buy antibiotics. With antibiotics it should also be noted that the common brands come in solutions of 5 and 10%. Few owners are fully aware of the difference and most are not so sure about dosage. Antibiotics are usually injected under the skin and not into the muscle. While producers maintain that this helps, veterinarians doubt the efficiency of a normal dose of 5% solution injected under the skin.

It is evident that with a better supply of veterinary medicine and vaccination campaigns against CCPP, mortality could be significantly reduced. Assuming an eradication of CCPP and the reduction of other deaths by a third, the mortality rate could be halved in goats and be reduced by a fifth in sheep (cf Table 5)

Losses due to emaciation and rainfall were limited in the study period, but it is not unexpected that sheep suffered more, because grass became more scarce than browse. Most deaths in this category were due to the 1987 failure of the short rains in the western third of Mukogodo. Predation remains a risk, despite the dense population in Mukogodo and accounts for roughly one tenth of all losses. This is however considerably less than in other pastoral areas. Few animals are lost while grazing; due to the density of settlement stray animals are usually found quickly.

The mortality of goats is positively correlated with wealth. This is a result of bigger flock size, i.e. less close inspection and the supply bottleneck for medicine mentioned above. In sheep, variation is bigger but does not show a clear pattern.

Veterinary input per stock unit does not vary with wealth in livestock nor with the amount of cash income. Interestingly, the input of those with a regular remittance of cash from migrant labourers is 50% higher in the sample. This higher input however is not reflected in mortality rates! Generally, channels of access to medicine, i.e. through a son working in Nanyuki, a brother working on a nearby ranch or a relative in the veterinary service are more important than wealth in the amount used per stock unit.

However, an important wealth-related difference emerges if we compare the proportion of animals lost to diseases vs. those lost to predation and loss while herding. While rich and medium households lost 83% to disease and only 8% to predation/loss, poor and very poor lost only 51% to diseases, but 26% to predation/loss. This reflects the fact that smaller herds are herded by smaller children, are less mobile and are unattended for longer periods of time. Moreover, in the poor sample families the head was more often absent and lost animals were less often found save in the evening or night.

6.5. Overall Performance

Overall performance can be assessed by calculating a rate of "natural increase". For Mukogodo goats this rate is 9% and for sheep 24%. The low performance of goats is due to a combination of low reproductive rate and high mortality. Dahl and Hjort (1976) after noting the dearth of data, indicate possible rates of increase of 31-41% for goats. For sheep, the natural increase rate is more in line with the figures given from other areas. Dahl and Hjort (1976) quote rates of 28-35% per year, and their simulations arrive at figures of 18-26%.

Again, there is a significant difference between wealthranks. The goat flocks of the medium and rich had a calculated natural increase of 13%, while those of the poor decreased by 1%. The figures for sheep are 28% and 13% respectively. Before discussing offtake it should be pointed out that the margin for potential offtake without decreasing the flock is much smaller for the poor, in the case of goats it is even inexistant.

While more detailed research would be necessary to consider interventions in factors related to the relatively low reproductive performance, it is quite clear that with a better supply of veterinary drugs and better information of producers, especially on dosage, mortality could be significantly reduced.

7. The impact of wealth on modes of offtake and acquisition

In this section, the relative importance of different modes of offtake and acquisition are discussed. For a detailed discussion taking producer wealth into account, the commercial transactions, i.e. sales and purchases, are taken together as are the traditional transactions, i.e. the giving, receiving and exchanging of animals. Voluntary slaughter is considered separately. The analysis will on the one hand show differences in the utilization of the two species, on the other hand the difference in socioeconomic strategies of households with different wealth and access to other resources will become apparent.

As commercial transactions and voluntary slaughter of animals are numerically few for each sample household within the time between survey visits, their recording has been accurate. Traditional transactions and exchanges that often involve touchy social relations however tend to be underreported and poorer people are understandably reluctant to talk about animals they have received as a result of begging or as outright charity. Gifts and credits received by them are therefore underreported most (Grandin and Bekure, 1982).

Table 6 first summarizes the relative importance of the different modes of offtake and acquisition, which will then be discussed in detail. As is obvious from the table, the numbers involved, mainly in acquisitions, are very low due to the overall poverty of Mukogodo producers. From long talks about all kinds of transactions it is nevertheless clear that their relative importance is reflected in the figures discussed below.

Table 6

Importance of different modes of offtake and acquisition by species and percentage of female animals involved
(% and (N) of total offtake/acquisition)

	goats	sheep	all smallstock
Offtake			
Sale	44% (120)	31% (36)	42% (156)
Given	18% (49)	15% (18)	17% (67)
Exchange	5% (14)	9% (10)	6% (24)
Slaughter	33% (89)	45% (52)	36% (141)
Acquisition			
Purchase	31% (29)	27% (3)	30% (32)
Receive	34% (32)	18% (2)	33% (34)
Exchange	35% (33)	55% (6)	37% (39)

7.1. Sales and purchases

Commercial transactions, i.e. sales and purchases are discussed first. Table 7 disaggregates the data on the relative importance of sales and purchases according to wealthrank and shows the importance of sales in the cash income of the wealthranks.

Sales represent almost 45% of the total offtake for goats, and roughly one third for sheep, which are used proportionally less for transactions involving cash and the market. Given the higher overall offtake rate of sheep, this translates into a "commercial offtake rate" that is similar for both species, 11.5% for goats and 10.1% for sheep. The degree of smallstock commercialization is therefore considerably higher than on the Kajiado group ranches studied by ILCA, where on the more commercialized ranch the figures were 7.4% and 4.0%, and on the less commercialized one 3.5% and 0.3% (Grandin, 1982). About a third of smallstock sold are females.

Purchases for cash account for about 30% of acquisitions, with sheep again being more outside of the commercialized domain. Purchases are clearly defined as "banking" by Mukogodo Maasai,

and often follow the receipt of cash (from sales or remittances) in excess of current needs. Not surprisingly, the large majority of animals bought like this are females that have further growth potential.

Table 7

Sales, purchases and cash income by species and wealthrank

		All	Rich	Med.	Poor	Very P.
<u>Sales</u>						
% of offtake	goats	44	47	47	43	25
	sheep	31	14	63	23	38
	all	42	36	51	37	28
% of females	goats	27	19	31	24	50
	sheep	33	40	22	71	0
	all	30	22	28	33	36
% local sale	goats	30	14	39	59	75
	sheep	22	40	11	10	-
	all	44	17	30	55	55
Average price	goats	192	189	198	156	171
	sheep	173	144	184	193	100
<u>Purchase</u>						
% of acquis.	goats	31	21	30	33	50
% of females	goats	80	100	53	79	100
<u>Cash Income</u>						
% Income from	Cattle	22	68	23	4	3
	Smallstock	21	19	27	19	13
	Skins	15	9	9	8	47
	Remittance	31	1	31	60	22
	Other	11	3	10	9	15

If we look at the relative importance of sales for wealthranks, we find a roughly equal importance of sales in rich and poor, while for medium households their importance is above average and very much below average for the very poor. The importance of sales for the rich and poor closely follow the relative importance of these sales in their total cash income. Among the rich, their heavy reliance on cattle sales

for their cash needs allows them to reduce their smallstock sales. In the income of the poor on the other hand, remittances from absentee workers (in a few cases from local wage-labour allows them a similar reduction of smallstock sales.

The medium households rely most on smallstock sales, and their sales are above average as a consequence. The very poor managed to raise their little cash by relying on the sale of skins, on remittances and on other activities (brewing, charcoaling etc.) while trying to limit smallstock sales, and investing more in traditional livestock networks.

The percentage of females sold is clearly inversely related to wealth. This does not reflect choice; on the contrary, the poorer households are constantly forced to sell off breeding stock to satisfy immediate cash needs. This tends to jeopardize their herd structure and is partly behind the low reproductive rates that have been noted above.

The table also shows that roughly a third of all smallstock are sold locally, i.e. to other producers who are "banking" or to those few wealthy people who engage in intermittent trading. Again it is evident that sheep are more outside the cash system and circulate more in traditional channels, except for the rich who have a larger surplus over those sheep they need for traditional transactions. It seems that it is easier for poorer people to find a local buyer, as they usually sell but one or two animals at one time. As local sales often involve friends or kin or persons otherwise obliged to each other, local prices are slightly higher than those of professional traders based in Mukogodo, we could expect a higher average price for poor people. That this is not the case is a consequence of selling more females, which are smaller and lighter and of animals younger in general. The difference in price per head for rich and poor is similar to the difference reported from high market-integration parts of Kajiado (Grandin 1985). Most people still agree that it is worthwhile to buy a small animal and resell it later to a professional trader.

Only the purchases of goats have been broken down according to wealthrank as for sheep the sample is too small. The lower importance of smallstock purchases for rich households can be explained by the fact that all household heads concerned disliked small cash dealings in goats (which they often sold in bulk) and rather concentrated on traditional circulation of smallstock. Moreover, some of them purchased cattle when they had surplus money. The high importance of purchases in the acquisitions of the very poor is a result of the underrepresentation of animals received as gifts and from begging. The numbers involved show that they are generally in no position to buy animals. It is therefore mainly the medium and poor households with their higher flow of cash from remittances that do the purchasing. If we take together the households

where remittances are more than 50% of total income, they account for 80% of all purchases!

7.2 Giving out and receiving animals

The categories of both "giving" and "receiving" animals do not just involve gifts, but transactions of very different character. Some gifts, like the giving of specified smallstock at marriage or for certain ceremonial relationships are outright compulsory. Others are gifts in the European sense of the term, i.e. free and voluntary, given to a friend or relative "just like that" (as one discussion partner said) or for some moral or other support. Intermediate and terminologically separate (called paran) are "gifts" given to poorer people or dependants that are often the result of insistent begging, sometimes considered as a veritable "rip-off" by the "giver". In this category, also loans have been included that are very often long-term and can blend into paran-gifts when the giver has little hope of retrieving the loan even in the long term.

Table 8

Animals given and received by wealthrank, species and sex of animal

	All	Rich	Med.	Poor	Very P.
<u>Giving out</u>					
% of offtake goats	18	22	15	12	28
sheep	15	21	7	20	-
all	17	22	15	14	22
% females goats	63	47	61	88	75
sheep	38	13	50	67	-
all	56	36	60	79	75
<u>Receiving</u>					
% of acquis. all	33	60	30	30	0
% females all	91	92	88	93	-
Animals received per animal given	0.54	0.48	0.53	1.0	0

The giving out of animals accounts for less than 20% of offtake. This is roughly in line with the figures reported by Grandin from Kajiado (1982). Among goats, the females dominate slightly but do not reach their proportion of the total herd (74%). In sheep, mainly males are given out. Such males are important for slaughter at ceremonial occasions, like marriage

and childbirth, and close relatives and friends often help the one who has to give a ceremony.

Receiving accounts for another third of acquisitions, but this is certainly an underrepresentation. Beside the fact that one does not brag about animals received, poorer people understandably dislike reporting animals they have got by begging (paran). Paran animals are very often males that are slaughtered or sold by the recipient, so that the rate of females is lower than in the table.

Looking at wealthranks it could be expected that rich owners would proportionally give out more animals in such transactions. The same was reported from Kajiado (Grandin 1985). Conversely receipts constitute 60% of acquisitions for the rich. This shows the extent to which rich owners are integrated into the traditional reciprocity networks that are an important security mechanism. To be an important person in Mukogodo (an Maasailand in general, see Galaty 1983a,b) still means to be a generous giver, and in turn a happy receiver. Animals received are moreover largely females, but only 36% of animals given. Rich people however do have a net outflow of animals.

The importance in total offtake of animals given then decreases with decreasing wealth. So does the proportion of females received, whereas the proportion rises for animals given. The net outflow decreases, and for poor people inflow and outflow reach a balance. Given the underreporting of incoming "gifts", they probably profit in numbers, but there remains a drain on breeding animals.

In the sample, very poor households only give animals but do not receive any. This is certainly due to underreporting, as they could not survive this way. That animals given are as important in their offtake as among the rich is only surprising at first sight. Looking at the individual cases it becomes clear that this level is necessary for the maintenance of crucial social relationships. As many of these households depend on richer patrons, relatives and neighbors, such ties are indeed important for survival. In one case a very old, almost destitute man gifted three goats (14% of his holding at the time) to the wealthy patron he was living with, to help the latter pay a fine of some twenty goats. As for the poor, there is probably a net outflow of females in gift-relations.

7.3. Exchanges

Exchanges account for less than 10% of smallstock given out, but dominate among those coming in. In areas less linked to the market than Mukogodo, exchanges are much more important, as can be seen from Mbirikani group ranch in Kajiado where they reach 20% (Grandin, 1985). Sheep, especially male sheep or castrates are proportionally more often involved in exchanges than goats, as one common form involves the exchange

of one big male or castrated sheep for two small females of either species. The males or castrates are highly valued for their fat in case of diseases, or when a woman has given birth and are considered essential in certain ceremonies.

Exchanges usually involve animals of opposite sex. Thereby, females are valued "one up", i.e. for a smallish female, one gets a big male (or castrate), or one very big male (or castrate) for two small females. Also possible is the exchange of one big male for a smaller male and a small female. Most often it is the person in need of a large male/castrate initiating the exchange, and consequently giving out females is considered as less favorable.

For the whole area I have recorded only two exchanges of cattle for smallstock, the traditional exchange rate being 1 heifer for 12 smallstock, of which about ten have to be females. Although people maintain that such exchanges are important for poor smallstock owners to rebuild a cattle herd, they are extremely rare nowadays.

In the following table, exchanges are not disaggregated for species, as the number of sheep involved is minimal.

Table 9

Exchanges by wealthrank

	All	Rich	Med.	Poor	Very P.
Exchange					
% of offtake	7	2	7	8	14
% of acquisition	37	20	38	38	60

The trend visible in spite of the small sample is that the importance of procuring animals by exchanges grows with declining wealth, because chances of finding an animal suitable for a specific purpose are smaller in small holdings, and because poorer households have a less extensive "gift network" and higher cash constraints.

There is certainly a trend for poor and very poor households to be on the unfavorable end of exchanges in terms of breeding stock whenever a big male or castrate is direly needed. Conversely, for rich men it is sometimes interesting to get a promising castrate for two small females and to fatten it up, specially if the new owners have access to outside markets.

7.4. Voluntary slaughter

In discussing slaughter, it should be pointed out that this category only includes animals that were slaughtered voluntarily, not in extremis. The relative importance of the slaughter of goats and sheep is inverse to that of sales, underlining again that sheep are definitely preferred for home consumption, if a choice is possible. Their importance is similar in the more market-integrated group ranches in Kajiado, but lower than in remoter areas like southern Kajiado (Grandin 1982) or Turkana (McCabe 1985). The resulting consumption of meat is discussed in section 10 below. Data on the slaughter of smallstock are broken down according to wealthrank, species and purpose of slaughter in Table 10.

The pattern between the wealthranks is difficult to interpret. The overall slaughter rate of the rich is similar to that of the poor. The rich however have a lower slaughter rate for goats and a higher one for sheep. Obviously, they have enough sheep to follow the cultural preference and slaughter them for food, a luxury poorer people cannot afford. Rich people have much more the choice to slaughter sheep and sell goats, the price for sheep being lower anyway. As has been said, medium households need to sell proportionally more and therefore tend to slaughter less. They can probably do so because they can normally avoid bottlenecks of "shop food" and have enough milk, and deaths are numerically important enough to guarantee a reasonable supply of meat. Why they sell such a high proportion of sheep and slaughter so few is however not fully clear.

Table 10

Voluntary slaughter by species, wealthrank and purpose

		All	Rich	Med.	Poor	Very P.
% of Offtake	goats	33	29	30	39	38
	sheep	45	62	24	42	50
	all	36	40	29	40	44

Percentage of Slaughter for food	goats	29	41	31	27	42
	sheep	40	57	28	23	25
for medicine	goats	56	45	69	65	25
	sheep	32	22	28	46	50
for ceremony	goats	10	14	-	8	33
	sheep	28	22	43	31	25

The readiness to slaughter smallstock "just for food" proportional to wealth. Given the precariously low level of sheep holdings of poor and very poor, they are especially reluctant to slaughter them for food. The high proportion of goats slaughtered for food among the very poor is thus a reflex of their difficulties: in most cases goats were slaughtered when it became impossible to mobilize any cash for maize meal and when shops refused credit or were out of stock. This represents a "wastage", i.e. the failure to convert expensive meat calories into cheap grain calories.

Although slaughter is similar in proportion among rich and poor, the numbers involved and the reasons for slaughter vary widely. The poor slaughter a high proportion only to cover bare essentials, i.e. for the curing of human disease and for ceremonies. The rich slaughter a similar proportion because they can afford the luxury.

The different use of sheep in comparison to goats is again made clear by the figures on slaughter for ceremonies. Only 10% of goats are slaughtered for that purpose, but 28% of sheep that even dominate numerically here (13 vs. 9). Again, very poor people were sometimes forced to use goats rather than the appropriate sheep.

3. Offtake, acquisitions and flock development

This section summarizes the effect of the overall transactions and acquisitions on the numerical development of the flocks in 1987/8. The relevant figures are presented in the following table.

First it must be noted that both the gross and net offtake rates in both species are extremely high, roughly double of what ILCA found in Kajiado (Grandin, 1982). In other words, smallstock are heavily utilized. The gross offtake rates are similar between the two species, the offtake of sheep being slightly higher. The figures confirm the general finding of similar studies that poorer people (i.e. the people of Mukogodo in comparison to the Kajiado Maasai) have a higher offtake rate. Inside Mukogodo, we do find a negative relation of offtake rate and wealth, but unlike to Kajiado, the very poor people fall out of the pattern for reasons outlined below.

The acquisition rate of sheep is similar to the one recorded in Kajiado, but the rate of goats is double the Kajiado figure. If people acquire smallstock, they do so in goats disproportionately. Like in Kajiado, we find a clear tendency for acquisition rates to be inversely related to wealth. Very poor people fall out of this pattern, both because they lack cash and have a restricted social network. Gross offtake and

acquisition rate together reflect a quite considerable circulation of stock also between Mukogodo producers, a feature common in all pastoral systems.

Table 11

Gross Offtake, Acquisitions, Net Offtake and Actual Herd Increase (% of original flock)

		Total	Rich	Med.	Poor	V. Poor
Gross Offtake	Goats	26	27	22	30	28
	Sheep	32	43	23	39	21
	Total	27	30	22	33	27
Acquisitions	Goats	9	7	5	20	7
	Sheep	3	1	3	5	5
	Total	8	5	5	15	7
Net Offtake	Goats	15	20	17	10	21
	Sheep	29	42	20	34	16
	Total	18	25	17	18	20
Actual Herd Increase	Goats	- 8	- 5		-16	-14
	Sheep	- 8	0		- 5	-24
	Total	- 8	- 4		-13	-16

In combination, the total net offtake rate of sheep is double the one of goats. Although 1987/8 was an average year, the net offtake rate was so high that flock growth could not make good for it, so that the sample flocks of both sheep and goats decreased by 8%. A comparison between the estimates of the smallstock populations in Mukogodo 1985 and 1987 equally suggests very slow annual growth rates of 2% and 4% for goats and sheep respectively.

When looking at wealthranks it is not surprising that poor people's holdings decreased considerably more than those of medium and rich households, i.e. poor people were forced even more to eat into their assets to cover essential needs. The decrease of smallstock was offset somewhat by a parallel increase of cattle holdings, but again less so for the poor as cattle are 50% of the holding among the rich, but only 25% among the poor. It can be expected that with growing cattle holdings, offtake of cattle and cow milk will increase, thereby reducing the pressure on smallstock flocks, but mainly for the wealthier half. This trend is typical for the post-drought situation of the Mukogodo economy.

Moreover it must be pointed out that poor households already get 70% of their cash income from non-livestock activities. Their position is so precarious that they were forced to decrease their flocks while already massively subsidizing their livestock enterprise with cash earned elsewhere. The flocks of the very poor decreased most, despite very low standards of living and a heavy reliance on charity.

The study proves once again that if a discussion of "offtake" is not just taking commercial transactions into account, the rate of utilization is very high. There is no evidence for the often heard reproach to pastoralists that they irrationally cling to their livestock for its own sake.

In other words, in Mukogodo the issue is not to increase commercial offtake rates, but rather to decrease them in order to give the poorer producers the chance to increase their herds and gain a measure of security.

9 Meat and Milk from Smallstock

9.1 Meat

Meat from smallstock was the almost exclusive source of meat in Mukogodo in 1987/8. For the whole period of study I know of only three cattle that were voluntarily slaughtered. All were killed in important ceremonial contexts, i.e. sacrificed. Cow mortality was much smaller than goat mortality, so that little beef came from this side.

Most mature smallstock that died and were not eaten by wildlife were consumed, in a few cases with unpleasant effects for the consumers. The following calculation estimates the amount of meat potentially available per AAME (Average Adult Male Equivalent). It is assumed that about half of the animals that died could be eaten (the others being kids and total losses to wildlife). Adding the voluntary slaughters and taking an edible weight of 24 kg for sheep and of 26 kg for goats (after Nestel, 1985 and Wilson et al., 1982), the daily meat consumption per AAME would be around 180 gr/day for the poor and 260 gr/day for the rich. This is within the findings of Nestel in Kajiado. Although the actual intake will vary widely between age and sex categories, the amount can theoretically cover protein needs.

9.2. Milk

The following discussion is basically about the offtake and yield of goat milk, as sheep are almost never milked. Producers contend that milking sheep is difficult, yields little and that it endangers lamb survival.

It is highly characteristic for the milking strategy of pastoral people that the Maasai do not speak about milking a cow or dam, but about milking a calf or kid. In other words, they fully acknowledge the competition for milk between animal offspring and people. The amount actually milked carefully assesses the condition of mother and kid/lamb and human needs. Given the slow growth of Mukogodo flocks, the normal strategy is a "kid-first" strategy. As a consequence, goats were very often not milked (or only once per day) in the first weeks after parturition, when yields are highest. Milking increased when the kid started browsing and was in good condition, but by then the potential yield is considerably lower already. Potential yields fluctuate heavily with forage conditions, but available yield curves suggest a rather steep decline after the eighth or ninth week (Blackburn and Field 1986).

In the present study, it has not been possible to measure the total (milked-out) yield of goats. Instead, actual offtake estimates were recorded regularly over nine months and verified with sample measurements in two wet and one dry seasons. The estimates, normally obtained from the wives milking the goats in terms of standard containers used for milking (enamel cups or tins) correspond to the measurements and are internally consistent.

Actual offtake clearly varies with the seasons, from about 90 ml/day in the dry to 180 ml/day in the wet seasons. However, a comparative discussion of the offtake of Mukogodo goats proves to be difficult. First, milk production of smallstock, being almost entirely for subsistence, is seriously underresearched. Second, many sources do not give a clear indication whether they are talking about total yield or actual offtake, as already Dahl and Hjert have noted (1976).

Table 12

Actual average offtake per head by month and season (ml)

dry----->		wet----->			dry----->		wet----->		
1987		1988							
Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
90	100	150	140	150	100	90	150	180	170

The figures from Mukogodo are however comparable to the wet season offtakes reported from Baringo of 160 ml/day (Homewood and Hurst 1986) and of 80 - 260 ml/day (Little 1981), and for Turkana of 120 dl/day over two years (McCabe 1985). The only indication about the total potential yield in Mukogodo comes from a few wet season observations of goats that had lost

their kids and were fully milked. Their yield is 2 to 2.5 times the average actual offtake and in the area of 350 ml/day. This is comparable to the total yields reported from Marsabit District (which is drier) of 200-380 ml/day (Calder 1986), but somewhat lower than the figure of 300-700 ml/day given in Dahl and Hjort (1976). At least, there is no evidence that the milk production of Mukogodo goats fall short of goats in comparable systems.

Table 13

Average yield and incidence of smallstock milking per season and wealth rank

	Total	R	M	F	VP
Average yield wet seasons (ml)	160	130	160	180	130
dry seasons (ml)	90	70	80	110	110
Households milking at all 1)					
wet seasons	65%	46%	69%	86%	50%
dry seasons	29%	17%	28%	50%	20%

1) Calculation: number of visits on which households reported that they were milking goats at all as percentage of total visits.

Given the probable range of error due to the method of data collection, wealth-related differences in offtake are rather small. The emerging trend is what can be expected, i.e. that rich households milk their animals less hard, especially in the wet season, when they have a good cow milk supply. Poor people who do not have cows or no milking cows take off more, whereas the very poor probably value kid survival more and hence milk less. Among the very poor, milk usually ceases to be "a food", and becomes a whitener for tea. Similarly, the frequency with which households bother to or are forced to milk goats is inversely related to wealth (and cattle holdings).

More important is that goat milk is very often the only milk available to poor and very poor households (i.e. to 40% of the population), especially in the dry season. At these times of the year it is crucial for the nutrition of smaller children, specially those in the 2-5 age bracket. In both Turkana and Kajiado, studies have shown that this age group was most at risk nutritionally (Nestel 1985; Galvin, 1984).

10. Notes on the smallstock marketing system

A detailed study of the marketing system has been outside the scope of the present study. Moreover those people engaged in smallstock trade in Mukogodo have not been talkative about their operations or margins nor was it possible to get marketing figures from the Laikipia County Council.

In spite of the extensive reliance of Mukogodo producers on smallstock sales, the marketing system is rather weak and prices are low, e.g. compared to those in Isiolo. Mukogodo is clearly a buyers' market, where it is the seller who has to actively look for a buyer. If a producer wants to sell, in the large majority of cases one or two animals at a time, he has basically four options:

- a) he can find another local producer who wants to "bank" some surplus cash. About 25% of recorded sales are of this type. This channel is popular as usually both sides know each other or they are even connected by some kin or ageset relation, the transfer of the animal is no problem etc.
- b) he can go to one of the maybe two dozen or so rich Maasai producers that also routinely but intermittently trade both cattle and smallstock. They account for 5-10% of sales. These producer-traders rarely actively look for animals themselves, but accumulate what is offered to them. They have personal contacts to wholesaler/butchers in Nanyuki and Meru, and when they have got together a sufficient number, they sell in bulk, often adding substantial numbers from their own production.
- c) he can try to sell to one of the roughly fifteen to twenty traders/shop-owners/butchers based in Mukogodo itself. In this market segment, there is a difference between central Mukogodo, hinterland of the divisional center of Doldol and the rest of the division. In Doldol exists a daily local market, where sellers can bring their smallstock. But even here, most animals are bought by the shop-owner/butchers. About 40% of animals sold go this way: of these a quarter are slaughtered in Doldol. Cut meat is mainly bought by the employees of the administration and the mission(s), by teachers, policemen and the school feeding programs. Mukogodo-based traders are in a very good position; they do not necessarily have to buy at a given point of time, whereas the seller usually needs cash straight away. In the Doldol market, animals are often sold in the late afternoon for very low prices. Prices are however lowest if animals have to be given by a producer to cover credits that have accumulated at the shop. Some shop-owners agreed that their profits come much more from livestock trade than from retailing bulk foodstuffs (maizemeal, maize, beans and sugar) with controlled prices.

d) he can try to sell to traders from outside of Mukogodo. On the one hand, there are a few itinerant livestock traders and wholesalers' agents and employees of nearby ranches, on the other hand the wholesalers and butchers based in Nanyuki. Few producers, mainly the better-off, have the contacts to sell directly to the latter. Those who do are however often prepared to take along the single animals of friends, relatives and neighbors. From eastern Mukogodo there is a tradition of forming small parties and to trek animals to the market in Isiolo where prices are usually higher. Overall maybe 30% of sales go through such channels, fetching a slightly better price than from the locally-based traders.

There have been intermittent attempts by the County Council to institute auctions in Doldol, but they have met with little immediate success and never reached sufficient long-term regularity to ensure a predictable turnover. Larger butchers from Nanyuki complained that auctions tended to push up prices but that they still could not be sure to find a sufficient number of animals. Given the generally low level of Mukogodo holdings, sale decisions are indeed in most cases a very short-term reaction to immediate cash needs, even in medium households. Butchers thus prefer the much larger Isiolo market, in spite of the higher price-level.

As a result of this marketing structure, Mukogodo producers are unanimous that it is often difficult to sell an animal when cash is needed and that conversely they are often forced to accept low prices. It is also clear that most producers, but especially the poorer half, would profit from stronger marketing system.

11. Conclusions

1.

The proportion of smallstock in the Mukogodo system is very high and reflects an impoverished post-drought situation. The importance of smallstock is high in cash income of all but the richest households. The distribution of stock is very skewed, and the proportion of smallstock in household herds increases with declining wealth.

2.

There are no big differences between wealthranks in the way smallstock are managed. However, poorer people have more problems of having sufficient and adequate herding labour. The poor often have to work with children that are very young, which is reflected in higher losses to wildlife and while herding. Poor people are less mobile and tend to stay in areas that are more intensively used.

3. Reproductive performance is generally low in comparison to other pastoral areas, sheep doing somewhat better than goats. The reproductive performance of poor peoples' flocks is specially bad and probably due to an unbalanced age structure and a constant offtake drain on females.

Mortality is high and similar in both species, with disease dominating the causes. Goat mortality is higher which is mainly due to the occurrence of CCPP in the area. For the prevention and treatment of diseases it is the drug supply that is more of a constraint than the availability of cash or knowledge among producers. As a result, wealthier people have a higher disease mortality. Inversely, poor people lose more animals as a result of inadequate management. The eradication of CCPP, a better supply of drugs and the training of people in the dosage of preventive medicine could considerably reduce mortality.

Herd growth excluding offtake and acquisition is low and even lower for the poor, whose goat flocks hardly manage to reproduce themselves.

4. Generally, the net offtake rate and the rate of commercial sales are high, indicating the large extent to which Mukogodo producers are integrated into the market. Sheep figure more prominently in the non-commercial circulation of smallstock within Mukogodo, as they are preferred for slaughter for ceremonies and for the treatment of diseases.

In spite of the high degree of commercialization of smallstock production in Mukogodo and a high demand of meat in urban areas, the marketing system is weak and disfavours producers. This however is partly due to the small numbers sold by individuals and sale decisions that are usually very short term reactions to cash constraints.

5. Most importantly, the overall pattern of offtake and acquisition is the result of a complex articulation of strategies that differ considerably between wealthranks. Knowledge of these differences is important in planning interventions and evaluating their potential impact.

Rich households depend least on smallstock both for their cash income. They can afford to sell less and slaughter more, a tendency more marked in sheep. They however invest proportionally more smallstock into social networks that are important for influence and longterm security. In such relations they have a net outflow of animals, but tend to lose in male and gain in female animals. In 1987/8 their smallstock flocks

decreased, but this reduction is offset by their saving strategy for cattle which increased considerably. With growing cattle herds, the pressure on their smallstock will decrease and flocks will grow or allow more generous consumption. As they own 60% of all smallstock, total commercial offtake from Mukogodo will however tend to decrease.

Medium households still concentrate mainly on livestock for their survival. As the rich, they have tended to increase cattle holdings in 1987/8; as a result they have to rely most on smallstock for cash income, i.e. they sell more than the rich and slaughter least of all. Their flocks decreased slightly, but as among the rich this is offset by the growth of cattle herds. The medium term tendency is the same as for the rich.

Poor households have a higher proportion of their income from remittances and wages, a result of forced labour migration among them. In spite of lower cash income from smallstock, their offtake rates are high in order to cover basic needs for cash, slaughter and socially motivated transactions. It is obvious however that their stock networks are less extensive. In all transactions they suffer an above average drain of females.

The high gross offtake is only offset by higher purchases, usually possible with cash remitted by migrant labourers. In other words, their flocks that already decreased in 1987/8 would decrease even more if poor people not subsidise livestock production with cash earned largely outside Mukogodo. The inability to increase holdings despite a substantial influx of money makes full recovery from the last droughts rather improbable. There is a tendency for Mukogodo to become a residential area for migrants' families engaging in residual smallstock production with low inputs and returns.

Very poor households depend to a good extent on wealthier patrons. They sold least in order to conserve their minimal flocks, but were sometimes forced to "waste" animals, also females, by slaughtering them for food when cash and credit was unavailable. Interestingly, they invest proportionally more into traditional stock transactions in order to secure the crucial social relations that their survival depends on. That their herds decreased most over 1987/8 which was not a particularly difficult year is reason for concern.

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