INVESTIGATIONS ON SEASONAL SUPPLY PATTERNS AND PRICING EFFICIENCY FOR SLAUGHTER CATTLE IN KENYA WITH PARTICULAR REFERENCE TO KAJIADO AND NAKURU DISTRICTS

by

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A Thesis Submitted in Part Fulfilment
for the Degree of Master of Science
in the University of Nairobi.

August 1976.

This thesis is my original work and has not been presented for a degree in any other university.

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LIST OF ABBREVIATIONS USED IN THE THESIS

ALT	Altitude
Av.P	Average Price
CDW	Cold Dressed Weight
DC	District Commissioner
EAAFRO	East African Agricultural and Forestry Research Organisation
EATRO	East African Trypanosomiasis Research Organisation
FAO	Food and Agriculture Organisation
FAQ	Fair Average Quality
Ft.	Feet
GAQ	Good Average Quality
GDP	Gross Domestic Product
GFR	Gross Farm Revenue
IBRD	International Bank for Reconstruction and Development
IDA	International Development Agency
IDS	Institute for Development Studies
ILO	International Labour Office
KFA	Kenya Farmers Association
Kg.	Kilogramme
KMC	Kenya Meat Commission
£.K	Kenya pound
LMD	Livestock Marketing Division
N.N.	No Notum-Nobody noted (author unknown)
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa

ACKNOWLEDGEMENT

I wish to acknowledge my deep gratitude to my supervisors Prof. Adolf Weber and Dr. R.I. Molla for their patience, constant guidance and constructive criticism, without which this study would have been a veritable muddle.

I am also very much grateful to the officials of the Kenya Meat Commission, the Ministry of Agriculture both in the headquarters and in the field whose cooperation and great sense of understanding were of remarkable help in my work. Their names are so numerous that putting them down here without forgetting some might be impossible.

I would be distinctly ungrateful if I do not mention here that my two postgraduate years at the University of Nairobi that culminates in the writing of this thesis would have been unconceivable were it not for the generous scholarship that was offered to me by the German Academic Exchange Service (DAAD). This generosity has gone down on record; I will never forget it.

To my mother Sarah Ngumi, I say thank you very much for the unfailing encouragement that has always characterized her.

Finally, my grateful thanks go to Miss Mehrun Ramji, the secretary who had to work tirelessly in her spare time to type and retype the thesis to give it its present shape.

Peter Douglas Ngumi

ABSTRACT

The objective of this study was to examine the pattern of the variation in supply of slaughter cattle, occurring differently in pastoral and agricultural areas, and also to analyse the problem of pricing efficiency in the KMC market for these cattle. For this purpose, Kajiado and Nakuru districts were chosen to represent the pastoral and agricultural areas respectively. The beef cattle supply figures used in the analysis are mainly from the KMC records from 1966-1974. In few instances figures from the LMD and County Council auctions have been used.

The thesis can be divided mainly in two parts: a very descriptive one (chapters one to three) and a more analytical oriented part (chapters four to six).

Chapter one starts with the introduction which gives the role of the livestock in the Kenyan economy, the contribution in terms of Gross Farm Revenue, GDP, export earnings, nutrition, land use and employment. This chapter in addition gives the importance of the beef cattle subsector, and its problems before finally laying down the objectives and the hypotheses of the study. The methodology used in the whole analysis and the limitations that characterise the study are also given in this chapter.

Chapter two deals with the literature review. It is here that attention is focussed on the various works that have been done on any aspect of the supply and pricing of beef cattle, or any other considerations that the author considers pertinent to this study. It is evident from these writings that pricing efficiency and supply patterns have been given only implicit attention or completely neglected.

In chapter three such important aspects of the beef industry e.g. the role of the KMC as a major beef cattle marketing institution, and the Kenya government policy in improving the beef industry are dealt with. Institutions such as the LMD, feedlot schemes and the non-KMC markets are also considered.

Chapter four is devoted exclusively to examining major aspects of the beef cattle supply in Kenya. Emphasis is however laid on Kajiado and Nakuru districts isolated from this study. The seasonality of supply and analysis of supply determinants are presented. By use of some statistically simplified basic models, the supply situation for a period of nine years (1965-1974) is analysed. Factors left out in the model but which in the author's opinion are critical in determining beef cattle supply volumes are given before finally putting the hypotheses to test in the light of the findings.

In chapter five, examination of all aspects of the KMC pricing, including the analysis of efficiency of this pricing are given. The implication of the KMC's beef cattle pricing is given in the last part of this chapter.

Lastly, chapter six gives the summary of the thesis, poses some issues of policy considerations before giving the conclusion.

The thesis has clearly demonstrated as illogical, the isolation of one or two economic factors for the purpose of explaining the supply behaviour amongst the cattle producers. It has been shown that supply of beef cattle is dependent on an interplay of a number of factors ranging from economic, cultural, natural, etc. The supply patterns are thus hard to predict before the supplies are delivered. The supply conditions change every now and then.

Slaughter cattle supply from Kajiado district to the KMC was found to be influenced by the rainfall. An inverse relation between supply and rainfall over the nine year period (1966-1974) was detected. In Nakuru district on the other hand the supply of slaughter cattle to the KMC appear unaffected by the rainfall. Although the rainfall coefficient is positive, it emerges as statistically insignificant.

The importance of price level in determining the supply levels from Kajiado and Nakuru to the KMC was not established. The study showed that the slaughter cattle supply to the KMC from Nakuru district, unlike that from Kajiado district is price elastic but only very slightly so. There also emerged very low R^2 value which warn against great reliance on KMC prices as main slaughter cattle supply influence factor.

On the question of pricing efficiency, KMC pricing has been given due consideration and the author using both verbal and graphical arguments has recommended use of price discriminatory policies in place of the present 'static pricing policy' imposed by the government on the KMC. Fixed prices over time make it first and foremost hard for the KMC to adopt a rational pricing policy i.e. adapting itself like other competitors to the dictates of the market environments. This aspect as shown in chapter five, is the main cause of various inefficiencies, and the author has recommended in conclusion amongst other things, that KMC should be set free from government restrictions and be run on purely commercial basis thus be able to compete effectively with other beef purchasing organisations and individuals. The government intervention would only be applauded if it is evident that the position of the cost of living and the rate of development of the beef industry warrant such intervention.

Footnote

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'Slaughter cattle' and 'beef cattle' and 'cattle for slaughter' are used interchangeably throughout the thesis.

CHAPTER ONE

INTRODUCTION

1.1 THE ROLE OF LIVESTOCK IN THE KENYAN ECONOMY

As seen from various perspectives, livestock appear to play a major role in the development of the Kenyan economy.

Kenya is estimated to be carrying a livestock population of about 20 million cattle, approximately 8 per cent of it being dairy cattle of all types, about 4 to 5 million sheep and five million goats. The country's statistics on livestock are rough. Two principal estimates for 1970 had the following:

Table 1: Livestock Numbers in Kenya, 1970

Type	Ministry of Agriculture	Central Bureau of Statistics
	(million heads)	
Cattle (total)	9.1	9.9
Grade dairy	0.7	*
Commercial Beef	0.4	*
Indigenous Beef	8.0	*
Sheep and Goats	9.5	8.3
Wool Sheep	0.6	*
Meat Sheep	3.5	*
Goats	5.4	*
Camels	*(a)	0.52
Donkeys	*	0.18

Source: Kenya, Agricultural Sector Survey, IBRD/IDA document, Report No. 254 a-KE (annex 5, p.2) December, 1975.

* Not available.

(a) The Ministry of Agriculture gave no estimates for camels and donkeys, while the Central Bureau of Statistics gave aggregate for cattle, sheep and goats without breaking them down.

CHAPTER ONE

INTRODUCTION

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1.1.1 Contribution in Terms of Gross Farm Revenue, Gross Domestic Product and Export Earnings

Livestock and livestock products contribute approximately 30 per cent of gross farm revenue in Kenya. Their value amounted to £.K. 23.2 million in 1970 in current prices.

Higher prices are responsible for a growth rate of 7.5 per cent given erroneously by Lijoodi (13), for available figures did not show a very marked increase in livestock numbers.[1] The livestock sector also contributes a sizeable proportion to the GDP. In the non-monetary economy this sector supplies milk, meat and blood for food, and also hides and skins for home use mainly as substitutes for blankets. In 1970, for example, 75 per cent of milk and 80 per cent of the beef were consumed on the farms where produced.

The contribution to the economy and to the country's valuable foreign exchange by livestock can be illustrated by the following figures on total production, local sales and export value. Table 2 shows this in monetary value while table 3 gives the same in tonnage.

Table 2: KMC: Monetary Value of Livestock and Livestock Products, Kenya 1970 - 1974

Year	Local Sales (£,000)	Exports (£,000)	Total Value K£. (£,000)
1970	3,418,564	2,454,260	5,872,824
1971	3,429,549	2,861,576	6,291,125
1972	3,981,055	4,393,580	8,374,635
1973	3,517,511	3,589,050	7,106,551
1974	2,790,422	4,029,491	6,819,913

Source: Extracts. KMC, Annual Reports and Accounts, 1970, 71, 72, 73, 74. Nairobi.

Table 3: Production and Disposal of Carcass Beef by the KMC Kenya, 1969 - 1975

Year	Total Production (Tonnes)	Local Sales (Tonnes)	Export(b)	% of Production Exported
1969	26,219	14,333	11,987	45.7
1970	27,993	15,621	12,372	44.2
1971	26,094	13,611	12,483	47.8
1972	26,905	12,780	14,125	52.5
1973	22,694	11,752	10,944	48.2
1974	19,770	8,374	11,396	57.6
1975	16,600	3,239	13,361	80.5

Source: Extracts. Kenya Economic Surveys, Ministry of Finance and Planning, Nairobi, 1969-1975.

(b) These export figures include chilled or frozen and canned tonnages. It is evident that KMC local sales have been on a decline with export figures reflecting some stability. It should be appreciated that over this period KMC has had growing competition from slaughter houses lately becoming significant in the rural areas.

The figures on the percentage of total production which is exported are near or over fifty per cent in most cases. This shows clearly the importance of beef as an export product for KMC. The figures for 1971 indicate that the sales of meat in the local market declined during 1971 to 11,086 tons while there was an increase in the quantity of production exported. It is contended that during the same year, export demand for beef remained considerably in excess of available supplies, and for this reason in February 1972 the Government announced a further increase in producer prices for cattle delivered to KMC's Athi River plant in an attempt to increase supplies. (12)

The export situation of livestock and livestock products is further illustrated on the table overleaf.

1.1.2 Nutrition

Nutritionally, the importance of the livestock products mainly meat and milk needs no emphasis. The country will continue to experience a rapid growth in population from about 11 million (10,942,000) by 1969 census to projected 15 million by 1980, 21.3 million in 1990 and about 30 million in the year 2000. This represents a constant growth rate of 3.3 per cent per annum. Even if this population growth rate were to decline considerably, a population of less than 25 million in the year 2000 appears to be unlikely (20). The rise in population numbers increases the demand of animal

Table 4: Estimated Total Beef Consumption Assuming Constant per capita Consumption, Kenya, 1968-1973

Item	1968	1969	1970	1971	1972	1973
Total population in Kenya (millions)	10.4	10.8	11.2	11.6	12.0	12.0
Kg./capita consumption of Beef	11.6	11.6	11.6	11.6	11.6	11.6
Beef needed in Tonnes	120,640	125,280	129,920	134,560	139,200	143,840
Beef produced in Tonnes	129,955	133,466	136,208	138,691	141,476	143,940
Surplus Tonnes	+9315	+8186	+6288	+4131	+2276	-100

Source: East African Community, Common Market and Economic Affairs Secretariat. 'Seminar on Cooperation in Agricultural Development in East Africa, January 13-20, 1975'. (Mimeo), Nairobi, p. 15.

From the above statistics, it is clearly discernible that since 1968 there has been a decline in the surplus meat available. Local beef production seems not capable of sustaining the estimated per capita consumption of 11.6 Kg. of beef per year. This situation can be saved only by increased yields from the National herd both in offtake rates and CDW. Although Kenya has a substantial beef herd; only over 10% is improved, there is a shortage of beef because of low productivity.

protein. Already a majority of Kenyan population, especially in the rural areas, is malnourished and the situation needs improvement now as ever. The need to increase the productivity of the livestock sector in this respect is thus clearly discernable, and therefore compelling. Also it can be said that with the rising incomes, as projected for the current plan period, the domestic consumption of livestock products, whose demand is income elastic is expected to rise.

1.1.3 Land Use and Employment

In terms of land use, livestock occupies a greater part of land than any other agricultural activity (6 annex 5, p.3). The land area can be indicatively divided into four categories. According to the social, economic background of the people occupying it,[2] seventy four per cent is used by pastoralists, twelve per cent by range subsistence cultivators, ten per cent by high potential small holders and four per cent by large scale farms and ranches.

About 80 per cent of this land surface area receives an average rainfall of less than 625-750 mm (25" - 30") per year. Apart from approximately 101,173.61 hectares (250,000 acres) of irrigable land and some areas suitable for sisal whose prospects have deteriorated rapidly in the recent years, the greater area is not suitable for permanent cultivation. The population of these areas derive their livelihood mainly from pastoralism.

Much of the land in the higher rainfall areas is also devoted to livestock. A glance at the average number of cattle per capita, however, reveals that relatively little emphasis is laid on animal husbandry in the high rainfall areas. The drier the environment becomes, the more the importance of livestock increases. Various factors are mainly responsible for this:-

(a) higher economic returns per unit of land in high rainfall areas has outcompeted livestock;

(b) the reliability on arable crops is higher with high rainfall;

(c) the incidence of stock diseases is less in the dry areas hence favouring livestock production there;

(d) and generally there are more varied land use opportunities open in the higher rainfall areas than dry ones. Thus vast areas of Kenya's land surface have to be tied to livestock if they are to be utilised economically.

According to a recent survey, (7, p.408), short and long term prospects for increased employment in the livestock sector are bright. This is mainly because demand for beef both for domestic consumption and export is

rising fast and is providing the necessary stimulus for production. The optimism in this aspect is attributable to various observations: First, there is a large reservoir of not economically used stock in the national herd compared to the small nucleus of exceptionally high quality stock. Secondly, the technology for production, disease control, range improvement and water development is already established. With these provisions in mind, the Kenya government has created a new Ministry of Water Development to deal with the national water problems. The pastoral areas will be major beneficiaries of the development. Also, other critical problems that have formerly constrained the full development of the livestock industry are now being attacked at all levels.

Greater emphasis than ever is being placed on expanded livestock research.[3] The contention that the employment prospects in this sector are bright thus does not sound unfounded. It should be pointed out here that while most of the employment opportunities occur in the form of self-employment amongst thousands of pastoral families, government endeavours to improve this sector could result in greater participation by the pastoralists in the money economy. This is so because their highest comparative advantage lies in livestock production and also their land-use options are few and in some cases non-existent. Unfortunately the annual

enumeration of employment, which is the primary source of employment data excludes small holder farming areas including pastoralists. In some places, employment will also be created in other agrarian communities where expansion of livestock production is possible, as well as in the institutions that constitute the market channel for livestock.

1.2 THE IMPORTANCE OF THE BEEF CATTLE SUBSECTOR

Beef cattle (or cattle for slaughter) make up about 90% of cattle population and constitute about 60% of the total value of marketed livestock.

Much appreciation is attached to the fact that while available markets especially export markets for most important crops that the country produces are severely limited, beef is in very strong international demand and this situation is likely to continue.

Domestically, consumption of beef is also highly income elastic and is expected to grow rapidly with the rising incomes projected for the current plan period 1974-1978. In fact, a forecast was made in 1966 by Aldington and Wilson (2) to the effect that the rising domestic demand for beef is likely to reduce the then still substantial exportable surplus by the end of the next decade, i.e. 1980.

Much importance and efforts therefore will have to be put on the development of the beef cattle subsector in order to satisfy the local demand and leave an export surplus. The situation, especially judged from increasing population and rising incomes, show that beef cattle production will continue to grow in importance with time. It is with this realization that the Kenya government has embarked on moves (see section 4.1) to improve the industry.

1.3 THE PROBLEM OF THE BEEF INDUSTRY

The rapidly growing world demand for beef provides a particularly promising market situation for Kenya's beef industry. The promising prospect cannot be realised without first eroding the problems in this vital subsector of the economy. It appears, that the beef industry suffers from four main problems. First, the offtake rate is very low (20) about half as high as it should be (4); second, the structure and level of producer prices does not fit with economic forces of supply and demand; third, processing facilities are inadequate to cope with increased supply when it occurs; fourth, diseases are always a threat to the industry. Only the first two problems will be dealt with here.

According to the previous Development Plan (10, Sec. 8.164, p. 254) from Kenya's view point, beef production is not constrained seriously by lack of markets (with the proviso that at present certain disease control regulations influence the country's export of meat to European markets). The main constraint is on the supply side. This necessitates the survey on supply and supply patterns, and other factors both economic and non-economic that influence the offtake.

The current Development Plan (11, pp. 244-245) also expressed the need for increased supply. It echoes the need to stimulate supplies through an adequate pricing policy among other measures like intensified veterinary services, provision of loans for ranch development, and improving processing facilities. The present beef pricing policy thus will be a subject of interest in this study.

1.4 OBJECTIVES OF THE STUDY AND HYPOTHESES

This study endeavours to explore the problem of pricing efficiency in the market for slaughter cattle in Kenya. It aims also to study the causes, patterns, and economic implications of the variations in supply of slaughter cattle occurring differently in typical pastoral and agricultural areas. The pastoral and agricultural areas are represented by Kajiado and Nakuru Districts respectively in this study.

A contention is hereby made that not enough knowledge has so far been gathered on how these areas are distinguished in their seasonal cattle supply patterns. It is, however, presumed that seasonal variations in cattle supply are different in pastoral and agricultural areas.

Prices for slaughter cattle paid to farmers by the KMC (whose statistics form the basis for analysis in this study) are set by the Kenya government. These prices will be considered vis-à-vis the seasonal supply pattern. A discussion of proposal on how to improve the present pricing system for different supply areas is to be one of the undertakings of this study.

The impact of inefficient pricing in agricultural markets (especially in the beef industry) has been neglected as a field of research in Kenya. It was thus an objective of this study to contribute to a better knowledge of the pricing function in the development of this important subsector of agriculture in Kenya. This is, however, limited to the prices set by the government since the data for the non-KMC market is not available. KMC nonetheless occupies an important part in the beef industry and thus deductions from it would not be out of place.

The following questions are looked into in the study:-

(i) What is the seasonal price and supply pattern for slaughter cattle in the identified areas?

(ii) Are any supply trends discernible in these markets? What are the possible explanations?

(iii) Does a correlation exist between monthly average prices and supplies? Hence, how responsive and indicative are prices to the supplies coming in? Can negative or positive supply responses to prices be observed?

(iv) What factors other than prices explain the observed relationships and what might be their relative importance both in the short and the long-run?

HYPOTHESES OF THE STUDY

The general hypotheses tested are:

(a) That cattle owners from the agricultural areas reflect more response to cattle prices given by the KMC than the pastoralists.

(b) That cattle owners are indifferent to prices and therefore, changes in output level are the result of factors other than prices.

(c) That non-economic (factors like rainfall, diseases, cultural observations, etc.) considerations are more important supply determinants in the purely pastoral areas than the agricultural areas.

(d) That supply is likely to be more unstable in the typically pastoral areas than in agricultural ones.

1.5 METHODOLOGY

For the purposes of this study, no resort has been made to the use of sophisticated econometric analysis. Graphical presentation and analysis has been used especially in establishing supply patterns. Also simple statistical calculations have been used to work out supply indices.

The main data consist of observations recorded over a period of nine years from 1966-1974. These include monthly slaughter cattle supply figures from the KMC records; producer price i.e. average prices for all grades except Manufacture grade, on per CDW paid to the supplier for the same period, and average monthly rainfall figures from records of the East African Meteorological Department of the East African Community for Kajiado and Nakuru Districts.

The figures have been transformed to logarithms for standardisation to make comparisons of the two supply districts studied (Kajiado and Nakuru) possible. This transformation has also made the reading of elasticities of supplies in these areas possible. Also the coefficient of regression given on untransformed data simply indicate the slope of the dependent variable over observed values of independent variables and does not tell us clearly by how much percentage a change in the independent variable effects the dependent variable which the logarithms do.

The first step of the analysis has been to describe the past behaviour of slaughter cattle supply and secondly, to analyse this behaviour.

For any of the variables (supply, prices and rainfall), there are 108 observations for each of the stations used viz. equal to the number of months in 9 years. The computer has been used to work out regression

and correlation coefficients used in the ensuring deductions.

1.6 LIMITATIONS OF THE STUDY

Like most studies, this one suffers from various shortcomings. Lack of complete data of slaughter cattle supply from the two districts has been a major handicap in the analysis. This was due to the lack of proper records by the people involved, e.g. private butchers' purchases, and this is why exclusive reliance was made on the KMC figures. According to estimates by Aldington and Wilson (2), KMC handled only 20 per cent of the total beef cattle slaughtered in 1968, i.e. the non-KMC buyers handled 80 per cent of the beef cattle slaughtered. This means that districts supply patterns based on KMC supply only are unlikely to give representative supply patterns for the respective districts.

Also, it has been pointed out elsewhere (1) and from common knowledge, that supply behaviour or trend need by no means be evidence of the working of a single economic factor, e.g. supply changes in a certain trend are not solely dependent on prices. Thus the analysis conducted by relying on prices and rainfall both of which are quantifiable has failed to measure the influences of the non-quantifiable factors e.g. cultural retention of stocks as opposed to their disposition, amongst the pastoral Maasai.

Thus the author contends that it is good to look at this study in the above outlined perspective.

Footnotes to Chapter One

1. See Appendix 1. These figures are from the United Nations Economic Commission for Africa based on estimates of Food and Agriculture Organisation of the United Nations. Cattle numbers increased from 1965 to 1970 by 3.05 per annum; sheep, goats, pigs were on the other side decreasing.On the overall, there is no evidence that during this period a substantial productivity per unit of livestock occurred to justify the growth rate of 7.5 per cent per year over the period 1965-1970 given by Lijoodi, (13).

2. Total land and water area in Kenya is recorded as 58,264,600 hectares (Statistical Abstract, 1972), of which 43,500,000 hectares is used mainly by pastoralists.

3. In addition to research activities by the Ministry of Agriculture's Veterinary Department, The East African Community has two research stations in Kenya which serve the livestock sector. The East African Veterinary Research Organisation (EAVRO) at Muguga does basic Research on Rinderpest (CBPP), Malignant Catarrah Fever, East Coast Fever (ECF) and helminthic parasites. Other activities are research in animal genetics and the production of rinderpest and CBPP vaccines for a large part of Africa. The East African Agriculture and Forest Research Organisation (EAAFRO) at Muguga does researches into animal nutrition and meat technology. Also the East African Trypanosomiasis Research Organisation (EATRO) at Tororo, Uganda, has a group of veterinarians working on trypanosomal livestock diseases. The consequence of these research endeavours will be to raise the development of the livestock sector and undoubtedly its scope for employment.

4. Aldington and Wilson gave an estimated offtake rate for Kenya as 13.2%.

CHAPTER TWO

LITERATURE REVIEW

In this chapter the author reviews various writings dealing with different aspects of the livestock industry, to which he has been exposed. One main observation is that nowhere in the literature reviewed has beef cattle pricing or beef cattle seasonal supply pattern been accorded emphasis either on a national or regional level. Where these aspects which are of interest to this study are touched, it is just in passing and not very great emphasis is given to the issues relating to pricing policy or supply characteristics. Also, except in two cases, the role of KMC as a major marketing institution in the beef cattle market is not very much appraised. Most of the works reviewed have dealt with the livestock sector as an entity without breaking it to various aspects.

Edith Whetham (21), though not writing specifically on livestock, has said much about it and actually touched some aspects relevant to this study.

In chapter Seven (ibid., p.141), Whetham regards KMC as a marketing board charged with the responsibility of'a buyer of last resort' thus maintaining minimum prices to producers and buying cattle and selling beef and by-products in both domestic and export markets. She also looks at the KMC as a public corporation carrying out

government's policy of buying at stated prices.

On the KMC prices, Whetham contends that fixed prices over a period, as are characteristic of the KMC, give no inducement to sellers to change pattern of supply, i.e. to supply more when demand increases and to restrict supply when there is not enough demand. The latter view is, however, very much in theory since as has been stated in chapter One the problem in the beef cattle marketing is more determined by supply fluctuations and not by demand. The demand for beef is more stable both in the local and external markets. Whetham also mentions the dire consequences for the capacity use of the slaughter houses if prices remain fixed. Under capacity use of the slaughter houses would for example, raise the operational costs of the KMC. This situation is inevitable when prices fail to induce adequate supply for the capacity available in the slaughter houses.

On the non-adjustment of the KMC pricing policy in response to demand and supply, the author contends that in such a situation, fluctuations in supplies would be met by the changes in the size of stocks of meat held in cold storages or by reducing or increasing exports. KMC might also refuse to buy and thus push to producers at random the costs of holding cattle with no hope for a compesating rise in prices.[1] Whetham in reviewing this situation, suggests that given some price elasticity of both supply and domestic demand in the short periods

of two or three months, some seasonal change in both buying and wholesale price might reduce the seasonal variation in the flow of supplies. This would come about because the producers would be enabled to adjust their supplies rationally. This argument or suggestion can be accepted but not wholly. It is true that under normal circumstances the relative level of agricultural prices influences the allocation of production resources and hence the level and pattern of agricultural production. This is especially so in a place like Nakuru where the economy is much more monetarised than in Kajiado. It can, however, not be denied that the nature of cattle production which entails a long gestation period, and is surrounded by numerous uncertainties, responding to the ruling of market prices would not be as automatic as implied by Whetham.

On seasonality of supply she accepts that the supply of cattle for slaughter normally has a considerable variation both during season and between seasons. She sees the adverse effects which this phenomenon can have on occasioning non-usage of full capacities of the slaughter houses, a situation from which KMC is not immune.

Aldington and Wilson (2, pp. 36-38; 182-230) on the other hand discuss the role of the KMC and its pricing (purchase and selling) policies. They refer to government' policies towards KMC and also make projections of beef

exports to 1975. On the question of pricing in the industry, the authors contend that unless KMC has a clear mandate on what objectives the government considers it should attempt to maximise, or take care of, it is very difficult for the KMC to adopt a rational pricing policy. The authors also like Whetham deplore the lack of flexibility by the KMC in its pricing policies. They argue that the present price policy which involves publishing producer and wholesale prices at regular but long intervals would work efficiently if only KMC successfully exercised monopolistic and monopsonistic powers in the Kenya beef market. In such a case, supplies of beef had to be delivered regularly and by pure chance the equilibrium price with the demand for beef could be achieved. This situation does not exist and the KMC in practice has to compete with other buyers in the market who are able to alter their prices according to the dictates of the conditions in the market. Infact, recently (27) the KMC Managing Commissioner lamented amongst other things, the inability of the KMC to compete for beef cattle supplies with other buyers from the farmers. The Managing Commissioner cited the low prices offered by the KMC as being non-inducive to producers most of whom have to meet high input costs due to the situation of the general inflation. The KMC Managing Commissioner looks at the situation eight years after the writing by Aldington and Wilson. His opinion then serves to indicate that change has not taken place, an observation that warrants review.

Klaus Meyn (15) is another author who investigated Kenya's livestock industry in general and beef in particular. Meyn makes an attempt to cover a wide range of aspects on beef production and hence appreciates his inability to go into great detail on any single problem like pricing policy. He cites the prospects of further exploitation of the industry. He contends that the expanding market for beef, (probably attributable to some of the factors we have touched elsewhere viz. population increase and rising incomes, rising beef prices and availability of large tracts of land suitable for ranching) make beef production in Kenya viable.

Meyn notes that prices are instrumental in determining the direction of flow of the supplies. In the densely populated areas this flow is usually to the non-KMC buyers who pay much more than the KMC, while (according to him) good price level in the outlying pastoral areas could not be maintained if KMC would not take substantial numbers of cattle from these areas.

Donald MacGillivray (14), like Meyn, looks at the livestock industry in totality and investigates on a broad perspective the opportunities and problems confronting this industry and presents a plan for further development. MacGillivray's interests are in production not pricing. His line of analysis is followed very closely five years later by the United Nations Commission for Africa.

The beef industry has also been examined by Harold K. Schneider (17). He argues that the opportunity costs for pastoralists of economic change tend to be much higher than for people whose wealth is principally on land because of larger status losses. Most pastoral people, particularly the Masai consider decline in cattle numbers as having an adverse effect on their status. Although Schneider's contention does not touch the question of prices, it carries an implication that pricing policy is less likely to act as a supply incentive where the pastoral tradition is deeply entrenched and cattle ownership confer significant social status. This falls very much in line with our hypothesis that 'cattle owners in pastoral areas are indifferent to prices and therefore, changes in output level are the result to non-economic factors'. This notion, however, remains to be tested.

Spinks (19) in his work assesses existing marketing facilities for the livestock and meat industry and estimates the potential market within East Africa. He discusses the future demand of this Kenyan industry in terms of supply needs. Spinks also includes a feasibility study of locations and sizes of processing plants for livestock products.

Smith (18) though not writing on livestock, has some contentions that the author considers relevant to the Kenyan beef and cattle industry. He argues that agricultural price policies are better suited to secure an optimal allocation of resources rather than as a device for redistribution of income to the rural areas. From the optimal allocation of resources concept, it can be argued that in an area where there are various land use options the adoption of any agricultural activity can be encouraged or discouraged by use of a certain pricing policy. This holds true in the livestock industry or any competing agricultural activities. We have in mind a district like Nakuru where numerous agricultural activities are open to the farmer and price is thus likely to exert influence on what will be done on a farm. Small relative changes in price will change the ranking in profitability of various farm enterprises. Where various competing agricultural options are few or non-existent, as is the case in some pastoral areas, the price policy can be seen as a device for income redistribution among cattle producers. Pricing policy is also seen as a device that can be used to encourage or discourage the fullest exploitation of the available natural resources.

The Kenya government, through its Ministry of Agriculture, has also shown much interest in livestock in general and beef cattle in particular. It set up a commission which gave its report (20) which amongst

other things reviewed the status of the industry and suggested a long-term strategy and recommended policies for the nineteen seventies. That report, however, views the industry in very broad terms but very much in harmony with the government plans for development of range areas.

Some works on the beef industry have also been conducted by FAO on some specific aspects of the beef industry though nothing specifically to do with price analysis. These include the work by G. Bedoes (3) who showed that KMC costs are too high and there is scope for economising. He suggested that KMC should consider concentrating its activities on its most profitable products and also gave the opinion that KMC should be given authority to fix its own prices. An opinion was expressed that KMC profit margin in the local market is relatively low, particularly for low quality beef, because of the level of the government administered prices which do not allow KMC to compete effectively with other cattle buyers.

All the above reflects that livestock industry and beef in particular have been and continue to be subjects of interest for the Kenya government, international organisations like the FAO, and even to individuals.

Footnotes to Chapter Two

1. The present author has no evidence of any time that the KMC has been reluctant to buy. The KMC practice has been (according to livestock purchasing officers), to divert cattle to the less occupied of its abattoirs in case of the very rare periods of oversupply.

CHAPTER THREE

THE BEEF INDUSTRY IN KENYA AND THE ROLE OF KMC AS A MAJOR MARKETING INSTITUTION

It has been pointed out in the introductory chapter that there is an increasing demand for beef and slaughter stock both for domestic and foreign markets. World import demand for meat has been increasing for years with prices high and going up (14). The following table (page 29) illustrates the export situation over the years 1970 to 1975 for beef, meat and products to various countries of destination, both in quality and value.

The trend in meat exports shown in the above table reflects the impact of an increasing domestic demand on the availability of fresh chilled and frozen beef for export.

The table shows that except for the export of fresh chilled, or frozen beef to Libya, Kenya's beef export performance was not particularly good. There is room for further exploitation of the export potential of the industry. Despite the existing stringent veterinary regulations, various markets especially of canned and frozen beef should be explored. Nonetheless, growing domestic demand for beef arising from population and incomes increase, coupled with

Table 5: Export of Beef[(a)] and Veal from Kenya to Some Major Markets 1970, 1972, 1974, 1975
(Value in Kenya Shillings and Quantity in Tonnes)

Country of Destination	1970		1972		1974		1975	
	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value
Libya	4306	3794124	12971	12956074	11515	10502292	14027	10080238
Hong Kong	7244	3512608	5936	3481043	1434	1168602	1205	809091
Burundi	594	464268	639	673520	475	527828	605	728893
Zambia	2	1100	-[(b)]	-	2237	1939201	-	-
Greece	-	-	-	-	11446	7788363	5823	3226993
Total Quantity	12146		19546		27107		21760	

Source: Extracts from East African Customs and Excise, Annual Trade Reports, 1970, 1972, 1974, 1975.

(a) These exports are either fresh, chilled or frozen.

(b) Figures not available.

supply expansion problems especially in the short-run, will continue to constrain Kenya's meat exports. (See tables 2 and 3).

A look at the average cattle prices paid to the sellers at the main Dalgety slaughter stock auctions over the years 1961 to 1967 reflected rising domestic demand over the period.

It is clearly discernible from table 7 below that at every one of these stock auction stations the prices have for the covered years been going up. There is no evidence that the situation has changed since. Although the number of stock sold by the Dalgety is only a small proportion of total slaughter numbers, it is indicative of how much the local demand can be rising. This steady increase in cattle prices compared to the general price level, not only heralds bright future prospects for the industry but also emphasizes the need to guard the livestock resources against depletion. The high price levels are partly due to the general inflation, but mainly due to the supply shortages (27). In order to raise the productivity of the national herd which is the basic natural wealth upon which the beef industry rests, it is imperative that the interests of herd owners, be they traditional pastoralists or commercial ranchers receive due economic consideration. The attention these people receive will depend much on factors such as: the arrangements that there are in the marketing system

for their product, the available marketing institutions, and the position of these institutions vis-a-vis that of the producers.

Table 6: Average Prices Paid for Heads of Cattle at Various Auction Centres in Kenya 1961-67

Centre Av. P Year	Naivasha	Lanet	Nanyuki	Molo
	Centre's Av. P			
1961	378.92	392.10	385.48	345.00
1962	399.92	402.55	413.90	341.75
1963	389.56	418.05	437.15	330.11
1964	419.31	456.68	461.12	442.37
1965	427.50	478.26	466.91	482.94
1966	448.61	483.07	462.61	554.50
1967	563.14	633.00	585.24	569.50

Source: Extract. Aldington, T.J. and Wilson, F.A. (op.cit.) pp. 250-251.

In Kenya, the KMC acts as the most important institution for beef marketing, and its origin dates back to the colonial era.

In the early part of this century, the European settlers in Kenya were looking for outlets for their slaughter stock. The low domestic demand for beef led to the opening of a meat factory at Athi River by Liebigs Limited in 1938 to process and cann beef for foreign markets. The KMC which was established by an Ordinance in 1950 (25), took over the factory and increased its activities considerably. It established

slaughter houses in Mombasa, Nakuru, Eldoret and Ngong.

On its formation, KMC was theoretically given certain monpoly powers to purchase and sell livestock and livestock products, and had to operate on commercial principles from the beginning. It has, however, never been technically possible to extend its tentacles to all over the country as far as purchasing of slaughter stock is concerned. As has been seen earlier, it only deals with about twenty per cent of the total national beef market.

The throughput of KMC plants in 1967 was 215,000 head of cattle, approximately twenty per cent of the estimated total offtake of Kenya in that year (2), which was 47 per cent of the estimated marketed offtake.

In 1970, the estimates of the percentage of total offtake were in an interval of 9 to 14 per cent (15). If, however, we would adhere to Aldington and Wilson's estimation from 1967, that KMC handles about 47 per cent of the estimated marketed offtake, this would mean that other marketing arrangements take up the remaining 53 per cent. (These other marketing arrangements are dealt with later in this chapter). KMC stands as the greatest single organisation in the entire beef industry. The records of the contribution of its production in terms of weight are shown in table 7 on the next page.

Table 7: KMC: Disposal of Carcass and Tinned Meat in Tonnes 1971 - 1974

Year	Tonnage of Carcass Disposed	Tonnage Canned
1971	29395	9703
1972	28217	10133
1973	22968	6985
1974	18781	6743

Source: Extract from KMC Annual Reports and Accounts 1971-1974, Nairobi.

KMC has had at varied times a legal monopoly of the sale of meat wholesale in the principal towns of Kenya, viz. Nairobi, Mombasa, Nakuru and Eldoret. This monopoly has, however, gradually ceased to exist. In fact, KMC closed its abattoirs in Eldoret in 1968 and in Nakuru and Ngong in 1975 leaving the County Councils and the private butchers on the livestock and meat market scene in these areas. The challenge of this monopoly in Nairobi is also becoming more and more protected with the establishment of private abattoirs in places like Waithaka, Dagoretti, which are all close to the city.

KMC however, remains the single biggest buyer of beef cattle, and seller of beef products. It enjoys monopoly as far as exports are concerned, but not beyond the Kenya border where KMC has to compete with others.

KMC functions under a board consisting of individual representatives of various facets of the industry except consumers, all of whom are mainly appointed by the Minister for Agriculture. It carries out government policy in her beef industry like fixing annually the producer and wholesale[6] prices for carcass meat and defining grades of the slaughtered animals. Its importance in the whole industry as a major policy institution thus becomes evident.

3.1 GOVERNMENT POLICY IN IMPROVING THE BEEF INDUSTRY

3.1.1 Overall Beef Development Strategy

The Kenya government policy in improving the beef industry can be appreciated by looking at its overall policy towards the livestock industry. This perspective poses no difficulties since the beef industry constitutes an integral part of the livestock industry.

The government seems to lay great emphasis on the fact that until recently no attempt was made to fully exploit the country's potential for the livestock development. In fact, most of the development efforts were concentrated in the high potential areas while the medium potential areas, although very suitable for livestock development, were under-exploited. Recent government policies for future expansion of the livestock industry have established goals to increase marketed production by the small holders and the pastoralists in

the relatively drier areas. These drier range areas of Kenya include the northern part of the Rift Valley Province, Narok, Eastern Province and nearly all parts of the Masai land. The main source of income and means of livelihood for the people of these areas is beef cattle. These people have to cater for the beef demand which comes chiefly from the urban areas where per capita consumption is greater because of higher income levels. Efforts to develop these areas by the government are thus economically justifiable.

In its 1969-1974 Development Plan, the government pledged to develop the range and high potential areas. The former occupy some 492,000 sq.km. or about four fifths of the country. Their main contribution to the economy is beef cattle. A five year pilot project was begun in 1969 financed by International Development Agency (IDA), a branch of the World Bank, Swedish International Development Agency (SIDA), and Kenya government. This included investments meant to fully utilize the vast range potential. These included:

(a) Ranch development including working capital and supporting technical services.

(b) Development facilities for livestock movement and marketing.

(c) Range water survey and development.

(d) Provision of ancillary technical services of range management and veterinary services division of the Ministry of Agriculture.

(e) Provision of credit facilities to the livestock keepers.

Around the same time, in 1969, at the request of the Kenya government, the UNDP pilot project on beef fattening was started, aimed at establishing economically viable methods of cattle fattening particularly with regard to cattle from pastoral areas. One objective of the project was to determine the optimum stock feeding and management techniques for increasing beef production both for domestic and export markets. The major objective, however, was to clarify the prospects for stratification of the beef industry, and the integration of the beef fattening into the areas of high potential farming lands. This project and its follow-up have led the government to encourage the beef fattening undertaking in the feedlot system. Implicit in these endeavours is the importance the Kenya government attaches to the improvement of the entire livestock industry in general and to beef development in particular. The government wishes the economy to realize an increase in: (a) the total cattle population, (b) the present offtake rates of 11 to 13 per cent, and (c) carcass weights of cattle

slaughtered now averaging about 140 kg. (31, p.7).[7] Such wishes if realized will add greatly to the income derived from this agricultural industry.

3.1.2 The Livestock Marketing Division, LMD

The Livestock Marketing Division of the Ministry of Agriculture (hereafter referred to as the LMD) is one of the organisations through which the Kenya government effects its policy of improving the beef cattle industry.

One of the proposed aims of the government is to raise the offtake rates of cattle especially from the predominantly pastoral areas. In fact, a study by Fuglie (5) indicates that the greatest potential for increasing beef output in Kenya lies in increasing offtake rates of cattle from the low potential unimproved pastoral areas which comprise of 75 per cent of the land in Kenya and carry 35 to 40 per cent of total cattle herd in Kenya. The ways by which production can be increased from such pastoral areas are, however, very limited mainly because:

(a) There is little or no opportunity to increase grazing areas.

(b) Stocking rates are already very high, opportunities however exist to

(i) improve husbandry and health of stock as well as,

(ii) improving marketing facilities to increase the offtake rates. The government uses LMD to exploit this second possibility.

LMD has threefold functions:

(a) It acts as the sole buyer of beef cattle in remote areas of the country. These include areas such as Marsabit, Wajir, Garissa, Samburu, Baringo, West Pokot, Lamu, and parts of Laikipia.

(b) As an official channel through which the cattle from these areas, particularly those from East and Eastern Province in particular can pass to the finishing areas.

(c) LMD has even been used in earlier times to purchase low value stock as a part of the destocking programme. The Division also hoped to disseminate market information to keep cattle producers informed of livestock prices (9, p. 79).

LMD procures cattle either directly from owners or from middlemen who buy from the owners or even County Council auctions. The pastoralist sells his animals in most cases to a trader who in turn assembles them for sale either to LMD, to local butchers or if he has means, to the KMC.

It is an orthodox practice of the LMD after purchase of cattle to hold them for a minimum of three months in the holding grounds prior to sale and subsequent movement into the disease free zone. This is in compliance with the veterinary requirements. At holding grounds cattle are provided with grazing or other feed is provided, dips, water facilities and any required veterinary attention. Cattle usually gain additional weights at the holding grounds. The LMD serves as a good source of cattle for the grazier schemes, i.e. feedlots. It also sells to members of the public at auctions which are held periodically at holding grounds with the sale price including movement to the nearest railway station.

The press extract attached (see appendix 9) shows one method of the LMD's sale of its cattle and the pricing method adapted. The LMD's objectives can briefly be summed up as follows:

(a) Incremental advancement in the purchase of cattle from the pastoral areas, especially in the remote North and North Eastern Provinces with a view of raising the offtake rates of these areas. The main aim based on this move is raising the offtake from the national herd. The division buys stock in these areas and sends them through the stock route and quarantine system either to auctions for feeder cattle, for direct slaughter to the KMC or any other willing buyer.

(b) The LMD also works on the objective of developing facilities to market cattle from the above mentioned areas, such facilities include stock routes, holding grounds, quarantine system and other complementary provisions which have helped to improve the capacity to market stock. According to a recent survey (6, annex 5, p. 7) through the efforts of LMD annual movement of cattle from these areas increased from 25,000 heads in 1969-1970 to 45,000 heads in 1971-1972.

(c) The LMD has also the objective of improving the monetary income of these pastoral peoples by the provision of output for their stock.

(d) LMD's other objective is the provision by sale of stock partly immature from the low potential pastoral areas to development projects, ranches, and assisting the new ranches and feedlot schemes in the higher potential areas in achieving stocking levels of economic viability. These feedlots as is pointed out later in the chapter, needs a sure source of supply of the immatures, if they are to cope with the beef demand in the market, especially of high value stock from the KMC.

The following table illustrates the cattle sales, both mature and immature, made by the LMD to various destinations. The type of the immatures offered for sale are the typical Boran and Zebu ranging in age from 2 to 5 years.

Table 8: LMD Cattle Sales 1968-1973

Year Destination	1968	1969
KMC	18,342	13,441
Auctions	3,502	6,576
Others	972	1,019
Total	22,816	21,036

The author was informed by the LMD's official that there has been no publication of the LMD's dealings since 1967.

Source: LMD, Unpublished Records, Nairobi, 1976.

The LMD, through its endeavours, bears considerable risks through deaths and losses of cattle as the following table indicates.

Table 9: LMD Cattle Losses 1968-1973

Year Loss	1968	1969	1970	1971	1972	1973
Deaths	2,189	1,841	15,358	5,367	2,577	2,597
Others**	-	80	84	51	197	53
Total	2,189	1,921	15,442	5,418	2,774	2,650

** Other losses includes thefts, animals straying away, or killed by wild animals.

Source: LMD, Unpublished Records, Nairobi, 1976.

The Kenya government by supporting the activities of this division of its agricultural ministry carries out effectively its policy of improving the beef industry.

3.1.3 The Feedlot System

Together with the supporting of the LMD's activities, the Kenya government has in pursuance of its policy to improve the beef industry supported the feedlot system. This involves fattening of immature stock brought mainly by the LMD from the low potential areas to the high potential areas in which the feedlots are situated.

The Kenya government, in conjunction with the UNDP and FAO, established a project late in 1967 to establish the technical feasibility and economic viability in buying immatures from the low potential areas to develop them into high quality stock by intensively feeding them while they are in confinement. It was the success of the first project that has encouraged such operation in various parts of the high potential areas.

Before this endeavour there were only limited sales of immature stock except under duress in times of drought. An observation has been made that no established market price was fair to both buyer and seller and the slaughter value of the immature was usually not adequate to induce the producer to sell. (24) In that event, the prices established by the project on a liveweight basis have attracted many immatures. Producers have also become accustomed to sales by liveweight which is a more objective pricing criterion than bargaining which is likely to result in unfair deal especially on the producer's side.

Farmers in the high potential areas who feed their stock this way under confinement have made use of surplus maize produce, reject wheat, barley and bran mill. Bran mill is produced by the millers when they manufacture sifted maize meal. Molasses have also been used. This has shown that the farmers' interest in

using molasses for both beef and dairy stock opens up possibility that the surplus of it, which at times has been dumped, could be channelled into the livestock industry.

The feedlot system serves as a major supplier of high quality beef to the KMC. When the first project was established, the type of beef it produced coupled with its lack of seasonality, impressed the KMC such that it introduced price incentives to encourage the establishment of additional intensive feeding operations. The KMC contends that there is an ever ready export market for high quality beef. This contention serves as an incentive to increase such operations. From the present intake of cattle at the KMC, it is immediately apparent that very few carcasses are produced in the higher grades. A vast majority of them fall in either standard or manufacturing grades. If the high world demand for the high quality beef is to be fully exploited to the best advantage of the country, then the feedlot system should be further encouraged. After all, despite the fact that intensive farming necessarily involves relatively high overhead costs, these costs are justified as long as the ratio between beef prices and feeding costs are favourable.

When a low grade cattle is better fed in the feedlot its grade in selling becomes improved. The feeding period increases the quantity of high grade, valuable

beef cuts such as rump, fillet and round steak.

It is contended by the feedlot operators that a mere 70 days in a feedlot can increase the edible beef on a low quality carcass by 50 per cent.

The total national offtake rate is currently estimated at 13.2 per cent. The UNDP/FAO report (24) estimated that if all stock were channelled through feedlots prior to slaughter, it is probable that the offtake would be of the order of 30% of the national herd. Assuming that these cattle were all processed at the KMC, this would indicate a sevenfold throughput. In addition, heavier carcasses would increase the weight of meat handled still further. While this might be an unrealistically high assumption for the immediate future, it nonetheless points to the tremendous potential for increasing foreign earnings through a rational use of the country's beef herd. This is indicative of the government's interest in aiding the project mainly through financing research undertakings. The feedlot system thus serves to further improve the beef industry.

3.2 BEEF CATTLE MARKETING

Beef cattle marketing is here looked at under two headings viz. the KMC and the non-KMC market.

3.2.1 The Non-KMC Market

The paucity of data that characterizes this market makes its importance rather hard to discern. This market was however, estimated to handle about 53 per cent of the marketed beef cattle, while the KMC handled 47 per cent (2, 1967). This market is operated by private traders who buy cattle in large numbers from various sources, e.g. auctions, such as are operated by the County Councils in the producing districts, KFA auctions held occasionally in Nakuru and Eldoret and even Mackenzie Dalgety auctions. The conventional way of making the purchases in such auctions where no prices are set beforehand is merely through traders out-bidding each other with the biggest bidder getting the cattle. The height of prices depends on the number of traders present and the number of cattle heads available for sale and of course the general availability of cattle elsewhere. The traders involved in buying from the auctions resell their auction purchases mainly in big urban abattoirs and even to the KMC.

Local butchers are the other people operating in this market. These mainly buy their cattle from the producers in their immediate neighbourhood (though some are capable of travelling long distances to make purchases) and slaughter them and sell meat in the same locality.

The LMD which has already been described in 3.1.2 is another participant in this non-KMC market. Its principal concern being the purchase and movement of immature cattle from the remote areas like Mandera, Isiolo, Marallal and some parts of Kilifi and Kwale Districts for sale in areas where marketing is more developed, and also to the KMC.

3.2.2 The KMC Market

The KMC which is estimated by Aldington and Wilson (1967) to handle less than a half of total marketed beef cattle in Kenya gets its supplies from sources such as direct supplies from the producers to the KMC as is the case with areas of close proximity to its slaughtering plants like Kajiado, direct purchases from far removed areas where transportation is not a problem. Stocks destined for the KMC plants from such areas are moved to the nearest railway station from which they are railed to the commission meets the railway charges.

The KMC may also get supplies from livestock traders who buy either from the producers themselves, from auctions, and from LMD grounds, feedlot operators and ranching schemes. The KMC pricing system and its implications are dealt with in chapter five.

Footnotes to Chapter Three

1. This is done in conjunction with the Ministry of Agriculture and the Treasury.

2. The same source indicates that over the years 1959-1967 the average CDW of beef cattle from commercial farm and ranches to the KMC was 196 Kg. and that from pastoral and semi-pastoral cattle was 126 Kg. However, carcass data from the KMC for the period 1968-1973 has shown a decline; that of the low grade is given as 124 Kg. This is a matter of concern to the government.

CHAPTER FOUR

BEEF CATTLE SUPPLY

4.1 SUPPLY OF BEEF CATTLE IN KENYA

This section deals with the spatial characteristics of beef cattle supply in Kenya, taking Kajiado and Nakuru districts as case studies or sample districts. The seasonal characteristics of supply in these areas are given main emphasis.

Unlike most agricultural activities whose geographical distribution is very limited, cattle production is very widespread. Beef cattle supply in the country is from all districts, though the number vary from district to another mainly in response to different ecological endowments. These districts can be classified into the following: (16, pp. 7-8)

(i) Pastoral districts of Kajiado, Narok, Garissa.

(ii) Range subsistence cultivator districts e.g. Kitui, Machakos.

(iii) High potential small holder districts e.g. Kiambu, Murang'a, Nyeri.

(iv) Mainly large scale districts of Nakuru, Trans Nzoia, Uasin Gishu, Laikipia.

These divisions suffer from generalisations since in any one of them subdivisions can be made. For example, pastoral districts range from the very dry ones like Turkana, Garissa, Wajir, Mandera etc. with carrying capacity ranging from 30-60 acres (12.1 hectares - 24.3 hectares) per cattle to areas like Kajiado, Laikipia with an estimated carrying capacity of about 10 acres (4.05 hectares) per animal. Another defect in the above division can be seen if we take into consideration that large scale farming areas are common in some parts of the districts denoted as small holder districts like Kiambu. Very big commercial ranching areas are also to be found in a district like Machakos coming in the category of subsistence cultivator districts.

The following table on the next page gives a picture of human and cattle population in these areas.

Table 10: Human and Cattle Population in the Various Cattle Producing Districts, Kenya, 1970

Districts	Human Population	Cattle Population	Cattle per capita
Pastoralists	892,500	3,391,000	3.80
Range Subsistence	1,070,000	942,000	0.88
High Potential	7,558,400	3,054,000	0.40
Large Farm	604,800	400,000	0.66
Total Kenya	10,125,700	7,787,000	0.77

Source: Extract from J.R. Peberdy (op.cit.), Appendix 3.1.

KMC receives its beef cattle intake from areas such as Baringo, Kajiado, Laikipia, Machakos, Nakuru, Trans Nzoia, Uasin Gishu and Marakwet, Kericho, Kiambu, Narok, Murang'a, Ngong and Nyeri districts. The supply is from pastoralists, subsistence range farmers, commercial ranches, both individual and cooperatives, and also from the LMD's establishments in these districts or elsewhere in the country.

The supply from these districts in any one month, quarter of the year or year depends on conditions varying from one producing district to the other. It is for instance shown (29, p.1) that the heavy deliveries to the KMC during the first quarter of 1974 was attributable to a large degree to severe drought conditions which existed at that time, particularly in Kajiado district. This district alone sent 21,421 heads of cattle to the KMC, i.e. 38.8 per cent of the total cattle intake that KMC received during that quarter. It can be noted, as is pointed out later in this chapter that environmental, economic and even social conditions peculiar to the supplying areas not only influence the number of heads of cattle supplied to the KMC and other butchers, but also the seasonality of these supplies.

The cases of seasonality for supply from Kajiado and Nakuru districts respectively are dealt with in 4.3.

4.2 BEEF CATTLE SUPPLY FROM KAJIADO AND NAKURU DISTRICTS TO THE KMC

On the basis of number of cattle heads supplied to the KMC plants, Lamu, Nakuru, Uasin Gishu, Marakwet, Laikipia, Nyandarwa, Kajiado, Machakos and Baringo constitute the principal supplying districts. These districts especially Lamu, Nakuru, Kajiado and Uasin Gishu vie with each other for the leading supplying position. This position changes from one season to another depending on different conditions determining supply in these districts.

As pointed out earlier, Nakuru and Kajiado are the focus of attention in this study. Collected KMC purchases data from these districts for one hundred and eight months from January 1966-December 1974 are given in the appendix. It will be noted that although the figures of supply for any one month are shown on the basis of farm they come from, i.e. LS = Large scale farm and SS = Small Scale farm, this is more true of Nakuru district where farming is more commercialized than in Kajiado district. The supply from Kajiado district include direct sale to KMC Athi River plant and supply to the KMC abattoir at Ngong. The supply from Nakuru is mainly from large estates, ranches and small individual pastoralists. Like in other cattle producing districts, KMC is not the sole buyer in Kajiado and Nakuru districts. Other buyers also operate though none

has the capability of buying as many heads as the KMC especially under the conditions of duress when the producers are forced to sell their cattle and other livestock or incur considerable losses through death and decline of live weights. The sales involve transactions that take place either directly between producers and the KMC or between a producer and a stock trader who then sells to the KMC. In the Kajiado district, LMD has established a number of cattle buying centres where individual pastoralists are enabled to sell cattle directly to the division at fixed prices over scales.

LMD makes use of weighbridge to get the liveweight measures. This is in accordance with the LMD's policy which does not seek to displace the private livestock trader in the district. In such areas where private traders perform an important function in raising the purchases from producers and sales to the KMC, the LMD's function is supposed to merely afford additional sales opportunities. Most of these purchases, however, end up in the KMC after satisfying the demand for local slaughter. It is also known that a number of cattle find their way from Kajiado to other districts like Taita Taveta, Narok and even across the Kenya border to Tanzania. Where such long distant supplies are made, price differentials between the KMC and these markets is the determining factor.

4.3 SEASONALITY OF SUPPLY FROM THE KAJIADO AND NAKURU DISTRICTS

It is characteristic of agricultural production and the supply to the markets to show seasonal variations. The seasonality of supply of Kajiado and Nakuru districts respectively is investigated in this section by the use of the supply indices.[1] The factors influencing the seasonal oscillation in supply are dealt with in the explanations taken in this chapter (see 4.4).

The calculation of supply index for the two districts followed four major steps:

(a) The first involved the calculation of centred moving average of the quarterly cattle supply[2] of beef cattle to the KMC from these districts.

(b) The second step involved calculation of the moving averages and the ratio of the observed data to these moving averages.

(c) In step three the ratios obtained in (b) were averaged, and

(d) In the last step the averages obtained in (c) were adjusted to give the supply index which has been graphed to give the seasonal supply patterns.

Table 11: Calculation of Centred Moving Average of Cattle Supply to the KMC from Kajiado District 1966-1974

Time	(a) Observed Quarterly Totals (Heads)	(b) 4 Quarter Moving Totals (Heads)	(c) Centred Moving Averages (Heads)	(d) Ratio of observed Values t moving Averages
1	2768			
1966 2	1398			
3	5140	12071	3412.40	1.506
4	2765	15228	3973.40	0.695
1	5925	16559	4433.10	1.337
1967 2	2739	18906	5062.80	0.541
3	7477	21596	5343.90	1.399
4	5455	21155	5468.80	0.997
1	5485	22595	5000.9	1.096
1968 2	4179	17412	3947.3	1.058
3	2293	14166	3148.4	0.728
4	2209	11021	2335.8	0.946
1	2340	7665	2027.8	1.154
1969 2	823	8557	2193.4	0.375
3	3185	8990	2389.3	1.333
4	2642	10124	2575.0	1.026
1	3474	10476	2673.3	1.299
1970 2	1175	10910	2858.6	0.411
3	3619	11959	2644.5	1.369
4	3091	9197	2330.4	1.326
1	1312	9446	2901.6	0.452
1971 2	1824	13767	3218.8	0.566
3	7540	11984	3384.3	2.227
4	1308	15090	4053.1	0.323
1	4418	17335	4391.0	0.927
1972 2	4069	18052	4144.9	1.992
3	8257	17076	4079.9	0.081
4	332	16083	4306.1	0.795
1	3425	16556	4584.8	0.99
1973 2	4542	17893	6310.9	1.520
3	9594	18785	8114.3	0.151
4	1224	31702	8051.0	2.029
1	16342	33212	8002.3	0.756
1974 2	6052	31196		
3	7578	32826		
4	2864			

B. Calculating the moving averages and the ratios of observed data to moving averages.

(i) The centred moving averages given in (a) above represent the series with the seasonal and random components largely smoothed out. These are shown on figure A below.

(ii) The ratios of observed values to moving averages will contain the seasonal and random components together with any bias resulting from the application of the moving average procedure. These ratios are graphed in figure B below. They indicate a very clearly discernible supply pattern; it can, however, be contended that the third quarter of any year seems to reflect high figures most of the time compared to the second quarter. The ratios shown on figure D can nevertheless be made more meaningful if they are subjected to some alterations. (see (C) below). This involves arranging these ratios in columns for each quarter (see table 12 on the next page) and the values in each column averaged. This step eliminates the random fluctuations in the given ratios. It is also convenient at this stage to omit the decimal points in the ratios by using 1000 as a base instead of unity. This explains why the figures in table 14 below look the way they are.

Fig. A Moving Averages of Cattle Supply to KMC from Kajiado District On Quarterly Basis 1966-1974

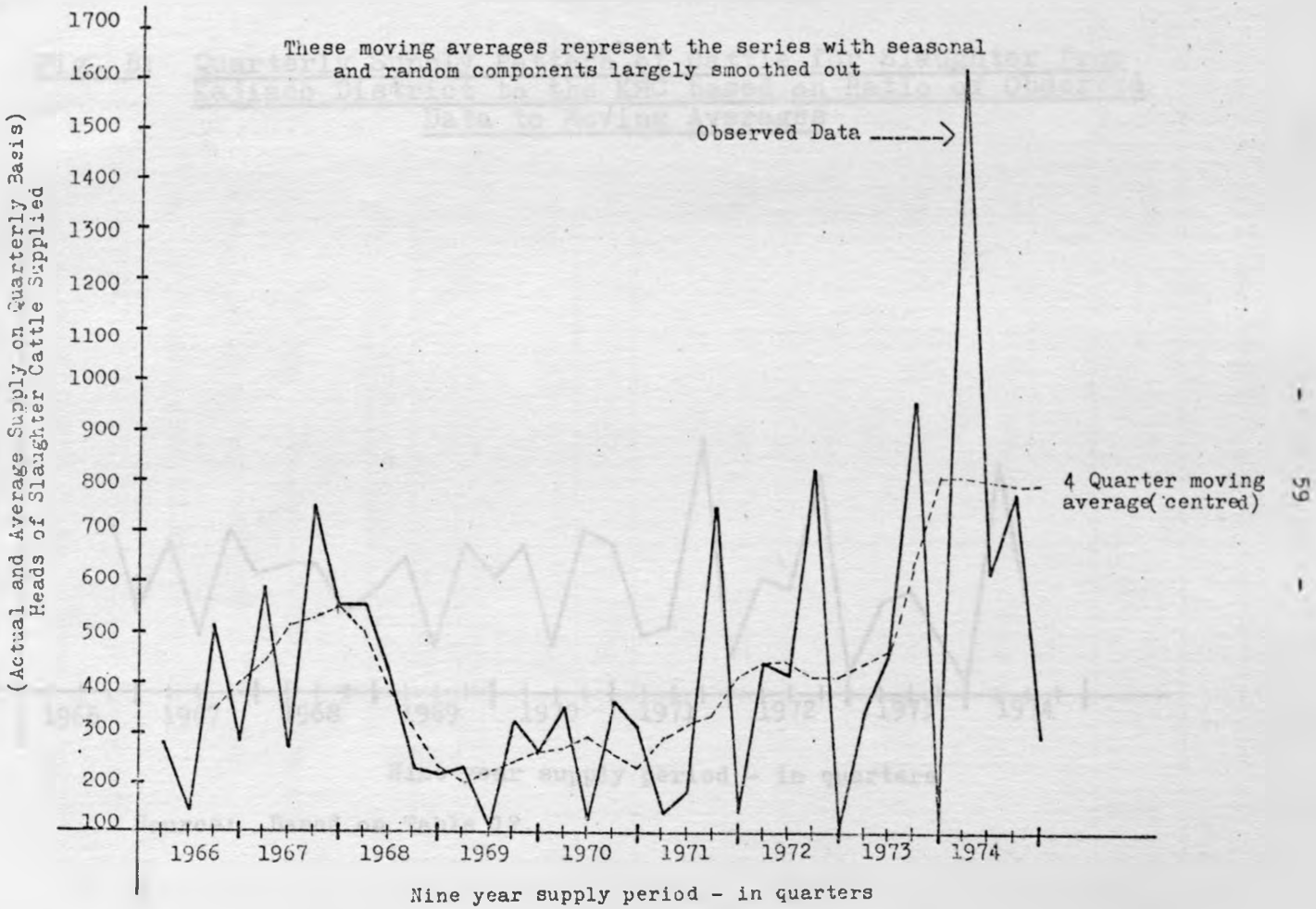
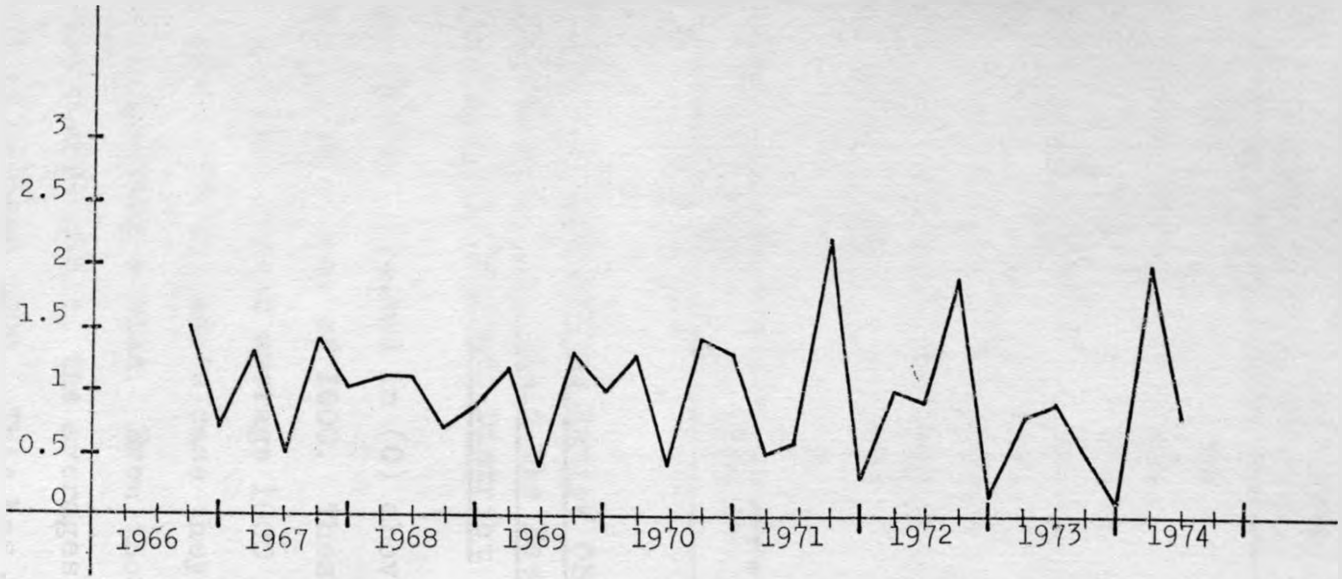


Fig. B: Quarterly Supply Pattern of Cattle for Slaughter from Kajiado District to the KMC based on Ratio of Observed Data to Moving Averages



Nine year supply period - in quarters

Source: Based on Table 12.

C. Averaging the Ratios (Kajiado District)

Table 12: Ratios of Observed Values to Moving Averages, Kajiado District 1966-1974

Quarter Year	March Quarter	June Quarter	September Quarter	December Quarter
1966	-	-	1506	695
1967	1337	541	1399	997
1968	1096	1058	728	946
1969	1154	375	1333	1026
1970	1299	411	1369	1326
1971	452	566	2227	323
1972	999	927	1992	81
1973	795	99	1520	151
1974	2029	756	-	-
Averages	1145	592	1509	693

D. Adjusting the Averages of the Ratios Obtained in (C) above in order to Obtain the Beef Cattle Supply Index for Kajiado District

The average ratios obtained in (C) above may contain bias with a base of 1000. These quarterly averages should average 1000 i.e. add up to 4000. In Kajiado's case they add up to 3939 indicating a bias. Even though this bias is rather negligible, the averages should be adjusted to average 1000. This has been done by multiplying each average by the factor 4000/3939 to obtain the supply index for Kajiado district shown in the following table.

Table 13: Index of Beef Cattle Seasonal Supply Variation to the KMC from Kajiado District 1966-1974

Quarter in the Year	Average Ratios	Index of Seasonal Supply Variations
March quarter	1145	1163
June quarter	592	601
September quarter	1509	1532
December quarter	693	704
Mean	984.75	1000

Figure C below is the graphed index of seasonal supply variation, or the supply pattern of beef cattle from Kajiado district to the KMC over the nine years period (1966-1974). This index reveals that due to purely seasonal influences, average monthly slaughter cattle supply in the March quarter, for example is 16.3 per cent above what it otherwise would be (according to the indicated calculations). The June quarter average monthly supply for similar but opposite seasonal influence is 39.9 per cent below what it would otherwise be. Thus, from this index the overall picture of supply of beef cattle to the KMC from Kajiado shows that there were two pick supply periods over the nine years observed, one in the March quarter and the other in the September quarter.

From the collected KMC supply data from Kajiado district graphed in figure A, it can be pointed out that the seasonal supply pattern is not constant over every year. As the analysis in 4.4 below will show, supply of beef depends on an interplay of varied factors many of which reflect no seasonality in their occurence. Hence, little or no reliance can be placed on the calculated index in estimating seasonal supply variation with some accuracy.

4.3.2 Supply of Cattle for Slaughter to the KMC from Nakuru District

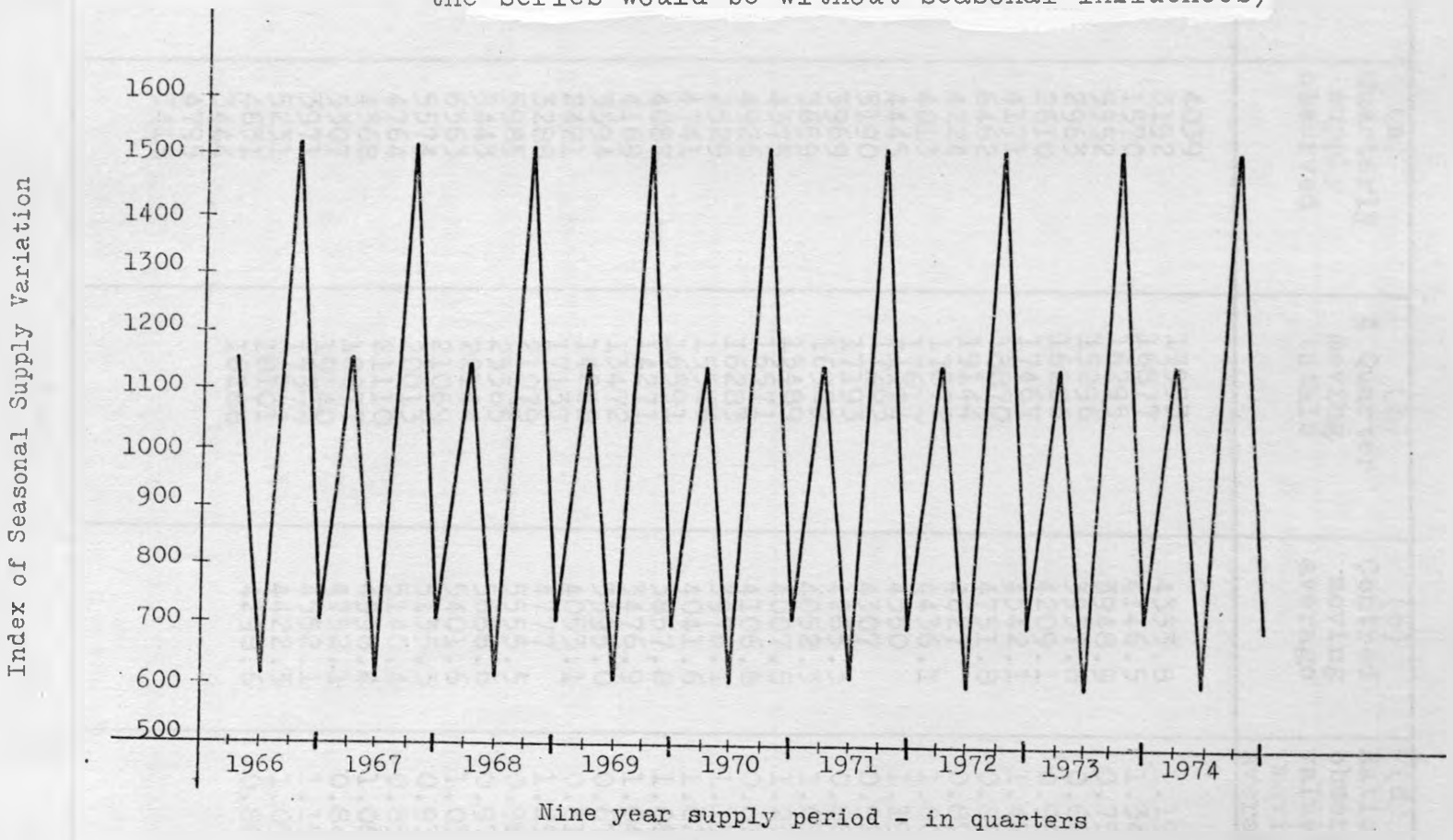
This section gives the computation of seasonal supply index for slaughter cattle delivered to the KMC from Nakuru district. In this calculations, use has been made of the quarterly cattle supply figures for the same period like the ones used in the case of Kajiado district, i.e. January 1966 to December 1974. The steps followed are similar to those followed in the case of Kajiado above.

E. The first step here involved calculation of centred moving average of the quarterly cattle supply figures to the KMC for Nakuru district. This first stage is given on table 15 below. It is done by calculating four quarterly moving totals, adding adjacent totals and dividing

them by 8. The moving averages thus calculated represent the series with the seasonal and random components largely smoothed out. This is shown graphically on Figure D below. The ratios of the observed beef cattle supply figures of Nakuru district to the moving averages already obtained are calculated. These ratios contain the seasonal and random components that influence supply, together with any bias resulting from the application of moving average procedure. For calculation convenience in compiling the table 16 below averaging the ratios of observed values to moving averages, the decimal points in the ratios are omitted by using 1000 as the base instead of unity, just as was done in the case of Kajiado district.

Fig. C: Supply of Cattle for Slaughter to KMC from Kajiado District
Index of Seasonal Supply Variation

(The seasonal supply pattern - as indicated below must be thought of as being superimposed on what the series would be without seasonal influences)



Source: Based on table 13.

Table 14: Calculation of Centred Moving Average of Beef Cattle Supply from Nakuru District to the KMC, 1966-1974

Year		(a) Quarterly supply observed	(b) 4 Quarter moving totals	(c) Centred moving average	(d) Ratio of observed values to moving average
	1	4039			
			17953		
1966	2	3192		4353.8	1.19
			16877		
	3	1570		4146.5	1.34
			16295		
	4	5552		3948.9	0.75
			15296		
	1	2963		3937.8	0.66
			16206		
1967	2	2610		4209.1	0.99
			17467		
	3	4171		4542.1	1.42
			18870		
	4	6462		4751.8	0.89
			19144		
	1	4224		4627	0.87
			17872		
1968	2	4013		4436.1	1.00
			17617		
	3	4445		4360	1.19
			17263		
	4	5190		4307	0.92
			17193		
	1	3969		4265.3	0.86
			16929		
1969	2	3659		4052.3	1.08
			15489		
	3	4375		4007.5	1.23
			16571		
	4	4926		4106.8	0.61
			16283		
	1	2529		3976.1	1.19
			15526		
1970	2	4741		4041.6	1.02
			16591		
	3	4087		3857.8	1.08
			14271		
	4	4169		3476.9	1.04
			13472		
	1	3594		3595.0	0.67
			14288		
1971	2	2421		4053.1	0.81
			17137		
	3	3288		4777	1.25
			21079		
	4	5985		5555.5	0.98
			23365		
	1	5443		5688.6	0.97
			22144		
1972	2	6363		5401.6	1.03
			21069		
	3	5574		5135.3	0.93
			20013		
	4	4764		5140.4	0.85
			21110		
	1	4368		4998.4	1.06
			18877		
1973	2	5307		4752.1	0.84
			19140		
	3	3971		4552.1	1.15
			17277		
	4	5231		4422.3	1.05
			18101		
	1	4631		4298.6	0.80
			16288		
1974	2	3444			
	3	4795			
	4	3418			

Table 15: Averaging the Ratios of Observed Beef Cattle Quarterly Supply Figures to their Moving Averages - Nakuru District 1966-1974

Year	March Quarter	June Quarter	September Quarter	December Quarter
1966	-	-	1190	1340
1967	750	660	990	1420
1968	890	870	1000	1190
1969	920	860	1080	1230
1970	610	1190	1020	1080
1971	1040	670	810	1250
1972	980	970	1030	930
1973	850	1060	840	1150
1974	1050	800	-	-
Averages	886	885	995	1199

Source: Based on figures in Appendix 3.

The ratios above arranged in columns for each quarter and the values averaged in each column This eliminates the random fluctuations in the ratios. The averaging of the ratios has been done by using the simple arithmetic mean. It is however appreciated that the use of this mean could present a problem because occasionally an irregularly large fluctuation may occur which may be regarded as of an episodic character. Nakuru nevertheless seems to be free from such exaggerated episodic supply oscillations compared to Kajiado. Factors bringing about such observations are analysed in 4.4.2 below.

G. Adjusting the Average Ratios to Obtain the Beef Cattle Supply Index for Nakuru

With the base of 1000 used above the quarterly average ratios should add up to 4000. In the above case, as table 16 below shows, they add up to 3965 and average 991.25 indicating some bias.

Adjusting makes them add up to 4000 hence average to 1000. This has been done by multiplying each of the average by the factor 4000/3965, to give the index of seasonal variation of beef cattle supply to the KMC from Nakuru District.

Table 16: Index of Seasonal Beef Cattle Variation from Nakuru District to the KMC 1966-1974

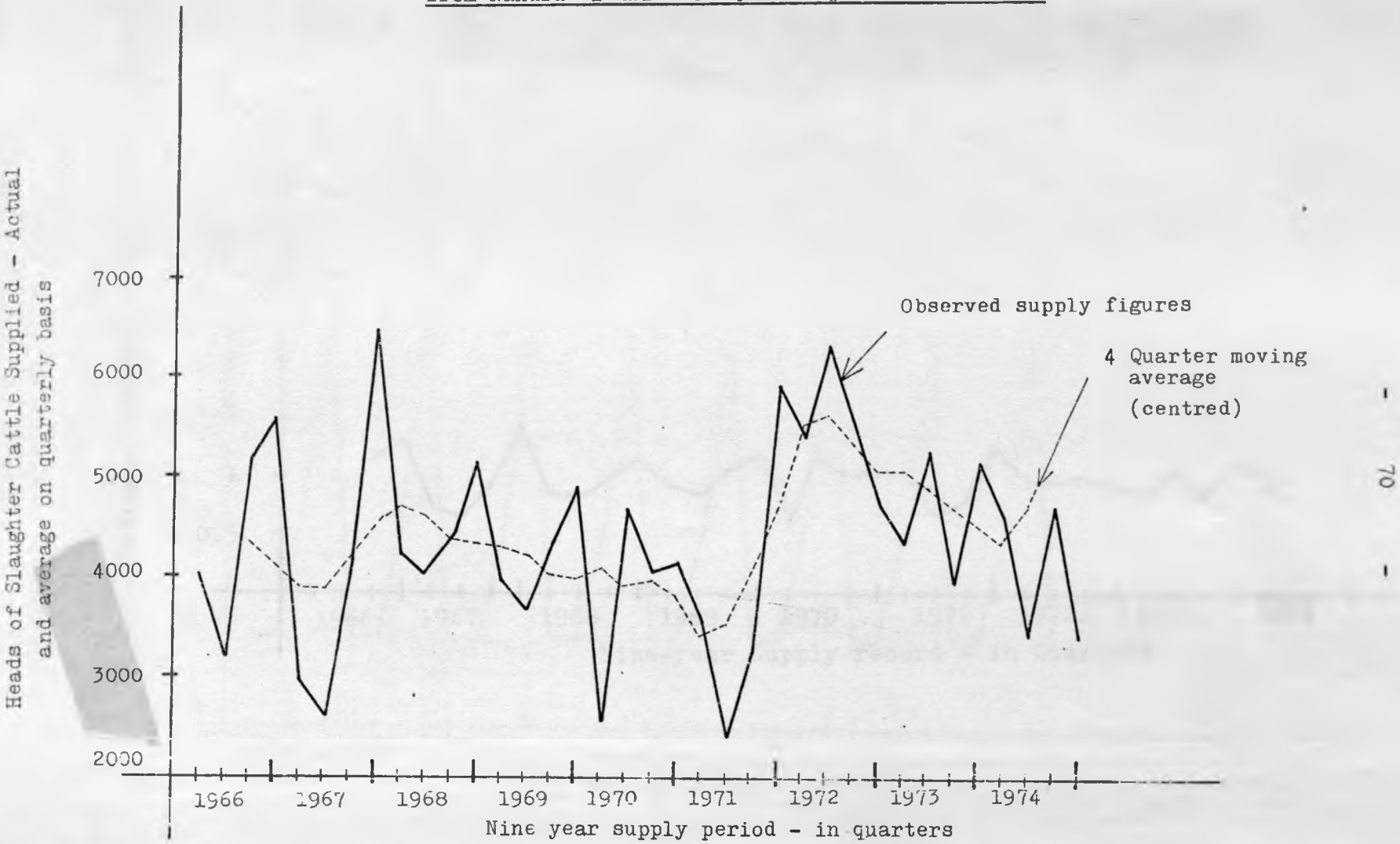
Quarter in the Year	Average Ratios	Index of Supply
March quarter	886	894
June quarter	885	893
September quarter	995	1004
December quarter	1199	1209
Mean	991.25	1000

Source: Author's calculation.

This index of supply for Nakuru district indicate that due to seasonal influences on the supply of slaughter cattle to the KMC from

Nakuru district over the years 1966 to 1974, the March and June quarters supply figures were lower by 10.5 per cent below what they would otherwise be. The December quarter on the other hand gave a 20.9 per cent higher figure than would be expected. These results are graphed in figure F below, before proceeding to analyse the various factors that bring about seasonal supply differences in 4.4.

Fig. D: Moving Average of Slaughter Cattle Supplied to the KMC from Nakuru District on Quarterly Basis 1966-1974



Source: Based on data in Appendix 3.

Fig. E: Quarterly Supply Pattern of Cattle for Slaughter from Nakuru District to the KMC based on Ratio of Observed Data to Moving Averages

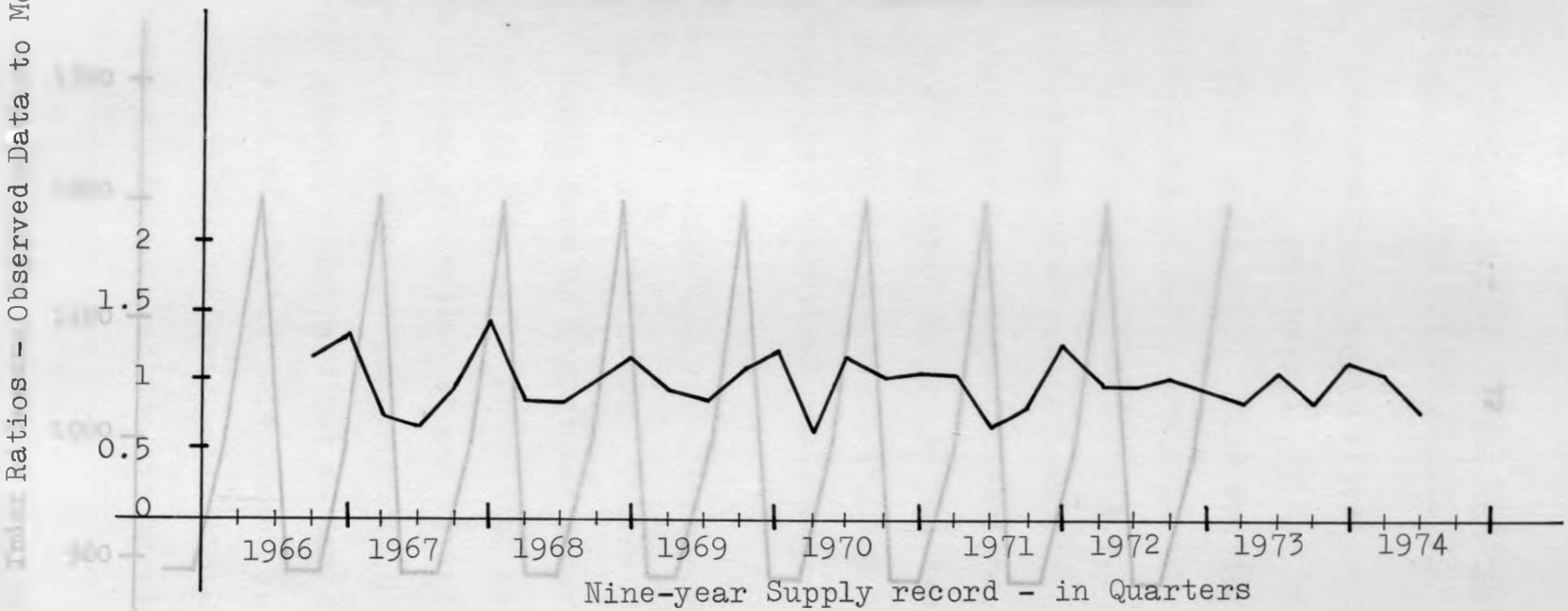
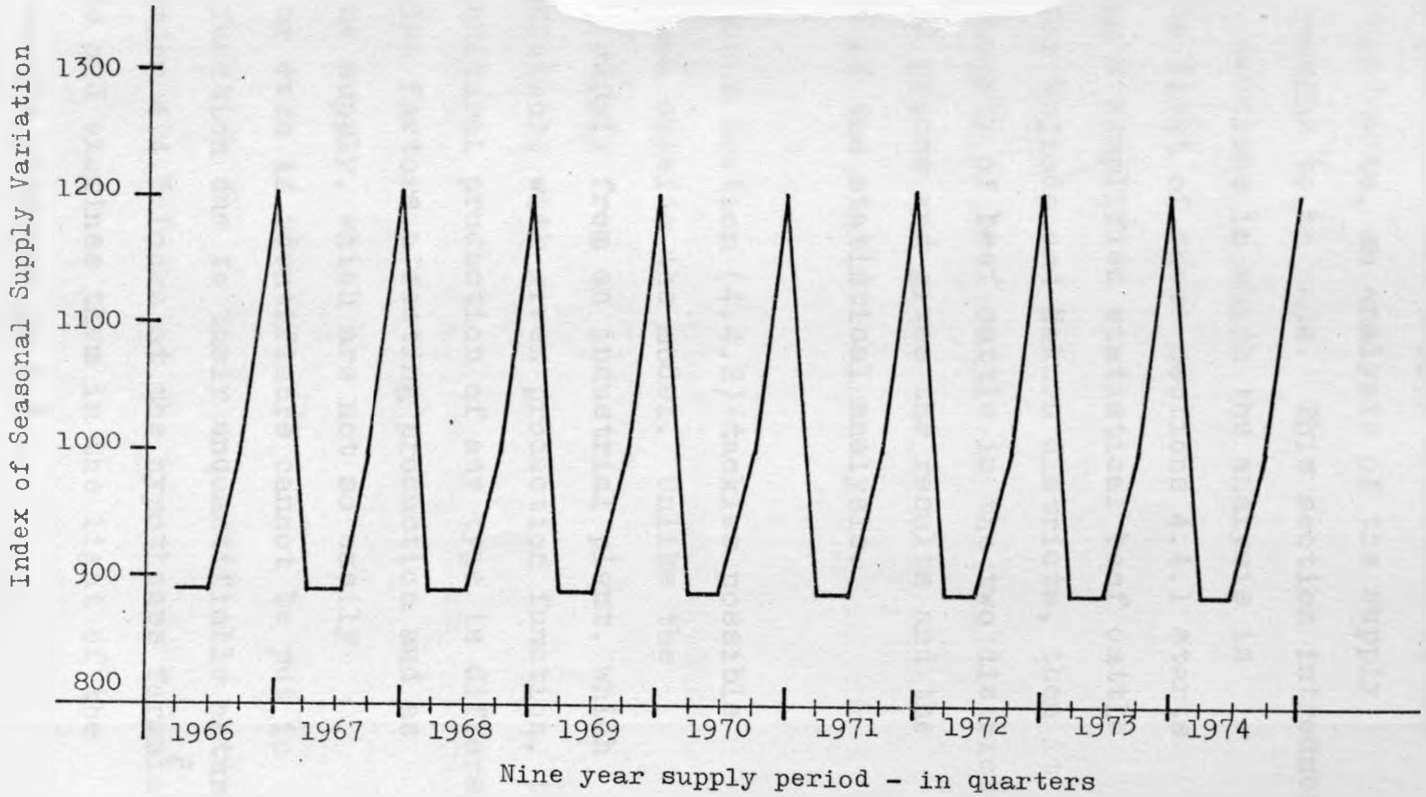


Fig. F: Supply of Cattle for Slaughter to KMC from Nakuru District
Index of Seasonal Supply Variation

(The seasonal supply pattern - as indicated below must be thought of as being superimposed on what the series would be without seasonal influences)



Source: Based on data in table 16.

4.4 ANALYSIS OF BEEF CATTLE SUPPLY DETERMINANTS IN KAJIADO AND NAKURU DISTRICTS

Having presented the supply situation in the two reference districts, an analysis of the supply determinants remains to be made. This section introduces the next three sections in which the analysis is presented. The first of these sections 4.4.1 starts with describing a simplified statistical beef cattle supply model for Kajiado and Nakuru districts, then it regresses the supply of beef cattle in the two districts on rainfall and prices and gives the results and the interpretation of the statistical analysis.

The second section (4.4.2) tackles possible supply influences outside the model. Unlike the production and supply from an industrial plant, which is easily predictable with given production function, the case for agricultural production of any type is different. There are varied factors affecting production and as such affect the supply, which are not so easily discernible, or even if identifiable cannot be put in a production function due to their unquantifiable nature. The third section 4.4.3 looks at the hypotheses formulated in chapter one and examines them in the light of the statistical results obtained in 4.4.1.

4.4.1 The Basic Model

The following models were developed to explain the supply situation in Kajiado and Nakuru districts respectively:[3]

(1) $\log S_K = A_1 + B_1 \log R_K + C_1 \log P_K + e_1$

(2) $\log S_N = A_2 + B_2 \log R_N + C_2 \log P_N + e_2$

where log S = the logarithm of monthly beef cattle supply, with the subscripts K and N denoting Kajiado and Nakuru districts respectively.

A - Constant which gives the mean predicted value of the observations.

B - Gives the average effect of independent variable (rainfall) on dependent variable (supply), prices held constant.

C - Gives the average effect of the second independent variable in the model i.e. (price) on the supply, rainfall held constant.

P - Gives the average monthly prices.

R - The average monthly amount of rainfall.

e - The error term.

Computer programme XDS3 was used to estimate the models, making use of figures for 9 years on monthly beef cattle supply, average KMC beef cattle prices and monthly average rainfall. The regression results obtained are given in table 17 below.

Based on the regression coefficient and the correlation coefficient in equation (1) see results table 18 below, it can be said with certainty that rainfall has an inverse influence on Kajiado district's slaughter cattle supply to the KMC. This is evident from the coefficient's negative sign. The 't' value however, indicates that rainfall as a supply determining variable is not statistically significant at the 99% level of confidence. Infact at the same level of confidence the coefficient of determination (R^2) indicates that only (3.5%) of the supply is determined by the rainfall. This means that 96.5% of the supply is determined by other factors which the author has attempted to explain (see 4.4.2) below. The results in equation (2) show that the Kajiado district's slaughter cattle supply to the KMC is highly price inelastic, i.e. (-0.0518).[5] It is,however noticeable, that the coefficient of determination shows that KMC prices for beef cattle explain only 0.7 per cent of the supply leaving 99.3 per cent of the supply to be explained by other factors.

Despite the fact that the coefficient of regression for the price emerge with a negative sign, the author finds it unthinkable that this would be the case, i.e. the high prices bear an inverse relation with supply. Such a conclusion can only be made if average prices of slaughter cattle in the competing market outlets were known. It might be true that even when the KMC prices are at their highest, only very few sellers will deliver their cattle to the KMC since other market outlets offer more remunerative returns than the KMC. The price figures from these other market outlets were however lacking and this makes any conclusion on the results liable to be regarded with reservation. The 't' value in the case of the price coefficient also expresses its statistical insignificance at the 99% confidence level.

Slaughter cattle supply to the KMC from Nakuru district appear unaffected by rainfall. Although the rainfall coefficient is positive, it emerges as statistically insignificant. Also noticeable is the fact that the coefficient of determination shows that rainfall as a beef cattle supply determining variable explains only a negligible 0.058 per cent of the supply influence. Nakuru district is better endowed than Kajiado district as far as water supply is concerned and there are actually no cases of marked drought periods like the ones appearing occasionally in Kajiado district.

Table 17: Regression of Cattle Supply from Kajiado and Nakuru Districts to the KMC on Rainfall and Prices Based on Monthly Data 1966-1974

Dependent Variable	Constant	Independent Variables		Common Coefficients	Correlation Coefficient	Degrees of Freedom
		Rainfall	Price			
(1) KMC slaughter cattle from Kajiado District	7.2185 SE(0.2267) t(31.84)	-0.1186 (0.0618) 1.92		R^2 = 0.035 t = 2.358 DW = 1.062	0.187	106
(2) "	6.8650 SE(0.1828) t(37.55)		-0.0518 (0.1891) (0.27)	R^2 = 0.0007 t = 2.358 DW = 1.053	0.027	106
(3) "	7.2543 SE(0.2726) t(26.61)	-0.1183 (0.0621) 1.91	-0.0446 (0.1867) 0.24	R^2 = 0.0353 t = 2.358 DW = 1.0637	0.188	105
(4) KMC slaughter cattle from Nakuru District	7.2092 SE(0.1220) t(59.09)	0.0074 (0.0299) (0.25)		R^2 = 0.00058 t = 2.358 DW = 1.5745	0.024	106
(5) "	7.1976 SE(0.0690) t(104.3)		0.0490 (0.0714) (0.69)	R^2 = 0.0045 t = 2.358 DW = 1.5654	0.068	106
(6) "	7.1686 SE(0.1340) t(52.72)	0.0074 (0.0300) 0.25	0.0490 (0.0717) 0.68	R^2 = 0.0052 t = 2.358 DW = 1.5797	0.072	105

N.B.: (1) All figures in the brackets are the standard errors and the figures immediately below them are the respective t statistics. Also the above figures have been derived at 99% level of confidence. The critical 't' in that case = 2.358. DW = Durbin Watson statistics.

(2) The equations are in logarithms.

The equation (6) shows that slaughter cattle supply to the KMC from Nakuru district, unlike that from Kajiado district, is price elastic, but only very slightly so (0.0490). The very low R^2 value (0.46 per cent) warns against great reliance on KMC prices as main slaughter cattle supply influence factor. The 't' value is also very insignificant. Consequently other factors must be explained.

The following observations serve as a summary of these statistical results.

(1) There is no serial correlation between the error term and any of the explanatory variables as can be seen from the Durbin-Watson statistics. This is particularly so in the case of Nakuru.

(2) None of the coefficients of explanations viz. the regression coefficients is statistically significant at the 99 per cent confidence level. In both Kajiado and Nakuru equations, the coefficient of price is more insignificant than rainfall.

(3) Also, in all equations, the coefficient of determination explain extremely low percentages of the observed relationship between the independent and dependent variable. The greatest percentage of the observed relationships is only 3.5% (i.e. between Kajiado district supply and rainfall or Kajiado district supply and rainfall and price, combined). With regard to price alone, only 0.07 per cent of supply from Kajiado district is explained by it and only 0.04 per cent at Nakuru.

It seems that no conclusive statement can be made on the beef cattle supply behaviour in these two districts based entirely on the two identified variables (rainfall and price). For instance, although one may argue from the statistical results only that the Masai cattle owners in Kajiado hold on to their cattle as rain increase, this is, however, an observation determined by several unidentified factors since rainfall explains only 3.5 per cent. The result though insignificant, may, however, help to confirm the views expressed by the field agricultural officers to the author, and which the author considers to be economically significant. These were that, ceteris paribus, an inverse relation exists between supply and rainfall. When the rainfall is low, especially during the times of drought, there is a 'natural tendency',

particularly amongst the pastoralists, to sell most of their heads of cattle in order to reduce the losses that would be possibly incurred through deaths. This reduction serves various purposes. Amongst the main ones are: (i) the easing of movement of cattle from one area to another in search of pasture, (ii) also the reduction of the competition by the cattle on the available pasture thus raising their chances of survival. In better times, i.e. during the rains especially following the drought, the producers reflect resistance to any incentive to sell their cattle. The rainy season affords these producers two advantages:

(i) Rainy season is ideal for a 'herd build up' to replenish the losses incurred either by death or voluntary sale during the dry season. In the pastoral areas, this assertion bears great validity considering that there are no ways of getting supplementary feeds for the cattle and other animals during drought. Water availability in these times is also a problem.

In the agricultural areas like Nakuru, drought may not be as severely felt as in the pastoral areas. Water availability is not usually a problem, and there are also better chances of getting dry season provision for feeding the cattle other than depending solely on pasture. This is especially so if the herd is not very big. A producer in the agricultural area might

thus never be under such a great duress as his counterpart in the pastoral area.

During the rainy season, the milk supply which was at its low ebb during drought period, also increases. Milk serves as:- (i) an important part of the diet especially amongst the pastoral peoples, (ii) also as a means of earning income. The pastoral people who were 'malfed' during the drought will hence be reluctant to sell their 'source of food' during the rains.

The importance or otherwise of prices in determining slaughter cattle supply levels depends on a number of factors, viz.

(i) Whether there is a coincidence of demand for money by the producers and the KMC price rise.

(ii) Whether there are no better alternative means of realizing monetary income other than the Sale of cattle (this would be very true in Nakuru where the farming activities are varied).

(iii) The subjective evaluation of the price level by the producers. Is the new price level 'high enough' compared to that of alternative market outlet?

The propensity to dispose off cattle from any community will very much be influenced by these factors.

From the considerations thus far tackled, further explanations of the beef cattle supply level determining factors appear very imperative.

4.4.2 Other Factors Influencing Supply

The factors considered here, though left outside the simplified supply model, are nevertheless of considerable economic significance.

(i) The supply models for the two districts do not take into account the effect of alternative market outlets available to the supplies going to the KMC.

The beef cattle suppliers have no legal obligation to take their animals to the KMC. KMC competes for the available cattle supplies with a large number of butchers all over the country and sometimes across the national borders. Just as demand normally tends to flow in the direction of the lowest price, supply will under normal circumstances tend to flow into those markets offering the highest price. Farmers with crops to sell and traders who buy from them will seek out the most profitable markets within reach. Actually in calculating what is

the most profitable market sellers must, and usually do take into account not only the expected price but also the costs that must be incurred in obtaining that price, e.g. distances to be covered, risks to be borne, chances of doing other businesses, etc.

The case for cattle supply does not differ from that of a farmer and his crops. Given possible market alternatives, and economic rationality a cattle owner with an intention to dispose some of his heads, be they in pastoral or agricultural districts, will move to the highest paying buyer.

In its twenty fourth annual report (26(h), p.3) the commission lamented:

> "It was unfortunate that sufficient slaughter stock was not available to take full advantage of the new markets and prices negotiated.....over the years the commission has emphasized its concern over the inadequacy of cattle supplies and it is in view of this that the increased producer prices were welcome though they are not adequate to allow effective and healthy competition with other local slaughter houses".

From this statement a contention can be derived that the lower the KMC prices are in relation to those of its competing market outlets for beef cattle, the lower are its cattle receipts expected to be.

The lack of records showing average prices paid per an average cattle head by the non-KMC buyers precipitate the seclusion of this factor from the model.

Cattle, like many other agricultural products, can be sold only at a certain age, and hence rising prices will not induce increased supply immediately unless the cattle heads available are already in the saleable age. The price elasticity of supply might therefore, not manifest itself at the same time as the price rises.

Disease incidence in the livestock producing areas is another supply determining factor that cannot be included in the model. Many diseases limit the production and distribution of cattle herds, so affecting adversely the supply to the KMC and even to the buyers.

Tick borne disease and East Coast Fever are the main causes of death in adult stock in most Kenya range lands while calf scours, Bovine pleuro-pneumonia, Coccidiosis and other endoparasites are very common in calves and account for a high mortality rate thus affecting adversely the number of cattle reaching adulthood, hence saleable. Foot and mouth disease is also widespread.

One important aspect of cattle disease is the ease with which they can be spread from one area to another. The veterinary officials control this spread by exercise of vigilance against cattle movement, imposing isolation and quarantine orders. These result in supply limitation due to the delay in transit.

Cultural factors have also been responsible for low offtake and supply of cattle to the KMC and presumably to other markets also. Primarily amongst the pastoralists but even amongst some settled agricultural communities, cattle are kept to secure a living for a family as well as a status symbol. In the pastoral areas like Kajiado, the large number of cattle per family are necessary due to poor nutrition, management and low genetic potential.[4] Milk yields are low and are frequently further reduced through long drought periods. Large numbers of cattle are therefore necessary to meet the high milk demand.

The number of cattle herds one has also determine the social stand of the owner. Amongst the Masai especially the greater the number of cattle heads one has, the more revered the owner is amongst his tribesmen. This could explain not only the low supply to the KMC from such people,but also the low total offtake. Cattle is also used for settling social transactions like debts, paying dowry (bride-price) and

also for tribal religious ceremonies.

A factor emerging from the above is reluctance by the producers to sell cattle unless under a situation of duress.

In pastoralists' herds, the proportion of cows is normally higher than in a commercial beef herd. This is deemed necessary for the perpetuation of large numbers. It is also evident that heifer calves are better looked after than bull calves as they will secure the living of the family and increase of herds in years to come. The main objective of a pastoralist in this case is not acquisition of maximum returns (in terms of money) from the cattle sales, but the maintenance of a maximum number of cattle heads. Sales of cattle to the KMC or to any other buyers may occur on very few instances, e.g. when money is wanted to pay taxes, school fees, fines, etc.

Supply of cattle especially from the pastoralists is likely to be limited by the above factors. The prices paid for the cattle by the KMC can therefore be regarded in relation to the forgone social benefits of retaining them. In commercial farms like those available in parts of Nakuru district, economic motives dominate the production and supply of varied agricultural production including that of cattle. The relative

profitability of other agricultural activities that producers engage in will have significant influence not only to the hectarage devoted to cattle but also to the numbers that will eventually be supplied to the KMC.

4.4.3 Hypotheses Testing

The hypotheses formulated in this study were looked at in the light of statistical findings given earlier in this chapter and rejected or accepted.

The first hypothesis was that cattle producers in the agricultural areas reflect response to the price given by the KMC for their cattle. On the basis of the supply model results worked from given supply to the KMC and price figures, this hypothesis can be rejected. The prices in this period (1966-1974) did not have statistically significant influence on the supply. It is however, worth noting that the long period between a calf's birth and the time taken before it can be sold in the market as a cattle for slaughter is likely to obscure some price influence. This period is normally over 3-5 years while prices considered here are monthly averages. The underlying assumption behind the above hypothesis was that farmers base their decisions to produce on market prices. The author also had in mind the notion that unlike the pastoral areas, the agricultural

areas enjoy the ease with which production patterns can be changed in time. The pastoral areas are not suitable for any agricultural activity other than stock keeping. Under normal circumstances the relative level of agricultural prices influence the allocation of production resources and thus the level and pattern of production. This led the author to presuppose that the supply of cattle to the KMC would show some response to prices.

While this has been rejected on the basis of the statistical analysis, it should be counted that slaughter cattle supply to the KMC is only a part of the total cattle supply which might have some response to price.

Given the production possibilities in other agricultural enterprises, it can be argued that the producer prices of the KMC do not rise high enough over time as to make the farmers shift their production pattern in favour of beef cattle. If wheat per hectare for example is more paying to the farmer in Nakuru than keeping cattle on the same piece of land, a rational farmer on economic considerations would shift his activity to the former. The prices of pigs, sheep, etc. if better than those of beef stock will have a similar effect. It is out of these considerations that the author thought the hypothesis as rational.

The second hypothesis stated that the cattle owners are indifferent to prices and therefore changes in output level are the result of factors other than prices. From the findings already explained this cannot be 100 per cent correct in either agricultural or pastoral areas.

Despite the fact that the statistical results did not show the prices as outstanding in beef cattle supply determination, this does not invalidate its importance. Prices are among the many supply determining factors. In the real economic world prices are likely to play an important part in influencing supply among the more economically minded farmers. This fact would be more so in the agricultural areas where, as has been pointed out earlier, relative changes in price will change the ranking in the profitability of the various farm enterprices. The pastoral peoples are also becoming increasingly economically minded though as pointed out earlier, the cultural and other influences can relegate the importance of price to obscurity.

The third hypothesis asserted that factors other than prices are more important supply determinants in the purely pastoral areas than in the agricultural areas. The fact that price was not shown as statistically significant together with the other explanations given in 4.4.2 renders this hypothesis worth of acceptance. It was observed that factors like disease incidence,

cultural factors and retention of stock for nutritional purposes bear more strongly amongst the pastoralists than the agriculturalists. It might all the same be said that the outcome that the prices were not found significant in Nakuru district representing the agricultural areas means that the hypothesis cannot be limited to the pastoral areas only, but can apply to the agricultural ones as well. Studies of other districts would in the author's opinion, shed more light on these findings. In the present case, this was not possible due to the limitations of both time and finances.

Other studies might help to overcome two difficulties in the simple supply model used by the author:

(a) The two independent variables, rainfall and prices had probably to be 'lagged' to measure their influence over time on cattle supply, but no apriori knowledge was available to the author to enable him to treat these variables in such a way.

(b) Also, if the above was to be done, longer periods of observation than the one the author has used would be necessary to discover more clearly the regular or irregular relationships of the supply patterns.

Footnotes to Chapter Four

1. The method used here to establish the seasonal supply patterns of cattle is adapted from Karmel P.H., Polasek, M. Applied Statistics for Economists, Pitman (1971), pp. 271-278.

2. The author adopted quarterly figures instead of monthly from the common knowledge that supply changes amongst other things are a function of time. Supply changes of cattle are likely to manifest themselves over a longer period than one month. A quarter in the author's opinion would be better. It has however, the defect of reducing the observations from 108 to 36.

3. The data used in the ensuing calculations using these models are given in the appendices 2 and 5 in their absolute form. They have been transformed to logarithms (see chapter one on methodology) for convenient calculations and interpretations.

4. There is a general consensus on this point about the behaviour of pastoralists by the livestock and veterinary officers contacted by the author in Kajiado district. This district is inhabited by the pastoral Masai.

5. The coefficient (-0.0518) on page 75 must also be explained as indicating the existence of a negative relationship between supply and price in the beef cattle market i.e. increased price a tendency to lead to less supplies.

CHAPTER FIVE

PRICING OF THE BEEF CATTLE

The main objective of this chapter is to analytically assess the efficiency of the KMC pricing system. Pricing in this case is restricted to the buying of beef cattle from the producer. To achieve the above objectives, an attempt has been made in the first part (5.1), to identify the general pricing system under which the KMC operates. In the second part (5.2) an analysis of the KMC purchasing operations has been done. This includes investigations on the KMC Purchasing Costs[1] at various supply points in the country. These costs are given the consideration in the assessment of KMC's pricing efficiency analysed in (5.3). In this analysis various theoretical and practical factors have been evaluated. Also in this connection, KMC has been regarded as a dichotomy. The purpose of doing this was to enable the author to analyse the KMC, first as a public body operating under no-profit no-loss basis, and secondly as a business concern that must make profits. The last section (5.4) deals with the impact (or influence) of the KMC pricing policy on the resource allocative process. Some graphical presentations to illustrate the observation are given. This section ends with the analysis of the rationale for such pricing policy. It should be expressed here that non-KMC prices could not be dealt with due to lack of data. Auction prices from two supply areas have, however, been used to represent

open market prices for comparison with the KMC prices.

5.1 THE KMC PRICING SYSTEM

The government of Kenya, through its Ministry of Agriculture sets producer prices for cattle delivered to the KMC on per Kg. CDW basis of different grades of beef. These prices are uniform for the whole country and as such have no regional or seasonal differentiation. The prices are periodically reviewed. These periods have ranged from a few months to a year.

Table 18: KMC Beef Producer Prices per Kg./CDW, 1972

Grade	Athi River				Nakuru		Ngong		Mombasa	
	1.2.72 to 12.2.72		14.2.72 to 6.12.72		7.12.72 to 31.12.72		1.1.72 to 6.12.72		7.12.72 to 31.12.72	
	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.
Prime	4	50	4	70	4	70	4	50	4	50
Choice	4	25	4	45	4	67	4	25	4	45
FAQ Passed	4	00	4	20	4	41	4	00	4	20
FAQ Retained	3	18	3	18	3	34	3	18	3	34
Standard Passed	2	95	3	15	3	42	2	95	3	12
Standard Retained	2	65	2	65	2	78	2	65	2	78
Commercial Passed	2	60	2	80	2	94	2	60	2	73
Commercial Retained	2	30	2	30	2	42	2	30	2	42

Source: KMC Annual Report and Accounts, Nairobi, 1972, p. 3.

Since 17th July, 1973 (26(h), p.4) the KMC has adopted a uniform purchase price for all its branches. As can be seen from table above, prior to this date, different KMC plants paid different prices to the cattle suppliers. It is however, clearly discernible from the table that these differences were not very substantial. The KMC producer prices however, vary between grades. The following table shows these uniform prices for the period between July 17th, 1973 and December 31st, 1973 and between January 1st, 1974 and December 31st, 1974.

Table 19: Producer Prices for Beef at all KMC Branches on per Kg/CDW Basis

Grade	1973		1974	
	Shs.	Cts.	Shs.	Cts.
Prime	4	90	5	90
Choice	4	87	5	85
FAQ (Passed)	4	61	5	50
FAQ (Retained)	4	31	5	15
Standard (Passed)	3	67	4	85
Standard (Retained)	3	37	4	45
Commercial (Passed)	3	19	4	25
Commercial (Retained)	2	89	3	90
Manufacturing (Passed)	2	20	2	45
Manufacturing (Retained)	2	20	2	45

Source: Extracts from KMC Annual Report and Accounts, Nairobi, 1973 and 1974.

In some instances, the KMC departs from these rigid prices. A premium of 20 cts. to 30 cts. has been paid on per Kg. CDW on cattle grading FAQ or better and produced under approved contract feedlot or supplemental feeding. This can, however, be regarded as a negligible deviation from the rule especially if it is taken into consideration that only five out of the original 12 feedlot operation are still operational after the closure of seven.[2] In fact, a marked decline of the high grade animals from the feedlot scheme had been noted by the commission by the end of 1974 (26(i), p. 4). This was attributed to the escalating prices of feed and other related inputs and low production prices all of which rendered some feedlot operations uneconomical.

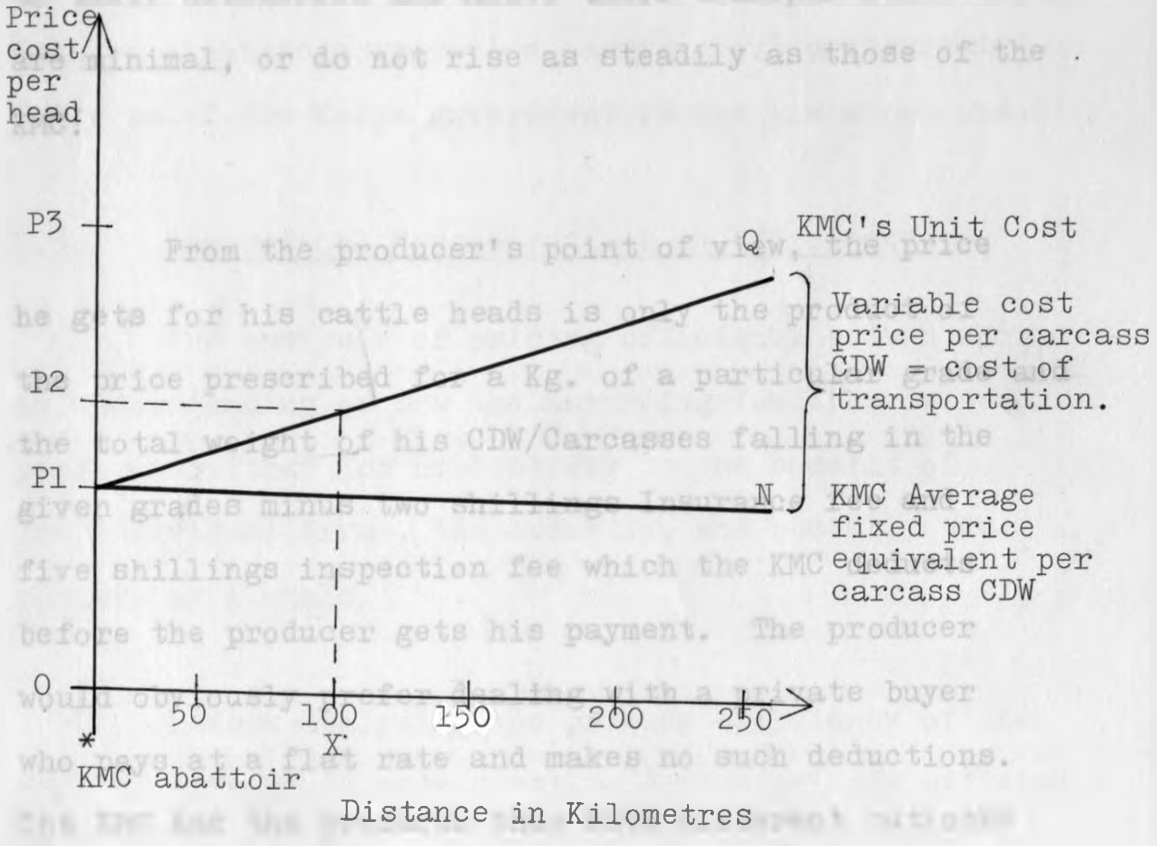
5.2 ANALYSIS OF KMC PURCHASING OPERATIONS

KMC, as has been pointed out, buys cattle from the producers at numerous stations all over the country at stated prices, and undertakes the cost of transporting them by rail to the neartest of its slaughter houses from the point of purchase (see appendices 7 and 8).

The prices at which the KMC makes its cattle purchases can be looked at from two perspectives viz. that of the KMC itself, and that of any given producer. From the KMC's point of view, the price paid to its farmer for procurement of each head of cattle includes the amount of money that is derived by multiplying the

CDW of the carcass by the price per Kg. of its determined grade, plus the transport cost from the point of purchase to the KMC abattoir. This means that the purchase price per head of cattle rises with the distance from the KMC abattoir as shown below.

Fig. G. KMC - Spatial Difference in Purchase Price



From the KMC's point of view, the above diagram shows that if a producer delivers his cattle to Athi River (KMC abattoir) at point O, KMC's cost price is OP_1 shs./ CDW/Carcass grade. But on the other hand, if KMC buys from location 'X' 100 Km. from Athi River, KMC's cost price equals OP_2, i.e. OP_1 + shs. 45.40 (see appendix 6 on the transport charge rates). This increase in cost price from OP_1 to OP_2 thus represents transfer costs,

denoted by line P_1 Q on Fig. G. above.

The situation portrayed above is peculiar to the KMC and not the private butchers. This is because the private butchers do not buy cattle on fixed grade CDW prices, and also because they normally buy in areas close to their butcheries and hence their transportation costs are minimal, or do not rise as steadily as those of the KMC.

From the producer's point of view, the price he gets for his cattle heads is only the product of the price prescribed for a Kg. of a particular grade and the total weight of his CDW/Carcasses falling in the given grades minus two shillings Insurance fee and five shillings inspection fee which the KMC deducts before the producer gets his payment. The producer would obviously prefer dealing with a private buyer who pays at a flat rate and makes no such deductions. The KMC and the producer thus have different outlooks on the prices paid to the producer.

5.3 PRICING EFFICIENCY OF THE KMC

In this section the author takes three main steps in order to assess the efficiency in the KMC pricing policy. The first step has been to set some theoretical factors that are presumed present in any efficient pricing system, the deviations from which will

help to make conclusion about the KMC policy. The other two steps entail assessment of KMC first, as a public body operating under the notion of no-profit no-loss, and secondly as a profit making company. This dichotomy is justified by the fact that KMC is partly a commercial firm buying cattle and selling beef and by-products in both domestic and export markets and it is also a public corporation carrying out prescribed policies of the Kenya government in the livestock industry.

5.3.1 Theoretical Considerations on Efficiency

The analysis of pricing efficiency brings about an understanding of how the marketing function is performed either for or contrary to the benefit of the individual firms, the industry, and possibly the society as a whole.

Before analysing the pricing efficiency of the KMC, an attempt is made first to define pricing efficiency and then to lay down the theoretical criteria which in the author's opinion forms a good analytical base.

Pricing efficiency studies attempt to appraise what happens to prices by directly contrasting actual prices with the ones that are generated by an efficiency model (4). The author uses the 'perfect market' criteria as a model of perfection in pricing efficiency. This model provides a diagnostic tool by which to test a

given situation in pricing (22) efficiency, the results serving to indicate either efficient performance or otherwise. The basic characteristics of prices in a 'perfect market' of a particular commodity are:

(a) A system of prices that changes with the market forces of supply and demand;

(b) A network of prices among geographically separated market whose differences are equal to transfer costs;

(c) Price differences which over time are exactly equal to costs of transferring the commodity from one period of time to another;

(d) And price differences among forms of commodity grade or classes equal to the necessary costs of converting the commodity from such form of grade or class to another.[3]

These four above mentioned characteristics of prices in a perfect market constitute a model that can be used to measure whether pricing of a firm of one by a government is efficient or not. In fact, this use of the perfect market model does not imply that perfect competitive conditions prevail at any time and place. However, even under monopolistic competition, the criteria above have deductive value. Markets are changing day after the

other, being continually subject to various shocks and disturbances. The concept of a perfect market despite its limitation, however, acts as a useful directional aid to spot distortions in the pricing performance.

5.3.2 Pricing Efficiency of the KMC as a Public Body

If one looks at the KMC as a public body, operating on a 'no-profit no-loss' basis, various conflicts emerge from its pricing policy. The KMC as a public body acts as a buyer of last resort from sellers especially in areas where they cannot obtain better prices, and also buys from commercial farmers who require a steady market. By controlling the prices at which the KMC makes its purchases, the government may be interested in keeping the consumer prices down hence ensuring high level of consumption, and reduce inflationary pressure on wage rates. At the same time the government's stated policy has always been the accelertted development of the agricultural industry through enhanced producer returns. The Kenya government actually regards the pricing policies as an integral and crucial part of the package of programmes and policies that can either stimulate or inhibit the development of the agricultural sector (11, pp. 244-245).

These two policies viz. accelerated development of the industry through enhanced producer returns and that of keeping domestic prices down have been at conflict

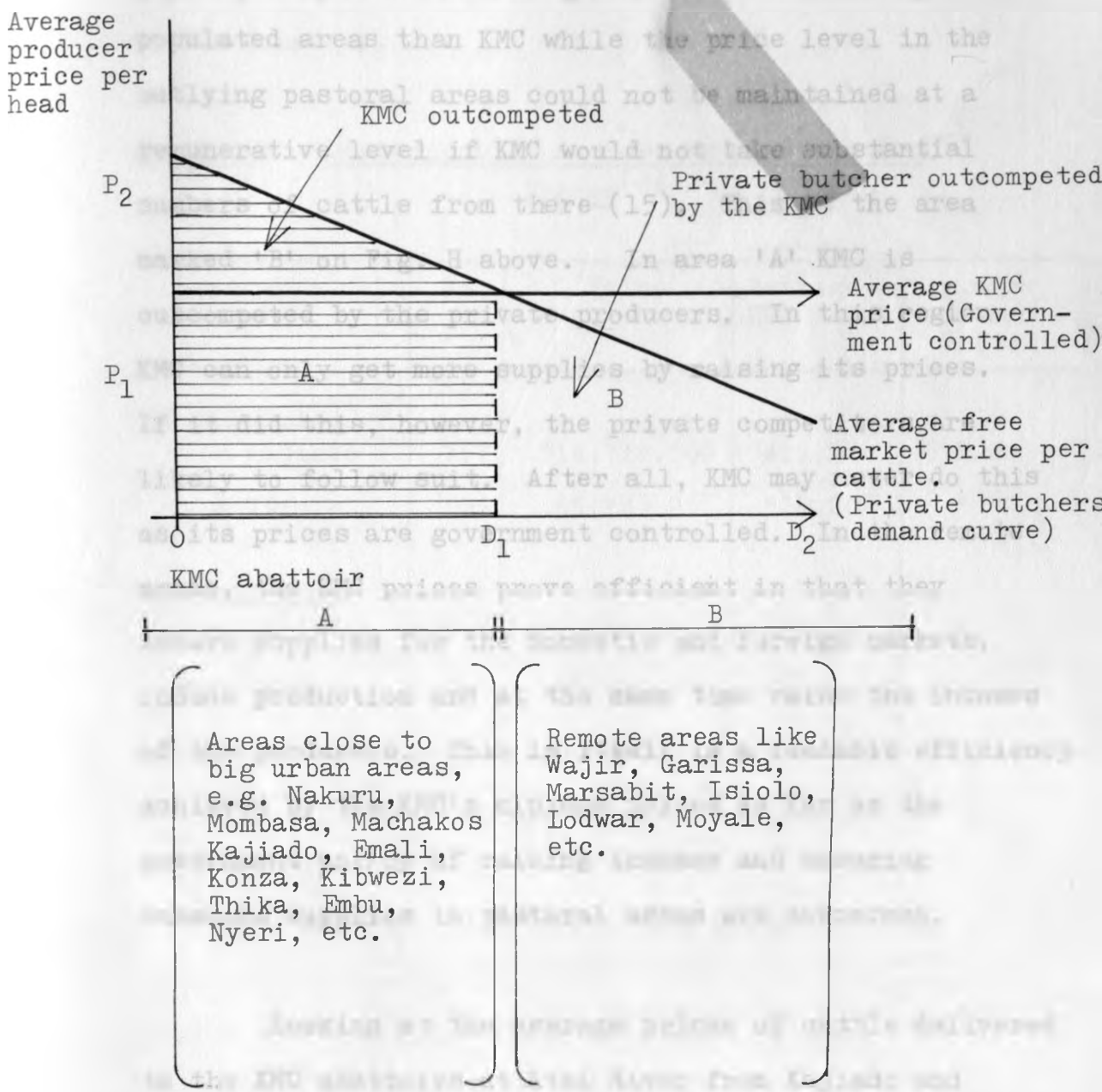
with each other and thus KMC prices can be said to be inefficient as far as reaching those objectives are concerned. It is only when some criteria in the perfect market pricing are used that these KMC prices reflect some 'partial efficiency' as will be seen below.

Although the KMC pays producers equal prices based on the CDW/Kg/shs. it in effect operates at a geographically differentiated 'cost price' system, (as pointed earlier) since it pays varied transfer costs to get cattle from geographically separated production points. This means, that KMC's 'cost price' per head of cattle differs depending on the source of supply. Since KMC does not pass the transfer costs to producers, then judged from the economic point of view, it's pricing reflects inefficiency. However, examined from the point of view of a public utility, this pricing practice must be seen as contributory to the efficient (performance of KMC) execution of its obligations. This is the case because in so doing, KMC subsidises producers in the more remote production areas who otherwise would be paid less per head of their cattle bought by the KMC. This would be a disincentive to increased production and would undercut Kenya government's primary policy aimed at enhanced beef production (see introductory chapter).

The KMC also maintains price differential among different grades of cattle i.e. the highest grade fetching more money than the low grade. This is to some extent nearly equal to the amount of money incurred by the farmer to raise the grade of the cattle head. The KMC, however, fails to meet perfect market criteria (a) and (c) since its prices are fixed by the government and as such do not respond to the market forces of supply and demand and also in so far as KMC does not vary its prices over time so as to reflect its storage costs. As a public body and as a business concern, therefore, KMC portrays some deficiencies.

Fig. H. below helps to illustrate further the KMC's operation position and illustrates on what side it is efficient or not.

Fig. H: KMC Market's Spatial Extention



The above figure indicates that under the present conditions whereby the KMC has to compete with the local butchers for the supply of beef cattle particularly in areas which are easily accessible and near big beef

markets, it can only expand its market spatially if it were to remain in operation. Private butchers pay higher prices for slaughter cattle in densely populated areas than KMC while the price level in the outlying pastoral areas could not be maintained at a remunerative level if KMC would not take substantial numbers of cattle from there (15). This is the area marked 'B' on Fig. H above. In area 'A' KMC is outcompeted by the private producers. In this region KMC can only get more supplies by raising its prices. If it did this, however, the private competitors are likely to follow suit. After all, KMC may never do this as its prices are government controlled. In the remote areas, the KMC prices prove efficient in that they secure supplies for the domestic and foreign markets, induce production and at the same time raise the incomes of the producers. This in itself is a laudable efficiency achieved by the KMC's minimum prices as far as the government policy of raising incomes and ensuring enhanced supplies in pastoral areas are concerned.

Looking at the average prices of cattle delivered to the KMC abattoirs at Athi River from Kajiado and Isiolo district although there is a five month difference between the periods considered (see below). It is evident that the price of KMC is less than the auction prices in the less remote areas, (Kajiado) while the situation is the opposite in Isiolo where KMC price is higher than the auction price. This might be attributed to

lack of competition in those far removed areas, and as such from the government policy consideration, KMC pricing there is efficient bringing about higher income to the producer.

Table 20: Comparison of Average KMC and Auction Prices(a)

	No.	Value	Average KMC Price	Average Auction Price
September 1975				
From Kajiado	757	314,718.000	415.70	592.00
From Isiolo	105	55,143.95	525.20	*
February 1976				
From Kajiado	1663	1,014,363.10	609.90	*
From Isiolo	141	66,482.45	471.50	464.00

Source: Extract from unpublished records of KMC, LMD and District Livestock Officer, Kajiado, 1976.

(a) The author used these auction prices as the only representation of open market prices available. The auction figures for Isiolo for September 1975 and Kajiado February 1976 were not available.

5.3.3 Pricing Efficiency of the KMC as a Business Concern

Analysis of the KMC as a business concern gives us another view about the 'efficiency' of its prices.

KMC, though regarded this way, has its producer prices set by the government. These prices usually operate over a lengthy period of time. This aspect may be first looked at in relation to the theoretical efficiency criteria and then in relation to the practical and rather subjective producer interest.

Fixed prices over time make it first and foremost hard for the KMC to adopt a rational pricing policy, i.e. adopting itself like other competitors to the dictates of the market environment. Also the perfect market model in addition to the points set out above requires that there be no institutional interferences in the market operations, one of which is pricing. If this then is not ensured as is presently the case with the KMC, its prices can never be efficient and also its competitive position in the market is hampered. The main consideration here is the general agreement that in the perfect market, competition between sellers and buyers is really effective. This condition is, however, absent where the KMC is not left to compete freely with other beef cattle buyers in the market altering its prices depending on supply and demand.[4] It can be argued that the present KMC inflexible prices could only suffice in a situation where KMC exercised monopolistic influence in the beef cattle market which is not so. It could also suffice if the supplies of the beef cattle achieved an equilibrium with the

demand for beef without any marginal price changes. This situation is, however, non-existent. KMC is faced with a situation where a sizeable part of its cattle receipts are liable to market fluctuations, a situation that warrants ability to alter prices as soon as the situation demands it. The KMC is incapable of doing this because of the legislative process that is required for the government to make changes in the prices. Thus the necessary adjustment should be made in good time and hence these prices do not vary rationally with time as would be expected in a 'perfect' competitive market where all competitors involved are well informed of the changes in the market and act rationally towards them.

There is, however, a possibllity that from some producers' view fixed prices over time may not be very bad. This would be the case with those producers who are in close proximity to the KMC depots and who might feel that the financial returns that would accrue from transporting their stock for sale to more competitive markets (where private dealers pay more) do not warrant the costs incurred in doing so. Others might be indifferent to prices so long as their costs are covered or some target amount realised if they are selling for some financial purpose, e.g. to pay tax, dowry payment etc. Other sellers may just not be ready to take a risk of taking their cattle to an auction or to individual buyer who have no fixed prices but use unscrupulous

haggling to arrive at their prices.

KMC prices are also paid regardless of the location of supply at least from the producer's point of view. This practice has its own adverse effects as is being pointed out in 5.4 below, in addition to defying the efficiency criteria. Looking at this KMC pricing vis-a-vis the perfect market pricing model, the practice is inefficient especially to a business organisation that must make profits to survive. This judgement of inefficiency, however, is not as easy to make as it looks, outside the theoretical framework.

5.4 THE IMPLICATIONS OF THE KMC PRICING POLICY

Any type of pricing policy is bound to have some effects or implications especially in relation to the producers. The following is an account of the implications emanating from the KMC pricing policy that has already been given.

(a) Due to the rigidity of its pricing over-time, KMC is likely to experience insufficient supplies in the off-season (rainy season when producers usually withhold their supplies). A rational producers response to such uniform pricing is likely to be to reduce as much

as possible his supplies during better times and sell during bad season (i.e. drought periods). In fact very recently (27), the KMC Managing Commissioner revealed that:

> "KMC has some difficult months ahead with the coming of the rains, farmers will hold back stock to fatten and factory utilization will not be to capacity at Athi River and Mombasa Factories"

meaning incurring heavy costs.

(b) KMC is likely to suffer from the fact that instead of potential short-run disequilibrium in supply and demand being eased by marginal adjustment in price, they occur as surplus or deficit. Surplus, if any, results in incurrence of heavy storage costs by the KMC while insufficient supply would mean operating below capacity. KMC would experience a rise in cost per unit of output in proportion to the amount of existing capacity not used. Also costs of operation under the notion of economies of scale, tend to fall with increasing size of plant when used to capacity though at a decreasing rate as the size increases. This is economically a misallocation or misutilisation of resources that would find better use if the situation was different. Most of the resources used in the beef production

like land, watering facilities, labour, etc. could find employment in other agricultural activities. This is especially so in purely agricultural areas.

(c) It can also be asserted that unless the KMC adapts a locational discrimination in its pricing, by actually paying farmers in different areas differently, it will find that it cannot be sure of supplies even from a district like Kajiado which enjoys close proximity to KMC's main plant at Athi River. It is a common phenomenon that just as demand tends to flow in the direction of lowest price, supply tends to flow in the direction of highest prices. Producers will normally seek the most profitable market within reach. The practice of the suppliers from Kajiado when they feel that the KMC's prices are very low is to transport and sometimes trek their animals to places as far as Tanzania, Taita-Taveta district and even Narok in search of better markets.[5] The producers not only risk deaths and contraction of diseases en route but also much shrinkage due to exhaustion and lack of enough food. Changes in price between two or more markets thus alters the pattern of supplies between markets.

At Athi River KMC plant, in 1969, 8,410 fewer cattle were slaughtered than in 1968, a decline of six per cent. In fact, for three years from 1967 the intake of cattle showed a decline.

Table 21: KMC Cattle Receipts 1967-1969

Year	Number of Heads Supplied	
	Cattle	Calves
1967	217,738	585
1968	194,482	376
1969	187,733	192

Source: Extract from KMC Annual Reports, 1967, 1968, 1969.

More recently, in 1974, the total slaughter cattle supplied to the KMC plants totalled 28,534 heads during the second quarter. This was a decline of 26,735 heads or 48 per cent from 55,269 heads slaughtered during the first quarter of the same year. Also the second quarter 1974, compared to the same quarter in 1973, showed a decline of 423 heads (29, 30). Although these declines in slaughter numbers can be attributed partly to variations in pasture conditions, the situation is also attributed to non-attractiveness of the KMC prices to the producers vis-a-vis the prices paid by the other cattle buyers. This was in fact expressed by the KMC in its 24th Annual Report (26(h)).

> "..... over the years the commission has emphasized its concern over the inadequacy of cattle supplies and it is in view of this that the increased producer prices were welcome although they are not adequate to allow effective and healthy competition with other local slaughter houses".

This situation at KMC has been restated three years later by the KMC Managing Commissioner.

> "KMC is paying farmers inducement prices for the higher grades but not sufficient to give them the confidence they need..... But we must not make it impossible for the farmer to produce. He will down the tools". (27)

Such KMC pricing has those implications of maintaining the KMC at a disadvantage of trading position; a situation devoid of flexibility in response to the situation in the markets. The KMC activities ought to be adjustable. For example, in a particular beef supply situation, a relative increase in consumer demand for a particular grade should induce a relative increase in price of that grade not only at retail, but also at producer level.

The producer should get inducement prices in order to produce the grade fetching the highest price in the consumer market. If on the other hand the demand condition does not improve or is relatively fixed, the increase in a particular grade will result in lower prices for that grade both to producer and consumers.

The condition of perfect competition with automatic dissemination of information on prices will act as a signal to consumers to increase consumption and signal to producers to cut their production, or supply until the situation improves. Such are the quick adjustments that the KMC is denied by the present pricing policy.

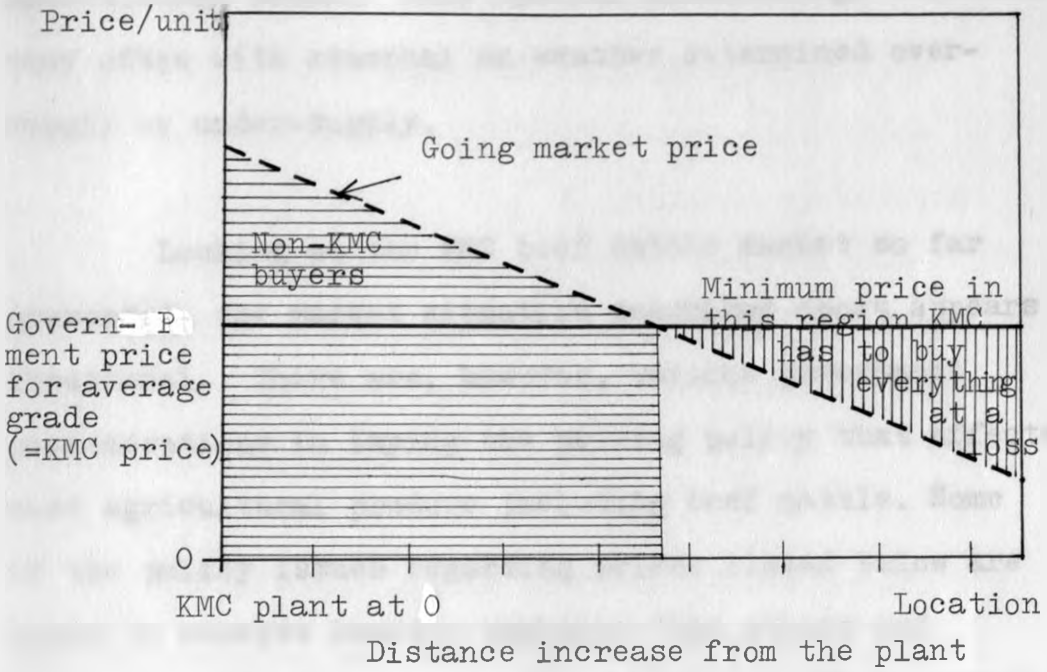
The following graphical presentation puts in perspective the KMC losses implied by fixed uniform prices especially vis-à-vis the non-KMC buyers and the behaviour of the two in given market situation.

From figure H it can be seen how the KMC is disadvantaged by the setting of minimum prices. The KMC can hardly manage to make purchases of cattle near its plants at that price because the competing non-KMC buyers can pay higher prices in times of higher demand.

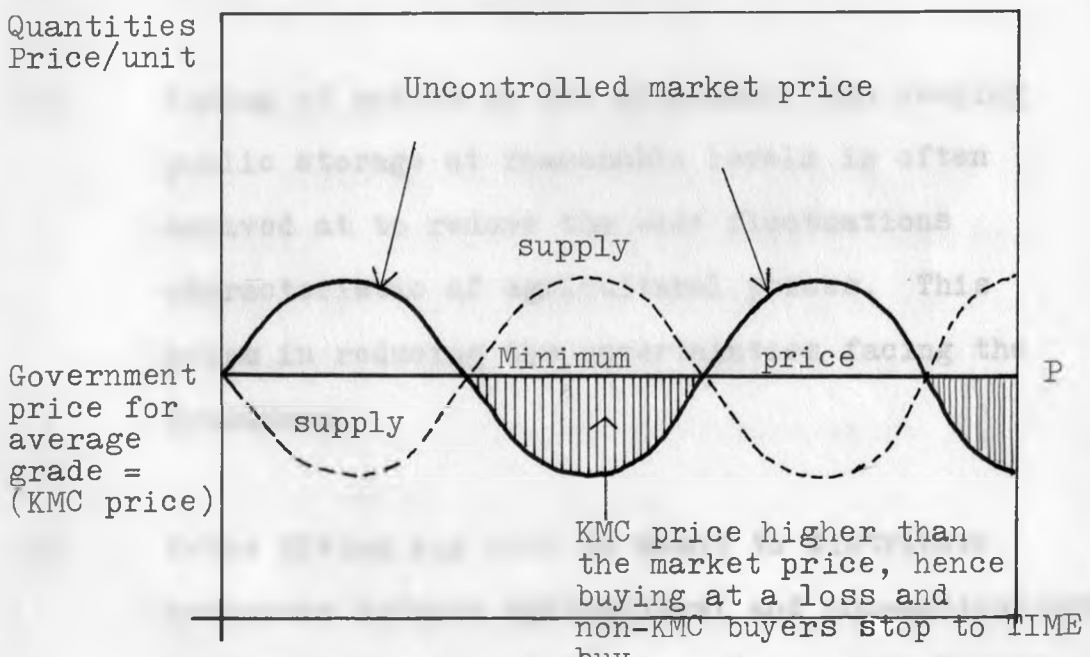
With increasing distance, however, the KMC is forced to pay for the high transfer costs without being able to lower its prices accordingly. Figure I graphically presents the inability of the KMC to adjust itself overtime to different supply situation. This difficulty is not experienced by the non-KMC buyers who would naturally stop to buy if going market price is lower than the price fixed by the government.

Fig. I: Inability of KMC to Adjust to Outgoing Market Prices in Space and Time

(a) Spatial consequence of uniform price



(b) Enforced buying in Times of Oversupply for KMC Uniform Prices



This means that KMC has to move specifically to far distant pastoral areas where droughts and sometimes over-supply occur more frequently than in more agricultural areas. This spatial disadvantage coincides very often with seasonal or weather determined over-supply or under-supply.

Looking at the KMC beef cattle market so far presented, the market situation described above appears irrational. There are, however, various government considerations in laying the pricing policy that affects most agricultural produce including beef cattle. Some of the policy issues regarding prices listed below are bound to receive heavier emphasis than others and make impossible the existence of a hear perfect market situation especially in the beef cattle market.

(a) Fixing of prices by the government and keeping public storage at reasonable levels is often arrived at to reduce the wide fluctuations characteristic of agricultural prices. This helps in reducing the uncertainties facing the producers.

(b) Price fixing may also be meant to distribute resources between agricultural and non-agricultural activities or even between various agricultural activities used this way, the pricing policy either encourages or discourages production.

(c) Spatial distribution of resources within the country may also be a major consideration behind some pricing policy.

(d) Also, there might be some product quality consideration in fixing and adopting some pricing policy, e.g. discriminatory pricing might be exercised by the KMC on various beef grade, such that the high grades get higher returns than the low ones to induce producers in improving the quality.

In concluding this chapter, it can be pointed out that despite the lack of conformity between KMC pricing and that laid down under the theoretical criteria, to some extent it is rational.

(i) As a government minimum price, it serves as a floor price hence reduce price fluctuation below it. Producers thus know the minimum they can get for their animals if they took them to the KMC, unlike auctions or private deals between single producer and buyers where any price is likely to come up.

(ii) Unlike in other cattle markets where quality of an animal is subjectively determined, KMC pricing based on grade is more objective criteria

and less costly in time. The alternative to this for the producer is to transport his animals sometimes to very distant places with various risks to bear (mentioned earlier) and uncertain of price level by the time the market is reached.

(iii) The administrative capacity of the KMC is too low to cope with constant administration to changing prices in different cattle markets all over the country without incurring extremely high costs in the process. Slight adjustment of those prices from time to time is, however, possible.

Footnotes to Chapter Five

1. KMC's purchasing costs is here taken to mean the price at which KMC gets one head of cattle from any supply point within the country to its Athi River abbatoir.

2. The author got this information from the Livestock Officer, KMC headquarters, Sadler House, Nairobi in December 1975.

3. The presumption here is that it is possible to establish these cost differences.

4. This is the buying method adopted by the LMD which is a government institution. It buys stock in the open markets like auction where other buyers are present and the prices more competitive.

5. This was expressed to the author by the District Livestock Officer stationed at Kajiado when he called on him for an interview, December 1975.

CHAPTER SIX

SUMMARY, POLICY RECOMMENDATION AND CONCLUSION

6.1 SUMMARY

This study sought to explore the problem of pricing efficiency in the KMC market for slaughter cattle, and also to study the causes, patterns and economic implications of the variations in supply of slaughter cattle occurring differently in the pastoral and agricultural areas. It was felt necessary first to survey briefly the beef cattle sector in the overall agricultural economy and then to put KMC in the proper perspective.

Various aspects of the KMC pricing policy have been analysed and considered against the background of pricing in a 'perfect market' model in order to determine their efficiency. The author felt it imperative that such a valid standard as 'perfect market' model must be postulated as a basis of comparison before any judgement on efficiency can be arrived at. The positions of the KMC as a public body and also as a trading organisation competing in the numerous private butchers have been analysed in assessing its efficiency. Graphical presentations have been used in this analysis.

The seasonality of supply for the two reference districts viz. Kajiado and Nakuru have been worked out using the supply figures for the nine years - 1966 to 1974. Here, use has been made of graphs and explanations to draw the necessary picture. Regression equations have also been worked out for Kajiado and Nakuru districts (representing the pastoral and agricultural areas) respectively to determine the relation between beef cattle supplies from these areas to the KMC, the rainfall of these districts, and prices that these supplies fetch in the KMC. Rainfall and prices had been isolated a priori as the most likely supply determinants. These factors have been subject to the statistical test, and also tested are the hypotheses set at the onset of the study. All these have been looked at in the light of the statistical findings and on this basis have been rejected or accepted.

While little or nothing can be done to change the seasonality of supply of the beef cattle which depends mainly on natural conditions than on price drive, the KMC prices have been found wanting and it is on them that the recommendations have been made below.

6.2 POLICY RECOMMENDATIONS

The pricing activities of the beef cattle by the KMC are really restricted. The KMC producer prices are set by the government on per Kg./CDW/grade basis, not set on regional or seasonal basis but are the result of periodic review which exhibit no discernible seasonal variation. These periods have ranged from one month to a year. Unlike in the open market, these prices are not adjustable to the dynamically changing economic climate. The consequence, as has been the observed, is the inability of the KMC to satisfy its beef stock demand due to the competition from other beef cattle buyers who can adjust freely to the dictates of the market supply and demand conditions. This competition is especially great in areas of close proximity to the urban markets; and declines with distance.

It is from that background that the following few policy recommendations have been made:

(a) That KMC should be set free from government restrictions and be run on purely commercial basis and compete effectively with other beef cattle purchasing organisations and individuals. Unless this is done, KMC will continue to operate under difficulties. It will occasionally operate under capacity due to lack of enough

supplies, and also be unable to meet the export demand from outside Kenya, on which it enjoys a supplying monopoly. The necessity of having to pass any price adjustment to producers through legislative channels before they are enforced is not only cumbersome but a great source of pricing inefficiency. Quick price adjustments are essential in a dynamic economy where supply and demand conditions are changing now and then. If KMC faced a decline in demand for its products, say to meet the export demand for its products, it should be free to manipulate its producer price and create incentive to supply like is the case to other buyers.

The government intervention should come in only if it is evident that the position of the cost of living and the rate of development of the beef industry warrant such intervention. Such action will, however, lack the permanence of the present government control over the KMC, and hence less detrimental to the KMC's trading position. It has been graphically shown in chapter five that with increasing distance from the big urban market for beef, the KMC prices will be higher than those of other buyers. This is because these buyers cannot meet the

transport costs to the urban markets the way the KMC does. Given the government's wish to raise the levels of standard of living of the producers, there should be price control in these remote areas (which should be identified) to prevent exploitation. This was actually the idea behind the establishment of the LMD to increase the market outlets available to these remote area producers.

(b) The KMC should adopt a pricing strategy that takes into account seasonal fluctuations in supplies if it were to avoid trading losses incurred by under-utilization of its operational capacity or in storage costs in case of a rare oversupply. This takes one back to the first recommendation which required that it be let free to change its prices according to the economic environment.

(c) KMC should also consider locational discrimination in prices, i.e. paying different prices for different producing areas so as to exploit to the maximum the different supply potentials in different producing areas. This would act as a disincentive to producers to transport their cattle to distant places to fetch better prices, but in doing so incurring great physical losses

on the cattle and bearing considerable risks of disease contraction, thefts and sometimes attacks by animals etc.

Although the coefficients derived in the study did not indicate the economic rationality on the side of the producers (i.e. price was not shown as a significant determinant of supply), the author considers this as not representative of the real situation. This is particularly the case in the agricultural areas. The author maintains the contention that in these areas, relative profitability (based on price and cost of production) greatly influences production decisions. Although in the pastoral areas the producers have cultural considerations hindering their cattle supply to the markets, and although the money compared to the ever increasing demand for money in the agricultural areas, it is unthinkable that they are completely blind to price trends. Price increases on seasonal locational and even on grade basis will definitely have economically desirable response from the producers.

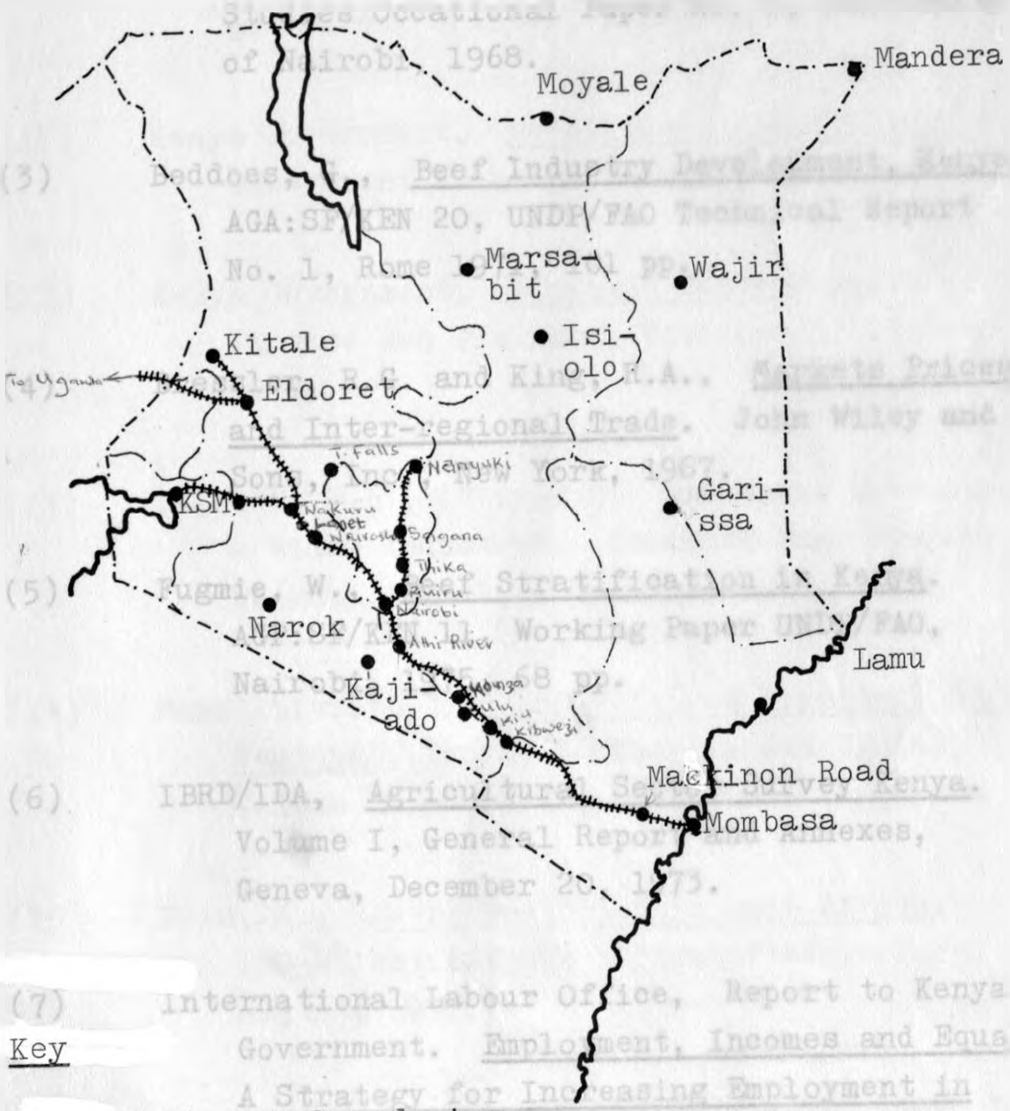
6.3 CONCLUSION

KMC will continue to be of considerable importance in the beef market both locally and abroad. Also, the importance of beef cattle in the agricultural sector, in raising the incomes of the producers, in earning foreign exchange for the country, and in utilizing land

particularly that with no alternative economic use. For these reasons more positive interest must be shown by the government by letting the KMC operate without much undue restriction. It is hoped that the gains from this agricultural industry for the whole economy would be maximised outside and not inside a restricting atmosphere.

Map: Railway Stations Serving Main Cattle Supply Areas

K E N Y A



Key

Provincial boundaries
Railway line
Major towns
Railway Station

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Appendix 1

Kenya Livestock Population 1960-1974

(1000 Head)

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Cattle	7052	7200	7366	6800	7398	7500	7400	7215	7500	7908	8600	8170	7760	7370	7400
Sheep	4745	4300	3842	3900	4039	4050	4100	4145	4200	4056	3700	3515	3339	3172	3200
Goats	4595	4700	4923	5100	5329	5300	5300	5300	5000	4334	4000	4000	3800	3600	3600
Pigs	51	58	52	46	52	55	55	51	60	69	57	60	60	62	65
Horses	5	4	3	3	2	2	2	2	2	2	2	2	2	2	2
Camels	230	230	245	255	260	270	280	290	300	312	315	320	322	325	330

SOURCE: Special communication between the author and the Chief Statistician's office, Statistics Division, Economic Commission for Africa, February, 1976.

Appendix 2

Kenya: Production of meat

(1000 M.T. Production)

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Beef and Veal	-	112	103	95	104	112	121	120	124	127	136	129	120	110	114
Mutton and lamb	-	13	11	12	12	12	12	12	12	12	11	10	10	9	9
Meat of goat	-	12	13	13	14	14	14	14	13	11	11	11	10	10	10
Pig meat	-	4	4	3	3	4	4	3	4	4	5	5	5	5	5
Meat chickens	-	7	8	8	9	9	11	12	13	13	14	18	19	20	21
Other meat	-	10	10	10	10	11	11	11	11	11	11	11	11	11	11

SOURCE: Special communication between the author and the author and the chief statieian's office, Statistics Division, Economic Commission for Africa, February, 1976.

Appendix 3 (i)

Cattle bought from Nakuru and Kajiado Districts from June 1965-June 1975

(Monthly totals)

Year/Month 1965		Nakuru	Total Nakuru	Kajiado	Ngong	Kajiado District Total
June	LS	1433		-	-	
	SS	47	1480	189	-	189
July	LS	1345		-	-	
	SS	97	1442	897	-	897
Aug.	LS	1397		-	-	
	SS	-	1397	1227	-	1227
Sept.	LS	1391		-	-	
	SS	51	1442	889	-	889
Oct.	LS	1064		-	-	
	SS	46	1110	922	234	1156
Nov.	LS	869		-	-	
	SS	155	1024	971	296	1267
Dec.	LS	796				
	SS	332	1128	792	149	941
Total	LS	8295		-	-	
Total	SS	728		5887	679	
Grand total		9023		5887	679	

LS = Large Scale Farms

SS = Small Scale Farms

SOURCE: KMC (unpublished records)

Appendix 3 (ii)

Year/Month 1966		Nakuru	Total Nakuru	Kajiado	Ngong	Kajiado District Total
Jan.	LS	1032		-	-	
	SS	200	1232	697	300	997
Feb.	LS	1430		-	-	
	SS	40	1470	508	-	508
Mar.	LS	1041		-	9	
	SS	296	1337	798	456	1263
Apr.	LS	782		-	9	
	SS	80	862	221	256	486
May	LS	718		-	-	
	SS	247	965	417	148	565
Jun.	LS	827		-	-	
	SS	539	1365	347	-	347
Jul.	LS	1270		-	-	
	SS	180	1450	304	295	799
Aug.	LS	1591		-	-	
	SS	179	1770	684	715	1399
Sept.	LS	1747		-	-	
	SS	203	1950	1941	1001	2942
Oct.	LS	2422		-	20	
	SS	133	2555	820	305	1145
Nov.	LS	1544		-	-	
	SS	17	1561	549	181	730
Dec.	LS	-		-	-	
	SS	1436	1436	794	96	890
Total	LS	15840				
Total	SS	2114				
Grand total		17954				

SOURCE: KMC, Unpublished records.

Appendix 3 (iii)

Year/Month 1967		Nakuru	Total Nakuru	Kajiado	Ngong	Kajiado District Total
Jan.	LS	228		50	-	
	SS	-	228	2335	267	2661
Feb.	LS	1242		-	10	
	SS	270	1512	1506	427	1943
Mar.	LS	712		-	-	
	SS	511	1223	1234	87	1321
Apr.	LS	323		-	-	
	SS	327	650	854	40	894
May	LS	296		-	-	
	SS	210	506	740	-	740
Jun.	LS	1158		-	-	
	SS	296	1454	962	143	1105
Jul.	LS	759		-	10	
	SS	435	1194	1574	263	1847
Aug.	LS	1233		-	-	
	SS	351	1584	2263	206	2469
Sept.	LS	1168		-	-	
	SS	225	1393	3080	81	3161
Oct.	LS	1809		-	-	
	SS	465	2274	2307	-	2451
Nov.	LS	2131		-	-	
	SS	566	2697	1644	99	1743
Dec.	LS	812		-	-	
	SS	679	1491	1216	46	1262
Total	LS	11871		50	20	
Total	SS	4335		19715	1659	
Grand total		16206		19765	1679	

SOURCE: KMC, Unpublished records.

Appendix 3 (iv)

Year/Month 1968		Nakuru	Total Nakuru	Kajiado	Ngong	Kajiado District Total
Jan.	LS	1105		-	-	
	SS	125	1230	2242	159	2601
Feb.	LS	887	1002			2150
	SS	315		1852	297	
Mar.	LS	1248		-	-	
	SS	744	1992	735	-	735
Apr.	LS	897		-	-	
	SS	280	1177	702	50	752
May	LS	965		-	-	
	SS	308	1273	1327	-	1327
Jun.	LS	1223		-	-	
	SS	340	1563	2049	51	2100
Jul.	LS	1168		-	-	
	SS	454	1522	1502	-	1502
Aug.	LS	1073		99	-	
	SS	525	1598	24	120	243
Sept.	LS	1268		-	10	
	SS	317	1585	236	320	548
Oct.	LS	1522		-	-	
	SS	472	1994	462	80	542
Nov.	LS	1528		-	-	
	SS	405	1933	372	685	1063
Dec.	LS	900		-	-	
	SS	363	1263	336	268	604
Total	LS	13584		99	10	
Total	SS	4648		11846	2012	
Grand total		18232		11945	2022	

SOURCE: KMC, Unpublished records.

Appendix 3 (v)

Year/Month 1969		Nakuru	Total Nakuru	Kajiado	Ngong	Kajiado District Total
Jan.	LS	1060		22	13	
	SS	488	1548	1003	-	1038
Feb.	LS	527		-	-	
	SS	740	1267	380	-	380
Mar.	LS	841		-	21	
	SS	313	1154	921	-	922
Apr.	LS	732		-	-	
	SS	686	1418	352	11	363
May	LS	964		-	7	
	SS	299	1263	289	-	296
Jun.	LS	657		-	-	
	SS	321	978	164	-	164
Jul.	LS	654		-	-	
	SS	280	934	746	-	746
Aug.	LS	750		-	-	
	SS	955	1705	1056	-	1056
Sept.	LS	1049		-	-	
	SS	687	1736	1183	200	1383
Oct.	LS	688		-	-	
	SS	874	1562	977	-	977
Nov.	LS	692		-	11	
	SS	1022	1714	878		389
Dec.	LS	667		-	-	
	SS	983	1650	776	-	776
Total	LS	9281		22	52	
Total	SS	7648		8725	211	
Grand total		16929		8747	263	

SOURCE: KMC, Unpublished records.

Appendix 3 (vi)

Year/Month 1970		Nakuru	Total Nakuru	Kajiado	Ngong	Kajiado District Total
Jan.	LS	651		-	-	
	SS	394	1045	965	-	965
Feb.	LS	401		-	-	
	SS	900	1301	1256	-	1256
Mar.	LS	856		-	-	
	SS	427	1283	1253	-	1253
Apr.	LS	1029		-	-	
	SS	758	1787	1033	-	1033
May	LS	619		-	-	
	SS	455	1074	50	-	50
Jun.	LS	1018		-	-	
	SS	862	1880	92	-	92
Jul.	LS	1274		-	-	
	SS	1142	1142	678	100	778
Aug.	LS	1074		-	25	
	SS	559	1633	1463	-	1488
Sept.	LS	1164		-	-	
	SS	148	1312	904	449	1353
Oct.	LS	990		-	-	
	SS	479	1469	2403	302	2705
Nov.	LS	616		-	-	
	SS	480	1096	288	-	288
Dec.	LS	1117		33	-	
	SS	487	1604	65	-	98
Total	LS	10809		33	25	
Total	SS	7091		10450	851	
Grand total		17900		10483	876	

SOURCE: KMC, Unpublished records.

Appendix 3 (vii)

Year/Month 1971		Nakuru	Total Nakuru	Kajiado	Ngong	Kajiado District Total
Jan.	LS	728		-	-	
	SS	172	900	732	-	732
Feb.	LS	972		-	-	
	SS	582	1554	306	-	306
Mar.	LS	908		-	-	
	SS	232	1140	274	-	274
Apr.	LS	938		-	-	
	SS	78	1016	724	-	724
May.	LS	656		-	-	
	SS	236	892	137	18	155
Jun.	LS	456		-	-	
	SS	57	513	945	-	945
Jul.	LS	898		-	-	
	SS	67	965	2321	-	2321
Aug.	LS	1212		-	-	
	SS	82	1294	1469	-	1469
Sept.	LS	806		-	-	
	SS	223	1029	3750	-	3750
Oct.	LS	1359		-	-	
	SS	355	1714	206	-	206
Nov.	LS	1835		-	-	
	SS	200	2035	823	-	823
Dec.	LS	2106		-	-	
	SS	131	2237	819	-	819
Total	LS	12874		-	-	
Total	SS	2415		12506	18	
Grand total		15289		12506	18	

SOURCE: KMC, Unpublished records.

Appendix 3 (viii)

Year/Month 1972		Nakuru	Total Nakuru	Kajiado	Ngong	Kajiado District Total
Jan.	LS	2061		-	-	
	SS	433	2494	782	-	782
Feb.	LS	1634		-	-	
	SS	138	1772	1613	-	1613
Mar.	LS	1024		-	-	
	SS	153	1177	1926	97	2023
Apr.	LS	1807		-	15	
	SS	260	2067	1494	-	1509
May	LS	1982		-	-	
	SS	303	2285	1211		1211
Jun.	LS	1841		-	-	
	SS	170	3011	1349		1349
Jul.	LS	1548		-	-	
	SS	374	1922	2157	-	2157
Aug.	LS	1369		-	-	
	SS	386	1755	4630	-	4630
Sept.	LS	1623		-	-	
	SS	274	1897	1470	-	1470
Oct.	LS	1706		-	-	
	SS	284	1990	168	-	168
Nov.	LS	1573		-	-	
	SS	365	1938	61	-	61
Dec.	LS	537		-	-	
	SS	299	836	103	-	103
Total	LS	18705		-	97	
Total	SS	3439		16964	15	
Grand total		22144		16964	112	

SOURCE: KMC, Unpublished records.

Appendix 3 (ix)

Year/Month 1973		Nakuru	Total Nakuru	Kajiado	Ngong	Kajiado District Total
Jan.	LS	1361		-	36	
	SS	333	1694	619	-	655
Feb.	LS	970		-	-	
	SS	96	1066	1293	-	1293
Mar.	LS	1149		-	-	
	SS	459	1608	1477	-	1477
Apr.	LS	1604		-	-	
	SS	228	1832	1096	-	1096
May	LS	1244		-	-	
	SS	235	1479	1574	73	1647
Jun.	LS	1803		-	-	
	SS	193	1996	1689	110	1799
Jul.	LS	1326		-	-	
	SS	117	1443	2206	-	2206
Aug.	LS	1331		-	-	
	SS	190	1521	1562	-	1562
Sept.	LS	835		-	-	
	SS	172	1007	2058		2058
Oct.	LS	2410		-	-	
	SS	336	2776	746	-	746
Nov.	LS	1069		-	-	
	SS	450	1519	317	-	317
Dec.	LS	715		-	-	
	SS	221	936	161	-	161
Total	LS	15817		-	36	
Total	SS	3060		14798	183	
Grand total		18877		14798	219	

SOURCE: KMC, Unpublished records.

Appendix 3 (x)

Year/Month 1974		Nakuru	Total Nakuru	Kajiado	Ngong	Kajiado District Total
Jan.	LS	1557		-	-	
	SS	99	1656	8221	-	8221
Feb.	LS	1472		-	-	
	SS	-	1472	4338	-	4338
Mar.	LS	1314		-	-	
	SS	179	1493	3662	121	3783
Apr.	LS	937		-	-	
	SS	63	1000	953	43	996
May	LS	1200		-	-	
	SS	238	1438	2488	-	2488
Jun.	LS	567		-	-	
	SS	439	1006	2466	102	2568
Jul.	LS	1474		-	-	
	LS	395	1869	1966	-	1966
Aug.	LS	570		-	-	
	SS	394	964	2821	-	2821
Sept.	LS	1493		-	-	
	SS	469	1962	2699	92	2791
Oct.	LS	1062		-	-	
	SS	410	1472	1687	-	1687
Nov.	LS	628		-	26	
	SS	408	1036	899	-	925
Dec.	LS	517		-	-	
	SS	393	910	252	-	252
Total	LS	12791		-	26	
Total	SS	3487		32452	358	
Grand total		16278		32452	384	

SOURCE: KMC, Unpublished records.

Appendix 4

Mean monthly rainfall figures for Kajiado District, 1966-1974

These have been derived from the averaging of monthly records of selected - widely separated rainfall recording stations of the East African Meteorological Department in the District.

Selected Stations	Positions	
Kajiado D.C.'s Office	1° 50's, 36° 48'E	ALT. 5700 ft.
Ngong D.C.'s Office	1° 22's, 36° 39'E	" 6700 ft.
Loitokitok	2° 56's, 37° 36'E	" 6050 ft.
Magadi Soda	1° 53's, 36° 17'E	" 2010 ft.

NB: These figures are all in mm.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1966	37.03	65.9	135	158.4	49	21.3	0.8	10.8	4.15	14.3	66.5	38.6
1967	12.5	26.5	81	228.4	136	6.9	8	16.2	18.5	54.5	91	54.3
1968	0	93.7	128	151	103	71	0.05	0.95	1.7	14.8	182.3	84
1969	94	82.7	87	39.6	91.2	9.3	0	7.63	3	32.7	11.5	6.33
1970	120	37.8	154.4	172	95.5	15.2	0.98	0	1.33	7.33	80.4	27.6
1971	47.4	23 ?	23	171.2	123	6	9.53	17	4.3	7.4	107	179
1972	40.4	171.3	58.3	16.7	81.6	61	1.2	5.1	21.4	57.5	112	47.3
1973	120.3	72.4	12.2	97.1	21.5	21.2	0	3.6	46.4	11.5	119	28.3
1974	12.3	22.3	112.4	293	43	35.1	41.5	4	7.5	3.7	86.9	38.7

SOURCE: E.A. Meteorological Departments records.

Appendix 5

Mean monthly rainfall figures for Nakuru District, 1966-1974

Like those of Kajiado, these figures have been derived from the averaging of monthly rainfall records of some (selected), widely separated rainfall recording stations of the East African Meteorological Department in the Nakuru District.

Selected Stations	Positions	
Nakuru Railway Station	0° 17'S	36° 04'E
Elementaita Soysambu Estate	0° 28'S	36° 12'E
Njoro Plant Breeding Station	0° 20'S	35° 57'E
Rongai Cogar Fram Ltd.	0° 11'S	35° 51'E

NB: These figures are all in mm.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1966	6.7	40	59.7	183.9	38.8	74.6	76.0	151.0	105.7	49.2	88.2	6.1
1967	3.4	2.2	27.8	105	154.6	75.5	109	41.4	44.1	65.6	113.6	2.9
1968	0.0	119	123.6	232.9	82.7	59.5	7735	60.4	32.3	55.7	114.5	50.6
1969	62	71.45	88.9	25.8	152.4	16.7	40.7	47.7	72.3	39.0	60.2	11.8
1970	162	12.7	150.4	183	136.7	61.7	87.9	88.1	77.8	53.6	64.5	25.8
1971	56.6	0.13	17.0	120.3	114.4	110.9	60.8	149	68.5	24.2	42.2	79.4
1972	2225	113.6	14.0	37.7	105.6	94.6	56.5	120.5	30.5	80.9	90.6	82.6
1973	35.6	36.7	0.4	52.6	119	29	75.6	152	146.4	39.4	61.1	5.6
1974	7.9	13.0	98	149	86.2	79	147	144	113	52	47	16.3

SOURCE: Compilation from the E.A. Meteorological Records.
Head Office, Ngong Road, Nairobi.

Appendix 6

KMC producer prices, 1964-1974

Producer prices: effective from 1/1/64 per 100 lb. cow

(Extracted from KMC Grading Regulations and Prices Booklets)

1964	Beef grade	Value per 100 lbs.	
	First	133.83	1.3383
	G.A.Q.	123.54	1.2354
	F.A.Q.	110.00	1.1000
	3rd	100.00	1.0000
	4th	87.50	0.8750
	Reject:		
	Manufacturing 'A'	65.00)	0.58
	Manufacturing 'B'	50.00)	
		Av. P	= 1.02

1965	Prices effective from 1/1/65 - value per lb.		
	First	143.00	1.43
	G.A.Q.	131.00	1.31
	F.A.Q.	119.00	1.19
	3rd	106.00	1.06
	4th	93.00	0.93
	Manufacturing 'A'	65.00)	0.58
	Manufacturing 'B'	50.00)	
		Av. P	= 1.08

1966	Prices effective from 1/1/66 Jan. - Dec.		
	First	153.00	1.50
	G.A.Q.	140.00	1.40
	F.A.Q.	130.00	1.30
	3rd	115.00	1.15
	4th	100.00	1.00
	Manufacturing 'A'	65.00)	0.58
	Manufacturing 'B'	50.00)	
		Av. P.	= 1.15 per kg.

1967 Producer prices effective from 1/1/1967 from 15/1/67

Beef grade	Jan - Apr Value per 100 lbs. CDW		May - Dec
First	153.00	AV.P. = 1.14	161.00
G.A.Q.	140.00		143.50
F.A.Q.	130.00		133.50
3rd	115.00		118.00
4th	100.00		102.50
Manufacturing 'A'	50.00		50.00
Manufacturing 'B'	50.00		50.00
		AV.P. =	1.17

1968 Producer prices effective from 1/1/1968

Grade	Value per 100 lbs. CDW		Jan - Dec
First	153.00		1.53
G.A.Q.	136.00		1.36
F.A.Q.	126.50		1.26
3rd	112.00		1.12
4th	102.50		1.02
Manufacturing	50.00		0.50
		AV.P. =	1.13

1969 Producer prices effective from 1/1/1969

Grade	Value per 100 kg CDW		Jan - Feb.
First	337.00		3.37
G.A.Q.	301.00		3.01
F.A.Q.	279.00		2.79
3rd	247.00		2.47
4th	225.50		2.25
Manufacturing	110.00		1.10
		AV.P. =	2.50

KMC buying prices

1969 Producer prices effective from 24th March 1969

Grade		Price per kg. CDW Minimum		Maximum	
First		3.85	3.85	open	3.85
G.A.Q.	P	3.41	3.75	4.10	3.59
	R	3.08	3.43	3.77	3.59
F.A.Q.	P	3.30	3.53	3.75	3.37
	R	2.97	3.20	3.42	
3rd	P	2.75	2.85	2.97	2.81
	R	2.65	2.76	2.87	
4th	P	2.40	2.50	2.60	2.45
	R	2.30	2.40	2.50	
Manufacturing		1.10			1.10
				AV.P =	2.86

1970 Prices effective on 16/2/70 to 15/3/70

Grade		
First	3.85	
G.A.Q.	4.02	
F.A.Q.	3.62	AV.P. = 2.98
3rd	2.81	
4th	2.45	
Manufacturing	1.10	

Prices effective from 16/3/70 to 19/4/70

First	3.85	
G.A.Q.	3.82	
F.A.Q.	3.52	AV.P. = 2.93
3rd	2.81	
4th	2.45	
Manufacturing	1.10	

Prices effective from 20/4/70 to 17/5/70

First	3.85	
G.A.Q.	3.62	
F.A.Q.	3.40	AV.P. = 2.87
3rd	2.81	
4th	2.45	
Manufacturing	1.10	

1971 Producer prices effective on 19/7/71

Prime		4.50	4.50	
Choice		4.25	4.25	
F.A.Q.	P	4.00	3.59	
	R	3.18		
Std.	P	2.95	2.80	AV.P. = 3.11
	R	2.65		
Comm.	P	2.60	2.45	
	R	2.30		
Manufacturing		1.10	1.10	

1972 Producer prices effective from Monday 14/2/72 Feb - Nov 1972

Athi River Only		Amount	Av. price per kg. producer	
Prime		4.70	4.70	
Choice		4.45	4.45	
F.A.Q.	P	4.20	3.69	
	R	3.18		
Std.	P	3.15	2.90	
	R	2.65		
Comm.	P	2.80	2.55	
	R	2.30		
Manufacturing P&R		1.50	1.50	
Condemned		.18	AV.P. =	3.29

Producer prices effective on 7/12/72 Dec. 72 - Feb. 73

Grade		Athi River	Ngong	Nakuru	
Prime		4.70	4.50	4.50	4.50
Choice		4.67	4.45	4.45	4.45
F.A.Q.	P	4.41	4.20	4.20	3.77
	R	3.34	3.34	3.34	
Std.	P	3.42	3.12	3.12	2.95
	R	2.78	2.78	2.78	
Comm.	P	2.94	2.73	2.73	2.58
	R	2.42	2.42	2.42	
Man	P	1.58	-	-	-
	R	1.58	-	-	
Condemned		0.18	0.18	0.18	

AV.P. = 3.04

PRICES 1973

1. Prices as at 1/1/73 (effective from 7/13/72 to 28/2/73)

Grade	Athi River	Mombasa	Nakuru	Ngong
Prime	4.70	4.50	4.50	4.50
Choice	4.67	4.45	4.45	4.45
FAQ 'P'	4.41	4.20	4.20	4.20
FAQ 'R'	3.34	3.34	3.34	3.34
Std.'P'	3.42	3.12	3.12	3.12
Std.'R'	2.78	2.78	2.78	2.78
Comm.'P'	2.94	2.73	2.73	2.73
'R'	2.42	2.42	2.42	2.42
Man. 'P'	1.58	1.16	-	-
'R'	1.58	1.16	-	-
Condemned	0.18	0.18	0.18	0.18

2. Prices effective from 1/3/73 to 25/3/73

Mombasa & Athi	Nakuru	Ngong
4.70	4.50	4.50
4.67	4.45	4.45
4.41	4.20	4.20
3.34	3.34	3.34
3.42	3.12	3.12
2.78	2.78	2.78
2.94	2.73	2.73
2.42	2.42	2.42
1.58	-	-
1.58	-	-
0.18	0.18	0.18

3. Producer prices effective from 26/3/73 to 16/7/73

Grade	Athi River, Mombasa and Nakuru	Ngong
Prime	4.70	4.50
Choice	4.67	4.45
FAQ 'P'	4.41	4.20
'R'	3.34	3.34
Std.'P'	3.42	3.12
'R'	2.78	2.78
Comm. 'P'	2.94	2.73
'R'	2.42	2.42
Man. 'P'	1.58	-
'R'	1.58	-
Condemned	0.18	0.18

4. Prices effective from 17/7/73 to 31/12/73 (All branches)

Prime	4.90
Choice	4.87
FAQ 'P'	4.61
'R'	4.31
Std.'P'	3.67
'R'	3.37
Comm. 'P'	3.19
'R'	2.89
Man. 'P'	1.83
'R'	1.83
Condemned	0.18

NB: Price differential AV.P. 3.77

1. Athi and Mombasa ceased on 28/2/73
2. Athi, Mombasa, Nakuru ceased on 25/3/73
3. Athi, Mombasa, Nakuru and Ngong ceased on 31/12/73

Prices effective from 17/7/73 to 31/12/73

(All Branches)

Prime	4.90
Choice	4.87
FAQ 'P'	4.61
FAQ 'R'	4.31
STD 'P'	3.67
STD 'R'	3.37
COMM. 'P'	3.19
COMM. 'R'	2.89
MAN 'P'	1.83
MAN 'R'	1.83
Condemned	0.18

SOURCE: Extract from KMC, Grading Regulations and Prices booklets.

1974 Prices effective on 1st January 197[illegible]

Grade	Price/kg. CDW	Grade Av. P.
Prime	5.35	5.35
Choice	5.30	5.30
FAQ Passed	5.60)	4.85
Retained	4.70)	
Standard Passed	4.20)	4.025
Retained	3.85)	
Commercial Passed	3.70)	3.55
Retained	3.40)	
Manufacturing Passed	2.20)	2.20
Retained	2.20)	
Condemned	0.18	AV.P. = 4.20

1975 Prices effective on 23rd January 1975

	Shs./kg CDW
Prime	5.90
Choice	5.85
FAQ (P)	5.50
Retained	5.15
Standard (P)	4.85
Retained	4.45
Commercial (P)	4.25
Retained	3.90
Manufacturing (P)	2.45
Retained	2.45

Note: Price differentials – Athi and Mombasa ceased on 28/2/73
Athi, Mombasa, Nakuru on 25/3/73
Athi, Mombasa, Nakuru, Ngong on 31/12/73

i.e. same prices ruled at Athi River, Mombasa, Nakuru, and Ngong from 31/12/73.

SOURCE: Extracted from KMC's Grading Regulations and prices booklet.

Appendix 7

Transport charge rate for cattle delivered by E.A. Railway Corporation to the KMC abattoirs.

Distance	Rate Per Head	Distance	Rate Per Head
km	Sh.cts.	km	Sh.cts.
0-100	45.40	1041-1060	142.35
101-120	47.40	1061-1080	144.40
121-140	49.40	1081-1100	146.45
141-160	51.45	1101-1120	148.40
161-180	53.30	1121-1140	150.45
181-200	55.50	1141-1160	152.45
201-220	57.55	1161-1180	154.50
221-240	59.50	1181-1200	156.55
241-260	61.55	1200-1220	158.50
261-280	63.55	1221-1240	160.55
281-300	65.60	1241-1260	160.55
301-320	67.65	1261-2180	164.60
321-340	69.60	1281-1300	166.65
341-360	71.65	1301-1320	168.65
361-380	73.65	1321-1340	170.60
381-400	75.70	1341-1360	172.65
401-420	77.75	1361-1380	174.70
421-440	79.75	1381-1400	176.70
441-460	81.75	1401-1420	178.75
461-480	83.75	1421-1440	180.70
481-500	85.80	1441-1460	182.75
501-520	87.85	1461-1480	184.80
521-540	89.85	1481-1500	186.80
541-560	91.85	1501-1520	188.85
561-580	93.85	1521-1540	190.85
581-600	95.90	1541-1560	192.85
601-620	97.90	1561-1580	194.85
621-640	99.95	1581-1600	196.90
641-660	102.00	1601-1620	198.95
661-680	103.95	1621-1640	200.95
681-700	106.00	1641-1660	203.00
701-720	108.00	1661-1680	204.95
721-740	110.05	1681-1700	207.00
741-760	112.10	1701-1720	209.05
761-780	114.05	1721-1740	211.05
781-800	116.10	1741-1760	213.10
801-820	118.10	1761-1780	215.05
821-840	120.15	1781.1800	217.10
841-860	122.15	1801-1820	219.15
861-880	124.20	1821-1840	221.15
881-900	126.20	1841-1860	223.20
901-920	128.20	1861-1880	225.15
921-940	130.25	1881-1900	227.20
941-960	132.25	1901-1920	229.20
961-980	134.30	1921-1940	231.25
981-1000	136.35	1941-1960	233.30
1001-1020	138.30	1961-1980	235.30
1021-1040	140.35	1981-2000	237.30

SOURCES: Section LIVESTOCK TARIFF NO. 1, E.A. RAILWAYS CORPORATION. 1976

Appendix 8

Transport costs that are incurred by the KMC in shipping cattle from the main Railway stations at which beef cattle are loaded and transported to KMC abattoir at Athi River.

Station	Distance from Athi River in kilometres	Cost of Transport per head Sh. cts.
T. Falls	247	61 . 75
Lumbwa	322	69 . 60
Kitale	496	85 . 80
Kipkabus	368	73 . 65
Eldoret	414	77 . 75
Naivasha	141	51 . 45
Lanet	203	57 . 55
Nakuru	210	57 . 55
Nanyuki	260	61 . 55
Oleolendo	195	55 . 50
Makuyu	116	47 . 40
Sagana	155	51 . 45
Thika	81	45 . 40
Ruiru	56	45 . 40
Kikuyu	60	45 . 40
Kibwezi	187	55 . 50
Bachumba	385	75 . 70
Mackinon Road	404	77 . 75
Kajiado	86	47 . 40
Emali	115	47 . 40
Konza	44	45 . 40
Sultan Hamud	102	47 . 40
Simba	133	49 . 40
Kiu	71	45 . 40
Ulu	57	45 . 40
Mombasa	504	87 . 85

See Appendix 6 above.

Appendix 9.

Advertisement for the Sale of Cattle by the LMD. Kenya, 1976

LIVESTOCK MARKETING DIVISION

Ministry of Agriculture

THE Division has animals for sale on a liveweight basis at Kurawa Holding Ground in Coast Province.

It is proposed to sell by weight as follows:

Animals weighing 225 kg. and upwards — Shs. 2/65 per kilo live-weight.

Animals weighing 200 — 224 kg. — Shs. 2/50 per kilo liveweight.

Animals weighing less than 200 kg. — Shs. 2/40 per kilo liveweight.

Arrangements to view can be made with Mr. Chanda of the Provincial Director's office, Tel. No. Mombasa 31248, or with Mr. Mbogori, Sabaki Holding Ground, Tel. No. Malindi 22Y3. Interested buyers outside Coast Province may make arrangements through the Division's office in the Ministry of Agriculture, Tel. No. Nairobi 335855.

The animals on offer are all of North East Province origin, and in terms of quality and conformation make up some of the best mobs ever purchased by the Division.

Animals must be paid for prior to leaving the holding ground, unless purchasers hold letters of credit from the Agricultural Finance Corporation or their bankers.

Delivery will be at Kurawa, but it may be possible to deliver elsewhere at owner's risk for a fee.

All animals have cleared C.B.P.P. quarantine and will have been revaccinated for Foot and Mouth Disease Types "A" "O" "C" and SAT II before leaving Kurawa.

S. J. MEADOWS,
Head, Livestock Marketing Division

Source: Daily Nation, March 16, 1976.