THE MARKETING OF SHEEP AND GOATS FROM TWO PASTORAL SYSTEMS IN KENYA

A comparison of market offtake from Maasailand and Baringo

by

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This thesis is my original work and has not

been submitted for a degree in any other University

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A B S T R A C T

The problem of sub-optimal offtake of sheep and goats from the Maasai production system is investigated. The study uses a comparative approach, taking the Baringo livestock production system as an example from which offtake of sheep and goats has largely been commercialised.

Forty-six livestock producers (sellers) and fifty-six buyers were interviewed as they transacted livestock at the Baringo and Kajiado markets. A Structure - Conduct - Performance model has been applied in comparing the results. Further, ordinary least squares regression and analysis of variance (ANOVA) techniques have been applied in analysing the main variables that determine prices and liveweights of the small ruminants transacted in Baringo auction markets. A total of 1481 ruminant market transactions were used in these analyses.

The results showed that Baringo producers routinely sold their small ruminants at competitive auction markets spread in the major production areas of the district. The concentration of the sellers at these markets was low and the buyers were moderately concentrated.

The Kajiado small ruminant markets were characterised by irregular and insufficient supplies. Non-Maasai traders rarely had direct access to the producers in Kajiado and market prices were determined through a one-to-one bargaining method at all the livestock markets.

Marketing efficiencies were largely determined by the mode employed in transporting livestock and the extent to which traders integrated vertically.

Body condition, a proxy for weight and meat quality, was a major determinant of market price. Consequently, the castrates, most of them in good to excellent body condition, commanded premium prices.

ABBREVIATIONS USED

ANOVA	:	Analysis of Variance
BPSSAP	:	Baringo Pilot Semi-arid Area Project
GoK	:	Government of Kenya
ILCA	:	International Livestock Centre for Africa
Kg	:	Kilogramme
KLDP	:	Kenya Livestock Development Project
KMC	:	Kenya Meat Commission
KSh.	:	Kenya Shilling The mean conversion rate between January and July 1985 was approximately US$1.00 = KSh.16.00.
UNDP/FAO	:	United Nations Development Programme/ Food and Agriculture Organization
mm	:	millimeter

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CHAPTER 1

1. INTRODUCTION

1.1 BACKGROUND INFORMATION

1.1.1 Tropical Africa

Approximately 46% (or 155 million) of the total 336 million people in Tropical African countries live in arid and semi-arid lands. These people are sometimes categorised as pastoralists and semi-pastoralists although the categorisation is not exactly in correspondence to the aridity levels [calculated after Jahnke, 1982, and International Livestock Centre for Africa (ILCA), 1980b]. They keep approximately 52%, 58% and 66% respectively of the cattle, sheep and goats found in Tropical Africa.

Together, beef and small ruminant meat contribute 80% of the total meat supply of the Tropical African region, the other 20% coming from pork and poultry. The contribution from small ruminants was estimated at 45% of the total meat supply in 1977. This amount was estimated to equal the contribution from beef [ILCA, 1980a, based on FAO estimates].

Currently almost all the small ruminants are raised under traditional systems of management from which offtake rates of 30-40% per annum are estimated (ILCA, 1980a; Meyn, 1977). It has nevertheless been shown that small ruminants play very important roles in the domestic supply of meat products. Among the roles include picking up the slack in domestic meat supply created by exports of live cattle and beef (Sudan, 1974) and being the choice slaughter stock for religious festivals.

In addition, small ruminants are the choice commercial slaughter stock in remote rural centres and home slaughter in all pastoral communities (Ariza-Nino and Griffith, 1979; Ariza-Nino et al, 1980; Josserand and Sullivan, 1979; Delgado and Staatz, 1980; Tilahun, 1983). Towards the year 2000 increased productivity from small ruminants is emphasised in order to reduce an expected meat supply deficit of 2.8 million metric tons in Tropical Africa (ILCA, 1980a).

1.1.2 Livestock and Meat Production from the Kenyan Rangelands: an Overview

It is estimated that the arid and semi-arid lands of Kenya, also referred to as rangelands, comprise 80% of the total land area of the nation. In 1981 it was estimated that these rangelands were inhabited by three million persons, or 16% of the total Kenya population, who depended largely on livestock for livelihood (Winrock International, 1983). Currently, it is estimated that 5.7 million million head of cattle, 5.0 million sheep and 6.4 million goats are kept in the rangeland out of a national total of 10.9 million cattle, 6.7 million sheep and 7.7 million goats (ILCA, 1985).

Traditionally, these rangelands have been the major sources of beef and small ruminant (sheep and goats) meat for both domestic consumption and export. The meat supply highlighted for Tropical Africa, however, applies to the Kenyan situation as well. Kenya's exports of meat and meat products have been on the decline since 1972 dropping from 10.2 thousand tons in 1972 to 2.3 thousand tons in 1983 (GoK 1984). Serious

shortages in domestic supply of meat, particularly beef, had been predicted over the last ten years (Chemonics 1977, Matthes 1980, GoK 1980). The reasons that these shortages have not been felt yet are probably due to decreasing per capita domestic consumption of beef tied to the local and worldwide state of inflation in the economy. There have also been unofficial but known imports of slaughter cattle from neighbouring countries (GoK 1984).

Currently, 95% of Kenya's annual market offtake, estimated at 311,500 head of cattle, comes from rangeland areas under pastoral production systems. In terms of area, these pastoral production systems occupy approximately 71% of the nation. In recent years, several programmes have been implemented addressing the issues of raising range livestock productivity, especially in the pastoral regions. For instance, the Kenya Livestock Development Projects (KLDP) I and II, implemented during the 1970's and early 1980's, and the Sheep and Goat Development Project focussed entirely on the rangelands, the former emphasizing cattle and the latter small ruminants. The latter evolved out of the realization that small ruminants have a key role in developing the livestock industry in Kenya.

In addition, livestock development issues have formed major components of continuous research programmes and development projects in the rangelands. The major development objectives have been to effect improvements in livestock management, including nutrition and disease control. In addition, the programmes have encompassed introduction of

superior genetic traits among the livestock and development of reliable marketing networks.

. Livestock marketing is considered particularly important because increased production is unlikely to be sustained in the targeted systems unless the product can be traded. However, the specialised public livestock marketing agencies in existence have tended to concentrate on cattle almost to the exclusion of the other species of livestock. The present situation is that almost all the small ruminants marketed out of the rangelands are handled by the private sector. For instance, small ruminants from northern Kenya are bought and transported to the main meat consumer and industrial centres (mainly Nairobi and Mombasa) by merchant traders who transport goods to remote market centres in northern Kenya. These traders backload small ruminants on the return trip (Airey, 1982). Most of these small ruminants are processed in private abattoirs for the domestic market.

Available documentary evidence is unanimous on the low market offtake rates of small ruminants from the whole of the Maasai pastoral production system (including Kajiado and Narok districts). This is in spite of the available opportunities for increasing offtake from the large flocks of small ruminants to the consuming urban centres.

Interviews with cattle traders and producers in eastern Kajiado (ILCA, unpublished) increasingly pointed to the lack of organised marketing system for small ruminants. This situation prevailed despite their availability and the high proportions of

marketable stock that had built up over time among Maasai flocks.

A decision was made to investigate the underlying reasons by comparing the Maasai system with a similar pastoral production system with a commercial marketing orientation for small ruminants. The Baringo system was then chosen for comparison on the basis of its long history of commercial offtake of small ruminants. In addition, a large amount of market transactions data had already been collected by the Sheep and Goat Development Project of United Nations Development Programme/Food and Agriculture Organisation (UNDP/FAO) from some of the Baringo markets. The raw data and the documents already compiled from the activities of this project have provided a starting point in the study of the Baringo system.

1.1.3 The Study Areas: Baringo and Kajiado Districts

1.1.3.1 Location, Size and Human Population

Figure 1.1 shows the location of both districts. Baringo district is 9,885 square kilometres in size (1.8% of Kenya) and in 1979 had an estimated human population of 203,800 persons. The three major ethnic groups in Baringo district are the Tugen (82.5% of district population) the Pokot (13.2%) and the Il Chamus (4.3%).

Kajiado District, located on the southern end of Kenya and bordering the Republic of Tanzania, has an area of 19,600 square kilometers (3.5% of Kenya). The estimated human population in 1979 was 149,000 persons, 70% of whom were pastoral Maasai. The rest were groups of farmers and urban

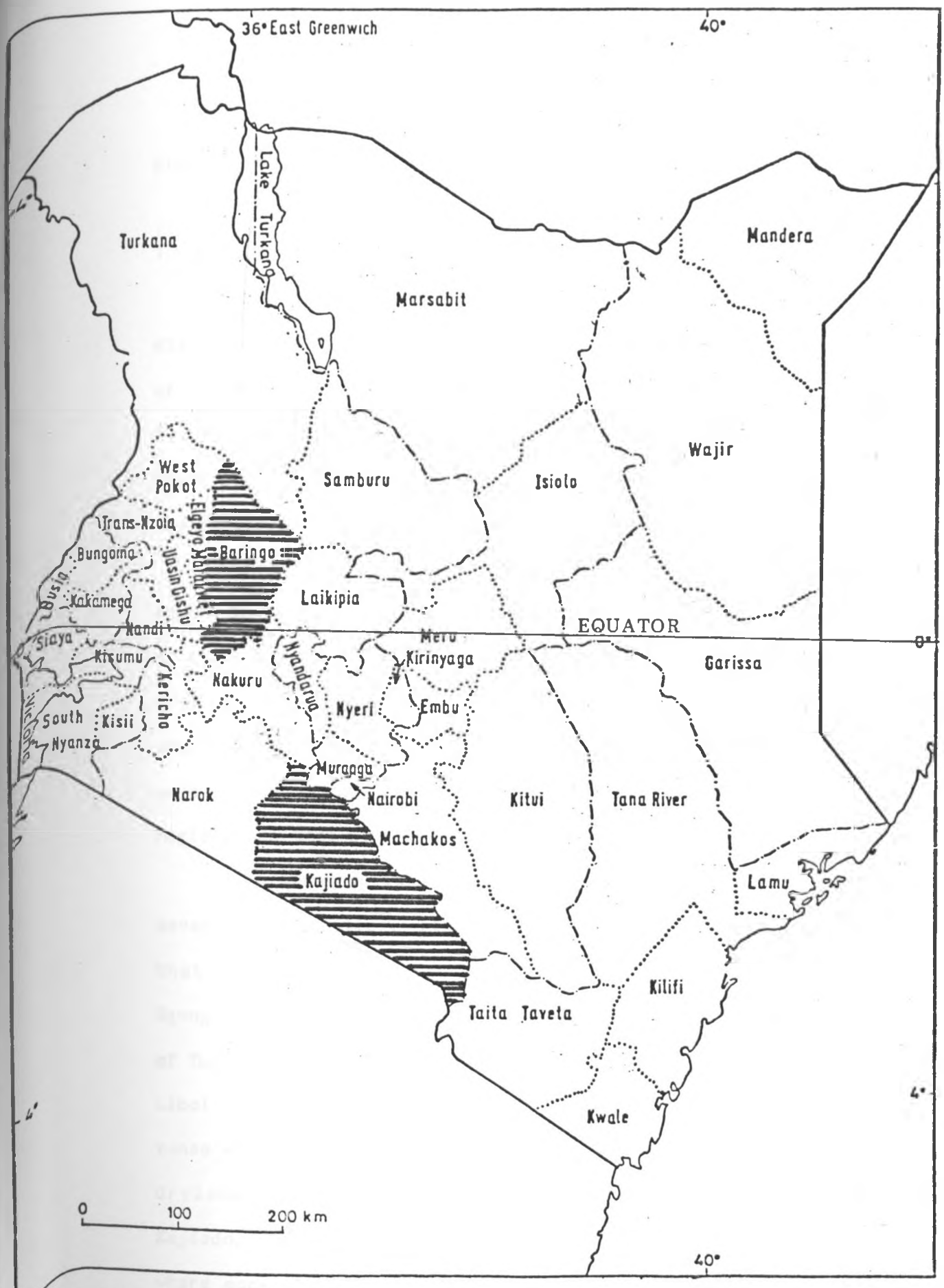

FIG. 1.1 Administrative map of Kenya showing Baringo and Kajiado Districts

population.

1.1.3.2 Climate and Land Use

The annual rainfall varies considerably across the district: Kapeddo[1b] in the north receives a mean annual rainfall of 377 mm, Marigat in the central region receives 650 mm, Eldama Ravine to the south receives 1122 mm and Kabarnet on top of the Tugen Hills receives 1344 mm. Eldama Ravine and Kabarnet areas are agricultural zones and therefore not covered in this study.

Kajiado on the other hand, has a narrower rainfall range across the district[1b]. Loitokitok area in the south eastern end of the district receives 821 mm of rainfall annually. Simba area in the eastern end receives 645 mm, while Kajiado town in the central region receives 510 mm and Magadi in the south western end of the district receives only 494 mm. All these regions are used by pastoralists and considered in this study.

In terms of land use Baringo and Kajiado districts have several similarities. First, there are areas in both districts that are mainly used for crop farming. These areas include Ngong and Loitokitok in Kajiado. In Baringo they include the top of Tugen Hills and Eldama Ravine in addition to the Perkerra and Liboi irrigation schemes. Second, there are the semi-pastoral zones where relatively more people in Baringo district practice dryland farming in addition to keeping livestock than in Kajiado. Third, both districts have the typical pastoral areas where more than 50% of the food and income is derived directly from livestock.

In both districts it can safely be said that the majority of the people depend mainly on livestock for their subsistence and income. It is because of this that the main thrust of government development programmes have been directed towards assisting livestock keepers. Such development programmes include the KLDP in Kajiado under which numerous group and individual ranches have been established and the current Baringo Pilot Semi-arid Area Project (BPSAAP) in Central Baringo. The latter is expected to benefit livestock producers currently holding approximately 27% and 36% of the cattle and small ruminants respectively of the entire district.

Table 1.1 presents estimates of livestock population in the two districts for the period 1970 to 1984. The large variations in numbers between years, especially in Kajiado, is a reflection of the occurrence of frequent droughts resulting in heavy losses. When sufficient rains are received however, the rangelands recover very rapidly leading to rapid build up of herds and flocks. The wide variations in the population estimates of the small ruminants and the gaps in the data presented on Table 1.1 for both districts are also an indication of the problems encountered when attempting to estimate population of small ruminants in the rangelands.

Baringo district is, however, on record as perhaps the most abused and denuded range district in Kenya. The rehabilitation programmes, though showing promising results under controlled trials, have not been successfully adopted by the users of the rangelands. Soil erosion and vegetation degradation are very evident especially in the region now marked

Table 1.1 Estimated Livestock Numbers in Baringo and Kajiado Districts : 1970 - 1984

Year	Baringo		Kajiado	
	Cattle	Small Ruminants	Cattle	Small Ruminants
1970	140,000	800,000	687,000	371,000
1974	154,000	993,000	800,000	1,009,400
1975	156,800	1,020,000	n.a.	n.a.
1976	161,500	1,018,000	500,000	n.a.
1979	366,000	921,000	559,000	773,600
1980	159,100	n.a.	525,000	n.a.
1981	175,000	915,000	644,000	598,000
1982	121,100	n.a.	713,400	n.a.
1984	84,000	n.a.	594,000	n.a.

n.a. = not available

Sources: ILCA 1979

Ministry of Agriculture, 1974 Kajiado District Annual Report.

Ministry of Agriculture (1979) Estimated Livestock Population for Kenya.

Ministry of Agriculture and Livestock Development, Animal Production Branch, 1981 Annual Report.

Ministry of Agriculture and Livestock Development (1984), Cattle and Beef Prices during 1985.

for the BPSAAP. Consequently soil and water conservation, crop and livestock improvement projects are receiving a greater allocation of project funds. For instance, in 1983/84 fiscal year, approximately 82% of the total approved allocation of funds went to the livestock improvement, soil and water conservation projects (GoK, 1983b).

1.2 PROBLEM DEFINITION

Compared to other major livestock producing districts of Kenya, Kajiado has major economic advantages because of its proximity to Nairobi, undoubtedly the main meat consumption centre. It is also close to several meat consuming highland towns. The district is also endowed with large herds and flocks of livestock. However, commercial offtake of small ruminants from Kajiado has been very low compared to other pastoral regions of Kenya like Baringo District.

Various past studies indicate that Kajiado producers maintain reasonable offtakes from their cattle herds, mostly through commercial sales (Bekure et al, 1982; Grandin, 1984; White and Meadows, 1981; Evangelou, 1984), and that the marketing network for cattle is well developed. These studies also found out that offtakes from flocks of small ruminants have been remarkably low. White and Meadows report average offtakes of 6.63% from small ruminants which compares poorly with 30-40% reported by Meyn (1977) in West African countries. Bekure et al (1982) were unable to document any offtake through the main livestock markets in eastern Kajiado. Evangelou (1984) reports insignificant commercial offtake of small ruminants. The few

sales that take place are mainly through the initiative of butchers at the small market centres scattered throughout Kajiado and Narok.

In more recent studies ILCA (1985) has reported total small ruminant offtake rates of 5.8% from Olkarkar group ranch in eastern Kajiado, out of which only 2.3% consisted of commercial sales. The corresponding total offtake from the adjacent Merueshi group ranch was calculated at 8.7%, of which 1.5% was comprised of commercial sales. The results also show that higher offtake rates of small ruminants were realised from poor pastoral households compared to the wealthy households. White and Meadows also found this phenomenon in their studies. Offtakes also tend to increase from the remote hinterland towards the main Nairobi-Mombasa highway and this has been attributed to the local butchers' intiative in buying slaughter stock.

King et al (1982) and Peacock (1984) confirm that Kajiado producers are keeping considerably high proportions of market stock composed of old females, mature and old castrates and old uncastrated males. King et al, for instance, estimated the combined market stock proportions as 37.8% for sheep and 41.9% for goats in Kajiado compared to 8.7% and 9.2% for sheep and goats respectively in Baringo as estimated by Airey (1982).

Other studies (ILCA unpublished) investigating buying orbits and buying behaviour of 18 regular cattle traders and 4 trekkers from eastern Kajiado to Ong'ata Rongai market indicated that traders were averse to trading in small ruminants. Some of the reasons given included unrealistically high prices

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charged by producers, irregular supplies and lack of effective consumer demand in small market centres in the production system.

Available statistics lack precise estimates of the quantities of small ruminant meat demanded in Kenya. However, the future demand is expected to increase rather than decrease. This will result from own demand of small ruminant meat as well as a cross-product (beef/small ruminant meat) demand created by the shortfalls in the supply of beef. The shortfalls in the supply of beef are mainly a result of a decreasing beef herd as shown in Table 1.2. Being the main substitute for beef in Kenya, small ruminant meat has a role to play, either in augmenting domestic supplies of meat and releasing beef for export or being an export product itself.

The expected slack that small ruminant meat is supposed to pick in domestic supplies of meat by 1990 was estimated in excess of 134,000 metric tons (Chemonics, 1977). The National Food Policy document of 1981 estimated the expected deficit in domestic beef supply at 135,000 metric tons by 1989 (GoK, 1981). More recently, a deficit of 10,000 metric tons was estimated for 1985 alone (GoK, 1985a). This deficit was expected to be met entirely through imports of live animals from a neighbouring country. Due to the recent heavy cattle losses from the 1984/85 drought, the deficits are expected to increase progressively between now and 1987 and possibly beyond. These shortage forecast only amplify the increasing role small ruminants must play in the domestic and export meat markets in Kenya.

Table 1.2 Population of Kenya's Beef Cattle: 1973-1983[1/]

Year	Number of beef cattle (thousands)
1973	9,500
1974	9,800
1975	9,250
1976	8,500
1977	9,000
1978	9,120
1979	8,850
1980	8,600
1981	8,330
1982	8,760
1983	9,000

Source: Ministry of Agriculture and Livestock Development, Animal Production Branch Annual Reports, Nairobi.

1/ Simple analysis from the above table shows a negative correlation between time and size of the national beef herd (r=-0.65). For every year the herd reduces by over 85,000 head. Further, a linear trend analysis forecasts that the herd will be reduced to 7.95 million head by the year 1990.

Briefly, the problem investigated is why livestock traders and Kajiado (and indeed, almost all Maasai) producers are not effectively responding to the demand and marketing opportunities for small ruminants. Such opportunities are found in Nairobi and other major meat consuming centres currently supplied from distant production areas including Baringo. The Maasai system has a considerable potential in terms of small ruminant livestock which, if fully exploited, would create a significant increase in Kenya's meat supplies. This increase can be justified in several ways.

First, there is a need to increase the sources of meat supplies to stem the domestic as well as export deficits discussed earlier. As regards exports, Kenya is strategically placed to take advantage of the high demand for small ruminant meat in the Northern Africa and Middle East regions. The two regions increased their small ruminant meat imports from 4,000 tons in 1967 to 128,000 tons in 1977 and still represent the market with the greatest potential for expansion (Winrock International, 1983).

Second, expanding production of small ruminants through regular offtake and price incentives would result in increased total animal biomass productivity of the range resource. The Maasai pastoral producers in Kajiado have always raised small ruminants alongside cattle. The proximity to the major meat processing and consumption centres gives the system a comparative geographic advantage in the national effort to increase production and commercial offtake of small ruminants. Already, several commercial beef ranches in the Eastern and

Coast Provinces of Kenya under the KLDP are incorporating small ruminants as complementary livestock enterprises with encouraging success.

The large proportions of marketable small ruminants retained under the Maasai production system are unjustifiable from an economic point of view, since, in the event of an epidemic disease outbreak considerable losses often result. In 1984, large numbers of small ruminants died from an outbreak of Nairobi Sheep Disease in the eastern Kajiado group ranches. The marketable small ruminants retained by those producers owning large numbers of cattle need to be sold to create additional income to further stimulate increased production. It is possible to sustain a higher offtake rate from the entire system than is the case at the moment.

The Baringo producers have responded well to the incentives created by the regular sale of small ruminants and the system has proved a dependable source of slaughter stock mainly for the Nakuru municipal markets. During periods when outbreaks of notifiable[1a] diseases are kept under control in Baringo, regular auction schedules attract buyers from Nairobi and other centres like Limuru and Kiambu towns in Kiambu District. The Baringo system has been studied and used here as a basis of comparison with the Kajiado marketing system in the anticipation that the marketing constraints identified in Kajiado can be alleviated through approaches used in Baringo.

1.3 OBJECTIVES OF THE STUDY

Baringo district has a long history of organised offtake of small ruminants and cattle spanning over 25 years. Available data on Kajiado, and indeed the whole of the Maasai system, show that only cattle have been the main livestock of commercial transactions. What has not been known is why the differences exist. It is also deemed desirable, as has already been pointed out, that the Kajiado marketing system for small ruminants needs to improve for the main reasons discussed under the problem definition section of this thesis.

The first specific objective of the study is to describe and compare the structure and conduct of the small ruminant markets in the two districts. The processes through which producers make decisions to sell, the concentration and pricing behaviour of both producers and buyers during market transactions are described. The methods buyers choose in disposing of the livestock they buy are also considered key elements in describing the structure and conduct of the markets.

The second objective is to estimate the marketing performance and relative efficiencies achieved in both districts between comparable marketing operations and between different modes of transporting livestock. The marketing costs incurred and the marketing margins are the main aspects considered in analysing this objective.

The third objective is to estimate the effects of sex, body condition, species of livestock as well as the time of sale as independent variables in determining market prices in the

auction type of selling employed in Baringo. Differences in body weight between sexes and between species will be examined as well. From previous marketing studies of cattle markets in Kajiado, where person to person negotiation is the mechanism of determining price, the sex, species and body condition variables have been shown to be the main determinants of market prices (Bekure et al, 1982).

The first two objectives are designed to describe the markets in both Baringo and Kajiado through a structure, conduct and performance (S-C-P) model. The S-C-P model was originally used in the study of industrial organization and is concerned mainly with the actions of firms as sellers of goods and services in the market place (Caves, 1977; Koch, 1974).

Market structure is defined by the economically significant features of a market. Some of these features include the seller and buyer concentration, product differentiation, barriers to entry for new firms and the level of fixed costs at which the firms operate.

These significant features of the market in turn affect the behaviour of the firms in the industry supplying the market and, ultimately, the economic performance of that market. Market behaviour (conduct) includes adoption of such business policies like pricing, setting of the quality of the product(s) and actions aimed at enhancing a firm's competitiveness in the industry by influencing the market structure. Finally, market performance is an appraisal of the actual performance of individual industries compared to their best possible contribution in providing maximum economic welfare to society.

One must, however, recognise that there are limitations in attempting to study pastoral production and offtake through a conventional industrial organisation model of a developed economy. For instance, a major production strategy observed among many pastoral producers aims at satisfying the subsistence needs of the producing households while the formal industries attempt to maximise profits from the sales of their products. The study attempts to identify the weak aspects of the Kajiado marketing system as the areas likely to show positive improvement with some amount of incentive. In particular, the amount and type of interactions and linkages between producers (sellers) and buyers of small ruminants and the marketing services needed for the Kajiado system will be examined.

The third objective focusses on the buyers' criteria for determining prices of individual animals at the market. The criteria applied may sometimes reflect the preferences of consumers as, for instance, where the sex and body condition are the main criteria. At other times, the need to maximise profits may be the motive so that the buyer will select for characteristics with clear price differentials. At yet other times, the buyers attempt to depress market prices by reducing the amount of time for active transactions. This behaviour has been observed in the Kajiado markets. How this can be avoided is examined by analysing the effect of time of sale on movements of market prices in the Baringo auction markets.

Footnotes:

1a) Notifiable diseases are those which, when they occur must be notified to the Veterinary Authorities as soon as possible. Important examples of these diseases in Kenya include rabies, foot and mouth disease, rinderpest and contagious pleuropneumonia.

1b) For location details of the places named, refer to Figures 3.1 and 3.2.

CHAPTER 2

REVIEW OF LITERATURE :
Marketing of Small Ruminants in Baringo and Kajiado Districts

The paucity of quantitative economic data from the pastoral production systems has been noted in the past (Dahl 1976, Little 1983). The problem is even worse with regards to small ruminants because under the traditional management they have been kept, considerable offtake has been consumed within the production units and have passed largely unquantified. Compared to cattle, therefore, utilisation of small ruminants in both domestic and export trade in the Tropical Africa region has been rather insignificant in commercial terms. In principle, however, studies that have been done with regards to offtake of cattle, especially through commercial sales, and problems identified tend to be relevant to small ruminants. This is to be expected since they originate from the same production systems in Kenya and indeed in Tropical Africa in general. One such problem area that has been identified is lack of market information services.

One key role government and public institutions can play in improving livestock market performance in Kenya and in most African countries is by acquiring and disseminating market information. Gatere and Dow (1980) in a consultancy report for the Ministry of Agriculture have clearly pointed out the need for such market information to improve the efficiency of the

beef markets. This observation was made after visiting several livestock markets in the high and medium potential livestock production zones at which both the auction and person-to-person negotiation methods of selling were used. The report indicated that the producers were, in the person-to-person system of selling as happens in Kajiado, generally less knowledgeable about market situation than the buyers. These producers were therefore commonly outwitted by the buyers during selling negotiations.

The report recommended the establishment of a price information system for the direct benefit of producers, buyers, government policy makers and indirectly for the benefit of consumers through rationalization of the marketing system.

The impact of improved price information with regards to small ruminants on the Maasai producers is currently questionable (Evangelou 1984). This pessimistic conclusion was a result of an extensive marketing study involving producers, livestock traders and butchers in the Maasai districts of Kajiado and Narok. Evangelou used a farming systems approach which centres on a household or ranch as a production unit. Study samples included seventy households in the group ranches and nine privately registered ranches within Kajiado. In addition, three small scale and two large scale livestock producers were interviewed in Narok district. Time series data were collected and included incomes, expenditures, livestock transactions, livestock management and labour activities. These data were used in constructing production budgets and in calculating costs and returns of the production units.

Among the many conclusions, Evangelou found out that Maasai traders themselves hardly engaged in marketing of small ruminants except perhaps when starting livestock trade in which case they quickly got to cattle trade as soon as they accumulated sufficient capital. Evangelou firmly asserts that expanded production in the Maasai system is possible but remains suboptimal because of lack of the essential link between production and marketing he defined as:

> "the state where prices accurately reflect demand and the producers being able to respond to the prices in order for improved market performance to further promote production."

Evangelou further argues that the current non-commercial orientation of Maasai producers does not provide a regular supply of small ruminants necessary for a major capital investment like transportation vehicles.

Immediate needs for cash, mainly for food, came up as the major reason for sales and significantly influenced the age and rates of offtake. Over 70% of the goats slaughtered at one of the butcheries surveyed in Kajiado were three years and over compared to an average age of one to two years and rarely over two and a half years from the Il Chamus production system in Baringo (Little 1983). The disparity in the age of offtake indicates that regular offtakes can stimulate production by shortening the time required to produce and provide stock to the market.

The studies of the Il Chamus covered almost the entire economy of this pastoral group of producers in relation to a larger regional economy from which the Il Chamus obtained grain food and other non-agricultural goods. Data on numbers of livestock sold and prices were collected from 58 Il Chamus families during 1980/81 period. A regression analysis of the sales data revealed that average price was not a statistically significant determinant of the number of small ruminant offered for sale. Little also found out that the Il Chamus were rapidly commercialising transaction with small ruminants to the extent that 80% of the transactions were in small ruminants during the 18-month period of study.

The studies by Evangelou diagnosed the existence of the suboptimal offtake of small ruminant from the Maasai system. However, the studies did not suggest methods by which this undesirable situation may be ameliorated. Little's studies as a ready solution also fails in that the Il Chamus represent only a small subsystem in the Baringo district. The proposed study utilises a wider data base in Baringo and compares the Baringo system with Kajiado in attempting to analyse the sub-optimal offtake problem.

The Sheep and Goat Development Project staff have also associated with livestock marketing activities in Baringo district since 1981. Broadly, the main objective of the project has been to improve livestock auction marketing activities in the district through building of handling yards and training of auction staff. In addition, the project staff have collected livestock transactions data which describes each animal sold by

species, sex, breed and body condition and the highest price offered. The areas of residence of both the seller and buyer were also recorded.

From the frequency tabulations of the data collected from six markets during the 1981/83 period, Airey et al (1984) point out that at the initial stages of recording, when auction sales were regularly held, more than one-third of the animals sold were purchased by buyers from Nairobi and Dagoretti. The latter is only 15 km from Nairobi and has three active private abattoirs which process meat for the Nairobi consumption market. Interruptions on marketing schedules caused by outbreaks of notifiable diseases during 1982 and 1983 greately reduced the regularity of attendance by these Nairobi and Dagoretti buyers.

Airey et al also found out that the pastoralists in Baringo maintained a large breeding base of small ruminants (about 50% of the flocks as breeding females) to sustain a high level of market offtake of males. It was estimated that over 75% of all the small ruminants auctioned over this period were males.

The buyers showed a marked preference for goats, on average paying over 30% more for goats than sheep on a price per kilogramme liveweight basis. In conclusion, Airey et al point out that markets must operate on a regular basis and provide sufficient numbers of livestock in order to attract a large number of buyers needed for competitive buying. Providing market information and well in advance about prices, types and numbers of livestock available for each market was also considered a vital service.

These data, however, have not been subjected to any statistical tests simply because they were not intended to be research data in the first place. The results as presented are also deficient in their description of the marketing system in two important aspects. First, no socio-economic background information about the producers and buyers have been presented. The socio-economic aspects form important structure and conduct elements of a pastoral marketing system. Second, marketing costs have been left out altogether. The latter is especially a crucial omission as it makes estimations of market performance an impossibility.

White and Meadows (1981) report the results of a socio-economics study in Kajiado District attempting to quantify changes in production, offtake and living standards of the pastoral communities under the group and individual ranch livestock development programmes. The study compared the status in three developed group and six individual ranches with three undeveloped ranches. Monthly sales data (numbers and monetary value) as well as numbers and imputed value of those consumed at home were recorded between February 1980 and August 1981. Livestock sales were analysed by individual households. Commercial offtake rates were calculated as the ratio of the number sold to the total numbers owned by households. A relevant conclusion arising out of this study was that the ranches, both developed and undeveloped, were not maximising the economic potential of small ruminants. The estimated commercial offtake rates were 6.63%, which, according to the researchers, could easily be doubled. The main cause for the low offtake was

attributed to poor marketing channels.

The White and Meadows study however, does not specify what the available marketing channels are or the solutions envisaged to improve them. The report does not describe how the commercial offtake (sales) is conducted and who the buyers are.

An in-depth study of the Maasai production system has also been conducted by ILCA using a sample of 122 households across three group ranches in eastern Kajiado. As part of this study, time series livestock transactions data were collected each month from each household. Numbers of livestock bought, sold, gifted or exchanged were recorded and described by sex, species and age category. Rates of commercial offtake were calculated as a ratio of the numbers sold to the average numbers held in the year. Grandin and Bekure (1982) reporting on the socio-economic impact state that proximity to demand centres and existing infrastructure have enormous influence on the levels of selling of small ruminants. A group ranch along the Nairobi-Mombasa highway with transportational links to several market centres along the highway reportedly had a commercial offtake rate four times the offtake rate of a group ranch further in the hinterland.

The results also indicated that small ruminants from eastern Kajiado were usually sold by the producer directly to the butcher. In contrast, the cattle were sold to a trader and sometimes changed hands several times before reaching the butcher, finishing ranch or crop farmer as a draught animal.

In this aspect Evangelou (op cit) found out that over half of the small ruminants slaughtered in butcheries were

bought directly from the producers.

Recent results of the above study, (ILCA, 1984) show that relatively wealthier households (in terms of both cattle and small ruminants owned) depend more on cattle sales for their cash income while poorer households depend more on sale of small ruminants.

Traditionally, eastern Kajiado producers raise cattle mainly. Numbers of small ruminants, among producers' livestock holdings, are highest in the central and western regions of Kajiado. The selling and buying of small ruminants also intensifies westwards. This is a result of increasing numbers of small ruminants and the proximity of the central and western regions to Nairobi, a major meat consuming market. The studies in eastern Kajiado alone are therefore unlikely to present a balanced status of the small ruminant marketing activities in Kajiado district.

In the remote production areas of Kajiado, Peacock (1984) observed that higher revenues were achieved from small ruminants when slaughtered and the cooked meat sold than when they were sold live. The slaughtering and selling of cooked meat was done on cattle market days and at other social gatherings at Mbirikani trading centre. The age, sex, weight and prices of the pieces of meat sold were recorded for a sample of small ruminants slaughtered at Mbirikani over a six-month period during 1983/84.

Peacock observed that the species preferred for disposal in this manner was the goat, making up 87% of all the slaughterings (n = 143). Male castrates made up 66.4% of all

the small ruminants slaughtered. Under this arrangement, goats on average fetched a gross income of KShs.337.50 at an average body liveweight of 36.3 kg while sheep fetched a higher income of KShs.380.60 at 36.6 kg liveweight. The main differences in income among the two species was caused by the sale of internal and tail fat from sheep which separately added about KShs.45.00. The income from the small ruminants disposed of this way was 60% higher than the mean prices per head sold live from this area as recorded from household survey data. Peacock's results reveal the true price discovery situation that pertains under uncontrolled price conditions in Kenya. The study by Peacock is part of ILCA's in-depth study of the Maasai production system in eastern Kajiado and the limitations indicated earlier apply.

The studies referred to in this chapter have discussed offtake of small ruminants from Baringo and Kajiado districts in general terms. Information on which commercial offtake was estimated was in most cases entirely derived from producers responses. A few of the studies were conducted in regions of either Baringo or Kajiado and are therefore only representative of the sub-systems studied.

This study, in contrast, utilises information collected directly from the markets in both districts. The important aspects of the data collected include responses of both buyers and sellers at the markets. In addition, objective livestock transactions price data were collected from the auction markets in Baringo. Every effort has been made to spread the markets from which data was collected to cover the important production areas in both districts. The study also emphasises marketing of

small ruminants in both districts and only presents data on cattle marketing for comparative purposes.

CHAPTER 3

3. RESEARCH METHODOLOGY

3.1 SAMPLE POPULATION

To meet the stated objectives, two sample populations were identified. The first sample population consisted of the buyers and sellers participating in the livestock transactions in both Kajiado and Baringo while the second population consisted of the livestock traded in Baringo district.

The first sample was therefore drawn from a population consisting of all the livestock producers and buyers participating in transacting livestock at designated market locations in the range zones of Baringo and Kajiado districts. These range zones were defined as the arid and semi-arid areas of the whole of Kajiado excluding the farming areas of Ngong and Loitokitok and the whole of Baringo excluding the farming areas of Eldam Ravine, the top of Tugen Hills and the Perkerra and Liboi irrigation schemes. In addition, Nginyang Division of Baringo was excluded from the sample population because organised marketing had been suspended due to security problems related to cattle rustling.

The second sample was drawn from a population consisting of all the small ruminants transacted at the Baringo markets between November 1984 and May 1985.

3.2 SAMPLING

3.2.1 Baringo District

A reconnaissance survey visit was made to Baringo for one week in January 1985 before data collection started. The main objective was to determine the appropriate sampling units and sample size. However, since the number of sellers (producers) and buyers was not known, it was not possible to pre-determine an appropriate sample size. A decision was therefore made to utilise the existing marketing schedules arranged by the County Council of Baringo and to cover as many markets as possible in the short period of time the study was carried out. Hence the sampling unit chosen was the market, defined here as "a location designated by the local authority, equipped with livestock handling facilities and which the producers and buyers recognise and utilise for transacting livestock."

At each market site, producers and buyers were interviewed as they waited to receive or make payments for the transactions made. These financial transactions were effected through the County Council cashier on site against official papers issued at the time of presenting animals into the ring. The order followed in making or receiving payments mixed sellers and buyers randomly.

One limitation, however, was the number of interviews that were possible under this arrangement. Several factors contributed to this limitation. First, the interviews were held mainly at the end of the day's selling and buying activity. This is the period when the sellers and buyers would freely

information about the numbers of livestock transacted as most were still transacting at the time of the interviews. Every effort was made to acquire this information by asking the respondents to supply the information at the close of their buying or selling activity. Several respondents did not comply resulting in a rather large wastage due to incomplete data.

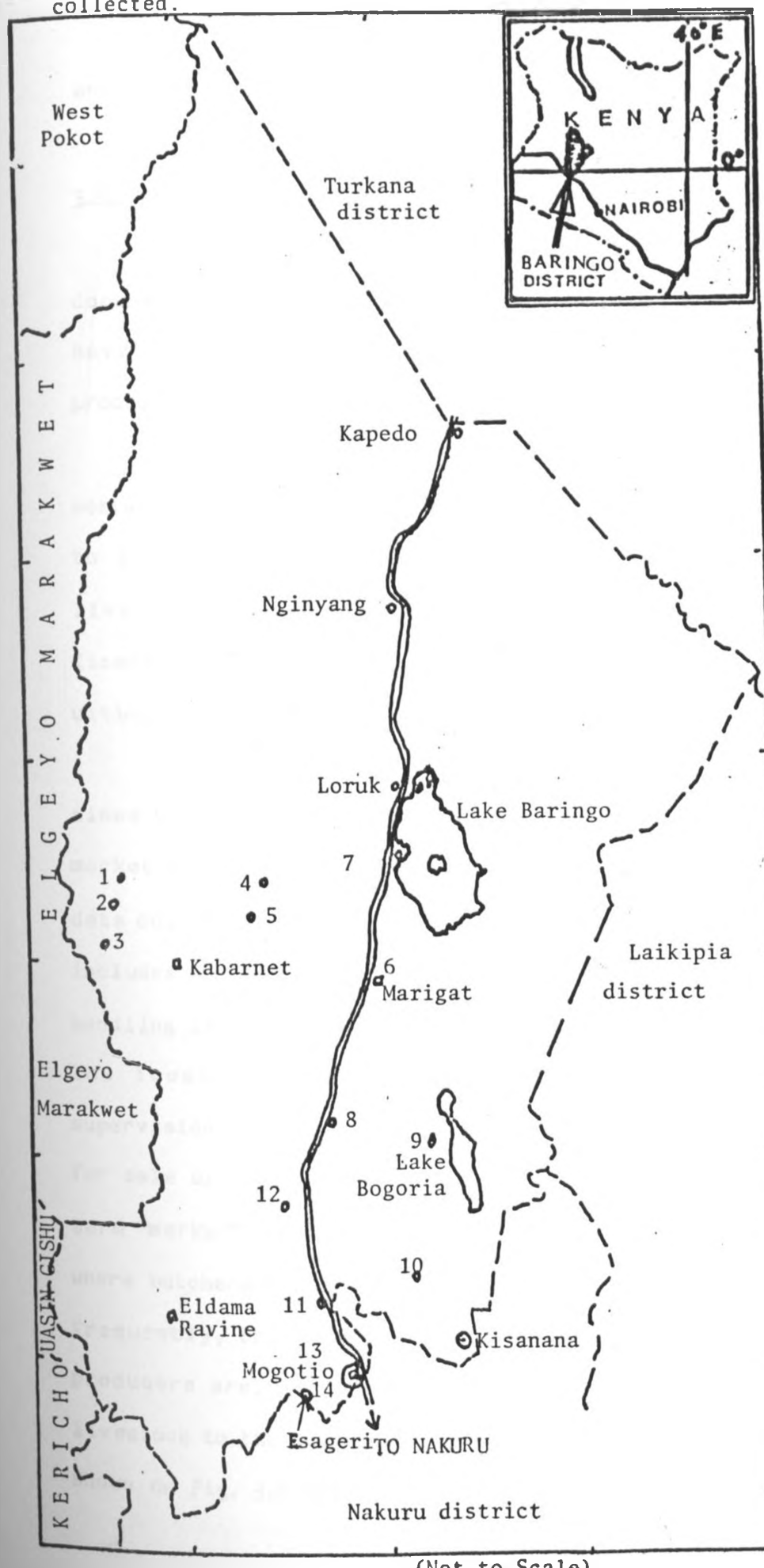
3.3 TYPE OF DATA COLLECTED

Both primary and secondary data have been used in this study. In correspondence to the stated objectives, the following types of data have been collected:-

3.3.1 Baringo district

(a) Twenty six sellers and twenty four buyers were interviewed at fourteen market locations using the questionnaires shown in appendices 1 and 2, respectively. Producers were interviewed to elicit information about their other sources of income, the process of deciding on the livestock to sell from their herds and flocks, approximate numbers sold in a year and the main reasons of selling. The methods producers use for determining selling price, mode of payment for animals sold, producers marketing costs and problems they face during marketing of stock were recorded. The producers were also asked to state the sizes and structure of their herds and flocks from which sale stock were selected. On the other hand, the buyers were asked to state how long they had

Fig 3.1 Map of Baringo district Showing centres where marketing data were collected.



(Not to Scale)

and Esageri in South Baringo.

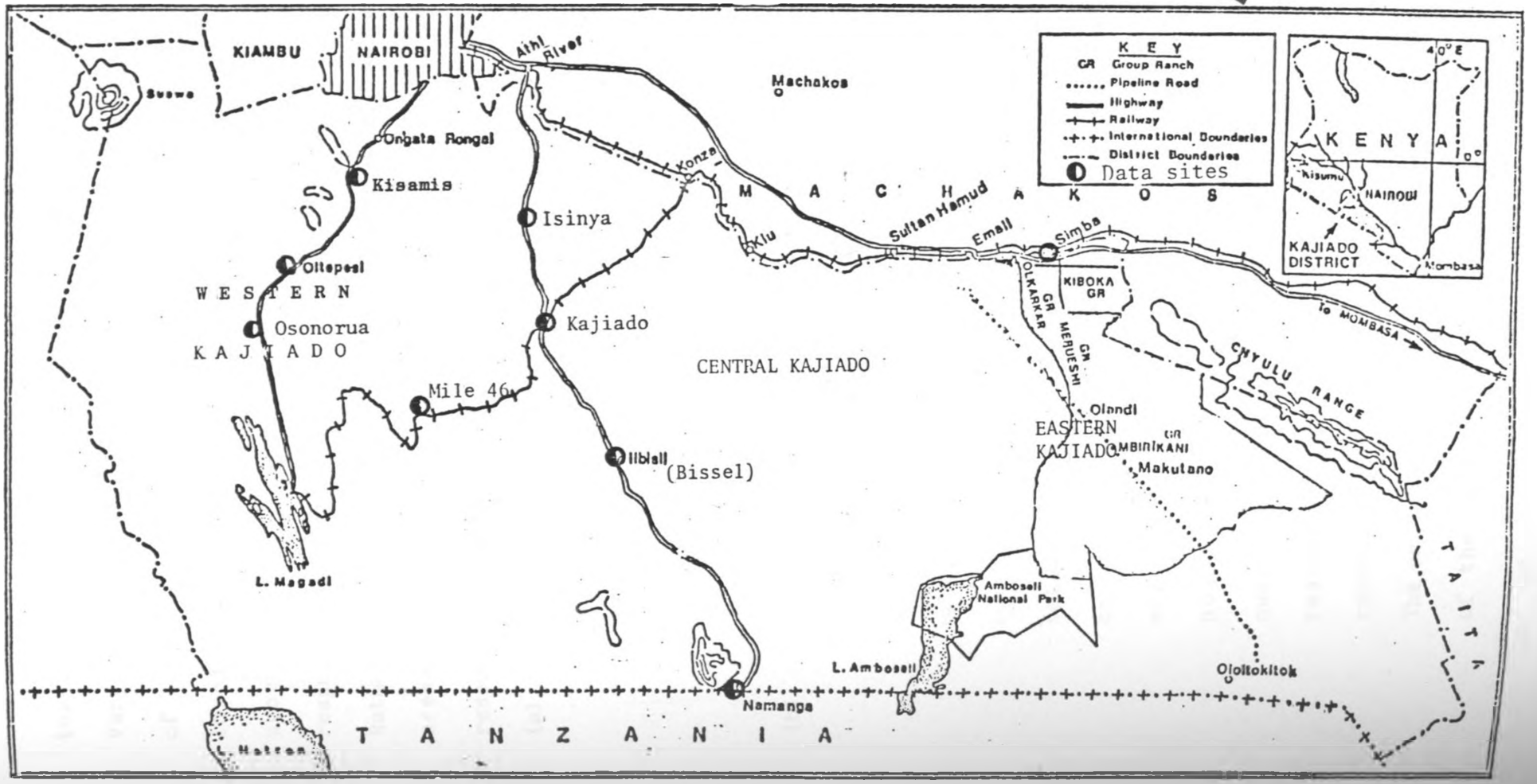
3.2.2 Kajiado District

Eastern Kajiado has been intensively studied and well documented by the ILCA Kenya research team of scientists who have been studying the Maasai pastoral system of livestock production and offtake since 1981.

This study, therefore, lays emphasis on the central and western regions of Kajiado, especially the latter which is known to be a traditional source of small ruminants supplying livestock to abattoirs around Nairobi. These abattoirs are Kiserian, Ngong and Ong'ata Rongai through which the meat ultimately gets into Nairobi.

Again, every available source of data has been utilized since the numbers of producers and buyers are not known. The market has, however, been used as the sampling unit for field data collection. The term "market" with reference to Kajiado includes the designated areas with or without physical livestock handling facilities but well known to the buyers and producers. The local authority may or may not be involved in the supervision of such markets and normally the markets designated for sale of small ruminants in Kajiado are not supervised. The term "market" is also used broadly to include market centres where butchers arrange to buy a few head of livestock, although frequently, from producers with urgent needs for money. The producers are, in this case, responsible for delivering the livestock to the butcher. The markets covered in this study are shown on Fig. 3.2 and include Namanga, Bissel, Mile 46, Kajiado

Fig. 3.2 Map of Kajiado District Showing Market Centres where data were collected



town, Isenya, Kisamis, Osonorua and Simba. All these markets vary in size in terms of numbers of buyers, sellers and volume of stock sold. Kajiado town, Osonorua and simba surveys involved the direct producer-butcher transactions described above. For the reasons mentioned, a sample fraction with respect to markets in Kajiado would be a meaningless statistic. Rather, efforts were made to spread coverage of the production areas. The following approaches were adopted in selecting respondents from Kajiado:

(a) Both the butchers and the producers were interviewed at the small market centres of Simba, Osonorua and Kajiado town. These centres were surveyed for only one day each. For the purposes of the questionnaire the butchers were categorised as buyers.

(b) At the larger markets the interviewer had to move around the open selling places observing transactions and interviewing those transacting. This method was adopted because the buyers and sellers kept changing positions constantly around the selling places as they looked for sellers or buyers. Because of this constant movement, conventional standard random selection procedures could not be applied. To avoid repeating respondents, however, their names were recorded on the questionnaires. The constant movements mixed the respondents so that selection tended to be completely random.

The only limitation in using this approach was that many of the respondents were not able to give complete

information about the numbers of livestock transacted as most were still transacting at the time of the interviews. Every effort was made to acquire this information by asking the respondents to supply the information at the close of their buying or selling activity. Several respondents did not comply resulting in a rather large wastage due to incomplete data.

3.3 TYPE OF DATA COLLECTED

Both primary and secondary data have been used in this study. In correspondence to the stated objectives, the following types of data have been collected:-

3.3.1 Baringo district

(a) Twenty six (26) sellers and twenty four (24) buyers were interviewed at fourteen (14) market locations using the questionnaires shown in appendices 1 and 2, respectively. Producers were interviewed to elicit information about their other sources of income, the process of deciding on the livestock to sell from their herds and flocks, approximate numbers sold in a year and the main reasons of selling. The methods producers use for determining selling price, mode of payment for animals sold, producers marketing costs and problems they face during marketing of stock were recorded. The producers were also asked to state the sizes and structure of their herds and flocks from which sale stock were selected. On the other hand, the buyers were asked to state how long they had

been in the livestock trade, the number of markets they participated in inside and outside the district and species of livestock they preferred to trade. They were asked to state the numbers purchased, the mode and costs of transportation, other marketing costs and destination. They were also asked to state the type and value of their fixed capital in the livestock trade and the general problems they faced while trading.

The County Council of Baringo made available the official record of livestock transactions involving 1581 head of small ruminants and 748 head of cattle covering a period of 29 market days during 1985. A total of 285 buyers and 1221 sellers were involved in these transactions. These data were used to construct the market structure features and the conduct of the markets in Baringo.

(b) Details of livestock transacted and described by species and sex and the highest prices offered were recorded using the form shown in Appendix 3. The details also included estimated weights of each animal transacted and a body condition score. The latter, although subjective, has nevertheless been found to be a consistent technique as a proxy for weight and meat quality of the animal described. The body condition score was made on a scale of 1 to 4. A numerical score of 1 represented emaciated animals in poor body condition. A score of 2 represented those in fair body condition, a score of 3 for those in good condition while a score of 4 was reserved for those in excellent body condition.

Data were collected in this manner on a total of 1091 cattle and 1487 small ruminants. this set of data has been trimmed and only mature stock (994 cattle and 1481 small ruminants) have been included for analysis since it was clear that the marketing activity focussed on slaughter stock.

Additional livestock transactions data, similar to the primary data above, were obtained from the records of the Sheep and Goat Development Project covering several months before the field work for this study was undertaken. These data have been used to augment the primary data in terms of descriptions of livestock transacted and prices, including all those offered but whose highest bids were not acceptable to the sellers.

A starting and ending time record was made on nine market days involving 763 head of small ruminants for the purpose of examining whether time of sale had a significant effect on price offered. These timed transactions are a sub-set of the larger livestock transactions data set.

The transactions data were used in analysing the effects of sex, body condition, species of livestock and time of sale on the price. Weight differences between sexes and species of livestock sold were also examined from these data.

(c) The market performance objective was analysed using the marketing costs obtained from the buyer/seller questionnaires and market prices from the livestock

transactions data set.

The extent to which cattle marketing is investigated in this study is very superficial. The only reason for examining cattle marketing is because in a pastoral production system, utilisation of cattle and small ruminants tend to be largely dependent on each other.

3.3.2 Kajiado District

(a) A total of twenty producers and thirty two buyers were interviewed at the Kajiado markets using the same questionnaires and eliciting the same information as from Baringo.

Personal interviews were held with small ruminant and cattle traders at Ong'ata Rongai and Kiserian to elicit information on sources of supply, availability and prices as they affect resellers of live animals and meat wholesalers at these terminal markets. These data were used in the analysis of structure and conduct in the Kajiado markets.

(b) The thesis has made use of unpublished livestock marketing study data from the Ong'ata Rongai terminal market. The collection of the data during the period 1982 to 1984 was supervised by the author. The unpublished data from Ong'ata Rongai, which is used in this thesis for comparisons with Baringo data, includes sex, species, prices and weights of small ruminants purchased within Kajiado markets and ending up at Ong'ata Rongai abattoirs. The questionnaire used for the

unpublished report in shown on Appendix 4.

The marketing costs data from the seller/buyer questionnaires and the price data from the livestock transactions questionnaire have been used in analysing the performance aspect of the Kajiado markets.

3.4 ANALYTICAL METHODS

3.4.1 **Data transformations**

Two types of data transformations have been made in analysing the livestock transactions data from the Baringo markets.

3.4.1.1 Body Weight Transformations

The first transformation involved using a sample of actual weights of small ruminants (N=63) to predict liveweights from estimated weights of a larger sample of small ruminants (N=800, including the above 63). The liveweight variable has been used repeatedly in analysing livestock transactions data in this thesis. However, it was not considered feasible or necessary to physically weigh all the animals auctioned. A decision was, therefore, made to use a trained weight estimator to estimate the weights of the larger sample N=800. Out of these, 63 were weighed. Comparisons of the estimated and actual weights of the 63 showed that the estimates were consistent with a remarkably high correlation coefficient (r=0.9327) with the actual weights.

A least squares regression analysis using estimated weights as independent variable (X) determining actual weights

(Y) also showed a good fit, $r^2=0.87$ and a low standard error of the actual weights around the fitted line (SE=2.9727). It was decided that the sample of actual weights (N=63) was adequate in formulating a transformation equation using the least squares regression technique. All the weight estimates were therefore transformed into predicted actual weights along the least squares regression line using the equation:-

$Y = 1.226 + 1.0164X$

$t = \quad 20.202$

Where:

Y = Predicted actual body weight in kilogrammes

X = Estimated weight in kilogrammes and

t = Student's "t" statistic for the distribution of β

Subsequently, the predicted weights have been used in all analyses involving body weights.

3.4.1.2 Auction Time Transformations

The second transformation involved calculating the time, in minutes after start of auctioning, when each of a sample of 763 small ruminants was sold. To achieve this, a starting and ending time record was kept on nine market days at nine different market locations.

For each market day, the total time (in minutes) of auctioning activity and the average time it took to auction one lot (usually one head at a time) were calculated. A new auction-time schedule was made for each market day with a time of sale entry corresponding to each animal auctioned in a sequence. If, for instance, in market A the total auction time

was 300 minutes during which 150 small ruminants were sold, then the average auction time was two minutes per head. The small sold 10th in the sequence [also fully described by sex, species, price (Kshs.) and weight as shown on Appendix 3] had its time of auction computed as 20 minutes after the start of auctioning, and 100 minutes for the 50th animal in the sequence.

In all, nine schedules, one for each day, were reconstructed in this manner comprising a total of 763 head of small ruminants. This transformation was necessary for two main reasons. First, market auctions started as different chronological times over the nine days. It was therefore necessary to use "active auction time" instead of "chronological time" of sale for uniformity across the markets. This put starting time at zero for all the timed markets. Second, average auction time per lot was easier to calculate than keeping a time record for each of the 763 timed transactions.

3.4.2 Data analysis

Several analytical methods have been employed in this study. The responses in the producer and buyer questionnaires were first standardised into convenient classes and analysed by questions across the spectrum of respondents. This set of data formed the core in the analysis of the market structure and conduct objective. Both the sellers and buyers are described by their independent significant features and market behaviour. For the sellers (producers), these aspects included the production and marketing goals, the alternative sources of livelihood and income, the methods of setting selling prices,

sources of market information and the main constraints in marketing. The responses were tabulated into absolute frequencies and also expressed as percentages.

The concentration of sellers aspect is presented as the average number of stock sold per seller and the market share taken up by the ten largest sellers over a 29-market day period in Baringo in 1985. No corresponding seller concentration data were calculated for Kajiado since there was no accurate method of determining the number of sellers and number of livestock sold at the Kajiado markets.

The significant market features and market conduct in relation to the buyers include their trading experiences, time allocated into livestock trade and the buyer mobility across markets both within and outside their districts. Also, the purposes and destinations of the livestock they purchasd and the constraints faced in marketing were important aspects studied. Again, the responses were tabulated into absolute frequencies and also expressed as percentages.

Sufficient data was not available to allow a conclusive analysis of level of fixed costs at which the livestock traders operated or the levels of integration. for this reason, only references are made of the few cases observed. Specialisation tendencies have, however, been analysed on the basis of the percentages of traders exhibiting preferences in trading in small ruminants only, in cattle only or in both small ruminants and cattle.

The buyer concentration at the markets in Baringo has been analysed on the basis of the percentage of livestock purchased by the largest ten buyers over a 29-day auction period in 1985. No corresponding analysis was done from Kajiado were the data was lacking.

Market performance has been analysed on the basis of marketing costs. The selling takes place within or close to the production systems so that the pastoral producer himself incurs minimal marketing costs. Market performance, therefore, in this study reflects the efficiency of the livestock buyers up to the retailer. From a welfare stand point, the most desirable level of performance should be that which offers the lowest possible average marketing costs per head of small ruminant sold because this would enable the livestock buyer and the meat seller to offer lower prices to the consumer.

Marketing costs and profit margins have been tabulated using the cost data calculated from the questionnaires and the price data from market transactions. Marketing costs included in the analysis relate to direct costs of transporting livestock, taxes paid to local governments, meat inspection fees paid to the central government, flaying and abattoir charges, direct costs of the buyer and assistants, and imputed trading losses for animals that die or disappear while in possession of the buyer or his agents. Profit margins are then calculated as:-

Profit Margin = Selling Price - Total Costs

Where:

Total costs = Marketing Costs + Buying Price.

Marketing margins are simply calculated as selling price less the buying price.

The analysis to determine the effects of sex, body condition, species of livestock and time of sale as independent variables on price has been done for the livestock transactions data from the Baringo auction markets. As a refinement of the analysis, body weights have been substituted for body condition for the the sample of small ruminants whose weight predictions were made. The variables analysed are, therefore, price (Kenya shillings per head and per kilogramme of body weight) and liveweights. Mean prices and mean weights have been calculated by species (sheep or goat), sex (entire males, castrate or female), body condition class (excellent, good, fair or poor) and by market. The results have been presented in tables and illustrated in bar charts. These analyses have facilitated comparisons of mean prices and weights between Baringo and Kajiado systems.

Ordinary least squares regression analysis has been done for price from the Baringo livestock transactions data using weight, sex and species as independent variables. Least squares regression analysis has also been done for price using body condition as the independent variable. It is therefore possible to estimate expected marginal increases in price for each unit change in body weight and from one body condition class to the next.

Analysis of variance (ANOVA) computations have also been applied to determine statistical significance of the variations for price and weight between species, sexes, body condition

classes and for price only between markets. The underlying hypothesis is that prices offered for each small ruminant are determined by the sex, species and observable quality characteristics of each animal as well as the place of sale.

The sex, species and body condition characteristics also determine the body weights. ANOVA allows for comparisons of mean prices and weights among the classes within each of these variables. For the smaller subset of timed market data, a covariance analysis technique has been used. This approach was used in order to isolate the effects of other variables (sex, market location and species) from the effects of time of sale *per se* on the price variable.

The MSTAT, MICROSTAT and SERIES 100 GRAPHICS computer packages have been used on the HP 150 micro computer for the regressions, ANOVA and charts. Analysis of covariance was done on the main frame HP 3000 computer.

CHAPTER 4

THE STRUCTURE AND CONDUCT OF SMALL RUMINANT MARKETS IN BARINGO AND KAJIADO DISTRICTS

4.1 INTRODUCTION

The individual pastoral producer can be equated to a firm in the context of the industrial organisation theory. The analogy makes it clear that some of the simple decisions that livestock sellers and buyers make do in fact constitute conduct in a pastoral marketing study like this one.

In studying the market structure and conduct objective, one major theoretical consideration has been made. Akin to the simultaneity problem in econometrics is the almost equal forces the sellers and buyers exhibit at the livestock markets. Whereas the sellers depend on the buyers to dispose of the numbers of livestock the sellers choose to market commercially, the livestock trade under the pastoral system is very much regularised by the numbers the sellers choose to offer for sale. As mentioned in Chapter 2, the numbers on offer from the pastoral system are often not determined by the levels of market prices. Indeed, the pastoral producers' objectives are not always to offer his total production for sale. It, therefore, becomes difficult to determine whether greater market forces are exerted by the sellers or buyers in a system like this.

However, it is also realised that the equal market forces do not result in a static equilibrium . Institutional influences, mainly government policies and a wider national

economy, exert periodic influences to which both the sellers and buyers respond differently. For instance, a change in consumer prices of meat instituted by government creates chain responses among both the producers and the buyers. Through the market institution, both the buyers and sellers have developed significant features and behaviour which characterise their coexistence.

This chapter, therefore, describes these features and behaviour of the sellers and buyers almost in equal proportions. For comparisons, results from Baringo and Kajiado are presented and discussed in parallel. The production goals and marketing behaviour of the producers (sellers) are presented in section 4.2 and the characteristics of the buyers in section 4.3. Finally the concentration of buyers and sellers at the Baringo markets is discussed in section 4.4.

4.2 PRODUCER GOALS AND MARKETING BEHAVIOUR

This section describes the economic influences under which the producers in both Baringo and Kajiado market their livestock, especially the small ruminants. The alternatives open to the producer while making marketing decisions are discussed. Among the key issues stressed here include the size and proportion of his market herd in relation to the total livestock owned, his other income generating occupations and the main reasons for selling livestock. The producers' methods of determining selling prices, mode of receiving payments as well as the main methods of transporting livestock to markets are also discussed.

In Baringo, the producers have direct and easy access to auction markets and it was verified that all the sellers interviewed were producers themselves. The situation in Kajiado was not as clear. Several producers who were also part-time traders were encountered. The term "producers" is therefore used here in the wider sense to include those in Kajiado predisposed to trading on part-time basis.

4.2.1 Size and Structure of Herds and Flocks

Producers were asked to state the numbers and kind of livestock they owned. The data were condensed into three main classes as breeding stock, market stock and immatures. The breeding stock in this definition included the mature productive females and males while the market stock comprised of the old unproductive males, the old and mature castrates and the old unproductive females. The proportion of market stock reflects the potential sales that can be made at any particular time without compromising the sustained productivity of the flock or herd. The rest of the stock are made up of immatures.

The results presented on Table 4.1 show that Kajiado producers are keeping more than twice the proportion (percentage) of the market sheep kept by Baringo producers (24.2% in Kajiado compared to 11.3% in Baringo) and a higher proportion of market class of goats (18% to 12.0% respectively). The proportions of market cattle kept per producer are only marginally higher in Kajiado than Baringo (9% in Kajiado compared to 8% in Baringo).

Table 4.1 Mean Livestock Holdings Among Producers

			BARINGO DISTRICT			KAJIADO DISTRICT			
SPECIES	No. of Respondents		Breeding stock	Immatures	Market stock	No. of Respondents	Breeding stock	Immatures	Market stock
1. SHEEP	22	Total livestock	405	527	12	(4)	42	5	15
		Mean holdings [b]	18	24	5		11	1	4
		(%)	(38)	(51)	(11)		(69)	(6)	(25)
2. GOATS	22	Total livestock	675	175	116	(4)	125	59	38
		Mean holdings [b]	31	8	5		31	15	10
		(%)	(70)	(18)	(12)		(55)	(27)	(18)
3. CATTLE	24	Total livestock	295	262	52	(8)	312	152	48
		Mean holdings [b]	12	11	2		39	19	6
4. AGGREGATE: [a]		(%)	(48)	(44)	(8)		(61)	(30)	(9)
SHEEP AND GOATS	2	Total livestock	---	75	---	(10)	---	1144	---
		Mean holdings [b]	---	38	---		---	114	---
5. AGGREGATE [a]	0	Total livestock	---	n.a.	---	(4)	---	395	---
CATTLE		Mean holdings [b]	---	n.a.	---		---	99	---

[a] Some respondents were not able to state the structure of their herds and flocks. Their livestock have been presented as aggregate numbers

[b] Mean holdings = average livestock per respondent

The results confirm previous research findings by various researchers that Kajiado producers have an unexploited potential for increasing offtake of small ruminants into the commercial markets. It has also been amply documented in other studies (ILCA 1984, White and Meadows 1981, Evangelou 1984) that wealthy Maasai producers will most likely sell cattle to meet their cash needs even if they had large flocks of small ruminants and many market stock among the flocks. This indicates that for individual Maasai producers the commercial offtake rates of small ruminants are inversely related to the numbers of cattle owned. A desirable relationship should be a positive one where both the small ruminant and cattle enterprises should be supportive of each other and allow increased offtakes of each.

Occasionally, the pastoralist has other ways of raising income which tends to reduce the need for selling livestock owned. Some of these alternative sources of income are discussed below.

4.2.2 Alternative Occupations of Producers

Respondents were asked to state what other occupations they had in addition to keeping livestock. It was, however, necessary to establish that the sellers were primarily producers and not livestock traders before the interviews.

These results showed a strong tendency to diversify into crop farming among the Baringo livestock producers. Almost 70% of the respondents attempted crop farming in addition to keeping livestock and only 15% subsisted as livestock keepers only. The

rest had a salaried employment in addition to keeping livestock. Other reports have shown this tendency to farming to be the case although with high rates of crop failure because of inappropriate agronomical techniques used. Average plot sizes has been estmated at 0.5 hectares (GoK 1984). The trend into farming in the range areas of Baringo is a result of deteriorating ecological conditions making the dependence on livestock increasingly unviable. The high rate of crop failure makes the Baringo producers heavily dependent on livestock sales to raise cash to purchase food for the families as illustrated in section 4.2.3.

In Maasailand about 60% of the producers interviewed at the markets indicated that they engaged in part-time trading in livestock. This was especially the case after the devastating 1984/85 drought when large number of cattle died. The post-drought recovery strategies involved buying and selling of small ruminants, especially in the Western and Central regions of Kajiado, and using the net income from trading to purchase other goods. In some cases the purchased small ruminants were kept and later exchanged for cattle as a way of rapid cattle herd build-up or simply sold and the income used to purchase cattle directly from the markets. About 30% of these producers were livestock keepers only while 10% attempted crop farming in addition to keeping livestock.

However, many prominent livestock traders interviewed in Kajiado considered this part-time occupation as competition. They argued that this increased the number of middlemen which resulted in unacceptably high prices at the terminal markets.

The argument was economically sound and the almost unsatiable demand for small ruminants during the post-drought period drove their prices quite high causing the regular traders to shift to buying cattle instead.

Provision of famine relief food by government also made it easier for the Kajiado producers to direct most of the available income and savings into part-time livestock trading instead of purchasing food for the family. In Baringo, provision of famine relief food boosted the ability of producers to bargain for better prices at the markets. Usually, buyers take advantage of the droughts and food shortages and pressurise producers to sell at low prices.

Although availability of market stock and alternative sources of income are fundamental considerations in marketing decisions, the producer's specific needs for cash ultimately determine what type of livestock would be appropriate to sell. These needs are discussed in the following section.

4.2.3 Major Reasons for Selling Livestock

Producers were asked to state the specific reasons or circumstances that would lead them to select either a small ruminant or cattle for sale in instances where they had both types of livestock. Of the 26 producers interviewed in Baringo, 21 responded to the choice of small ruminant for the market while 24 responded to the choice of cattle. In Kajiado 17 producers responded to the choice of small ruminants while 18 responded to the choice of cattle out of the total of 20 respondents. The respondents were free to give multiple reasons

if they considered them important and therefore the number of reasons sometimes exceeded the number of respondents. Table 4.2 presents a summary of the results.

In Baringo 71% of the respondents indicated that their main reasons for selling small ruminants were related to family welfare including food, clothing and education for the children while for cattle the equivalent proportion was 58%. In Kajiado, reasons of family welfare, including medical care and children education, were given by 88% of the producers as the main reasons for selling small ruminants while for cattle sales these reasons were given by 72% of the producers. Culling due to old age and the need to raise capital for farming were conspicuously more important among producers in Baringo than in Kajiado. In Kajiado young producers wishing to get into livestock trade would normally sell cattle to raise starting capital as reflected from the table above. In one illustrated trading partnership, (see section 7.2.5.2) young producers in Kajiado started their trade in small ruminants by selling some from their home flocks to raise starting capital.

In analysing the major reasons for selling stock the other occupations of producers have not been taken into account. The omission is purely to simplify the analysis although it must be accepted that a producer who has a regular income from a salaried job for example may need only to sell a small ruminant and combine the income with his regular salary and be able to meet most of his cash requirement. Also the added income security from his job would clearly increase his flexibility in making decisions to sell and invest into non-livestock related

Table 4.2 Summary of Producers' Major Reasons for Selling Livestock

Set of Reasons	BARINGO PRODUCERS Percentage of Respondents		KAJIADO PRODUCERS Percentage of Respondents	
	A Small ruminants	B Cattle	A Small Ruminants	B Cattle
1. Family welfare (education, food, health)	71%	58%	88%	72%
2. Livestock health and management (culling, drugs, drought)	19%	42%	12%	28%
3. To raise capital for farming	5%	25%	0%	0%
4. To raise capital for livestock structures and homes	0%	0%	0%	6%
5. To raise capital for starting trade	0%	0%	0%	11%
6. Other reasons	14%	21%	24%	61%

activities. The results are also influenced by whether or not the producers interviewed had both cattle and small ruminants to choose from.

In Baringo, the higher frequencies with respect to sale of small ruminants to purchase schools uniforms, family food and clothing would strongly suggest that producers are able to meet the costs of these items easily from frequent sale of small ruminants. Cattle are sold only for items requiring higher cash expenses and rather infrequently like payment of school fees and purchase of farm inputs. It is highly probable, also, that shortage of market cattle in Baringo was the most important factor contributing to the high frequencies of small ruminant sales.

The proximity of market facilities also influences the frequency of selling and sometimes the type of animal sold as discussed in the following section.

4.2.4 Producers' Choice of Selling Sites

The marketing channels and selling sites were investigated in both districts by asking producers to state at which places they had sold livestock in the 12 month period preceding the interviews. They were also asked to state the kind and numbers of livestock transacted at these places. The kind of selling places were for this purpose classified as either at the boma (homestead), watering point or nearest formal market. The producers' responses are summarised in Table 4.3.

The results show that Baringo producers exhibit a strong preference for selling both small ruminants and cattle at the

Table 4.3 Prefered Selling Sites for Baringo and Kajiado Producers

District/Place	SMALL RUMINANTS				CATTLE			
	Responses		Livestock		Responses		Livestock	
BARINGO	No.	(%)	No.	%	No.	(%)	No.	(%)
Boma	5	(22)	107	(19)	3	(18)	19	(12)
Water point	0	(0)	0	(0)	0	(0)	0	(0)
Designated market	18	(78)	465	(81)	14	(82)	142	(88)
TOTAL	23	(100)	572	(100)	17	(100)	161	(100)
KAJIADO								
Boma	4	(33)	27	(36)	5	(29)	32	(27)
Water point	0	(0)	0	(0)	0	(0)	0	(0)
Designated market	8	(67)	49	(64)	12	(71)	88	(73)
TOTAL	12	(100)	76	(100)	17	(100)	120	(100)

designated markets much more than the Kajiado producers. In Baringo, 81% of the small ruminants and 88% of the cattle were sold at designated markets compared to 64% for small ruminants and 73% for cattle in Kajiado.

Sales of small ruminants from the boma are common in Kajiado for homesteads close to market centres and usually a local butcher walks in to persuade the stock owner to sell. Close friendship between the buyer and producer is very common in this type of transaction and in Kajiado over one-third (36%) of the small ruminants are sold this way.

In Baringo less than one-fifth (19%) of the sales of small ruminants take place at the bomas. It was clear from the interviews with producers that the frequent auctions at markets close to production areas reduce the need to sell from the bomas. Cattle sales from the bomas are not a common feature in Baringo for the same reason.

In Kajiado, the chances of having a part-time trader in the same or from a closeby boma are rather high. Rather than waste a whole day at the market, a producer would sometimes prefer to sell cattle to such a neighbour trader or request him to sell the animal on his behalf. This accounts for the high rate of boma sales (27%). Sales at the boma obviously have the advantage of eliminating transfer costs and risks from the producer. There is also the disadvantage in that producers are often less informed about current market prices and would therefore most likely not receive a fair price from a buyer who is usually more informed.

The methods used by the producers in determining prices of small ruminants are discussed in the following section.

4.2.5 Determining Selling Prices for Small Ruminants

The respondents were asked to state what method they used in determining the price to ask for their small ruminants when selling. The results are summarised in Table 4.4 below.

The one criterion common in both districts is the use of size/age as basis of determining appropriate market price of small ruminants. This is an approximation of the live weight of the animal. Interviews with Baringo producers revealed that the majority knew the price of meat per kilogramme at the local butcheries, and devised their own formular for estimating the equivalent liveweight prices. The seller would then ask for a price as near as possible to the estimated worth of the live animal. Others, in the case of auctions, simply observed the prices offered for the first few animals in the auction ring before setting reserve prices of their stock.

For both Baringo and Kajiado it was observed that the majority of producers occasionally visited markets mainly to acquire livestock market information as discussed in the following section.

4.2.6 Markets as Sources of Information for Producers

Visits to livestock markets in operation were considered as a major method through which producers acquired market information and hopefully enhanced their competitive ability in pricing. To test to what degree the producers exploit this

Table 4.4 Producers' Methods of Determining Selling Prices for Small Ruminants

Criteria	Baringo District		Kajiado District	
	No. of responses	%	No. of responses	%
1. Size and age of animal	10	(33)	13	(43)
2. Bargaining subject to reserve price	7	(23)	0	(0)
3. Rely entirely on market forces of supply and demand	1	(3)	16	(53)
4. Rely entirely on auction method	9	(30)	0	(0)
5. Take into account pressures from drought and other circumstances	3	(10)	1	(3)
	30		30	

method and their other reasons for visiting markets when they are not selling livestock, respondents were asked to state whether they visited markets regularly, occasionally or rarely and the reasons for each case. Table 4.5 summarizes the answers to this question.

For the regular and occasional visitors to markets the need to keep abreast with livestock prices was clearly the overwhelming reason. Collecting and paying past debts to both livestock traders as well as sellers of other wares are also important reasons for the visits. Producers who never visited markets unless they were selling unanimously believed it was a waste of time in both districts.

As an indicator of the level of market development, the mode of payment for the small ruminants bought at the Baringo and Kajiado markets is discussed in the next section.

4.2.7 Mode of Payment for Small Ruminants Sold

All the 26 producers interviewed in Baringo stated that they had to receive full payment at the close of the auction. The auction system does not encourage deferred payments since in most cases the sellers and buyers are unfamiliar to each other. The auctioneer does not act as undertaker to collect unpaid debts on behalf of sellers.

In Kajiado eight of the nineteen producers interviewed, or 42%, always insisted on being paid in full immediately while eleven, or 58%,accepted selling on credit or part payment. The buyers benefiting from extended credit were categorised as regular customers or relatives, all invariably operating in

Table 4.5 Frequency of and Reasons for Visiting Markets when one is not selling livestock

Frequency	Number of respondents	(%)	District	Reasons for or against visits	Number of responses per reason[a/]
a) Regularly	5	(19)	-Baringo	-Keep abreast with market prices	5
	3	(16)	-Kajiado	-Keep abreast with market prices	1
				-Acquired passtime hobby	2
b) Occasionally	17	(65)	-Baringo	-Keep abreast with market prices	10
				-Collect/pay debts	5
				-To buy other wares	5
				-Hobby (social)	1
				-Wastes time	1
	13	(68)	-Kajiado	-Keep abreast with livestock prices	7
				-Hobby	4
				-Borrow money from friends	2
				-Collect/pay debts	2
				-Purchase other wares	1
c) Never	4	(15)	-Baringo	-Wastes time	4
	3	(16)	-Kajiado	-Wastes time	3

[a/] The number of responses may exceed number of respondents when a respondent has more than one reason for each circumstance.

remote markets of Kajiado and re-selling both locally and in markets close to Nairobi.

The person-to-person negotiations that take place and sometimes pre-existing relationships between producers and buyers create social bondanges commonly taken into account in livestock transactions (Grandin 1984). Although cases of default on payment are not common, the waiting time can be costly to the producers when they sell on credit or agreed deferred payments. The producers, however, are able to bridge the delays by borrowing from third parties promising to repay when the buyers pay up.

This deferred mode of payment is a significant indicator of an undeveloped marketing arrangement. It does not create an environment conducive to regular selling as generally all sellers prefer to be paid promptly at the time of transaction. Instead, the pastoralists get discouraged from selling.

The producers interviewed in both districts indicated that small ruminants were invariably trekked for insignificant distances to markets. Minimal trekking costs were therefore incurred and in almost all cases the owners themselves did the trekking. The producers' views about problems pertaining to small ruminant marketing are discussed in the following section.

4.2.8 Main Problems Experienced when Selling Small Ruminants

The producers were asked to describe what their major problems were when marketing small ruminants. Producers frequently gave more than one answer and the responses are tabulated on Table 4.6

Table 4,6 Problems Associated with Selling Small Ruminants

Problem	Baringo District		Kajiado District	
	No. of responses	(%)	No. of responses	(%)
1. Lack of organised markets	13	(38)	9	(30)
2. Low market prices	19	(56)	12	(40)
3. Frequent disease outbreaks	2	(6)	8	(27)
4. Buyers are afraid of buying stolen animals and buy less as a result	0	0	1	(3)
TOTAL	34	100	30	100

Low market prices and lack of organised markets were the two major problems the producers in both districts indicated they faced. Distance to the abattoirs, accessibility to the markets and periodic peak demands for cash were some of the circumstances related to low market prices in Baringo. For instance, in the Kerio Valley, average prices of small ruminants were about 30% lower than the prices offered in markets close to the abattoirs in South Baringo. There were other periods of peak demand for cash, like the start of every school term, when producers desparately needed to raise money for school fees and uniforms. The producers' bargaining power during these periods was considerably reduced and often the auctioneer had to use his tact in persuading buyers to raise offers to levels acceptable to the sellers.

Producers in Baringo who felt that organised markets were lacking had in mind the monthly auction schedules repeating at each market only once monthly and sometimes once every two months. Producers preferred to have auctions at closer intervals, especially since the designated market days scheduled on a once-weekly basis in recognised market centres are virtually ineffective in Baringo.

In the Kajiado markets no auction system exists and, as a form of revenue, the cess derived from live small ruminant sales has been insignificant for the whole district. There has, therefore, been no purposeful effort on the part of the county council to allocate resources for the development or operation of small ruminant markets. Instead the County Council of Olkejuado has concentrated on collecting cess at the abattoirs

on each head of small ruminant and cattle slaughtered. This system has been made easy by the elaborate records maintained at all major abattoirs.

Disease outbreaks, especially foot and mouth, and subsequent quarantine restrictions in movement of livestock within and out of the affected areas have been common problems in both districts. In the event of a disease outbreak, all scheduled auctions and formal markets premises are closed for all transactions until the areas are clear of the disease. Such a disease outbreak becomes a major worry for every producer who depends on livestock sales as the main source of income. The effects can be disastrous if the outbreak occurs immediately before a period of peak demand for cash described earlier.

The major differences in the problems faced by producers in the two districts can be summed up as poor market organisation and a higher rate of disease outbreak affecting the Kajiado markets. The problem of market organisation has been largely solved in the Baringo markets through the establishment of auction yards in the major production areas of the district. The manpower services for these auction markets are sufficiently provided by the local council with the support of the government ministries and the UNDP/FAO.

4.3 CHARACTERISTICS OF THE BUYERS

The role of the private buyer in livestock trade in Kenya has always been an important one. Like the producer, the buyer has various options when making decisions in livestock trade. For instance, he has the choice to trade in cattle or

small ruminants, allocate all or part of his working time into the trade and to decide how much capital to allocate in trade. He also decides the geographical areas (orbits) to trade in.

This section examines the characteristics of the buyers and the role they play as market participants in both Baringo and Kajiado Districts. As in all trading activities, it is assumed that the buyers aim at maximising profits and therefore make decisions that rationally minimise marketing costs.

The section presents results obtained from interviews (using questionnaire shown as Appendix 2) involving 24 and 32 buyers from Baringo and Kajiado markets respectively.

4.3.1 Trading Experience

All the buyers interviewed were asked to indicate how long they had been trading in livestock. The responses were classified into time groups shown on Table 4.7.

The results show that 20% of the buyers in Baringo had three years of trading experience and below compared to 44% among the buyers in Kajiado. The latter is explained mainly by the relatively large number of producers who had turned part-time traders at the time of the survey in Kajiado.

Baringo district, however, had a significantly higher proportion of traders with long experiences compared to Kajiado (59% with seven years and beyond to 41% in Kajiado). Buying expertise, although not exclusively dependent on number of years a buyer has been in trade is nevertheless highly related to the period of trading. The main attribute of an experienced and successful livestock buyer under the circumstances studied here

Table 4.7 Trading Experiences of Buyers

	NUMBER OF YEARS IN TRADE				
Baringo District	1 year	1-3 years	4-6 years	7-9 years	10 years plus
No. of respondents	3	2	5	4	10
(%)	(12)	(8)	(21)	(17)	(42)
Kajiado District					
No. of respondents	5	9	5	5	8
(%)	(16)	(28)	(16)	(16)	(25)

is the precision at estimating liveweights and indirectly the killing-out weights of slaughter stock. Ultimately the buyer must aim at paying a price that will allow a reasonable management income, all costs considered.

Discussions with prominent meat wholesalers at Ong'ata Rongai revealed that many livestock buyers have gone out of business purely through wrong estimation of livestock weights at buying. This has happened especially among those traders in the business of buying livestock and supplying meat whole sale to the retailers.

The amount of time the buyers allocated to livestock trade is discussed in the following section.

4.3.2 Time spent in tasks related to Livestock Trade

Using a week as a basis, respondents were asked to state the number of days they spent either buying, reselling, retailing or delivering meat. The results were as shown on Table 4.8.

Clearly most buyers considered themselves full time traders spending almost a whole week in the business. In Baringo, 50% of the buyers spent a minimum of six days each week trading in livestock. The corresponding proportion of buyers in Kajiado was much higher, at 85%. The difference in time allocated amplifies the extra time and efforts that Kajiado traders put into procuring livestock. This usually involves visiting bomas, water points and smaller market centres before the traders are able to accumulate sufficient mobs to take to larger market centres for resale or slaughter. This problems

Table 4.8 Time Allocation in Livestock Trade

	1	2	3	4	5	6	7
No. of respondents							
Baringo: N=24	1	3	3	3	2	8	4
(Declining %)	(100)	(97)	(84)	(71)	(58)	(50)	(17)
Kajiado: N=32	0	1	2	2	0	14	13
(Declining %) 1/	(100)	(100)	(97)	(91)	(85)	(85)	(41)

1/ Declining percentage portrays an inverse relationship between the number of buyers and the number of days allocated to livestock trade in a week.

relates to poor organisation of the marketing system in Kajiado alluded to earlier and presented as one of the problems faced by the producers. There is a certain information gap between producers and buyers. Under this arrangement, most of the buying from the producers in Kajiado is left to the local traders, many of them trading only part-time, with insufficient capital.

Due to the problems of insufficient capital, the laborious and time wasting procedures of procuring livestock and the attachment the Kajiado traders have to their own herds/flocks, the buyers tend to be less versatile in their buying orbits as shown in the next section.

4.3.3 Buyers' Mobility across markets

Respondents were asked to state the number of markets at which they bought livestock both within and outside Baringo and Kajiado districts. The results are presented in Table 4.9.

The results illustrate that buyers operating in the Baringo markets were quite versatile and operated in several markets within and outside the district. In contrast, buyers interviewed at the Kajiado markets tended to operate in very few markets and only one buyer purchased stock outside the district. For instance, 78% of the buyers in Kajiado purchased livestock at less than five markets within the district whereas, in Baringo, the corresponding proportion was only 56%. Also, the proportion buying stock at more than 10 markets in Baringo was seven times larger than the corresponding proportion in Kajiado district.

Table 4.9 Numerical Distribution of Markets Frequented by Buyers

Location	Number of markets/districts	BARINGO No. of responses	%	KAJIADO No. of responses	%
INSIDE:	At 1 market only	3	(13)	13	(41)
DISTRICT	At 2-4 markets	10	(43)	12	(37)
	At 5-10 markets	0	(0)	5	(16)
	At >10 markets	10	(43)	2	(6)
OUTSIDE	In 1 more district	1	(4)	0	(0)
DISTRICT	2 more districts	2	(9)	1	(3)
	3 more districts	3	(13)	0	(0)
	4 more districts	1	(4)	0	(0)
	5 more districts	1	(4)	0	(0)

Through experience, buyers get to know their buying orbits and set up maximum market prices they would be willing to pay from each market taking into account the marketing costs involved up to their destinations. For instance, buyers supplying wholesale carcasses from Mogotio abattoir to Nakuru municipality hardly bought at markets north of Marigat trading centre. The reasons given were increasing marketing costs. In addition, many buyers wanted to be available to supervise the slaughtering at the Mogotio abattoir in the mornings before rushing off to buy later in the day.

Some buyers operated in partnerships so that one could concentrate on buying activities while the others supervised the slaughtering, delivery of meat and collection of payments from the retailers. Unlike cattle, small ruminants were not trekked over long distances to the abattoirs. Buyers indicated that heavy losses from exhaustion were common. For this reason, buyers stuck to markets nearest to the abattoirs or resale points unless they wished to truck the animals.

Prominent buyers and retail butchers of small ruminants at Ong'ata Rongai and Kiserian markets sent advance buying parties to the Magadi area. As soon as sufficient numbers were procured, the advance parties sent word to the owners who hired trucks to bring the stock to either Kiserian or Ong'ata Rongai abattoirs. This way, transportation costs were incurred only when it was necessary and were kept to the minimum.

As discussed under section 5.2, transportation costs can be quite substantial especially when trucking has to be employed to conform with disease control restrictions. Normally

marketing is stopped altogether in the event of outbreaks of notifiable diseases which have been rather frequent in both districts. To cope with frequent market closures and restrictions on movement of livestock, a series of abattoirs have been set up along the Baringo-Nakuru boundaries (Noiwet-Mogotio, Kisanana and Esageri) for slaughtering stock from Baringo. In Kajiado similar abattoirs have come up in Namanga, and Bissel to process meat destined for the Nairobi market.

Between January and April of 1985 a total of 4111 head of small ruminants and 3023 cattle were slaughtered at these Baringo-Nakuru border abattoirs and sold in Nakuru. A sample of 64 small ruminant dressed carcasses were weighed at Mogotio abattoir and mean carcass weights calculated at 13.3 kg per head. These weights compare very closely with the mean carcass weights of 13.8 kg that have been recorded at Olekesasi abattoir at Ong'ata Rongai between the period 1982-84 involving a total of 909 head of small ruminants.

Purely on the basis of weight alone, therefore, small ruminants purchased from Kajiado and Baringo could not be differentiable. Quality differences were also unlikely to be significant and in any case most consumers are not influenced by quality grades at local butcheries. Weight and meat quality are emphasised purely to stress the fact that small ruminants sold in the Baringo and Kajiado markets can be considered as similar products. The reasons that the Nairobi, Dagoretti and Limuru buyers have for choosing to buy small ruminants from Baringo while Kajiado is a nearer source must be based on factors other than product quality.

The various destinations and purposes for buying livestock are discussed below.

4.3.4 Destinations of Purchased Stock Relative to Livestock Markets

Respondents from Baringo and Kajiado were asked to state the destinations and purpose of the livestock they bought. The destinations were classified into slaughter and consumption centres inside the district, slaughter inside the district with consumption centres outside the district and slaughter and consumption outside the district. The latter implied that livestock bought were transported live outside the district. The purposes were classified as resale, retail butchering, wholesale of meat and contract supplying of live animals to processing plants [for instance the Kenya Meat Commission (KMC)] or meat to institutions. The results, presented on Table 4.10, show that retail butchering trade was the main purpose for most of the livestock buyers purchasing and disposing within the two districts. A large number of buyers also engaged in reselling livestock to meat wholesalers and other retailers at the abattoir sites for immediate slaughter.

All the operators engaged in slaughtering livestock inside the districts and transporting meat to consumption centres outside the districts were wholesalers and contract suppliers serving Nakuru and Nairobi from Baringo and Kajiado areas respectively. Buyers transporting live animals out of the districts were primarily retailers in Nairobi, Nakuru and Limuru.

Table 4.10 Destinations and Purpose of Purchased Stock

Destination	Purpose	BARINGO DISTRICT (Respondents N = 24) No. of Responses[1]	No. of Small Ruminants	No. of Cattle	KAJIADO DISTRICT (Respondents N = 32) No. of Responses[1]	No. of Small Ruminants	No. of Cattle
A. To abattoirs and consumption centres inside district	1. Resell	5	93	0	12	n.a.	9
	2. Retail butcher	12	114	11	16	77	18
	3. Wholesale	0	0	0	0	0	0
	4. Contract supply	0	0	0	1	2	0
B. To abattoirs inside district, consumption outside district	1. Resell	0	0	0	0	0	0
	2. Retail butcher	0	0	0	2	41	0
	3. Wholesale	4	65	31	3	0	84
	4. Contract supply	1	48	0	1	n.a.[2]	n.a.[2]
C. To abattoirs and consumption centres outside district	1. Resell	1	0	25	0	0	0
	2. Retail butcher	2	103	0	0	0	0
	3. Wholesale	1	0	24	0	0	0
	4. Contract supply	1	19	0	0	0	0

[1] Some respondents supplied more than one response, hence number of respondents and total responses do not always tally.

[2] n.a. = not available.

4.3.5 Fixed Investments Related to Livestock Trade

Very few buyers in Baringo and Kajiado have fixed investments into the livestock trade. Of the 24 buyers interviewed in Baringo, only one had bought a livestock hauling truck, one had an old meat delivery van and only one had constructed an own retail butchery. In addition, only one was a member of a livestock buying society to which he had contributed some money into building a night yard at Limuru. In Kajiado, none of the 32 buyers had a truck, none had invested any money in livestock structures but five buyers had invested a total of KSh.385,000 in meat vans for delivering meat into Nairobi from Namanga. Only one had constructed a hides and skins drying structure.

It appears from the limited amount of investments in fixed capital that buyers deliberately maintained flexibility in the livestock trade both in terms of sources of supply of livestock and the purposes in both districts. Very few buyers were willing to enter into binding arrangements of contract supplying. Fluctuations in livestock market prices largely due to fluctuations in supply were common and most likely the buyers were responding to these fluctuations by maintaining flexibility.

Incidences of drought largely accounted for the seasonal fluctuations in market supply compounded by frequent disease outbreaks and quarantines thereafter. Even the retail/wholesale butchers with long experiences in the livestock trade chose to hire retail premises and utilised public abattoirs instead of having own facilities.

Some buyers in Baringo were negotiating for contracts to supply small ruminant meat to large government institutions in Nakuru like for instance, the military, prisons and schools. If they won the contract, then it would be necessary to invest into reliable transportation arrangements to handle the increased volume of business.

. The long list of problems faced by livestock buyers (Table 4.11) is an indication of how unstable they viewed the trade.

4.3.6 Problems Experienced During Trading

A summary of problems buyers face in livestock trade is presented on Table 4.11. Low operating capital and trading losses appear to be the major problems buyers face in both districts. In addition incidences of outbreaks of notifiable diseases, Foot and Mouth disease being the most notable among them, is a serious problem in Kajiado.

In both districts past problems are apparently still persisting and the tendency is to increase frequencies rather than decrease from the past to the present. Bekure et al (1982) identified several of the listed problems in their studies of the Emali cattle market in eastern Kajiado, namely the low margins, frequent disease outbreaks, low operating capital and occasional trading losses. Prescriptions for solving these problems have also been discussed in the document quoted above.

Table 4:11 List of Problems Faced by Buyers Presently and in the Past

	BARINGO DISTRICT				KAJIADO DISTRICT			
	Past Problem		Present Problem		Past Problem		Present Problem	
	No. (Responses)	%	No. (Responses)	%	No. (Responses)	%	No. Responses)	%
1. Trading losses or reduced profit margins	9	(21)	9	(21)	3	(5)	4	(6)
2. Low operating capital	15	(36)	15	(35)	21	(36)	21	(34)
3. High meat inspection fees and taxes	2	(5)	2	(5)	5	(9)	5	(8)
4. High condemnation rates	1	(2)	2	(5)	2	(3)	3	(5)
5. Difficulties associated with buying stolen stock	1	(2)	1	(2)	0	(0)	0	(0)
6. Bad debts	3	(7)	3	(7)	5	(9)	5	(8)
7. Poor marketing infrastructure	4	(10)	4	(9)	1	(2)	2	(3)
8. Frequent price fluctuations	3	(7)	3	(7)	0	(0)	0	(0)
9. Low consumer demand	2	(5)	2	(5)	4	(7)	5	(8)
10. Insufficient livestock supply	1	(2)	1	(2)	7	(12)	7	(11)
11. Poor money banking facilities in buying centres	1	(2)	1	(2)	0	(0)	0	(0)
12. Frequent disease outbreak leading to quarantines	0	(0)	0	(0)	10	(17)	10	(16)
Total responses	42		43		58		62	

Additional significant problems enumerated on Table 4.11 include poor marketing infrastructure, insufficient supplies in Maasailand after droughts and during disease quarantines. Poor banking facilities, in Baringo especially, increases the risks associated with keeping large sums of money on the buyers themselves. These problems are further discussed in detail below:

Poor infrastructure, mainly access roads to the production areas, are the main reasons responsible for low buyer turn out in some of the Baringo markets. Small ruminants are not usually trekked long distances to markets and it is important therefore that buyers must have access to the production areas. This problem is increasingly being solved within the government's policy of rural development. For instance, a new tarmac road is under construction through the Kerio Valley in Baringo where, as has been pointed out, market prices for both small ruminants and cattle are rather low. All the auction yards except for Marigat were badly in need of repair in the Baringo markets surveyed. Marigat has a large modern yard which was constructed with the assistance of the Sheep and Goat Project partially financed by the UNDP/FAO. A modern yard has also been constructed at Loruk, north of Lake Baringo, but was not included in the market survey.

The infrastructure problem in Kajiado cannot be regarded as serious except in a few areas in wet weather. There are three main roads crossing the district southwards. The Nairobi-Magadi road is tarmacked with several market centres at which most of the livestock sales take place. The Nairobi-Namanga

road is also tarmacked with several market centres also serving as sale points for livestock. The Emali-Loitokitok road is almost all weather with several market centres for livestock sales.

These market centres along the major roads are capable of adequately servicing the entire hinterland of Kajiado in terms providing marketing services. The structural facilities available have, however, been designed for handling cattle during vaccinations but these can be modified slightly to double as sale yards. In response to traders demand, the County Council of Kajiado is now constructing sale yards at Bissel and Mile 46 and a third yard is planned for Kisamis market.

Insufficient market supplies in Kajiado immediately after the droughts is almost a seasonal phenomenon. The disappearance of small ruminants from the markets is frequently associated with shortage of market cattle which frequently is a result of cattle losses from drought. It would be very difficult, therefore, to solve or eliminate market shortages of small ruminants without first taking measures to reduce or eliminate effects of cattle losses from droughts.

Maintaining flexibility in sources of supply including buying across districts, is a method some buyers have adopted for bridging the shortages from any one area. For instance two buyers operating from Limuru and interviewed at one of the Kerio Valley markets indicated that they also bought small ruminants from markets in Machakos, Kitui and from Mulot market in Narok district. Most of the small ruminants sold at Mulot market are believed to originate from Kericho district.

Another meat wholesaler supplying meat into the Nairobi market from Ong'ata Rongai abattoirs also purchased animals from outside Kajiado district. When he did this he utilised the abattoirs nearest the areas of purchase, like Tala, when purchases were made in Machakos and Dagoretti, when purchases were made in the Rift Valley Province and the livestock were transported by rail. This latter buyer owned a meat delivery van which made his operations even more flexible.

Inadequate banking facilities is presently a problem cattle buyers in both Baringo and Kajiado, especially the former. Buying a few hundred head of cattle, for those with contracts to supply large consignments to abattoirs like KMC, can involve several hundred thousand Kenya shillings, sometimes millions of shillings. Currently, buyers have to make their own arrangements for safe custody of the money, sometimes for several days, like in Baringo where auctions are scheduled over several consecutive days.

For the time being, no easy solutions are envisaged except that large buyers must continue to utilise banking facilities nearest to the markets of purchase and consider the extra costs of doing this as additional marketing costs. Buyers of small ruminants hardly deal with such large sums as to cause concern for the moment. Gradually, however, the problem will be lessened when more finance houses or mobile banking facilities are operational in the rural areas.

4.3.7 Buyer Tendencies Towards Specialization

A total of 2329 transactions of both small ruminants and cattle at the Baringo markets were examined. Further, the buying habits of 70 main buyers (defined as those buying five or more of either small ruminants or cattle on any market day) on 29 market days were also examined.

Of the 70 main buyers, only 10 bought both small ruminants and cattle on any of the 29 market days, whereas 40 bought small ruminants and 20 bought cattle only over the same period. These results are illustrated on Table 4.12.

The buyers specializing in either small ruminants or cattle only constituted 85.7% of the total (60/70) main buyers. Of these 70 main buyers, the destination and purpose for buying for 48 of them were known. Thirty-two (32) or 66.7% had contracts to supply meat to Nakuru retail butcheries while fourteen (14) or 29.2% operated retail butcheries inside Baringo district and two (2) or 4.1% operated retail butcheries at Limuru in Kiambu district. The type of livestock these 48 buyers traded are shown on Table 4.13.

The specialized set of buyers dealing only in either small ruminants or cattle constituted 67% of the buyers whose destination and purpose for buying were known, (32/48), although these were not exactly the same buyers categorised as wholesalers for the Nakuru market above.

The specialization aspect is further supported by the results of the sample interviewed through the questionnaire in both Baringo and Kajiado districts. The number and percentages of buyers specializing and non-specializing from the

Table 4.12 Categories of Main Livestock Buyers in Baringo

	Specialised buyers		Mixed buyers	
	Small Ruminants	Cattle	Small Ruminants	Cattle
Number of animals bought	923	303	285	67
Number of buyers	40	20	---------10----- [2/]	
Mean per buyer	23	15	29	7
Frequency of attendance (mean days per buyer over the 29 days[1/]	1.9	1.7	2.0	1.1

1/ Calculated from total specialised buyer-days = 76 for small ruminants, 34 for cattle and total non-specialised buyer-days = 20 for small ruminants and 11 for cattle over the 29 market days.

2/ These ten buyers traded in both small ruminants and cattle

Table 4.13 Number, Type of Livestock and Destinations for 48 Main Buyers from Baringo Markets

Destination	No. of buyers	No. of buyers of small ruminants only	No. of buyers of cattle only	No. of buyers of both cattle and small ruminants
a. Slaughter and consumption inside district	n = 14	8	4	2
b. Slaughter inside district, consumption outside	n = 32	14	6	12
c. Slaughter and consumption outside district	n = 2	0	0	2
Total	n = 48	22	10	16

questionnaire interviews are as shown on Table 4.14.

The results suggest that livestock buyers have strong tendencies to specialize in trading in either cattle or small ruminants. However, there was no evidence in way of fixed investments that could suggest incompatibility in trading with both livestock types.

In both districts the buyers who showed strong preference in trading in small ruminants only had the following arguments:-

i) Local consumers preferred mutton and goat meat to beef.

ii) Small ruminants required less capital than cattle to trade in.

iii) Small markets (few consumers) and lack of cooling facilities made small ruminants the ideal choice to slaughter to avoid losses from wastage.

iv) Transporting them by truck was easier and cheaper than cattle.

v) Easily available in local markets.

The buyers in Baringo and Kajiado who preferred to trade in cattle had the following main arguments:-

i) Beef sold faster than mutton or goat meat because it was cheaper.

ii) There were higher profit margins per head of cattle sold compared to small ruminants.

iii) It was easier to resell cattle than small ruminants especially since cattle could be trekked long distances to other markets without many death losses.

Table 4.14 Proportions of Specialised and Non-Specialised Buyers in Baringo and Kajiado Districts

District		No. of buyers specialising in small ruminants	No. of buyers specialising in cattle	No. of non-specialised buyers
Baringo	N=24	11	4	9
		---------- 62.5% ----------		37.5%
Kajiado	N=32	11	14	7
		---------- 78% ----------		22%

The other buyers in Baringo and Kajiado traded in both cattle and small ruminants mainly to maintain flexibility in case of shortage or irregular supply of one type. In addition, the buyer/retailers liked selling both to serve a wider clientele and maximised on the preference aspect from small ruminants and higher profit margins from cattle.

4.4 CONCENTRATION OF BUYERS AND SELLERS AT THE BARINGO MARKETS

Records of buyers and sellers over the 29 market days, during which 1581 head of small ruminants and 748 head of cattle were transacted, showed that the sellers were relatively many, selling an average of 2.1 head of small ruminants and 1.6 head of cattle per seller. On the other hand, the buyers were fewer averaging 8.2 head of small ruminants and 8.0 head of cattle per buyer. Further analysis of these transactions data is presented on Table 4.15.

The mean number of small ruminants transacted were 98.8 $\pm$ 41.6 head and 57.5 $\pm$ 29.9 head of cattle per market day over the 29 days. Over this period, the top ten main buyers of small ruminants accounted for 50% of all the small ruminant market transactions while the ten main cattle buyers accounted for 34% of all the cattle transactions during the 29 days.

Of the transactions involving the main buyers, (those buying five and more of either cattle or small ruminants) the top ten buyers of small ruminants bought 65.3% of the small ruminants sold while the ten main cattle buyers bought 68.6% of the cattle sold. The results suggest that the buyers are

Table 4.15 Concentration of Sellers and Buyers in the Baringo Markets

	Number transacted	No. of sellers	Average per seller (head)	No. of buyers	Average per buyer (head)
Small ruminants	1581	758	2.1	192	8.2
Cattle	748	463	1.6	93	8.0

moderately concentrated in these markets.

The top ten (10) biggest sellers of small ruminants sold 9.7% of all the small ruminants sold over the 29-day period. Among the group of big sellers (those who sold a total of five and more), the top ten sellers contributed 32.2% of the small ruminants sold by this group.

The top ten cattle sellers sold 11.9% of the cattle transacted during this period. Among the group of the big sellers (selling 5 or more), the top ten sellers contributed 80.9% of the cattle sold by this group.

The results show a rather low concentration of the sellers in the Baringo markets. Only a very small number of sellers can be considered as big sellers (those selling 5 and more) of either small ruminants or cattle.

The market concentration of sellers and buyers indicates a convincing absence of monopolies and monopsonies at the Baringo markets. The economic environment is therefore favourable for competitive marketing.

CHAPTER 5

MARKET PERFORMANCE

5.1 INTRODUCTION

This chapter examines the relative efficiencies of the small ruminant marketing channels employed in Baringo and Kajiado. Marketing efficiency is emphasised as one of the important measures of market performance. In the context of this study, a marketing channel is deemed relatively efficient if it facilitates the marketing operation at the least possible average cost.

Several calculations have been performed in assessing the marketing efficiencies. The marketing costs have been calculated as the sum of the average costs incurred between buying and reselling of the live animal or selling of the meat. The average costs are calculated on the basis of one head of small ruminant. The elements of marketing costs have been discussed under section 5.2.

The marketing margins have been calculated as the difference between buying and selling prices. The differences between marketing margins and the marketing costs are the profit margins. The profit margins reflect the returns to the buyers' labour, capital and management. These calculations are presented in detail in Appendices 8 to 13.

The criterion used in measuring efficiency in this study is by expressing the marketing costs as a percentage of the total cost outlay per head of small ruminant for each channel. Marketing efficiencies for similar channels in Baringo and

Kajiado are then compared on the basis of these percentage ratios. The lower ratios indicate higher marketing efficiencies.

These efficiency indicators are estimated using the producer's price as the starting point. For simplicity, the producer price is assumed to adequately represent the contribution of the livestock producer in the market performance analysis. The efficiency calculations therefore include only the activities of the traders dealing in live animals and meat. These traders are deemed to be profit maximisers and therefore responsive to prevailing market signals.

Within each district, marketing operations for livestock originating from one market source but ending up at different destinations and through different modes of transportation have been examined. This was done purely to highlight the major cost elements influencing the marketing costs.

It is considered important to define further the relationship between the producer and the consumer in livestock marketing, especially as the terms have been applied in this study. Starting with the pastoral livestock keeper as the producer, three main levels of consumers can be identified and each may purchase livestock directly from the producer. First, there are the buyers who buy and resell live to other traders. Second, there are the meat wholesalers and third, the retailers. For a selected number of marketing operations, marketing costs and profit margins have been calculated between the producer, resale (live), meat wholesale and retail stages.

Section 5.2 discusses direct marketing costs while

section 5.3 presents analysis and comparison of marketing margins and profit rates between Baringo and Kajiado markets. The results are further summarised in discussion form in section 5.4.

A variety of data sources have been used in computing the marketing costs and profit margins. These include the livestock transactions data from the Baringo markets, results of recent studies by ILCA (1985), unpublished ILCA studies of the Ong'ata Rongai livestock market (1982/84) and results of buyer interviews conducted during this study.

5.2 MARKETING COSTS

5.2.1 Mode and Costs of Transporting Livestock

Results from Baringo show that the buyers prefer to move the stock bought on hoof to their destinations. Out of 24 buyers, only five (21%) used trucks while nineteen (79%) trekked their livestock. The choice to use trucks or move on hoof was based largely on the distances to the destinations. However, the livestock moving across districts, especially across Nakuru, had to be trucked to conform to the disease control requirements in force at the time. This requirement applied for both cattle and small ruminants.

In Kajiado almost all buyers trekked livestock to the markets and slaughter points. Only two buyers (6%) operating from Nairobi and Kiambu used trucks to transport livestock to abattoirs close to Nairobi where the stock were slaughtered and delivered as meat. Both of these buyers were also wholesale meat suppliers in Nairobi. The Kiambu buyer interviewed

supplied small ruminant meat while the Nairobi buyer supplied beef.

The costs of transporting livestock were highly variable on per head basis. In March 1985, the cost of transporting cattle and small ruminants from Marigat to Limuru in Kiambu district was respectively estimated at KSh.120.00 and KSh.30.00 per head by truck. Transportation costs within Baringo district depended very much on the mode employed. The average cost of trekking small ruminants from Marigat to the abattoirs on the Nakuru-Baringo border (Mogotio) was estimated at KSh.5.00 and KSh.10.00 for cattle for the same distance, with a range between KSh.2.40 and KSh.10.00 for both types.

The commonest arrangement was, however, to pay the trekkers on the basis of distances trekked irrespective of the type of livestock or exact numbers involved. On this basis most trekkers earned KSh.120.00-130.00 between Marigat and Mogotio. The mobs trekked comprised approximately 100 head of either cattle or small ruminants and required a minimum of four trekkers. The owners of the animals shared these costs on the basis of the numbers each owned. By truck, the costs have been estimated at KSh.10.00 and KSh.20.00 for small ruminants and cattle respectively for the same distance.

In Kajiado, buyers were legally not allowed to trek animals over long distances at the time of the survey because of quarantine restrictions resulting from an outbreak of Foot and Mouth disease. All the animals bought during this period had, therefore, to be moved to the nearest abattoir for slaughter and transported as meat in delivery trucks. For this reason, very

little data were acquired with respect to costs of transporting live animals. From Kisamis market, (on the Nairobi-Magadi road) however, buyers have been trucking smallstock at a cost of KSh.10.00 per head to Ong'ata Rongai abattoir.

5.2.2 Other Marketing Costs

In addition to transportation of purchased livestock to destinations, buyers incurred the costs presented on Table 5.1 The results show that marketing costs per head of small ruminant within Baringo were almost three times the costs incurred within Kajiado, excluding the costs of transporting livestock. Costs of marketing cattle in Baringo were similarly 33% higher than Kajiado.

Within the districts, the ratio of the costs of marketing one head of small ruminant to the cost of marketing one head of cattle in Baringo is 1:3.54. The corresponding ratio within Kajiado is 1:7.99. This implies that not only are absolute marketing costs for small ruminants lower in Kajiado compared to Baringo but that the relative marketing cost between livestock types makes Kajiado a cheaper area to buy small ruminants from. Therefore absolute or relative costs of marketing small ruminants must be eliminated as a factor contributing to ineffective small ruminant markets in Kajiado. On the contrary, the arguments would be in favour of buying small ruminants from Kajiado compared to Baringo.

Table 5.1 Additional Costs of Purchasing Livestock (Mean KSh/head) From Markets to Abattoirs

Cost Item[1/]	BARINGO DISTRICT (Respondents N=20)		KAJIADO DISTRICT (Respondents N=16)	
	Small Ruminant (KSh./ head)	Cattle (KSh./ head)	Small Ruminant (KSh./ head)	Cattle (KSh./ head)
1. Transportation of buyer	2.11	7.30	0.15	5.95
2. Transportation of assistants	2.49	3.80	0.50	1.10
3. Food and drinks	1.66	11.17	0.20	9.45
4. Lodging	0.28	3.56	0.00	6.76
5. Taxes/cess paid	5.00	15.00	3.00	7.00
Total per head	11.54	40.83	3.85	30.27

1/ The above costs exclude personal expenses incurred between Bar and Limuru but include costs within Baringo. The total transportation costs for small ruminants moved to Limuru from Baringo are calculated separately and shown on Appendix Kajiado costs, however, include personal expenses of buyers and assistants from Nairobi and Kiambu Districts.

5.3 RELATIVE MARKETING EFFICIENCIES

5.3.1 Comparison of Marketing Margins and Profit Margins between Baringo and Kajiado Markets in Proximity to the Abattoirs (Noiwet-Mogotio and Ong'ata Rongai)

The level of marketing costs through this channel is expected to be the lowest since no transportation costs are incurred for live animals. The Noiwet-Mogotio markets in Baringo and the Ong'ata Rongai market in Kajiado are used as examples of sources of livestock and the Nakuru and Nairobi wholesale markets as the respective destinations. The marketing costs between Noiwet and Nakuru wholesale market averaged 9.5% of total costs to the buyer and a corresponding 3.5% between Ong'ata Rongai and Nairobi wholesale market. The profit margins achieved by Noiwet-Mogotio buyers (wholesalers) were 17.3% compared to 50.2% realised by Ong'ata Rongai buyers. Appendices 8 and 9 respectively show the analysis of marketing costs and profit margins from Noiwet-Mogotio and Ong'ata Rongai livestock markets. The buyers selling at the retail outlets at Mogotio trading centre, instead of wholeselling at Nakuru made a higher profit margin of 39.0% as shown on Appendix 10.

5.3.2 Marketing Costs and Profit Margins for the Markets in Kerio Valley (Baringo)

Kerio Valley was a favourite buying area for small ruminant buyers mainly because of the low market prices compared to the other markets in Baringo. Large numbers of sheep presented for sale in these markets were sought after and readily bought by buyers from Limuru in Kiambu district. The

large number of sheep bought were the main reason for the low mean prices. Kerio Valley has poor transport communication services, which partly explains the rather high transportation costs incurred by the buyers and assistants buying from the valley markets.

The marketing costs contributed 12.2% of the total costs for the buyers operating meat retail trade in Kabarnet town while buyers from Limuru incurred a corresponding 27.8% of the total costs. The difference is largely attributable to the costs of trucking live animals which the Limuru buyers had to undertake while Kabarnet buyers only trekked the stock up the escarpment. The profit margins were consequently in favour of Kabarnet buyers since the meat retail prices in Limuru, although higher than in Kabarnet, were not sufficiently different to offset the increase in marketing costs. Appendices 11 (a-c) present the analysis of marketing costs and profit margins for the Kabarnet buyers using price means covering the periods 1985 only and both 1984 and 1985. Appendix 11 (d) presents corresponding results for Limuru buyers in which costs of transporting livestock and buyers, food and accommodation comprise 21.2% of the total marketing costs.

5.3.3 Marketing Costs and Margins from Marigat Markets Through Noiwet-Mogotio Abattoirs to Nakuru Municipality Retail Butcheries

The distance between Marigat and Mogotio (60 km) was, on average, the longest the small ruminants were trekked over from the markets to the abattoirs in Baringo. The distance between

the markets (Kipcherere, Kibingor, Kampi ya Samaki and Marigat) and Mogotio by road is slightly over 60 km but the buying took place in sequence from the farthest end towards the abattoirs on a daily basis. The buying continued until the buyers had purchased sufficient numbers. The transportation of buyers and assistants and trekking costs per head therefore formed significant proportions of the marketing costs estimated at 28%. The marketing costs per head were, however, only 15.9% of the total costs and the buyers were able to have a profit margin of 32.3%. These costs and profit margins are presented on Appendix 12. The Nakuru meat retailers made an estimated profit margin of 20.7%.

5.3.4 Marketing Costs and Profit Margins from Kajiado Markets Through Mariakani Abattoirs to Mombasa Retail Butcheries

The transportation cost of live animals from Simba trading centre on the Nairobi-Mombasa highway to Mariakani was clearly the highest single item of the marketing costs, comprising almost 62% of the marketing costs. Despite the high marketing costs the profit margin to the buyer were quite attractive at 82.6% based on the mean prices of the markets before Ong'ata Rongai terminal market and 75.2% based on the mean prices from the group ranches in Eastern Kajiado. The marketing costs formed 17.1% and 16.4% of the total costs of these marketing operations respectively.The results of these analyses are presented on Appendices 13 (a) and (b).

5.4 DISCUSSION

The analysis of marketing costs and profit margins to small ruminant traders shows that quite favourable returns are realised in both districts. For ease of comparison, a summary of the marketing costs and profit margins are reproduced in Table 5.2.

The trucking method, as expected, is the most expensive but sometimes indispensable considering the distances involved between markets and the destinations. It is therefore, not meaninful to compare relative efficiencies between trekking and trucking modes of transportation because, in the analysis, the two are mutually exclusive. Even within similar modes of transportation, comparisons of efficiencies have to be limited to similar marketing stages of the operations.

Within Kajiado district, two distinct marketing channels can be described from the production areas: one originating from Eastern Kajiado to Mombasa wholesale market through Mariakani abattoirs and the second from the Central and Western regions of Kajiado supplying the Nairobi wholesale market through the Ong'ata Rongai/Kiserian abattoirs. Using average producer prices of KSh.165.00 in eastern Kajiado and the wholesale prices of KSh.346.00 in Mombasa, the marketing margin would be KSh.181.00. The marketing costs have been worked out at KSh.32.48 or 16.4% of the total costs (Appendix 13 (b).

On the other hand, the Western/Central Kajiado-Ong'ata Rongai-Nairobi channel had producer prices of KSh.157.02 and

Table 5.2 Summary of Marketing Costs and Profit Margins per head of Small Ruminant from the Baringo and Kajiado Markets

Source (market) (1)	Destination (2)	Total costs (3) (KSh.)	Marketing costs (4) (KSh.)	Percentage of marketing costs to total costs (5) (%)	Profit margins (6) (KSh.)	Percentage of profit margins in consumers' price (7) (%)	Mode of transportation (8)
1. Noiwet	Noiwet abattoir Nakuru wholesale	245.24	23.22	9.5	42.51	14.8	Trek
1b. Nakuru wholesale	Nakuru retail	267.75	n.a.	n.a.	55.38	20.7	n.a.
2. Kajiado hinterland	Ong'ata Rongai, terminal market	164.69	7.91	4.8	42.18	20.4	Trek
3a. Ong'ata Rongai terminal	Ong'ata Rongai abattoir-Nairobi, wholesale	219.78	7.67	3.5	110.32	33.4	Trek
3b. Nairobi wholesale	Nairobi, retail	310.10	n.a.	n.a.	36.90	10.6	n.a.
4. Noiwet	Mogotio, retail	235.15	13.23	5.6	91.78	28.1	Trek
5a. Kerio Valley 1/ 2/	Kabarnet, retail	181.34	22.16	12.2	153.28	45.8	Trek
5b. Kerio Valley 2/	Kabarnet, retail	171.42	22.11	12.9	163.20	48.8	Trek
5c. Kerio Valley 3/ 4/	Kabarnet, retail	226.81	22.39	9.9	107.81	32.2	Trek
6. Kerio Valley 4/	Limuru, retail	214.92	59.74	27.8	114.58	34.8	Truck
7. Marigat	Mogotio, abattoir-Nakuru, wholesale	217.46	34.57	15.9	70.29	24.4	Trek
8a. Kajiado hinterland 5/	Mariakani abattoir	189.46	32.44	17.1	156.54	45.2	Truck
8b. Kajiado hinterland 6/	Mariakani abattoir -Mombasa, wholesale	197.48	32.48	16.4	148.52	42.9	Truck
8c. Mombasa, wholesale	Mombasa retail	325.40	n.a.	n.a.	21.60	6.2	n.a.

1/ Using 1985 mean market price

2/ Using 1984/85 mean market price

3/ Using 1985 mean market price for goats only

4/ Using 1985 market price

5/ Using 1982-83 mean prices paid at hinterland markets supplying Ong'ata Rongai terminal market

6/ Using 1983/84 mean prices from Group Ranches in Eastern Kajiado

meat wholesale prices of KSh.330.10 in Nairobi. The total marketing costs were KSh.20.58 or 11.6% of the total costs. On the basis of this analysis, it can be said that the Western/Central Kajiado-Ong'ata Rongai-Nairobi channel is relatively more efficient of the two channels within Kajiado.

In Baringo, four main channels can be described. The first channel involves the markets in proximity of the abattoirs. As an example, the Noiwet-Mogotio operation has been analysed. Average marketing costs in this operation per head of small ruminant were 5.6% of total cost outlays. If the channel terminates at Nakuru wholesale market instead of Mogotio retail market, the ratio of marketing costs to cost outlays rises to 9.5% purely due to added transportation costs.

Two of the other three channels involve small ruminant purchases originating from Kerio Valley and ending up at Kabarnet meat retail market and the purchases originating from Kerio Valley and terminating at Limuru meat retail market. Again, mainly due to differences in transportation costs, the Kerio Valley-Kabarnet channel appears more efficient with a ratio of marketing costs to total cost outlay of 12.2% compared to 27.8% for the Kerio Valley-Limuru channel.

The fourth channel involves the small ruminant purchases from the Marigat group of markets and ending up at Nakuru meat wholesale through the Mogotio Nakuru-Baringo border abattoir. Operators in this channel achieve an average marketing costs to total cost outlay ratio of 15.9%. Within Baringo therefore, it can be concluded that marketing operations involving minimum transportation costs perform more efficiently than those

involving larger transportation cost elements.

Limited comparisons can be made for similar market operations between Kajiado and Baringo districts. For instance, the Ong'ata Rongai terminal market-Nairobi wholesale channel can be compared to the Noiwet market-Mogotio trading centre channel in Baringo for the markets in proximity to the abattoirs. On the basis of least ratio of marketing costs to total cost outlays, the Ong'ata Rongai-Nairobi channel is more efficient. On the same basis the Kajiado-Mariakani-Mombasa channel appears more efficient than the Kerio Valley-Limuru channel. Both channels utilise the trucking method of transportation. The Western/Central Kajiado-Ong'ata Rongai-Nairobi channel also appears marginally more efficient than the Marigat group of markets - Mogotio-Nakuru channel, the former achieving marketing costs to total cost ratios of 11.6% compared to 15.9% in the latter.

It can be concluded therefore, that small ruminant marketing from the Kajiado system is more efficient than from the Baringo system largely on the basis of lower marketing costs within Kajiado. Therefore, it follows that the low market offtake rates from Kajiado are not a result of an inefficient marketing system.

The returns to the buyers' capital, measured as the percentage of the trader's profit margin to total costs invested per head, including purchase price, were highest between Kerio Valley markets and Kabarnet retail centre with gross returns of 95.2%. The reasons for these extremely high returns are that the buyer is also the retailer and the Kerio Valley markets had

the lowest average prices among the markets studied for both small ruminants and cattle. As has been pointed out, the reason for the low small ruminant average market prices is the large number of sheep sold from these markets at very low prices. However, when average prices of goats only are considered from the Kerio Valley markets for the year 1985, then the traders' profit margins drop from KSh.153.28 per head and percentage returns of 84.5% to profit margins of KSh.107.81 per head and percentage returns of 47.53%. This price distortion created by the sale of sheep at these markets is enormous.

The returns also justify the trucking method employed between Simba and Mariakani and between Kerio Valley and Limuru. The buyers in the latter group are also retailers and frequently receive contracts to supply the Nairobi Cold Storage at negotiable wholesale prices. This group also buys most of the sheep from the Kerio Valley markets which makes the real profit margins and rates of return much higher than are shown in these calculations because mutton is retail sold at the same prices as goat meat.

Generally, however, the excessive profit margins achieved in both districts indicate inherent inefficiences. Conventional marketing theory argues that, barring monopolies, such attractive profit margins ought to attract a large number of traders. It has been shown in section 4.4, however, that the buyer concentration is rather modest. One plausible explanation for the absence of scramble into small ruminant trade in Baringo districts is due to saturated consumer markets within Baringo and Nakuru municipality. It is also very likely that

information regarding the excessive profits achieved was not freely disseminated whereas price information at the auction markets was largely public knowledge. This gap in information flow would tend to make the marketing structure less competitive benefiting relatively few traders. Results of chapter 4 seem to support this argument.

In Kajiado, poor market information flow also seems a plausible explanation for the excessive profits. The market structure is largely responsible for this as most of the transactions are kept secret. The fact that only local Maasai can succeed as primary buyers also makes the system less competitive. The partnership of traders from eastern Kajiado selling to the coastal markets is almost a monopoly within this production area. The high profits are partly explained by this monopolistic situation while poor information flow partly explains the lack of challenge from other local buyers. Both the number of buyers and sellers in Kajiado are limited, the latter by social values.

The retail prices of meat are regulated by the Kenya Government. The results of the analysis, especially the high profit margins, suggest that it is the livestock traders, rather than the producers, who have mostly benefited from rising consumer prices. The traders' profit margins make up rather high percentages of the prices the consumers pay. A price restructuring policy that would increase the percentage of the producer price in the consumer price would favourably encourage producers to sell more of their small ruminants.

CHAPTER 6

FACTORS DETERMINING MARKET PRICES AND WEIGHTS OF SMALL RUMINANTS IN BARINGO

6.1 INTRODUCTION

Price incentives are perhaps the commonest prescriptions offered for improving productivity and marketing of most of the traded goods. In Kenya, there has been no official government policy on the pricing of livestock whereas the consumer prices of meat are tightly controlled. Livestock buyers, therefore, characteristically attempt to bargain down the sellers or institute colluding tactics at the markets in order to allow attractive profit margins to themselves. Pastoral producers, who depend largely on sale of their livestock for their cash income, are rather vulnerable to the tactics the buyers may resort to in depressing market prices of livestock, especially during periods of peak demand for cash.

This chapter discusses some of the factors that determine prices at which small ruminants are sold in the Baringo auction markets. First, the sellers' price expectations are analysed by comparing the mean price of the group of small ruminants sold with the mean price offers of the group of small ruminants which the sellers returned unsold. Then the effects of the major determinants of prices (body condition, species, sex, market location and time of sale) are analysed. Finally market prices offered in the Baringo markets are compared with prices offered in the Kajiado markets.

6.2 DIFFERENCES IN MEAN AUCTION PRICE FOR THE SMALL RUMINANTS SOLD AND THOSE PASSED UNSOLD

The auction system of marketing affords the seller the right to decline the highest offer if he considers it unreasonable or below his reserve price. Of the 1481 cases examined, 96 head were passed unsold for this reason. The means of the highest offers for the group transacted and for the group passed unsold were compared to establish whether or not significant differences existed.

Although the mean price for the non-transacted group was marginally higher than the transacted group, KSh.179.01 for the former and KSh.173.66 for the latter, a one-way ANOVA test showed that the difference was insignificant at $P < 0.05$ confidence level. The F-ratio between the two groups was 0.357.

The non-transacted group was, on average, in better body condition with a mean score of 2.47 and a correlation coefficient of r=0.71 (N=96) between individual body condition scores and market price offers. As a sub-set, the non-transacted group of goats (N=60) had a mean market price offer of KSh.207.66, which was 19.3% above the overall market price mean of KSh.174.01 (N=1481). The mean offer of the non-transacted group of goats was also 16.0% above the mean of the total non-transacted group (N=96) of small ruminants. What one can say about this is that producers had a higher expectation for larger animals, particularly goats, in good body condition and were not willing to part with them easily. As a variable, body condition of each animal had a considerable influence on the price offered as shown in the following section.

6.3 EFFECT OF BODY CONDITION ON MARKET PRICE

A total of 1473 head of small ruminants presented for sale were also assessed for their body condition as a rough proxy for meat quality and weight. For all the stock sold, and separately for sheep and goats, a mean market price was calculated for each body condition class.

The results, presented on Tables 6.1 and 6.2 showed highly significant differences between the mean prices of the body condition classes at $P < 0.01$ level of confidence. A One-Way ANOVA of the prices between the four condition classes for all stock had an F-ratio of 520.756.

The body weight means were also statistically significant between the four condition classes at $P < 0.01$ level of confidence as shown on Table 6.3.

It has already been shown that a strong correlation ($r=0.71$) exists between the body condition score and market price. The relationship was further improved to $r=0.85$ when body weight was substituted for body condition in a sample of 800 small ruminants. The overall mean body condition score ($N=1473$) was 2.4, slightly under the mid-score of 2.5 between classes one and four.

The ordinary least squares regression relationship between body condition and market price has been calculated using the equation $Y_i = \alpha + \beta X_i$

Table 6.1 One-way ANOVA for Mean Market Price Between Body Condition Classes of Small Ruminants (Baringo District)

Group	Mean Price (KShs)	N
1=Poor body condition	95.31	161
2=Fair	140.53	791
3=Good	221.86	326
4=Excellent	294.72	195
Total	174.00	1473

Source of variation	D.f.	Variance	F-Ratio
Between	3	1823869.838	520.756**
Within	1469	3502.350118	

**Significant at P<0.01 level of confidence

Table 6.2 Comparisons of Market Prices Between Body Condition Classes

Body Condition Classes	Sheep only		Goats only	
	Mean Price KSh.	(N)	Mean Price KSh.	(N)
1=Poor Body Condition	92.53	(91)	98.93	(70)
2=Fair	130.90	(212)	143.97	(579)
3=Good	188.48	(46)	225.48	(280)
4=Excellent	212.86	(7)	297.72	(188)
Total	130.14	(356)	187.46	(1117)

Table 6.3 One-way ANOVA for Weight (kg) Between Body Condition Classes of Small Ruminants (Baringo District)

Group	Mean Weights (kg)	N
1=Poor body condition	17.76	131
2=Fair	21.99	449
3=Good	28.59	146
4=Excellent	35.55	74
Mean	23.75	800

Sources of Variation	D.f.	Variance	F. Ratio
Between	3	6604.768	317.920**
Within	796	20.775	
Total	799		

**Significant at P <0.01 level of confidence

Where Y_i = Mean market price in Kenya shillings for ith animal

α = Constant of the equation

β = Slope of the equation

X_i = Body condition score for the ith animal

The regression results were:

$$Y = 4.69 + 71.230\ X_i$$

$$t = 38.775 \text{ (d.f. = 1471)}$$

$$r2 = 0.5056, \quad \text{F-Ratio} = 1504.093$$

Where:

t = Value of student's "t" statistic for the distribution of β

r2 = Proportion of variation explained by the regression

F-Ratio = Ratio of explained variation to unexplained variation.

The results show that body condition as an independent variable is an important and statistically significant determinant of price at $P < 0.01$ level of confidence.

6.4 PRICE AND WEIGHT DIFFERENCES BETWEEN SPECIES AND SEXES OF SMALL RUMINANTS

Using a prediction linear regressioin equation discussed under chapter 3, predicted weights were calculated from estimates for a total of 808 small ruminants. The mean prices and weights for the sheep and goats and the various sexes have been calculated and correlated as shown on Tables 6.4 and 6.5.

The relationships indicate that buyers offered prices directly proportional to the actual body weights. This implied that the markets surveyed were oriented to supplying slaughter stock. The only exception was for females which tended to show

Table 6.4 Price for Weight Regression Coefficients for Various Classes of Small Ruminants

Class	(N)	Mean Price (KSh)	Mean Weight (Kg)	REGRESSION COEFFICIENTS (WT (X), PRICE (Y))				
				α	β	Std Error(β)	t	r^2
All small ruminants	808	186.02	23.74	-62.199	10.455	0.2266	46.146**	0.725
Sheep only	253	136.70	20.46	-43.800	8.823	0.393	2.480 **	0.668
Goats only	555	208.50	25.24	-47.387	10.138	0.283	35.795**	0.699
Sheep - Entire males	188	140.77	20.60	-46.088	9.072	0.448	20.268**	0.688
Castrates	12	191.25	26.21	-5.482	7.505	2.270	3.306**	0.522
Entire males and castrates	200	143.80	20.93	-44.400	8.990	0.423	21.276**	0.696
Females	53	109.90	18.66	-8.278	6.334	1.006	6.294**	0.437
Goats - Entire males	315	219.24	25.21	-52.487	10.779	0.379	28.477**	0.722
Castrates	102	253.53	30.72	-46.169	9.755	0.701	13.919**	0.660
Entire males and castrates	417	227.53	26.56	-38.00	10.00	0.322	31.032**	0.699
Females	138	150.72	21.26	+36.88	5.36	0.719	7.443**	0.290
Entire males only sheep and goats	503	189.91	23.49	-72.938	11.192	0.293	38.235**	0.745
Castrates only sheep and goats	114	246.97	30.247	-49.752	9.810	0.657	14.941**	0.666
Entire males and castrates sheep and goats	617	200.45	24.74	-59.819	10.522	0.252	41.720**	0.739
All females sheep and goats	190	139.40	20.54	+6.571	6.468	0.597	10.836**	0.383

**Significant at 0.01 level of confidence

Table 6.5 Mean Prices, Weights and Price-weight Correlations of Small Ruminants in Baringo

Class	N	Mean weights (Kg)	Mean Price (KSh)	Mean KSh/kg	Correlations Weights-prices (r)
All small ruminants	808	23.74	186.02	7.65	.852
All sheep	253	20.46	136.70	6.58	.817
All goats	555	25.24	208.50	8.14	.836
Sheep - entire males	188	20.60	140.77	6.73	.830
- Castrates	12	26.21	191.25	7.31	.723
- All males	200	20.93	143.80	6.77	.834
- Females	53	18.66	109.91	5.88	.661
Goats - Entire males	315	25.21	219.24	8.56	.849
- Castrates	102	30.72	253.53	8.15	.812
- All males	417	26.56	227.63	8.46	.836
- Females	138	21.26	150.72	7.17	.538

lower correlations between prices and weights. The possible explanations for this were that either buyers were unable to accurately estimate weights of female sheep and goats or that they were bought for other purposes, such as breeding, for which weight was not a principal consideration. The regression equations further confirm this assertion. At low body weights, the buyers paid a higher price on a per kg basis for females than they did for males. It was calculated from the regression pair of equations (6.1) and (6.2) constructed from Table 6.4 and shown below, that at less than 16.2 kg of body weight, the female goats commanded higher market prices per kg than males, had equal prices at about this weight and lower market prices above this weight cut-off. The equations used are:-

(Equation 6.1) Y-male goats = -38.00 + 10.00 X

(t = 31.032)

(Equation 6.2) Y-female goats = 36.88 + 5.36 X

(t = 7.443)

Where Y = Mean market price in Kenya shillings

X = Body weight in kilogrammes

The prices of male and female goats were equal when their weights were equal at 16.2 kg body weight. The price then was calculated at KSh.124.00 from the above equations.

Sheep exhibit similar price for weight relationships between sexes. The corresponding equations are:-

(Equation 6.3) Y-male sheep = -44.4 + 8.99X

(t = 21.276)

(Equation 6.4) Y-female sheep = -8.278 + 6.334 X

(t = 6.294)

The corresponding equi-price weight for male and female sheep was calculated at X = 13.6 kg of body weight and a mean price Y = KSh.77.86.

6.4.1 Weight Differences Between Sheep and Goats

Goats in Baringo were found to be significantly heavier than sheep. A One-Way ANOVA test between the sample of goats (N=555) whose weight were estimated and a sample of sheep (N=253) whose weights were also estimated showed that goats were significantly heavier than sheep at $P < .01$ level of confidence. The mean body weight for the goats was calculated at 25.24 kg whereas the mean body weight of sheep was 20.46 kg. The F-ratio of variances between and within the two groups was 98.497.

Within species, ANOVA tests were carried out to detect any weight differences between sexes. The results of these tests are discussed in the following sections.

6.4.1.1 Weight Differences Between Sexes of Sheep

Significant differences in predicted weights of sheep between the groups of entire males, castrated males and females were found at $P < .01$ level of confidence through a one-way ANOVA test. The mean body weights were 20.60 kg for the entire males (n=188), 26.21 kg for the castrates (n=12) and 18.66 kg for the females (n=53). The F-ratio of variances between the three groups was 13.310.

6.4.1.2 Weight Differences Between Sexes of Goats

Significant differences were also observed between the mean weights of entire males, castrates and females among goats. A one-way ANOVA test showed significant differences, at $P < .01$ level of confidence, between the mean weights of entire males at 25.21 kg (n=315), the mean weights of castrates at 30.72 kg (n=102) and the mean weights of females at 21.26 kg (n=138). The F-ratio of variances between these groups was 67.945.

The mean weight differences were still significant at $P<0.01$ level of confidence between all males (entire males and castrates) and females, the former achieving mean weights of 26.56 kg against 21.16 kg for the latter.

6.4.2 **Price Differences Between Sheep and Goats**

Buyers in the wholesale meat trade clearly preferred buying goats to sheep in all markets studied in response to the requirements of the meat retailers. This preference was reflected on the discriminatory pricing they practised when buying, during which the differences in prices paid for goats and those offered for sheep were statistically significant at $P < 0.01$ level of confidence. The mean price for sheep was KSh.6.58 per kg (N=253) whereas the mean price for goats was KSh.8.14 per kg (N=555). A one-way ANOVA F-ratio of the variances between the sheep and goats and within the entire sample (N=808) was 133.004. Further price differences within sexes of sheep and goats are presented in the following sections.

6.4.2.1 **Price Differences Between Sexes of Sheep (KSh/kg)**

A one-way ANOVA test also showed statistically significant differences existed between the mean prices of entire males, castrates and females at $P < .01$ level of confidence. The largest sex group, composed of entire males, sold at an average KSh.6.73 per kg (n=188), while an average price of KSh.7.31 per kg was achieved for the castrates (n=12) and KSh.5.88 per kg for the females (n=53). The result indicated a price means variance F-ratio of 8.937 between and within the sex groups.

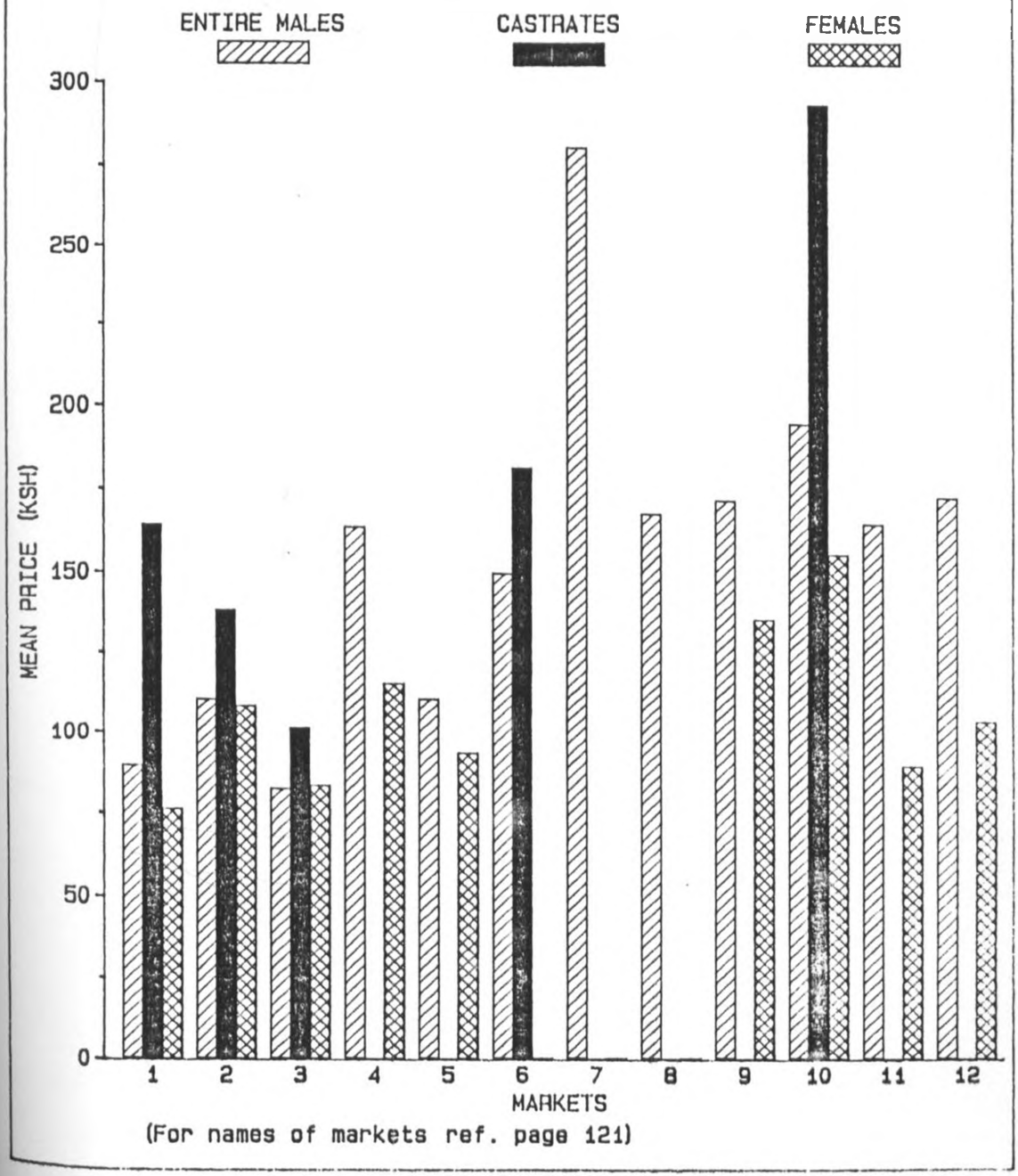
As shown earlier (section 6.3.1.1), the castrates were also significantly heavier than the entire males and females. The conclusion that can be drawn then is that the castrates received the best price (KSh/kg) as a reflection of the quality and quantity of saleable meat expected of them. Figure 6.1 illustrates the mean prices, by market, offered for the three sexes of sheep. In some markets the females and castrates were scarcely represented and, therefore, meaningful mean prices could not be calculated.

6.4.2.2 **Price Differences Between Sexes of Goats (KSh/kg)**

Statistically significant differences were also observed at $P < .01$ between the mean prices offered for entire males, castrates and females. The mean prices were KSh.8.56 per kg for entire males (n=315), KSh.8.15 for castrates (n=102) and KSh.7.17 for females (n=138). The F-ratio was 27.792.

Further analysis of price variance was carried out between all the males (castrates and entire) as a group and the

Figure 6.1 MEAN PRICE (KSH) BY MARKET & SEX FOR SHEEP
BARINGO DISTRICT



(For names of markets ref. page 121)

KEY TO MARKETS:

1 = Barwessa
2 = Kapluk
3 = Salawa
4 = Kipcherere
5 = Kibingor
6 = Marigat
7 = Kampi ya Samaki
8 = Radat
9 = Maji Moto
10 = Mugurin
11 = Emining
12 = Noiwet

females as the second group. Statistically significant differences at P <.01 were still observed between the mean prices. The group of males achieved an average price of KSh.8.46 per kg and an F-ratio of 51.469 resulted from this analysis.

Unlike sheep, goat castrates did not exhibit a higher price mean (KSh/kg) above the entire males. On the other hand, the average per head price for the castrates was above that of the entire males and females in all the markets as illustrated on Figure 6.2. These results are not contradictory when weights are taken into account. What one can say is that the additonal weight of castrates above the entire males did not attract a corresponding price premium. Using a pair of equations derived from Table 6.4 for the castrates and entire males, it has been worked out that the marginal price increase per kg for the castrates is lower than the marginal price increase for the entire males at body weights above 6.17 kg.

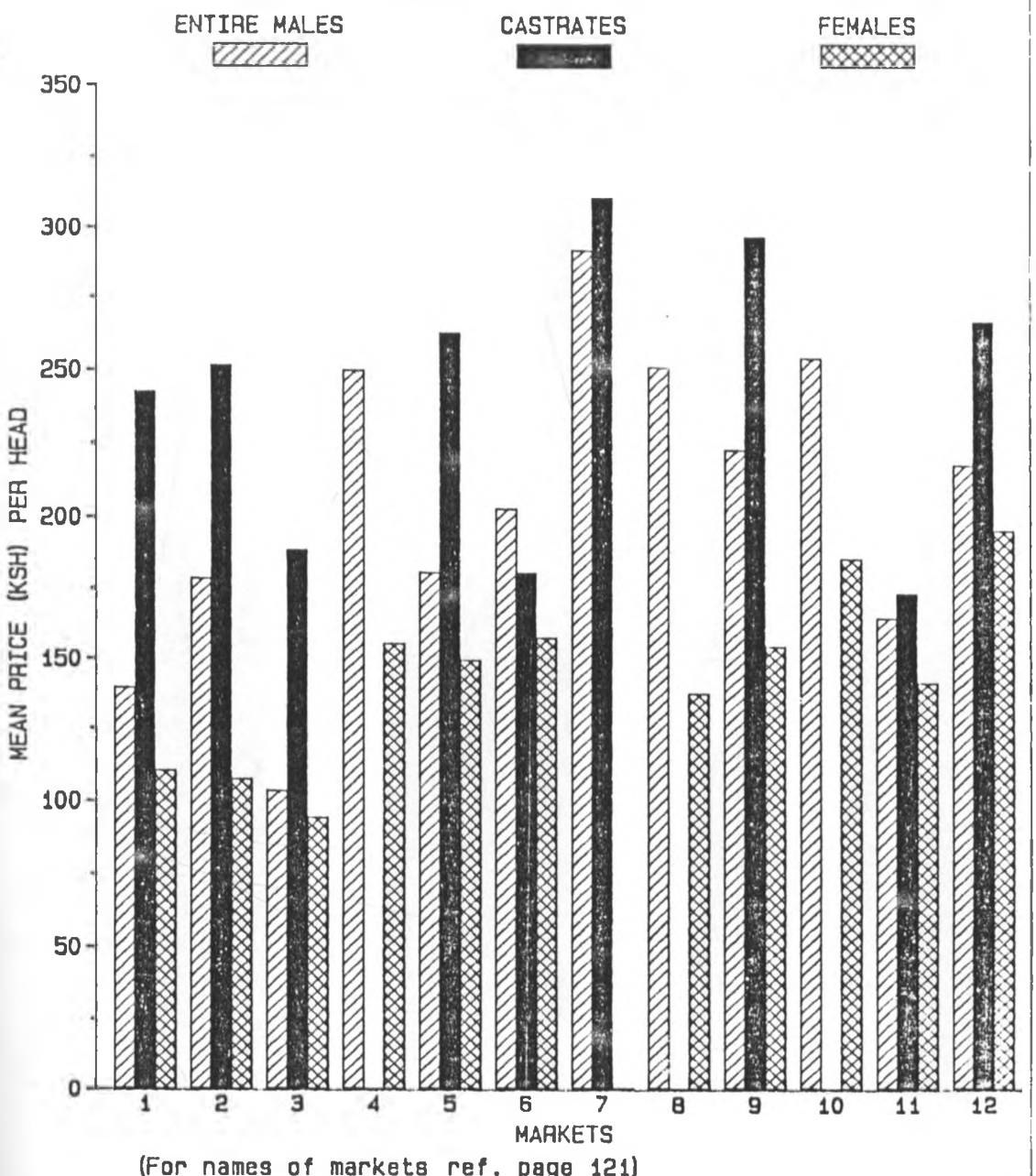
6.4.2.3 Price Differences Between Similar Sexes of Sheep and Goats of Similar Sexes

Statistically significant differences were observed, at P<.01 level of confidence, between the mean prices of male goats (entire and castrates) and a similar group of sheep. Similarly, significant differences were found at P<.01 level of confidence between the mean prices of female goats and sheep. On average, male goats fetched KSh.68.09 more than male sheep whereas the female goats fetched KSh.29.06 more than the sheep. Table 6.6 presents these comparative prices. For all the

Table 6.6 Comparison of Prices of Sheep and Goats by Sex

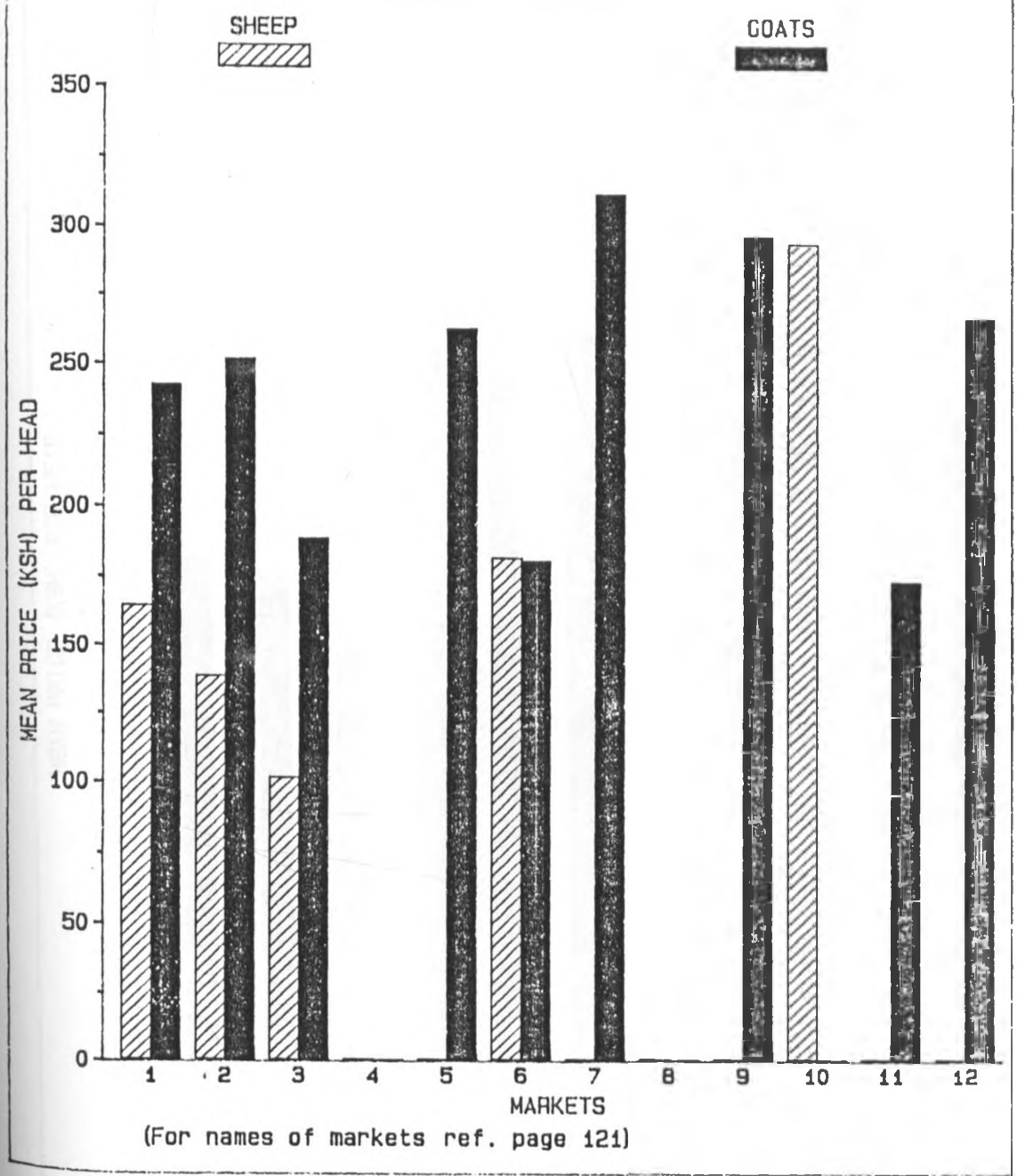
Species	Mean Prices (Males)		Mean Prices (Females)	
	KSh.	(N)	KSh.	(N)
Goats	207.36	(838)	130.86	(284)
Sheep	139.27	(273)	101.80	(86)
Total	190.63	(1111)	124.11	(370)

Figure 6.2 MEAN PRICE (KSH) BY MARKET FOR ALL GOATS
BARINGO DISTRICT



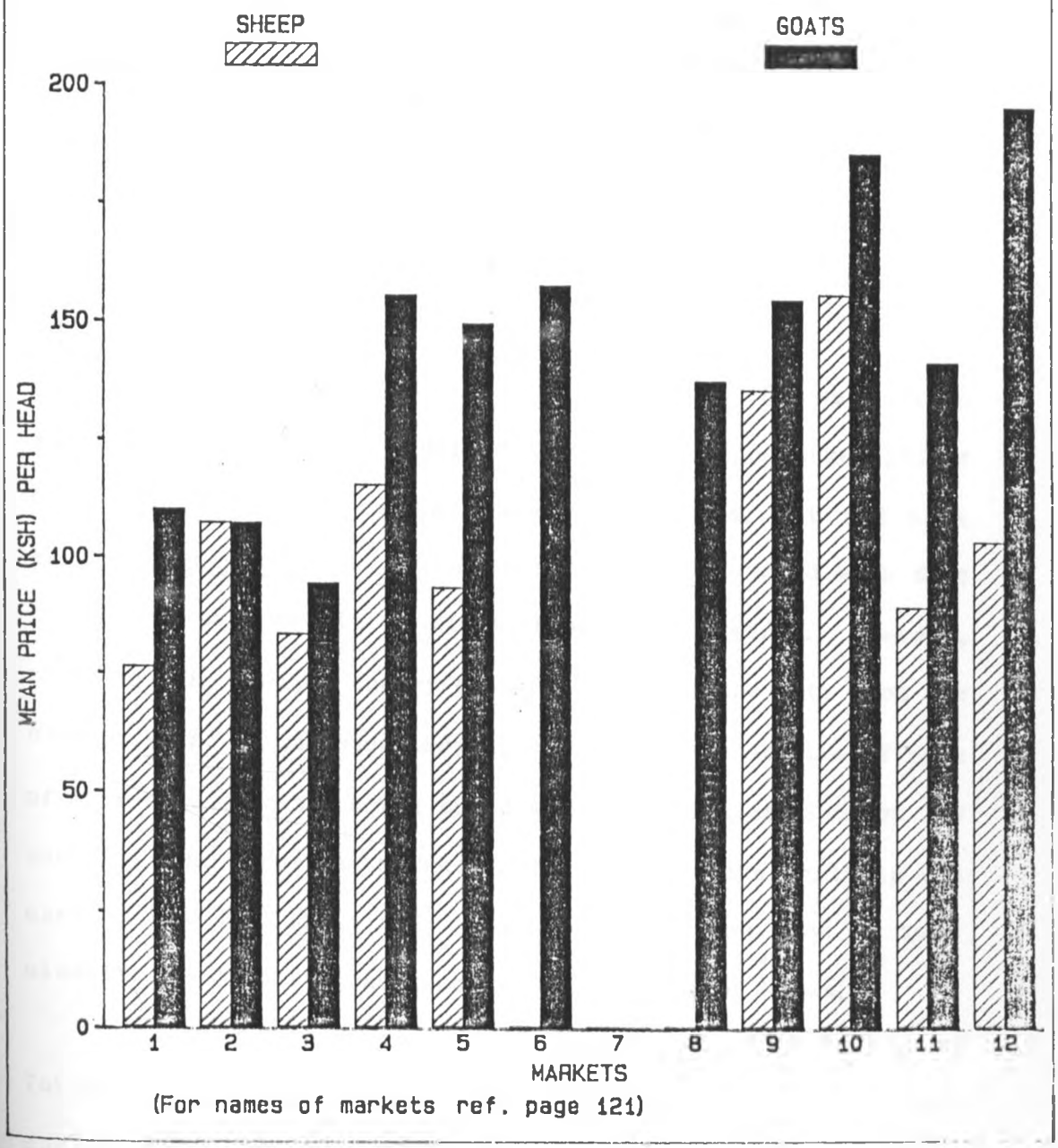
(For names of markets ref. page 121)

Figure 6.3 MEAN PRICE (KSH) BY MARKET FOR ALL CASTRATES
BARINGO DISTRICT



(For names of markets ref. page 121)

Figure 6.4 MEAN PRICE (KSH) BY MARKET FOR FEMALE SMALL RUMINANTS
BARINGO DISTRICT



(For names of markets ref. page 121)

markets, the price differences are illustrated on Figures 6.3 and 6.4.

6.5 PRICE DIFFERENCES BETWEEN MARKETS

In addition to significant mean price variations between species and sexes, significant mean price differences were observed between a sample of nine markets in which body weights of small ruminants were collected. The results are presented on Table 6.7.

6.6 RELATIONSHIP BETWEEN MARKET PRICE OF SMALL RUMINANTS AND TIME OF AUCTION

Results presented in sections 6.3.2 and 6.4 have shown statistically significant differences in the mean market prices between species, sexes and market locations. It had been expected, a priori, that the market price also varied with time of auction as a result of diminishing buyer demands. However, to be able to analyse the effect of time using the data from the nine markets, it was necessary first to disaggregate the effects of market locations, uneven numbers between markets, species and sexes of small ruminants presented. A covariance analysis was carried out including all these variables and time of sale classified into seven one-hour interval groups of sales.

The results of the covariance analysis presented on Table 6.8, once again, confirmed that the species, sex and market locations were the significant determinants of market price. Time of auction was statistically insignificant even at $P < .05$ level of confidence. Of the four determinants (sex, species, market, time), the sex variable was the most

Table 6.7 One-way ANOVA for Differences in Market Prices (KSh/kg) Between Markets in Baringo

Name of Market	Mean Price (KSh/kg)	N
Kapluk	8.25	188
Kipcherere	10.18	43
Kibingor	7.32	79
Marigat	7.21	99
Kampi ya Samaki	9.68	17
Radat	7.95	155
Maji Moto	7.93	70
Emining	5.99	62
Noiwet	7.70	87
MEAN	7.84	800

Source of Variation	D.f.	Variance	F. Ratio
Between	8	750282.50	23.90**
Within	791	31316.57	

** Significant at $P < 0.01$ level of confidence

Table 6.8 Least Squares Analysis of Variance : KSh/kg

Source of Variation	D.f.	Mean Square	F-Ratio	Remark
Market-month	8	64.186599	27.172	Significant at P <01
Time	6	1.754210	0.743	Not significant, P<.05
Species	1	114.577350	48.503	Significant, P<.01
Sex	1	575.373203	243.569	Significant, P<.01
Error	746	2.362259		

Mean = KSh. 7.72, Error Standard Deviation = 1.53696,
CV = 19.90, R^2 = .406

significant since it contributed the highest proportion of the total variance:

that is: $\frac{\text{Variance due to sex}}{\text{Total Variance}} \times 100 = 75.9\%$.

The next most important variable was the species by which contributed 15.1% of the total variance.

The mean prices (KSh/kg) for the various time groups are shown on Table 6.9. Further, "t" tests between any two price means showed that no single pair of time-price means were significantly different at $P < .05$ level of confidence.

The absence of significant differences between the mean prices of the time groups is largely attributed to the auction system which allows ample time and opportunity for the majority of the producers to sell without undue pressure from the buyers. The experience at Ong'ata Rongai and Emali cattle markets and Kisamis small ruminants market shows that buyers may arrive early but do not start serious negotiations with sellers until about the last two hours to closing time if supplies are not limiting. During these last hours the sellers are under sufficient pressure to sell and invariably have to reduce prices especially since markets are held only once and rarely twice weekly. The auction system affords flexibility so that sellers can present unsold stock for auction on the next day at a location close to their area of residence. If this still fails, they can present them on a scheduled day of informal marketing at their nearest market centre and negotiate prices directly with the buyers.

Table 6.9 Mean Market Prices (KSh/kg) by Groups of Auction Time

Time class	Mean Price (KSh/kg)
1. 0-60 minutes	6.69
2. 61-120 minutes	6.53
3. 121-180 "	6.79
4. 181-240 "	6.66
5. 241-300 "	6.96
6. 301-360 "	6.78
7. 361-420 "	6.60

Note: On average it took 2.5 minutes to sell one lot of small ruminant and 2.7 minutes for each lot of cattle, usually one head at a time, under this auction system. In the developed countries it takes approximately one (1) minute to sell each lot.

Section 6.7 compares these results of price analysis from the Baringo markets with corresponding results from the Kajiado markets.

6.7 COMPARING MARKET PRICES FROM BARINGO AND KAJIADO DISTRICTS

Liveweights were a major consideration at all the markets surveyed as most of the stock bought were destined for the abattoirs. Significant differences in weights were observed between the sheep and goats in Baringo, goats tending to be heavier than sheep. This is the opposite of the observations in Kajiado where sheep were found to be slightly heavier at the Olekesasi abattoir (ILCA unpubl.) and also at Mbirikani trading centre in Eastern Kajiado (Peacock, 1984). It was observed generally that sheep presented to the auctions in Baringo were small and in poor body condition and partly may be the cause of the disincentive prices offered for them.

It has been shown however, that the Maasai producers manage the sheep and goats equally well and a great deal of genetic selection is achieved almost at every breeding season. The producers decide which males in the flocks to use for breeding through very effective use of the apron controls on the males selected against (Peacock, ibid). The Maasai also have special use for sheep fat in the diets of the sick and breast-feeding mothers especially during periods of food stress. This makes the fatness characteristic rather desirable in order to meet this purpose. In addition, the extensive grassland conditions favour sheep in Eastern and Central regions of

Kajiado and partly explain the weight differences. Within the sexes, the castrates are also the heaviest in both sheep and goats in Kajiado. Early castration commonly practised by the Maasai facilitates faster growth and higher fat accumulation.

The Baringo data raise an interesting issue on the prices paid for goat males, castrates and females. While the average weights of castrates are significantly higher than those of entire males and females, the price per kg for castrates is lower than that of entire males. This situation suggests that buyers of goat castrates get the best in terms of quality and weight at prices KSh.0.45 cheaper than the entire males per kg. of liveweight. On the basis of total weight of animals bought, this gain can be substantial for a buyer choosing to buy goat castrates only compared to a buyer choosing to buy entire males of equal total weight.

The average market price for the small ruminants transacted in Baringo in 1984/85 was KSh.173.66 (N=1385). These data were augmented with long term transactions data from the report by Airey et al (1984). The resulting long term (1982/85) mean price for Baringo was calculated at KSh.165.99 per head (N=1869). A corresponding average price (1982/84) for all hinterland markets supplying slaughter stock to Olekesasi abattoir in Kajiado was KSh.157.02 (N=740), including all recorded breeds of small ruminants. If the comparison is narrowed to the Small East African Goat (SEAG) and the Red Maasai Sheep breeds, the only breeds recorded in Baringo, then the corresponding long term mean market price for Kajiado becomes KSh.158.26 (N=610). Between species, the comparative

long term market prices and weights for the two districts are presented in Table 6.10.

The comparison clearly shows that for all species, market prices (ksh/kg) offered at the Baringo markets are higher than Kajiado market prices.

Table 6.10 Comparative Market Prices and Liveweights per Head for Baringo[1/] and Kajiado[2/] Districts by Species

PARAMETER	SHEEP		GOATS	
	Baringo	Kajiado	Baringo	Kajiado
Mean body weight (kg)	22.9	30.5	27.0	28.5
Mean price (KSh/head)	134.81	155.16	232.28	160.82
Mean price (KSh/kg)	5.87	5.09	8.74	5.64
(N)	(499)	(276)	(793)	(334)

1/ Includes 1982/85 market data

2/ Includes 1982/84 market data

CHAPTER 7

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 SUMMARY

7.1.1 Introduction

This study set out to broadly investigate the reasons underlying the low levels of offtake of small ruminants from the Maasai pastoral production system. The problem has been analysed by comparing the marketing system in Kajiado representing the Maasai system with the marketing system in Baringo. The latter has for a long time maintained a commercial marketing system for both cattle and small ruminants. The production system in Baringo is in many respects comparable to the Maasai system.

The first objective was to describe and compare the structure and conduct of small ruminant markets in the two districts. The second objective was to estimate the marketing performance and relative efficiencies between comparable marketing operations. The third objective was to estimate the effects of sex, body condition, species of livestock sold and time of sale as independent variables determining market prices of small ruminants. The effects of sex, body condition and species on body weights have also been examined.

7.1.2 Producer Goals and Marketing Behaviour

It was observed that the Kajiado producers retained larger proportions of market class small ruminants in their

flocks than the Baringo producers. Approximately 24.2% of the sheep in the Kajiado flocks were market class stock compared to 11.3% in Baringo. Corresponding proportions of market goats were 18% in Kajiado compared to 12.0% in Baringo while proportions of market cattle in the Kajiado herds were only marginally higher than in Baringo.

The majority of the livestock producers interviewed in Baringo indicated that they were also subsistence crop farmers although the risks of crop failure were always high. In Kajiado, some of the producers interviewed indicated that they became part-time livestock traders during or immediately following droughts.

In both Baringo and Kajiado districts small ruminants were sold mainly for reasons related to family welfare.

Most of the sales took place at designated market locations. Sales at auctions accounted for 81% of the small ruminant sales in Baringo while in Kajiado, 64% of the sales were made at designated markets at trading centres. In addition, 33% of the small ruminant sales in Kajiado took place at the producers' bomas. Cattle were normally sold at the markets in both districts.

The size and age of the small ruminant were the two characteristics that substantially determined the price that the producer expected to receive in both districts. The exact price was however determined through the auctioning method in Baringo and through person-to-person in the Kajiado markets.

It was also clear that many more producers in Baringo than in Kajiado visited markets when they were not selling in

order to gain knowledged of the prevailing market prices.

All the Baringo producers interviewed were averse to selling on credit while almost 60% of the producers interviewed in Kajiado were willing to accept deferred payments from their regular buyers.

7.1.3 Characteristics of the Buyers

Forty-two per cent of the buyers interviewed in Baringo had over 10 years of trading experience compared to 25% in Kajiado. In both districts however, no monopolistic barriers to entry into livestock trade were observed. Most of the buyers in both districts patronise markets within their district of residence and that most of them consider themselves full time traders in livestock related activities.

The buyers' main reason for choosing to trade in small ruminants was the high preference for small ruminant meat shown by consumers. The cheaper beef prices, and therefore, a wider demand, was the main reason for choosing to trade in cattle. The main reason for trading in both cattle and small ruminants was to maintain flexibility in case of unstable supply of any one type.

Very few buyers of livestock invested in fixed capital for the purposes of livestock trade in both districts. Poor marketing infrastructure and unstable supplies mainly due to frequent out breaks of notifiable diseases were serious problems faced by the buyers.

Analysis of the type of livestock bought by 70 large buyers in Baringo showed that 85.7% traded in either small ruminants or cattle exclusively. Further, results of the sample interviewed through the questionnaire revealed that 62.5% and 78% of the buyers in Baringo and Kajiado respectively specialized in either small ruminants or cattle.

Within both districts, the animals bought were invariably trekked to their destinations (slaughter or resell) while trucking was left for long distances, usually outside the districts. Most of the retail butchers within Kajiado and Baringo bought their slaughter stock directly from the livestock markets. The livestock purchased and slaughtered within the districts but whose meat was sent outside the districts for consumption belonged to wholesalers. The wholesalers operating in Kajiado supplied the Nairobi consumption market while the wholesalers operating in Baringo supplied the Nakuru municipality consumption market.

7.1.4 Market Concentration - Baringo markets

The sellers at the Baringo markets were many. On average they sold 2.1 head of small ruminant and 1.6 head of cattle per person per market day. The buyers on the other hand were relatively few and bought an average of 8.2 small ruminants and 8.0 cattle per buyer per market day. The average numbers of livestock on offer at these markets were 99 small ruminants and 56 head of cattle per market day. The top ten sellers of small

ruminants sold 9.7% of the sheep and goats while the top ten sellers of cattle sold 11.9% of the cattle transacted. The top ten buyers of small ruminants bought 65.3% while the top ten buyers of cattle purchased 68.6%.

7.1.5 Marketing Costs and Margins per head of Small Ruminant

The costs of buying live small ruminants from the markets until the meat is delivered to the retailer have been worked out and the expected marketing margins estimated (see Appendices 8 to 13). The buyers from Kerio Valley retailing meat at Kabarnet markets achieved the highest profit margins (84%) per head of small ruminant. The buyers from Kajiado hinterland markets which supplied the Mombasa retail market through Mariakani abattoirs achieved almost similar profit margins (83%). The highest marketing costs were incurred between Kerio Valley markets and Limuru (28%) mainly because trucking had to be employed. The ratio of marketing costs to total costs ranged between 3.5% from the Ong'ata Rongai market centre to Nairobi and 27.8% from Kerio Valley to Limuru (Kiambu). The profit margins, on the other hand, ranged from 17.4% to 95%

7.1.6 Weights and Prices of Small ruminants in Baringo markets

Significant differences were observed in the body weights and prices offered for goats and sheep. Body condition per se, which is highly correlated to body weight, had a remarkable effect on the prices of all species and sexes of

small ruminants. It has been shown that between poor body condition and excellent body condition scores prices of small ruminants per head increased threefold while body weight (kg) increased only twofold between the same range of body conditions. At approximately 16.2 kg of body weight, the male and female goats had equal regressional projected market prices estimated at KSh.124.00 per head while the male and female sheep had equal projected prices of Ksh.77.86 at 13.6 kg body weight.

On average, goats were 5 kg heavier than sheep and within species, the male castrates were significantly heavier than the other sexes. Within the sheep, male castrates had the highest price per unit weight at KSh.7.31 per kg compared to entire male sheep at KSh.6.73 and females at KSh.5.88 per kg. Among goats, the entire males had the highest price at KSh.8.56 per kg compared to KSh.8.15 for male castrates and KSh.7.17 per kg for females. Between species, goats received an average of KShs.208.50 while sheep received an average of KSh.136.70 per head.

For all species, the market prices offered per kg in the Baringo markets were higher than the prices offered in Kajiado markets.

7.2 CONCLUSIONS

This section utilises information presented thus far to make conclusions on the underlying aspects of the problem. First, the main differences in the production strategies adopted by the producers in the two districts are discussed. The market structure, conduct and performance relationships are then

compared, especially as they are affected by the production strategies and the separate institutional marketing support arrangements in the two districts. Finally, the incidences of disease, the major production and marketing constraint in the systems studied, is discussed.

7.2.1 Differences in the Production Strategies of Small Ruminants: Baringo and Kajiado Compared.

The Baringo livestock producers depended on their livestock for most of their cash needs. They achieved this through routine sales of small ruminants mainly. To assure regular offtakes especially of males, Baringo producers maintained a large proportion of productive females in their flocks. Of the small ruminants transacted at the Baringo markets and whose data have been analysed, the females contributed only 21% and 25% of the sheep and goats respectively.

These proportions of offtake tally with the observations by Airey et al(1984) in which offtakes of 27% and 24% of the sheep and goats sold respectively were females.

The corresponding proportions of females among small ruminants sold in the Kajiado markets were 34% and 32% of the sheep and goats respectively (ILCA Unpublished). In addition, the total proportions of market class stock (defined as all the old unproductive males and females and all the old and mature castrates) were higher in the Kajiado flocks than in the Baringo flocks. In this study the proportions of market stock were found to be 25% and 18% of the sheep and goat flocks

respectively among the producers interviewed in Kajiado. Corresponding proportion in the Baringo flocks were 11% and 12% of the sheep and goat flocks respectively.

Market class proportion estimates of 8.7% and 9.2% of the sheep and goat flocks respectively in Baringo by Airey (1982) reasonably support the results of this study. However, King et al (1982) showed that the portions of market stock in the Kajiado flocks might be as high as four times the proportions in Baringo (37.8% and 41.9% for sheep and goats respectively).

There has been no evidence to suggest that higher home consumption or other forms of offtake may be responsible for lower proportions of market class stock among the Baringo flocks. On the contrary, sufficient evidence is available to show that considerable offtake of small ruminants passes through the commercial markets in Baringo.

There is also ample evidence to show that utilisation of small ruminants in the Maasai production system is still largely influenced by the society's social values . Grandin (1984), ILCA (1985), Dahl (1976) and White and Meadows (1981) have all come to the conclusion that wealthy Maasai households (those owning large herds of cattle) generally do not sell small ruminants which are principally regarded as food for the family. In addition, exchanges and gifts involving small ruminants are common among the households to establish or maintain social ties. Nutritional studies by Nestle, (1985) have also observed that fat sheep are kept for slaughtering for the sick and nursing mothers during times of food stress.

Further, it has been documented that having large flocks of small ruminants is also considered a strategy for post-drought recovery among the Maasai should the producers lose the cattle in the drought. This is done through selling and using the money to purchase cattle on the market or outright exchange of small ruminants for cattle. Having large flocks and herds also confers a social prestige and status among the other Maasai producers.

The wealthy Maasai producers therefore, prefer to raise cash through sale of cattle leaving the small ruminants for the purposes enumerated. This largely explains why large surpluses of market class small ruminants are frequently found in the wealthy households. The poorer households (those owning few cattle) meet most of their cash requirement through sales of small ruminants and from off-ranch incomes.

In summary, the Maasai producer strategies and their utilization of small ruminants are markedly different from the Baringo producers, the latter having developed to the current state at which offtake of small ruminants is largely commercial. On the other hand, the Maasai producers are still largely utilizing small ruminants in the traditional way. The prestige and social status that large flocks give, per se, cannot be regarded as a productive attribute. A change towards eliminating this social constraint is likely to achieve significant success towards commercialising use of small ruminants in Maasailand.

7.2.2 Differences in the Structure and Conduct of Livestock Markets in Baringo and Kajiado

7.2.2.1 The Baringo System of Marketing

In Baringo, more open competition in buying was observed at the auction rings and the prices offered became public knowledge. The auctioneer was left in control of the transactions once the animal was put in the ring and both the seller and buyer exhibited considerable confidence and trust in the auctioneer. For instance, 30% of the responses from producer interviews indicated that price determination was left to the auction system.

No explicit collusion in price setting was observed among the buyers or sellers in Baringo and, in most cases, the producers selling were not familiar with the buyers at the auction rings. Hence, it can be stated that this method of selling was impersonal and outside the control of either buyer or seller as described by Tomek and Robinson (1981). Prices at any single market in Baringo reflected short run supply and demand. It has already been shown (under section 6.5) that all the sales received a fair price on the basis of price per kg. Time of sale after the start of auction was not a significant determinant of price on any single day.

There appeared, however, to be limitations in market size at wholesale stages of marketing as the consumption market appeared to be saturated both within Baringo and Nakuru municipality. A new entrant into the wholesale trade could of course opt to supply meat at lower prices to gain a share of the market. If this happened the probable behaviour would be for

the other wholesalers to lower supply prices and in the end no significant increase in market share would result. This is because the consumer prices, rather than wholesale prices, determine the total market demand for meats. The consumer prices are controlled through government legislation. To alleviate this saturation problem, the wholesalers were actively exploring for larger markets in institutions around Nakuru. Entry into live animal trade was also not very attractive for new entrants as the wholesalers were themselves buyers at the live animal markets.

Vertical integration was commonly practised between live buying and retailing. It was pointed out in section 4.3.7 that approximately 67% of the buyers of live animals in Baringo were also meat wholesalers and about 29.2% of them integrated from livebuying through meat retailing. Although almost all the wholesalers had loose and legally unbinding arrangements with the retailers, it must be assumed that these contracts were of an integrative nature to assure continued and stable markets. Instability in supply of dressed carcasses was perhaps a reason why retailers wished to integrate to include buying their own live animals. However, the need to increase profit margins by controlling levels of marketing costs may have been a more important motive. From the analysis of marketing costs and margins it is obvious that buyer-retailers made considerable profit margins for the capital invested. For instance Kabarnet buyer-retailers made over 80% returns while Limuru buyer-retailers made over 50% returns.

7.2.2.2 The Kajiado (Maasailand) System of Marketing

In Kajiado, the method of person to person negotiation between seller and buyer does not create any meaningful competition when the details of the transactions are kept secret. It has been stated earlier that the buyer was usually the more informed about prevailing market situations than the seller. The advantage the buyer took of the imperfect information system resulted in impressive profit margins of 75.2% between the producer in the group ranches and Mariakani wholesale meat market. The buyers also achieved profit margins of 25.6% between the producer and Ong'ata Rongai terminal live-market. The differences indicate the considerable extra benefits achieved by integrating live buying and meat wholesale stages.

Unstable supplies from the Kajiado system also reduced the number of potential buyers thereby reducing competition even further. The two buyers of small ruminants from Kiambu district interviewed at the Baringo markets indicated that this state of instability of supplies is the main reason they do not buy in Maasailand despite the proximity and comparative advantage in costs. The numbers on offer at the Kajiado markets fluctuate considerably, especially after every major drought. The prices of live animals during the low supply periods in Maasailand are prohibitive. As a result of the fluctuating supplies and prices, the two buyers from Kiambu sought to buy from Machakos and Kitui districts when the markets in Baringo were closed for reasons of outbreaks of notifiable diseases.

Further, the two buyers complained of the high incidences of measles from the stock purchased from Maasailand compared to stock purchased from drier areas in the north, including Baringo. However, at the two Ong'ata rongai abattoirs processing stock from Maasailand mainly, only 0.2% and 0.1% of the cattle and small ruminants respectively were condemned due to measles in 1983. This loss does not substantially reduce the level of profit margins to the wholesaler (see Appendix 9).

The current system of marketing for small ruminants in Maasailand is heavily dependent on local Maasai traders to play the initial catalytic role of boma to boma seeking. However, the local Maasai livestock traders generally prefer trading in cattle to small ruminants citing several reasons for this. First, it is cattle rather than small ruminants that the majority of producers, especially the wealthy, will readily sell. Second, numerous buying and trekking routes have developed over time within the whole of Maasailand. These routes are well recognised by both producers and cattle buyers, which facilitates contact between the producers willing to sell and the buyers. This arrangement does not exist with respect to small ruminant trade which leaves the buyers with the harder option of boma to boma seeking.

The third reason cited by the local livestock traders was the existence, at the time of the survey, of a lucrative illicit cattle market along Kenya's border with a neighbouring country. The traders were able to buy cattle rather cheaply in exchange for the Kenya currency along the border. The local buyers, who are needed for the initial contacts with the

producers were, as a result occupied away from small ruminant trade.

The fourth reason is that trading in cattle appears to be a socially accepted occupation among the Maasai while trading in small ruminants is considered relatively inferior. Most of the cattle traders were willing to stay with their cattle through successive market stages towards the terminal markets until they got the right price for the cattle. The traders did not show the same patience with small ruminants, often claiming that high mortalities resulted from exhaustion if the small ruminants were trekked over long distances. As discussed under section 4.3.3, retail butchers operating at Kiserian and Ong'ata Rongai markets who got their supplies of small ruminants from the south western end of Kajiado (Magadi area) commonly trucked the animals to the abattoirs.

In addition, local livestock traders indicated that little effective demand for all meats exists at the small market centres within Maasailand. This is because considerable home consumption, especially of small ruminants, takes place in the producing households. There is, therefore, not sufficient business for the local livestock traders who may wish to buy from the producers to supply the local butcheries.

It can safely be stated that very few local Maasai traders combined live-buying and meat retailing within and outside Maasailand. This operation was carried out by non-Maasai buyers who frequented the two major small ruminant markets in Kajiado (Isinya and Kisamis) but conducted retail trade in Nairobi or Kiambu district. Contract arrangements

between the Maasai buyers of small ruminants and retailers or institutions for wholesale supply of meat were also non-existent.

7.2.3 Comparisons of Market Performance: Baringo and Kajiado

The marketing margin analysis carried out shows that traders of small ruminants in both districts operated a very lucrative business with rather high profit margins. However, on the basis of least marketing costs, efficiencies were achieved through the marketing channels that involved short distances between source and destination, thereby avoiding trucking, and those channels that involved some form of integration between livebuying and meat retail stages.

7.2.4 Determinants of Market Price

Results of the analysis of the Baringo livestock transactions data show that buyers were significantly influenced by the sex, species and body condition of the small ruminants. Body condition was shown to be highly significant in determining prices offered for the small ruminants at the auction markets in Baringo.

The sizes of the individual animals was listed as the criterion most commonly used in determining market prices among the Maasai producers. In addition, the prices (Ksh/kg) received in the Kajiado markets showed that higher prices were paid for male castrates compared to the other sexes, also on the basis of superior body condition.

It can safely be concluded, therefore, that large slaughter stock in good to excellent body condition received proportionately higher market prices even in the Kajiado system.

The results presented on Table 6.10 also confirm that goats received higher prices than sheep in both Kajiado and Baringo districts. The disparity between the prices of the sheep and those of goats are, however, lower in Kajiado. It has also been pointed out in this thesis that fat sheep are favoured for house slaughter for the sick and nursing mothers in Maasailand. The Maasai producers can exploit these preferences and market price differences by slaughtering more sheep for home consumption and releasing good quality goats for the market.

7.2.5 Selling Time as a Factor in Price Differences

It has been shown that no significnt differences exist in prices of small ruminants sold at different times of the same day in the Baringo markets. On the other hand, it has been observed that buyers are able to depress market prices as the time allocated for marketing reduces in the Kajiado markets. For instance, the cattle buyers at the Ong'ata Rongai and Emali markets were observed to concentrate their buying into the last few hours of the marketing time allocated. Similar collusion tactics were observed at the Kisamis and Isinya small ruminant markets. Under these circumstances, sellers are either forced to accept the depressed prices or hold on to the animals until the next market day, usually one week later. Alternatively, the sellers may wish to transfer the unsold stock to a larger market hoping to realise better prices.

This simple problem can largely be solved by either increasing the time of active marketing or instituting a system allowing for easy and free access to market price information.

7.2.6 Institutional Support in key areas of Small Ruminant Marketing

7.2.6.1 Institutional Support in Baringo

The auction system of marketing small ruminants in Baringo has been sustained through the support of the County Council of Baringo. Through the auction system, the council earns revenue while the producer is assured of a regular market outlet. The local and out-of-district buyers also find a regular and reliable source of livestock through the auction system. The council facilitates the system further by providing transportation to the buyers to the market centres off the major road networks.

The central government in addition supports the marketing system in Baringo through disease surveillance and preparation of auction marketing schedules in areas clear of notifiable diseases. These schedules are widely publicised within and outside the district. One department of the central government, in particular, compiles the important aspects of price and supply information on a weekly basis. This information is widely disseminated through the mass media along with price information of the other agricultural commodities in Kenya. The installation of modern auction yards has further improved livestock handling in selected strategic market locations.

7.2.6.2. Absence of Institutional Support in Kajiado

In Kajiado, and indeed the whole of Maasailand, all the support services enumerated for Baringo are non-existent in small ruminant marketing, except for disease surveillance. Instead the County Council of Olkejuado concentrates on supervising the cattle markets probably because the revenue levied per head sold is five times the amount levied from small ruminant sales. Almost all the revenue from small ruminant sales in Kajiado is collected as carcasses pass through the main abattoirs in the district.

None of the central government departments has shown interest in promoting marketing of small ruminants in the district. There is only one known organised partnership of local traders in the whole of Kajiado. The partnership of three novice traders was formed in 1984 and was introduced into the small ruminant trade by established Kamba traders from the neighbouring Machakos and Kitui districts. Despite their familiarity with the producers in the group ranches of eastern Kajiado, the members of the partnership have to put inordinate amounts of time while buying. They also have to cover long distances while assembling stock at a central location along the Nairobi-Mombasa highway. The partnership, on average, buys and transfers about 300 head of assorted small ruminants to Mariakani per month. In Baringo, such a number can be assembled in about two consecutive market days.

7.2.7 Incidences of Disease as a Constraint in Marketing of Small Ruminants

Foot and Mouth Disease is the most important disease related constraint in both Baringo and Kajiado districts. In the event of an outbreak, all marketing activities have to stop and movement of stock into or out of the affected regions is not allowed. This forces the buyers to change buying locations or temporarily halt trading. For instance, the partnership operating in the group ranches of eastern Kajiado was temporarily crippled towards the end of 1985 following a disease outbreak in the areas they bought from. The group had to resort to buying in unfamiliar areas of Machakos where they faced intense competition from the older established traders supplying the same Mariakani meat wholesale market.

In Baringo, the problem of total movement embargo following disease outbreaks was partly solved with the establishment of the Nakuru-Baringo border abattoirs. These abattoirs developed largely as a consequence of frequent quarantines prohibiting stock movement into and across Nakuru district. Now the meat from Baringo intended for the Nakuru municipal market is processed at these border abattoirs.

Recently, a few hinterland abattoirs have been established at Namanga and Bissel centres of Kajiado to process meat for the Nairobi market. The development of these abattoirs was also a result of a disease outbreak in northern areas of Kajiado surrounding Nairobi city in the middle of 1985.

These half-measure solutions are satisfactory for the local market but would be completely unacceptable for the export

market. Total control of Foot and Mouth disease is, therefore, the long term solution.

7.3 RECOMMENDATIONS FOR THE KAJIADO SYSTEM

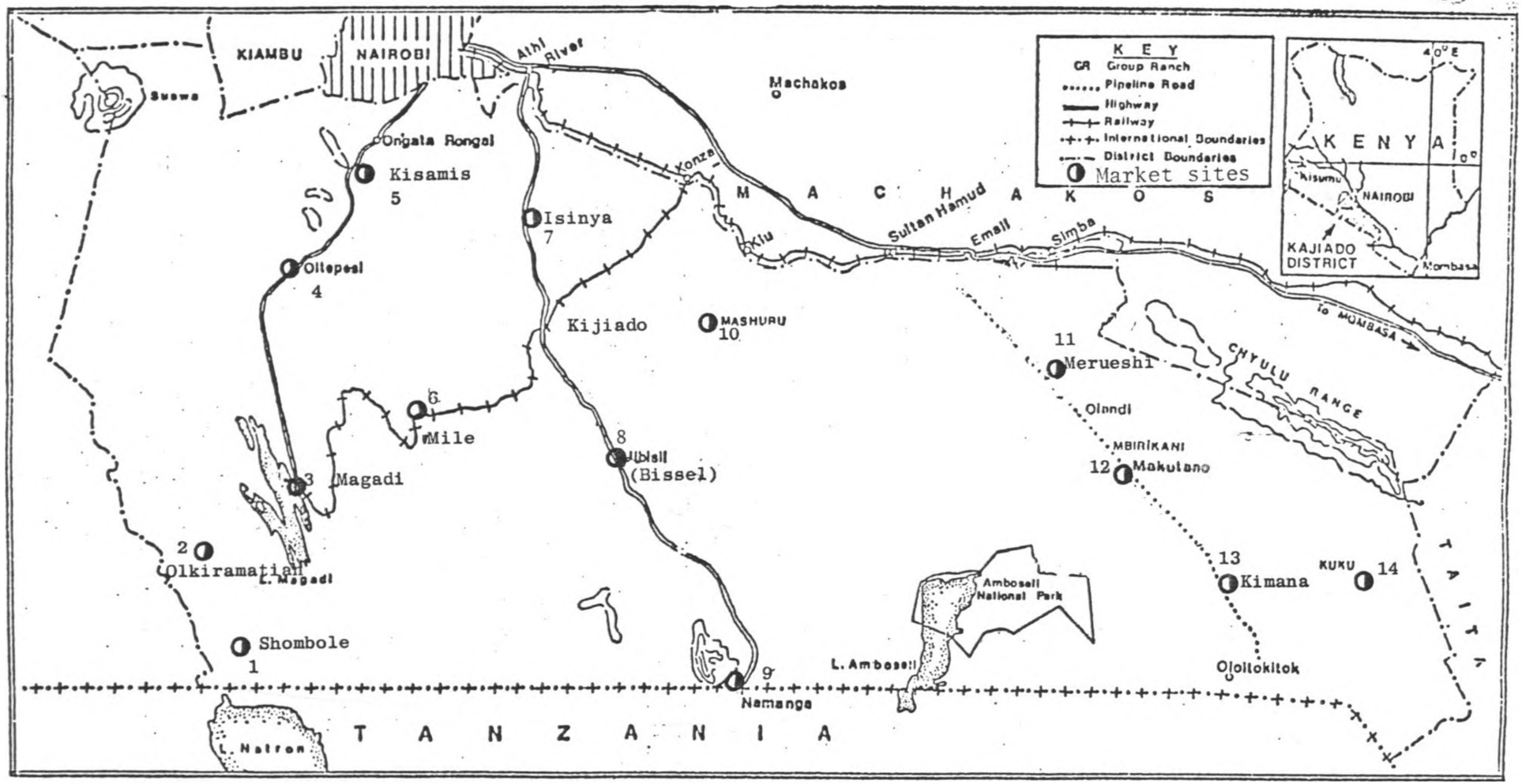
7.3.1 Introduce the auction method of selling in Maasailand for both cattle and small ruminants simultaneously

Initially the revenue from cattle sales may have to subsidise the costs of running small ruminant auctions, as is the case in Baringo, but this is a service the local government can undertake as a social expenditure. In total however, the revenue from combined cattle and small ruminant auctions should earn a positive net revenue to the local government. A deployment of the existing revenue collecting staff of the local government may be all that will be nedeeded for manpower and allocation of a light truck for transportation. Most of the suggested sites for auction sales (see Figure 7.1) are easily accessible by existing public transportation arrangements. Available evidence indicates that cattle auction marketing was once in existence in Kajiado district at the centres of Bissel, Mile 46, Ngong (later Kibiko), Mashuuru, Emali and Merueshi. Correctly the recommendation, therefore, calls for a re-introduction of the method to include small ruminants.

7.3.2 Improve the terms of Trade for the Pastoralists

Livestock will for a long time remain the main output of the pastoral systems. It has been shown, (ILCA 1985), that the real prices received for meat products out of Kajiado have been deteriorating compared to the price of the basket of goods and

Fig 7.1 Map of Kajiado District showing Suggested Sites for Auction Market Development



services the pastoralists have to purchase within the Kenyan economy. It is believed that if the pastoralist's terms of trade are improved he will be motivated to produce and sell within his existing socio-economic structure. Significant adjustments of meat prices upwards, especially for the lower grades of meat where most of the pastoral livestock fall, would greatly improve the welfare of the pastoralist by stimulating higer output and offtake from the system.

7.3.3 Improve livestock market price information and dissemination system

The calculated long-term price difference of KSh.2.24 per kg (both sheep and goats) between Baringo and Kajiado and the lower marketing costs for the latter are sufficient incentives to lure more buyers into Kajiado without necessarily affecting demand for small ruminants in Baringo. There is no immediate danger of over-exploiting the small ruminant population in Kajiado and on the contrary, increased offtake ought to stimulate production.

7.3.4 Introduce low cost small ruminant improvement programmes

For instance, heavy goat breeds like the Galla and the Dorper sheep breed can be introduced to improve body weights. Earlier investigations (De Boer 1981) have illustrated that significant advantages in body weights can be achieved through cross-breeding the Small East African goat with the Galla and the Red Maasai sheep with the Dorper. It has also been shown through the regressions of price on weight, (Table 6.4) that

there are significant increases in marginal revenue for weight increases among all male small ruminants in good to excellent body condition.

7.3.5 Improve infrastructure required for an effective auction system especially auction yards

Most of the cattle vaccination structures currently in use could easily be modified and used as auction yards in the areas suggested. Improvement of infrastructure also applies for most of Baringo markets.

7.3.6 Support new abattoirs in the production areas

Addicional abattoirs in western Kajiado (close to Magadi) would alleviate problems encountered when markets in such areas are closed in the event of an outbreak of a notifiable disease. No additional requirement for health control manpower is envisaged as health personnel are already in these areas and probably presently under-employed. Construction of the abattoirs can either be undertaken by the local council or by private investment for which user fees would be charged.

7.3.7 Support and strengthen buying partnerships, such as the one operating in eastern Kajiado, through government finances allocated for district development

Private finance institutions are unlikely to finance this type of business operation without tangible security. Alternatively, government may provide guarantees to private institutions for finances borrowed by such partnerships. For

REFERENCES

Airey, J L (1982). Sheep and Goat Project Interim Technical Report. FAO/Government of Kenya, Nairobi, Kenya.

Airey, J L, Bethke N, Koiser J (1984). Some Results from Sheep and Goat Auction Sales in Baringo District 1981-84, Technical Note No 27, Nairobi, Kenya.

Ariza-Nino, E J and Griffith J L P (1979). Livestock and Meat Marketing in West Africa Vol IV, Centre for Research on Economic Development, University of Michigan, U S A.

Ariza-Nino, E J, Herman L, Makinen M and Steedman C (1980). Livestock and Meat Marketing in West Africa Vol I, Synthesis Upper Volta, Centre for Research on Economic Development, University of Michigan, U S A.

Bekure, S, Evangelou P, and Chabari F (1982). Livestock Marketing in Eastern Kajiado, Kenya. ILCA Working Document No 26 Nairobi.

Boer, A J de (1981). Sheep and Goat Development Project, Kenya: Production Economics. Report prepared for GoK by FAO/UNDP, Rome.

Boer, A J de (1982). Goat and Goat Product Markets and Market Prospects: An International Perspective. In: Proc. Third International Conference on Goat Production and Disease, January 10-15 1982, Tucson, Arizona, U S A.

Caves, R (1977). American Industry: Structure, Conduct, Performance. Fourth Edition, Printice-Hall Inc. Englewood Cliffs New Jersey, U S A.

Chemonics International Consulting Division (1977). Livestock and Meat Industry Development study (Final Report). Prepared for the Ministry of Agriculture, Nairobi, Kenya.

Dahl, G and Hjort A (1976). Having Herds: Pastoral Herd Growth and Household Economy. Department of Social Anthropology, University of Stockholm, Sweden.

Delgado, C, and Staatz J (1980). Livestock and Meat Marketing in West Africa Vol III: Ivory Coast and Mali. Centre for Research on Economic Development, University of Michigan, U S A.

Evangelou, P (1984). Analysis of constraints to expanded livestock production in Kenya's Maasailand. Ph D Dissertation, University of Florida, Gainesvaille, U S A.

Gatere, K and Dow K (1980). Improving price information systems in beef marketing in Kenya. Development Planning Division, Ministry of Agriculture, Nairobi, Kenya.

Grandin, B E (1984): Livestock Transactions. In: Maasai Livestock Production System: Summary of results. S Bekure, P N de Leeuw and B E Grandin (Eds). ILCA/Kenya, Nairobi.

International Livestock Centre for Africa (ILCA) (1979a). District Development Briefs, ILCA/Kenya Working Document No 13, Nairobi.

International Livestock Centre for Africa (ILCA) (1979b). Economic Trends, Commodities: Livestock and meat exports after the drought in the Sahel. ILCA Bulletin No 3. Addis Ababa, Ethiopia.

International Livestock Centre for Africa (ILCA) (1980a). Economic Trends: small ruminant production in the world. ILCA Bulletin No 7, Addis Ababa, Ethiopia.

International Livestock Centre for Africa (ILCA) (1980b). Economic Trends: Demand prospects for meat and dairy products. ILCA Bulletin No 10, Addis Ababa, Ethiopia.

International Livestock Centre for Africa (ILCA) (1985). Maasai Livestock production system (in print). ILCA/Kenya Rangeland Programme, Nairobi, Kenya.

Jahnke, H E (1982). Livestock Production systems and livestock development in Tropical Africa. Kieler Wissenschaftsverlag Vauk, West Germany.

Josserand, H, and Sullivan, G (1979). Livestock and meat marketing in West Africa Vol II. Benin, Ghana, Liberia and Togo. Centre for Research on Economic Development, University of Michigan, U S A.

Kenya, Government of, (GoK) (1974). Annual Report for 1974, Kajiado District. Ministry of Agriculture, Kenya.

Kenya, Government of, (GoK) (1979). Estimated Livestock population for Kenya (unpublished). Ministry of Agriculture, Nairobi, Kenya.

Kenya, Government of, (GoK) (1980). National Livestock Development Policy, Ministry of Livestock Development, Nairobi, Kenya.

Kenya, Government of, (GoK) (1981). National Food Policy, Ministry of Agriculture, Nairobi, Kenya.

Kenya, Government of, (GoK) (1983a). Meat Inspection Records, Veterinary Development, Ministry of Agriculture, Kenya (unpublished).

Kenya, Government of, (GoK) (1983b). Annual Report (1983) for Baringo Pilot Semi-Arid Area Project. Ministry of Finance and Economic Planning, Kenya.

Kenya, Government of, (GoK) (1984). Cattle and Beef prices during 1985. Ministry of Agriculture, Nairobi, Kenya.

Kenya, Government of, (GoK) (1985). Kenya Gazette: Supplementary Legislation No 6. Government Printers, Nairobi, Kenya.

Kenya, Government of, (GoK) (n.d.) 1979 Population Census. Vol II. Analytical Report. Central Bureau of Statistics, Ministry of Finance and Planning, Nairobi, Kenya.

King, J M, Sayers A R, Peacock C P, and Kontrohr E (1982). Maasai herd and flock structure in relation to household livestock wealth and group ranch development. Working Document No 27, International Livestock Centre for Africa, Nairobi, Kenya.

Koch, J V (1974). Industrial Organization and Prices. Printice-Hall Inc., Englewood Cliffs, New Jersey, USA.

Little, P D (1983). From Household to region: The marketing/production interface among the Il Chamus of Northern Kenya. Ph D Dissertation, Department of Anthropology, Indiana University, U S A.

Matthes, M C (1979). Livestock marketing in Kenya. Field draft document. FAO/UNDP Marketing Development Project Ken 75-005. Nairobi.

Meyn, K (1977). A proposed livestock development strategy for West Africa. IBRD Western Africa Regional Office.

Nestel, P S (1985). Nutrition of Maasai Women and Children in Relation to Subsistence Food Production. Ph D Dissertation, Nutrition Department, Queen Elizabeth College, UK.

Peacock, C P (1984). Sheep and goat production on Maasai Group Ranches. Ph D Dissertation, University of Reading, UK.

Sudan, Government of, (1974). Land use Planning survey, Southern Darfur. Ministry of Agriculture, Khartoum.

Tilahun, N (1983). Livestock marketing in North Eastern Ethiopia. JEPSS Research Report No 10, ILCA, Addis Ababa, Ethiopia.

Tomek, W G, and Robinson K L (1981). Agricultural product prices, 2nd Edition. Cornell University Press, Ithaca, New York, U S A.

Winrock International, (1983). Socio-economic Aspects of Range Research in Kenya: A plan for reaching the ultimate target groups. Report submitted to Research Division, Ministry of Livestock Development, Nairobi, Kenya.

White, J M and Meadows S J (1981). Evaluation of the contribution of group and individual ranches in Kajiado District, Kenya, to economic development and pastoral production strategies. Ministry of Agriculture and Livestock Development, Nairobi, Kenya.

Appendix 1

LIVESTOCK MARKETING

Producer Marketing Strategy

Respondent:_____ Area/Ranch:_____ Date:_____

1. What are your main occupations besides keeping livestock?
   a) Farmer:_____
   b) Employment:_____

2. From your herd and flock:
   a) When would you decide to sell a cow/steer/bull?_____
   _____
   _____
   b) When would you decide to sell a goat or sheep?_____
   _____
   _____

3. Livestock sales in the last 12 months:

Type of livestock sold (cattle/smallstock)	No.	Place of Sale (Boma/Market/Waterpoint)	When sold Month / Year

FOR SHEEP & GOATS

4. How do you determine price to sell at?_____
   _____
   _____

5. When you are not selling, how often do you visit the market(s)?
   a) Regularly:_____ Why?_____
   b) Occasionally:_____ Why?_____
   c) Never:_____ Why?_____

6. HOw are you paid?
   a) Always in cash in full:_____
   b) Sometimes cash payment immediately, balance later:_____
   c) Who gets credit (b) if applicable:_____
   d) Have all your past debtors fully paid up?_____

..../2.

Appendix 1 (cont'd)

Livestock Marketing - Producer Marketing Strategy - 2 -

7. Do you have specific buyers (traders) you consider regular customers?

_____

If yes, from where? _____

Are they Resellers / Butchers / Contract Suppliers? _____

_____

OTHERS (specify): _____

_____

How often do they visit seeking to buy from you? _____

_____

8. How do you transport your sheep and goats to the market?

Mode of Transport	Estimated Cost (KShs)/head
Trek	_____
Truck	_____
Railway	_____
Distance to place of sale.	_____ kms

9. What are the main problems you face in selling sheep and goats?

Problem	Present	Past
a) _____	_____	_____
b) _____	_____	_____
c) _____	_____	_____
d) _____	_____	_____
e) _____	_____	_____
f) _____	_____	_____

FNC/rns
29/01/85

10. Current livestock holdings:-

CATTLE		SHEEP	
Classes	Nos.	Classes	Nos.
Bulls		'Old' Rams	
Mature steers		Service Rams	
Immature steers		'Old' Castrates	
Cows		Mature Castrates	
Heifers		Productive ewes	
Calves (M, F)		Lambs	

11. Exchanges and gifts in the last 12 months.

E X C H A N G E S

O U T		I N	
Type of Livestock	No..	'Type of Livestock	' No.

FNC/rns
29/01/85

GOATS

Classes	Nos.
'Old' Bucks	
Service bucks	
'Old' Castrates	
Mature Castrates	
Productive nannies	
Kids	

G I F T S

Type of Livestock	No.

Appendix 2

LIVESTOCK MARKETING

Survey of Buyers

Name of respondent:_____ Market:_____

Area of residence:_____ District:_____

Date:_____

1. How long have you been in this business?_____ years _____ months.

2. Where else do you buy livestock?_____

_____

_____

3. How many days in a week do you spend in livestock trade (including buying, reselling, butchering, etc)?_____

4. What type of livestock (cattle/smallstock) do you mainly buy?_____

Why?_____

_____

_____

5. What is the maximum/minimum number you bought at this market on one day during 1984?

	Cattle	Sheep/Goats
Maximum	_____	_____
Minimum	_____	_____
Average	_____	_____

6. What types of livestock have you purchased today and how will you transport them?

Type of Livestock	No.	Mode of T/sport	Own/hired	Estimated cost per head
a) _____	____	_____	_____	_____
b) _____	____	_____	_____	_____
c) _____	____	_____	_____	_____

7. How do you dispose of the livestock you buy?

Disposal	Place	Frequency (D/W/M)	No. of head
a) Resell	_____	_____	_____
b) Retail butcher	_____	_____	_____
c) Wholesale butcher	_____	_____	_____
d) Contract supplier:			
- Live animals	_____	_____	_____
- Meat	_____	_____	____kgs

.../2.

Appendix 2 (cont'd)

Livestock Marketing - Survey of Buyers - 2 -

8. What expenses do you incur in relation to marketing?

a) Transportation of self - 1 Return Trip KShs:_____
b) Transportation of assistants - 1 Return Trip KShs:_____
c) Food/drinks expenses - 1 Return trip KShs:_____
d) Lodging expenses - 1 Return trip KShs:_____
e) Taxes/cess paid per head: Cattle:_____ Sheep/Goats:_____
f) Watering charges/head Cattle:_____ Sheep/Goats:_____
g) OTHER (Specify):_____ KShs:_____

9. What investment have you made in connection with your livestock trade?

ITEM			YEAR	Value (KShs)
a) Truck for live animals	___	Type/make:_____	____	_____
b) Abattoir:	___	Location(s)_____	____	_____
c) Butchery:	___	Location(s)_____	____	_____
d) Holding yards:	___	Location(s)_____	____	_____
e) Meat delivery vans:	___	Type/make:_____	____	_____
		Distance travelled/day:_____ kms.		

f) OTHERS (Specify)_____

10. What losses do you often incur during trading (deaths/thefts/injuries/ disappearances/pricing, etc)?

	Type of Livestock	Av. lost per week	Cause of Loss	Estimated value of loss (KShs)
a)	_____	_____	_____	_____
b)	_____	_____	_____	_____
c)	_____	_____	_____	_____

11. What other problems have you often faced in your trade (capital/low selling prices/high taxes/high losses, etc.)?

	Problem	Present	Past
a)	_____	_____	_____
b)	_____	_____	_____
c)	_____	_____	_____
d)	_____	_____	_____
f)	_____	_____	_____

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Appendix 3

LIVESTOCK MARKETING FORM

NAME .....

MARKET ..... MARKET NO.....

DATE MARKET VISITED .....

No.	Type(Breed)	Sex	Estimated weight	Actual weight	Price	Remarks

Appendix 4

INTERNATIONAL LIVESTOCK CENTRE FOR AFRICA

ILCA

WEEKLY SHEEP/GOAT SALES AT ONG'ATA RONGAI

No. Brought for Sale:_____ Enumerator:_____ Date:_____

No. of Sellers:_____ No. of Buyers:_____

TYPE	BREED	SEX	CONDITION	Price sold at this market today	INFORMATION FROM SELLER				INFORMATION FROM BUYER			Slaughter weight (kg)
Sheep/ Goat	Maasai Sheep/Goat Dorper sheep		Excellent/ Good/ Fair/ Poor.		Are you a Trader or producer	If seller is trader anim bought For what price?	At what place? 1/	From Trader or Producer	PURPOSE Slaughter/ Rearing/ Selling.	DESTINATION	Method of Transport	

1/ PLACE PURCHASED FROM

- Group Ranch
- Individual Ranch: Kajiado/Machakos
- Trading Centres

DESTINATION

KMC Athi River; KMC Mombasa; Mariakani; Dagoretti; Ong'ata Rongai; Emali; Machakos; G.R. Kajiado; I.R. Kajiado; I.R. Machakos; OTHERS

Appendix 5 Controlled Retail Meat Prices for Areas (Centres) Receiving Livestock and Meat from Baringo and Kajiado Districts

Area/Centre	Beef with Bone (KSh/Kg)	Mutton/Goat Meat (KSh/Kg)	Liver Heart KSh/KG)	Tripes (KSh/Kg)
1 - Nairobi, Mombasa	21.00	21.60	20.20	12.20
2 - Nakuru Municipality	20.50	21.10	19.20	11.20
3 - Ngong, Ongata Rongai Kiserian, Athi River	20.50	21.10	19.20	11.20
4 - Kiambu, Thika towns	20.50	21.10	19.70	11.70
5 - Kiambu, Rural	20.00	20.60	18.70	11.20
6 - Nakuru, Rural	20.00	20.60	18.70	11.20
7 - Mariakani	20.00	20.60	17.80	11.20
8 - Baringo, all areas	19.50	21.10	18.20	10.70
9 - Elgeyo Marakwet	19.50	20.10	18.20	10.70

Source: Government of Kenya (1985) Subsidiary Legislation, Gazette Supplement No.6

Appendix 6 Monthly costs of Auction Operation in Baringo District

ITEM		RATES	TOTAL
1.	Fixed: Salaries and housing costs: allowances, -Clerk	1 @ KSh.2,000/month	2,000
	-Driver, Assistants	4 @ KSh.675/month	2,700
2.	Variable costs[1/]		
i)	-Subsistence allowances, -Clerk	@ KSh.125 p/night, 12 nights	1,500
ii)	-Subsistence allowances, -Drivers, Assistances	@ KSh.60/night	2,880
iii)	-Fuels, oils, depreciation	150 km/day, 12 days @ KSh.4.00 per km	7,200
iv)	Repairs and maintenance		2,000
v)	Miscellaneous materials		1,000
	Total estimated		19,280

1/ Variable costs calculated on the basis of a mean of 12 market days per month - see appendix 7

Appendix 7 Number of days in Auction Schedules October 1984 to September 1985

Year	Months	No. of days
1984, 4th Qtr	October	15
	November	8
	December	12
1985, 1st Qtr	January	11
	February	7
	March	11
2nd Qtr	April	15
	May	11
	June	15
3rd Qtr	July	13
	August	15
	September	12
MEAN/MONTH		12.1

Source: County Council of Baringo

Appendix 8 Analysis of Marketing Costs and Margins per Head of Small Ruminant Bought and Slaughtered at Noiwet-Mogotio Sold In Nakuru Municipality

Cost to Livestock Buyer (Wholesaler)			Revenue to Livestock Buyer[4] (Wholesale)			Revenue to Nakuru Retailer	
Cost Item	(KShs)		Item	(KShs)		Item	(KShs)
1. Mean purchase price[1]	221.92		Wholesale value of carcass at Nakuru[4]	232.75		Sale of meat[5]	281.53
2. Taxes, cess	5.00		Sale of heart, lungs liver, tripes and kidneys[4]	35.00	267.75	Sale of heart, lungs liver and kidneys[5]	19.20
3. Transportation to abattoir (live)	0.00		Value of head/trotters	10.00		Sale of tripes[5]	22.40
4. Flaying and abattoir fees	4.00		Value of skin	10.00			323.13
5. Meat inspection fee	3.00		Total	287.75		Cost at wholesale[6]	267.75
6. Meat transportation[2] to Nakuru	10.00		Wholesaler's profit margin KSh.	42.51		Retailer's profit margin KSh.	55.38
Sub-total		243.92	Return to capital	17.3%		Return to capital	20.68%
		1,22					
7. Trading loss 0.5%[3]							
Total costs		245.24					

Notes:
1/ Mean purchase price for all small ruminants at Noiwet market (N=87)
2/ A standard charge for transporting a small ruminant carcass to Nakuru was KSh.10.00 and Sh.100.00 for each cattle carcass.
3/ Traders indicated that about one animal out of every 200 they bought died from exhaustion or disease causes.
4/ Wholesale price at Nakuru was KSh.17.50 per kg meat; KSh.15.00 per kg lungs, heart/liver, kidney (1 kg); KSh.10.00 per kg tripes (2 kg). The average carcass weight was 13.3 kg.
5/ Using gazetted retail prices (appendix 5) and allowing for wastage of 2% carcass weight.
6/ Excluding retail values of head/trotters and skin.

Appendix 9 Analysis of Marketing Costs and Margins per head of Small Ruminant Purchased from Kajiado Markets, Resold Live at Ong'ata Rongai, Slaughtered at Ong'ata Rongai and Retail Sold in Nairobi Municipality

Cost to first Buyer (livestock trader)		Cost to 2nd Buyer (Wholesaler)	
Item	Amount KSh.	Item	Amount KSh.
1. Purchase price[1/]	157.02	1. Purchase price[2/]	206.87
2. Taxes, cess	1.00	2. Taxes, cess	1.00
		Sub-total	207.87
3. Transportation costs (trekking)	5.00	Add: Trading loss[3/]	
		(0.1% condemnation)	0.21
4. Food and drinks for buyer	0.20	Flaying, abattoir fees	1.20
5. Transportation of buyer	0.65	Meat inspection fees	3.00
Sub-total	163.87	County Council cess at abattoir	2.50
6. Trading losses (0.5%)	0.82		
Total costs	164.69	Meat delivery costs to Nairobi	5.00
		Total costs	219.78

Profit margin to livestock trader
(KSh.206.87 - 164.69) = KSh.42.18
Return to trader's capital = 25.6%

1/ Source: Results of unpublished ILCA study of Ong'ata Rongai livestock market over the period 1982-83.

2/ Source: Same as 1/

3/ Condemnation rates calculated from Ong'ata Rongai abattoirs 1983 data.

Appendix 9(cont'd) Analysis of Marketing Costs and Margins per head of Small Ruminant Purchased from Kajiado Markets, Resold at Ong'ata Rongai, Slaughtered at Ong'ata Rongai and Retail Sold in Nairobi Municipality

Revenue to 2nd buyer (Wholesaler)		Revenue to Nairobi Retailer[2/]	
Item	Amount KSh.	Item	Amount KSh.
1. Wholesale value of carcass,[1/] 14.3 kg at KSh.19.00 kg	271.70	Retail value of carcass @ KSh.21.60/kg (less 2% wastage)	302.40
2. Heart, lungs, liver, kidneys	18.00	Heart, lungs, liver, kidneys, @ KSh.20.20/kg	20.20
3. Tripes	20.40	Tripes @ KSh.12.20/kg	24.40
4. Head/trotters	10.00	Total revenue	347.00
5. Skin	10.00		
	330.10	Profit margin to retailer KSh.	36.90
Profit margin to wholesaler KSH.	110.32	Return to retailer's capital =	11.9%
Return to wholesaler's capital =	50.2%		

1/ Price operative at the time of the survey, May 1985

2/ Assumes Retailer does not buy or trade in head/trotters and skin
Gross margin is therefore calculated on wholesale basis of KSh.310.10.

Appendix 10 Analysis of Marketing Costs and Margins per head of Small Ruminant Purchased at Noiwet-Mogotio Markets, Retail Sold at Mogotio

Cost to Livestock Buyer	
Cost Item	(KSh.)
1. Mean purchase price	221.92
2. Taxes/cess	5.00
3. Transportation to abattoir	0.00
4. Flaying and abattoir charges	4.00
5. Meat inspection fees	3.00
6. Meat transportation to butchery	1.00
Sub-total	234.92
7. Add 0.1% loss (condemnation)	0.23
Total costs	235.15

Revenue to Livestock Buyer[1/] (Retailer)	
Item	(KSh.)
Retail value of carcass	267.33
Liver, heart, kidneys, lungs	18.20
Tripes	21.40
Head, trotters	10.00
Skin	10.00
Total	326.93
Profit Margin to buyer/retailer	KSh.91.78
Return to retailers capital	39.03%

1/ Revenue to buyer calculated at controlled retail prices applicable to Baringo District except for head/trotters and skin.

Appendix 11a Analysis of Marketing costs and Margins per head of Small Ruminant Purchased from Kerio Valley retail sold at Kabarnet Butchery by Buyer[1/]

Cost to buyer		Revenue to Buyer[3/] (Retailer)	
Cost Item	Amount KSh.	Item	Amount KSh.
1. Mean purchase price[2/]	159.18	Retail value of carcass (less 2% wastage)	275.02
2. Taxes, cess	5.00		
3. Transportation of livestock to abattoir (trek)	2.00	Heart, liver, lungs, kidneys	18.20
4. Flaying, abattoir fees	4.00	Tripes	21.40
5. Meat inspection fee	3.00	Head, trotters	10.00
6. Food and drinks	1.66	Skin	10.00
			334.62
7. Transportation of self and assistants	4.60		
8. Transportation of carcass from abattoir to butchery	1.00		
		Profit Margin to Retailer = Ksh.	153.28
Sub-total	180.44	Return to retailer's capital=	84.5%
Trading loss (0.5%)	0.90		
Total cost	181.34		

1/ Buyer at markets is also retail butcher

2/ Mean purchase price at market (1985)

3/ At controlled retail prices applicable to Baringo district on Appendix 5 except for head/trotters and skin.

Appendix 11b Analysis of Marketing Costs and Margins per head of Small Ruminant Purchased from Kerio Valley, Sold at Kabarnet Retail Butchery by Buyer[1/]: 1984-85

Cost to Buyer		Revenue to Buyer[3/]	
Item	Amount KSh.	Item	Amount KSh.
1. Mean purchase price[2/]	149.31	Retail value of carcass (less 2% wastage)	275.02
2. Taxes, cess	5.00	Heart, liver, lungs, kidneys	18.20
3. Transportation of livestock to abattoir (trek)	2.00	Tripes	21.40
4. Flaying abattoir fees	4.00	Head trotters	10.00
5. Meat inspection fees	3.00	Skin	10.00
6. Food and drinks	1.66		334.62
7. Transportation of buyer and assistants	4.60		
8. Transportation of carcass from abattoir to butchery	1.00	Buyer/retailer's profit margin = KSh.	163.20
Sub-total	170.57	Return to retailer's capital =	95.2%
9. Add 0.5% trading loss	0.85		
Total costs	171.42		

1/ Buyer at market is also retail butcher

2/ Mean market price for all 3 markets in Kerio Valley - (Barwessa, Kapluk and Salawa Total livestock (739 head) sold between November 1984 and March 1985.

3/ At controlled retail prices applicable to Baringo district except for head/trotters and skins.

Appendix 11c Analysis of Marketing Costs and Margins per head of Goat Purchased from Kerio Valley Sold at Kabarnet Retail Butchery by Buyer[1/] 1985

Cost to Buyer		Revenue to Buyer[3/]	
Cost Item	Amount KSh.	Item	Amount KSh.
1. Mean purchase price[2/]	204.42	Retail value of carcass (less 2% wastage)	275.02
2. Taxes, cess	5.00		
3. Transportation of livestock to abattoir (trek)	2.00	Heart, liver, lungs, kidneys	18.20
4. Flaying, abattoir fees	4.00	Tripes	21.40
5. Meat inspection fee	3.00	Head, trotters	10.00
6. Food and drinks	1.66	Skin	10.00
7. Transportation of self and assistants	4.60	Total revenue	334.62
8. Transportation of carcass from abattoir to butchery	1.00	Buyer/retailer's profit margin = KSh.	107.81
Sub-total	225.68	Return to retailer's capital =	47.53%
9. Trading loss (0.5%)	1.13		
Total cost	226.81		

1/ Buyer at markets is also retail butcher

2/ Mean purchase price at market (1985) - goats only

3/ At controlled retail prices applicable to Baringo district on Appendix 5 except for head/trotters and skin.

Appendix 11d Analysis of Marketing Costs and Margins per head of Small Ruminant Purchased in Kerio Valley, Slaughtered and Retail Sold at Limuru, Kiambu

Cost to Buyer		Revenue to Buyer	
Cost Item	Amount KSh.	Item	Amount KSh.
1. Purchase price Mean for Kerio Valley markets (1985)	159.18	Retail value of meat	268.50
2. Taxes/cess	5.00	Retail value, heart, liver, lungs, kidneys	18.70
3. Transportation of livestock (truck)	35.00	Retail value, tripes	22.40
4. Transportation of buyer)		Head, trotters	10.00
5. Food and lodging of buyer)1/	10.67	Skin	10.00
6. Flaying, abattoir fees	4.00	Total revenue	329.50
7. Meat inspection	3.00		
8. Transportation to butchery	1.00	Buyer/retailer profit margin =	114.58
Sub-total	213.85	Return to retailer's capital	53.3%
9. Trading loss (0.5%)	1.07		
Total	214.92		

1/ Total costs for transportation, food, drinks for buyer and assistants = KSh.1,920.00
Animals purchased and destined to Limuru = 180.00
Mean cost per head 10.67

Appendix 12 Analysis of Marketing Costs and Margins per head of Small Ruminant Purchased at Marigat[1/] Markets and Slaughtered at Mogotio, Sold in Nakuru Municipality

Cost to buyer		Revenue to buyer		Revenue to Nakuru Retailer	
Cost Item	Amount KSh.	Item	Amount KSh.	Item	Amount KSh.
1. Purchase price	182.89	Wholesale value of carcass	232.75	Retail value of carcass	281.53
2. Taxes, cess	5.00	Heart/liver	15.00	Heart, liver, lungs, kidneys	19.20
3. Transportation of livestock (trekking)	5.00	Tripes	20.00	Tripes	22.40
4. Transportation of buyers	4.60	Head/trotters	10.00	Total revenue[2/]	323.13
5. Food and drinks	1.66	Skin	10.00		
6. Lodging expenses	0.28	Total revenue	287.75		
7. Flaying and abattoir fees	4.00				
8. Meat inspection fees	3.00				
9. Transportation of carcass to Nakuru	10.00	Buyer's profit margin = KSh.	70.29	Retailer's profit Margin	KSh 55.38
Sub-total	216.43			Return to retailer's capital	20.68%
10. Trading loss (0.5%)	1.03	Return to buyer's capital	32.3%		
Total costs	217.46				

1/ Price at Marigat markets represents the mean of Kipcherere, Marigat and Kampi ya Samaki markets.
(N = 294 Head, Mean = KSh. 182.89)

2/ Assuming Nakuru retailer does not deal in head/trotters and skin.

Appendix 13a Analysis of Marketing Costs and Margins per head of small Ruminant Purchased from Kajiado Markets, Slaughtered at Mariakani and Retail Sold in Mombasa Municipality

Cost to Buyer		Revenue to Buyer	
Cost Item	Amount KSh.	Item	Amount KSh.
1. Purchase price[1/]	157.02	Wholesale value of carcass 14.0 kg @ Ksh.20.50/kg	287.00
2. Taxes, cess	1.00	Heart,liver,lungs,kidneys	18.00
3. Transportation costs (truck)	20.00	Tripes	20.40
4. Lodging expenses	1.00	Head,trotters	10.60
5. Food and drinks	3.00	Skin	10.00
			346.00
6. Wages for herder at Mariakani	1.00		
7. Abattoir and flaying	2.50	Profit margin to Buyer =	Ksh.156.54
8. Meat inspection	3.00		
9. Trading loss 0.5%	.94	Return to buyer's capital =	82.6%
Total costs	189.46		

1/ Mean of prices paid one market stage before the Ong'ata Rongai terminal market.

Appendix 13b Analysis of Marketing Costs and Margins per head of Small Ruminant Purchased from Kajiado Markets, Slaughtered at Mariakani for Retail Selling in Mombasa municipality

Cost to Buyer

Cost Item	Amount KSh.
1. Purchase price	165.00 1/
2. Taxes, cess	1.00
3. Transportation costs (truck)	20.00
4. Lodging expenses	1.00
5. Food and drinks	3.00
6. Wages for herder at Mariakani	1.00
7. Abattoir and flaying	2.50
8. Meat inspection	3.00
	196.50
9. Trading loss 0.5%	.98
Total costs	197.48

Revenue to Buyer

Item	Amount KSh.
Wholesale value of carcass 14.0 kg @ ksh.20.50/kg	287.00
Heart, liver, lungs kidneys	18.00
Tripes	20.40
Head trotters	10.60
Skin	10.00
	346.00
Profit margin to buyer = Ksh.	148.52
Return to buyer's capital =	75.2%

1/ Mean prices of small ruminants from the Group Ranches in Eastern Kajiado where livestock supply to Mariakani abattoir come from.

Appendix 14a LISTING OF SMALL RUMINANTS MARKETING DATA USED IN WEIGHT PREDICTION

NUMBER OF CASES: 63

	SEX	SPECIES	PRICEKSH	HGIRTHCM	ESTWEIGH	ACTWEIGH
1	3	3	195	70	24	28
2	2	2	195	75	28	30
3	2	3	310	83	36	44
4	1	2	180	71	28	25
5	3	3	200	70	26	25
6	2	3	225	73	27	33
7	2	3	200	73	25	26
8	1	2	175	75	26	27
9	1	2	195	70	24	25
10	1	3	200	70	24	25
11	2	3	330	81	42	44
12	3	3	190	65	23	24
13	3	3	210	73	26	26
14	3	3	210	73	26	26
15	2	3	260	72	28	27
16	2	3	400	87	44	52
17	3	3	220	70	28	26
18	2	3	500	89	57	57
19	1	3	135	61	16	22
20	2	3	190	67	23	26
21	2	3	375	87	48	48
22	3	2	140	70	20	25
23	3	3	200	72	24	26
24	1	2	165	69	24	24
25	1	2	155	70	23	25
26	3	3	200	66	25	27
27	3	2	210	75	26	31
28	3	2	110	72	20	24
29	2	3	470	92	43	53
30	3	2	110	67	17	23
31	1	3	215	71	30	30
32	1	2	215	77	29	29
33	2	3	245	72	32	34
34	3	3	185	69	26	25
35	1	3	130	67	18	25
36	1	3	220	72	31	30
37	2	3	235	71	30	28
38	2	3	250	73	32	32
39	2	3	225	72	32	29
40	2	3	220	73	31	34
41	2	3	220	80	30	35
42	2	3	160	68	27	27

N=63

Key

Sex 1 = Entire male
2 = Male castrate
3 = Female

Species 2 = Sheep
3 = Goat

Estweigh = Estimate weight, kg
Actweigh = Actual weight, kg
Hgirth cm = Heart girth Measurement in centimetres.

Appendix 14b REGRESSION ANALYSIS USED IN DEVELOPING WEIGHT PREDICTION EQUATION

---------- REGRESSION ANALYSIS ----------

NUMBER OF CASES: 63 NUMBER OF VARIABLES: 6

INDEX	NAME	MEAN	STD.DEV.
1	ESTWEIGH	26.8254	7.5038
DEP. VAR.:	ACTWEIGH	28.4921	8.1772

DEPENDENT VARIABLE: ACTWEIGH

VAR.	REGRESSION COEFFICIENT	STD. ERROR	T(DF= 61)	PROB.
ESTWEIGH	1.0164	.0503	20.202	.00000
CONSTANT	1.2261			

STD. ERROR OF EST. = 2.9727
r SQUARED = .8700
r = .9327

ANALYSIS OF VARIANCE TABLE

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PRO
REGRESSION	3606.6876	1	3606.6876	408.134	6.00
RESIDUAL	539.0584	61	8.8370		
TOTAL	4145.7460	62			

	OBSERVED	CALCULATED	RESIDUAL	STANDARDIZED RESIDUALS -2.0 ... 0
1	28.000	25.620	2.3797	
2	30.000	29.686	.3140	
3	44.000	37.817	6.1827	
4	25.000	29.686	-4.6860	
5	25.000	27.653	-2.6531	
6	33.000	28.670	4.3305	
7	26.000	26.637	-.6367	
8	27.000	27.653	-.6531	
9	25.000	25.620	-.6203	
10	25.000	25.620	-.6203	
11	44.000	43.916	.0841	
12	24.000	24.604	-.6038	
13	26.000	27.653	-1.6531	
14	26.000	27.653	-1.6531	
15	27.000	29.686	-2.6860	
16	52.000	45.949	6.0513	
17	26.000	29.686	-3.6860	
18	57.000	59.162	-2.1622	
19	22.000	17.489	4.5111	
20	26.000	24.604	1.3962	
21	48.000	50.014	-2.0144	
22	25.000	21.555	3.4454	
23	26.000	25.620	.3797	

Appendix 15 LISTING OF LIVESTOCK MARKET TRANSACTIONS DATA VARIABLES

	MARKET	MONTH	SPECIES	SEX	BCONDTN	WESTMATE	PRICEKSH	TRANSACT	ACTWEIGHT	KSHKG
1	6	4	2	1	2	24	170	1	26	6.64
2	6	4	2	1	3	24	185	1	26	7.22
3	6	4	2	1	2	22	160	1	24	6.78
4	6	4	2	1	2	22	160	1	24	6.78
5	6	4	2	1	2	22	160	1	24	6.78
6	6	4	2	1	2	24	175	1	26	6.83
7	6	4	2	1	2	23	170	1	25	6.91
8	6	4	2	1	2	25	185	1	27	6.95
9	6	4	2	1	2	26	225	1	28	8.14
10	6	4	2	1	2	22	160	1	24	6.78
11	6	4	2	1	2	22	155	2	24	6.57
12	6	4	2	1	2	20	135	2	22	6.26
13	6	4	2	1	2	27	220	1	29	7.67
14	6	4	2	1	2	21	150	1	23	6.65
15	6	4	2	1	2	20	140	1	22	6.50
16	12	5	2	1	2	20	140	1	22	6.50
17	2	3	2	1	1	17	125	2	19	6.75
18	12	5	2	1	2	22	155	1	24	6.57
19	6	4	2	1	2	22	150	1	24	6.36
20	6	4	2	1	2	21	140	1	23	6.20
21	6	4	2	1	2	21	160	1	23	7.09
22	6	4	2	1	1	20	150	1	22	6.96
23	2	3	2	1	2	16	110	1	17	6.29
24	11	5	2	1	2	24	155	2	25	6.05
25	2	3	2	1	1	15	95	1	16	5.77
26	2	3	2	1	1	14	60	1	15	3.88
27	2	3	2	1	2	13	100	1	14	6.93
28	2	3	2	1	1	12	85	1	13	6.33
29	2	3	2	1	1	12	80	1	13	5.96
30	8	3	2	1	1	20	125	1	22	5.80
31	2	3	2	1	2	15	135	1	16	8.20
32	8	3	2	1	2	22	170	1	24	7.21
33	11	5	2	1	2	24	130	1	26	5.07
34	2	3	2	1	1	16	110	1	17	6.29
35	2	3	2	1	2	14	120	1	15	7.76
36	2	3	2	1	2	18	150	1	20	7.68
37	6	3	2	1	2	21	135	1	23	5.98
38	6	3	2	1	1	17	110	1	19	5.94
39	7	4	2	1	2	25	210	1	27	7.88
40	12	5	2	1	1	16	70	1	17	4.00
41	12	5	2	1	2	23	180	1	25	7.32
42	7	4	2	1	3	26	260	1	28	9.40
43	12	5	2	1	2	28	240	1	30	8.08
44	6	3	2	1	2	19	135	1	21	6.57
45	8	3	2	1	4	28	255	1	30	8.59
46	2	3	2	1	1	14	120	1	15	7.76
47	2	3	2	1	1	14	115	1	15	7.44
48	2	3	2	1	2	18	190	1	20	9.73
49	2	3	2	1	2	15	120	1	16	7.29
50	2	3	2	1	2	15	120	1	16	7.29
51	7	4	2	1	3	30	370	1	32	11.67
52	6	3	2	1	2	21	180	2	23	7.98
53	2	3	2	1	1	15	100	1	16	5.07
54	2	3	2	1	1	15	105	1	16	5.37

N=808

Appendix 16 LISTING OF TIMED MARKET DATA VARIABLES

	MARKET	MONTH	TIME	SPECIES	SEX	PRICEKSH	ACTUALWT	KSH/KG.
1	2	3	89.30	2	1	100	15.60	6.41
2	2	3	91.00	3	1	175	22.00	7.95
3	2	3	92.30	3	1	175	22.60	7.75
4	2	3	94.50	2	1	35	14.50	2.41
5	2	3	96.30	2	1	105	15.60	6.73
6	2	3	99.30	3	1	175	21.00	8.33
7	2	3	101.50	2	1	115	16.70	6.88
8	2	3	105.00	2	1	85	14.50	5.86
9	2	3	108.50	2	1	300	26.70	11.24
10	2	3	112.00	3	1	295	26.10	11.30
11	2	3	113.30	3	1	155	22.00	7.05
12	2	3	115.50	3	1	220	24.00	9.17
13	2	3	117.30	3	1	150	18.90	7.94
14	2	3	120.80	2	1	100	15.60	6.41
15	2	3	122.50	2	1	95	15.60	6.09
16	2	3	124.30	3	1	220	24.00	9.17
17	2	3	129.50	3	1	95	15.90	5.97
18	2	3	131.30	3	1	255	26.10	9.77
19	2	3	133.00	3	1	415	32.20	12.89
20	2	3	134.80	3	1	130	17.90	7.26
21	2	3	136.50	3	1	240	25.60	9.38
22	2	3	138.30	3	1	250	25.00	10.00
23	2	3	140.00	3	1	505	40.30	12.53
24	2	3	141.80	3	1	405	32.20	12.58
25	2	3	143.50	3	1	160	19.90	8.04
26	2	3	145.30	3	1	360	30.00	12.00
27	2	3	147.00	3	1	265	28.10	9.43
28	2	3	148.80	3	1	185	24.00	7.71
29	2	3	150.50	3	1	250	27.10	9.23
30	2	3	152.30	3	1	360	31.20	11.54
31	2	3	154.00	3	1	200	26.10	7.66
32	2	3	155.80	3	1	165	18.90	8.73
33	2	3	157.50	3	1	150	16.90	8.83
34	2	3	159.30	2	1	120	13.40	8.96
35	2	3	161.00	3	1	200	25.00	8.00
36	2	3	162.30	3	1	150	19.90	7.54
37	2	3	164.50	3	3	145	26.50	5.47
38	2	3	166.30	2	1	90	13.40	6.72
39	2	3	168.00	3	1	155	22.00	7.05
40	2	3	169.80	3	1	215	23.00	9.35
41	2	3	171.50	2	1	100	13.40	7.46
42	2	3	173.30	3	1	185	19.90	9.30
43	2	3	175.00	3	3	165	26.50	6.23
44	2	3	176.80	3	1	305	30.10	10.13
45	2	3	178.50	2	1	120	13.40	8.96
46	2	3	180.30	3	1	115	15.90	7.23
47	2	3	182.00	3	1	190	19.90	9.55
48	2	3	183.80	2	1	120	14.50	8.28
49	2	3	185.50	2	1	120	14.50	8.28
50	2	3	187.30	3	1	260	28.10	9.25
51	2	3	190.80	2	1	100	14.50	6.90
52	2	3	192.50	2	1	105	14.50	7.24

N=63

1/ Timing at market 2 started almost 90 minutes after start of auction. Fifty head of small ruminants had already been sold.