Livestock Development and Policy in East Africa

Philip L. Raikes
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Philip L. Raikes
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Contents

Foreword and Acknowledgements V

Section 1: Introductory
1.1 Introduction – The Problem Posed 1
1.2 Outline of the East African Livestock Economies 5
1.3 An Outline Historical Sketch 19
1.4 Pastoralism and ”Economic Rationality” 23

Section 2: Aspects of Livestock Production in East Africa
2.0 Introduction 31
2.1 Livestock Production and Development 31
2.2 Pasture and Water 44
2.3 Livestock Breeds and Breeding 54
2.4 Diseases of Livestock 64
2.5 Herd Composition and Growth 77
2.6 Herd Accumulation and Response to Government Policies 88

Section 3: Meat and Dairy Production in East Africa
3.0 Introduction 107
3.1 Livestock Production in Kenya 107
3.2 Beef Production in Kenya 114
3.3 Dairy Production in Kenya 128
3.4 Livestock Production in Tanzania 141
3.5 Meat Production in Tanzania 147
3.6 Dairy Production in Tanzania 171

Section 4: Marketing and Processing of Livestock and Products
4.0 Introduction 188
4.1 State-Controlled Marketing in East Africa 189
4.2 The Marketing and Processing of Meat in Kenya 191
4.3 The Marketing and Processing of Meat in Tanzania 204
4.4 The Marketing and Processing of Dairy Products in Kenya 218
4.5 The Marketing and Processing of Dairy Products in Tanzania 228

Section 5: Summary & Conclusions 242
References 252
The research upon which this book is based was funded by a grant from the Danish Research Council for Development Research, through the Centre for Development Research in Copenhagen. However, at least as much of the information contained in it was gathered while working at the Economic Research Bureau of the University of Dar es Salaam and, more recently, during consultancy visits to East Africa.

The book itself was originally conceived as a relatively brief survey of official livestock projects and programmes, which was to form part of a broader survey of state agricultural policy in Kenya and Tanzania. In the course of working on this, it became clear to me that this focus was too narrow since it provided no basis for assessment of the policies under consideration. It thus seemed useful to consider some of the major ecological and socio-economic parameters affecting livestock production in Kenya and Tanzania, the ways in which local herding systems have developed within this context and the history of their interaction with colonial and post-colonial policy and officialdom.

The book makes no claim either to be comprehensive or to provide final answers to the questions raised and should certainly not be taken to provide any sort of "recipe for development". Its purpose is rather to raise questions which seem to me to have been obscured by current official approaches to livestock development and in so doing to provoke thought and discussion over a broader range of topics than might normally be included. For this reason, because of the nature of the subject itself and because my own knowledge of it is uneven, there are a number of loose ends. I have tried not to tuck these out of sight or obscure them with verbiage since many of them relate to important issues which need thorough discussion if solutions are to be found. Similarly, where statements are made for which there is insufficient supporting evidence, I have tried to make that fact clear. One might think it needlessly provocative to include such statements at all, but even a cursory acquaintance with the field of study indicates the impossibility of any such self-restraint. Many of the most firmly held beliefs of those in charge of livestock development rest on no firmer foundation than a sort of oral tradition in which a "guesstimate" is made and handed down, gathering respectability and credibility with age. In many cases, the evidence for any viewpoint is so sparse that the best one can do is to use whatever evidence
there is, indicate the reasoning upon which a conclusion is based and indicate clearly that it remains a judgement.

Since completing the book, I have found at least one area in which I was insufficiently critical of received opinion; tick-control and most particularly the control of East Coast Fever. In the book I accepted, though with some reserve, standard estimates of mortality from East Coast Fever, while the case for "maximal" dipping is accepted almost without reservation. Since then there has been a shift in informed opinion on both grounds. John Grindle has done interesting and original work on mortality rates in Malawi and a part of Tanzania, which suggests that these have been exaggerated.' The author makes clear though, that neither the data available nor the geographical coverage are sufficient to make the point with certainty. As regards maximal (regular weekly or even more frequent) dipping, a major shift is in progress under the influence of two different types of stimulus. The increasing cost of acaricides has shifted the focus of tick-control from total eradication towards the most cost-effective means of limiting losses, implying more flexible regimes where the intensity of dipping varies with season and threat. On the other hand the continued development of resistance among ticks to acaricides and the experience of Zimbabwe (where over one million cattle died with the break-down of a very efficient maximal strategy during the civil war) point to the need for more "robust" tick-control strategies, that is, strategies which are less vulnerable to organizational disruptions. These new strategies are thus complementary with research programmes which aim to achieve host immunity to ticks and/or pathogens and to develop a cure for East Coast Fever. How rapidly this new thinking will penetrate East African veterinary services is unclear. One could expect some resistance at least in Kenya, where the Cattle Cleansing Act makes failure to dip regularly a punishable offence in certain areas and where this Act is seen by some officials as the cornerstone of their efforts to control tick-borne diseases. One might suppose however that the increasingly tight foreign exchange situation of both Kenya and Tanzania would provide a powerful stimulus for a change in thinking.

This raises a more general point about up-to-date information. I have tried to update information since the manuscript was first finished

1J. Grindle, "Economic Losses form East Coast Fever in Malawi" (Dec. 1979) and "Economic Losses from East Coast Fever in Sukumaland, Tanzania" (July 1980), both Mimeo, Edinburgh and so far for restricted circulation.

2R. Southerst, summarising the findings of an international conference on Advances in the Control of Theileriosis, ILRAD, Nairobi, Feb. 1981.
(Autumn 1979) though not always successfully, especially in the case of Tanzania, where data for the 1970s are in any case somewhat sparse. In particular, I have not been able to include any material on the impact of a significant increase in the price of meat from late 1979.

Since the information upon which the book is based was collected in a variety of ways over a period of some twelve years living in and travelling to East Africa, it is hard to acknowledge all of those who have contributed information and ideas. Finn Kjærby has been particularly helpful and in the course of many discussions has made a number of useful suggestions, not all of which I have been able to follow. Others include Ole Mølgaard Andersen, Henry Bernstein, Jannik Boesen, Sofus Christiansen, Folmer Elling, Peter Ellis, William MacKenzie, Lazaro Parkipumy, Kjeld Phillip, Salva Rugumisa, Knud Erik Svendsen and Tom Zalla. In addition a large number of East African officials and a smaller number of herdsmen contributed their time, information and opinions. None, of course, bears responsibility for errors and omissions.

Alanagh, Toby and Ben put up with my withdrawal and non-contribution to household jobs while typing the first draft and bore the brunt of many ill-tempered demands for peace and quiet. Fiona Wilson edited this version so as to cut fat without also taking meat and bone, when the draft was judged to be too long. Helle Mortensen and Ketty Wendelboe then typed from a draft with two different sets of hand corrections. Cyda Andersen turned faded photocopies and untidy sketches into maps and diagrams. My thanks to all.

Philip Raikes
Copenhagen, August 1981
KENYA and TANZANIA. ADMINISTRATIVE BOUNDARIES.

- National Boundaries
- Regional Boundaries (TANZANIA), Provincial Boundaries (KENYA)
- Towns
- Railways
- Lake Steamer: The national boundaries shown here are traced from Map 3, and do not imply dismissal of Tanzania's claim to a part of Lake Malawi.

Map 1. East Africa: Administrative Boundaries.
SECTION 1: INTRODUCTORY

Chapter 1.1: Introduction – the Problem Posed

Well over half the land area of East Africa has rainfall insufficient for crop production and contributes to agricultural production mainly through the grazing and browsing of livestock. The combined herds of Kenya and Tanzania total some 20 million cattle, 15 million other livestock (mostly sheep and goats) and over 20 million chickens. Certainly the livestock sector is important. It is also commonly said to be a sector of unfulfilled potential in that its contribution to production, exports and nutrition could be considerably increased if "traditional" herders who keep the vast majority of all livestock could be induced to "modernize" their methods of production and sell larger proportions of their produce.

At one level, there is little doubt that the above is true. Considerable potential for increased production does remain unfulfilled. Large populations of stock are grazed extensively and do not convert this pasture very efficiently into meat and milk. Rates of off-take and yields are low, as is the proportion of total production which passes through official marketing channels. The combination of variable rainfall, disease and overgrazing gives herders a precarious living, which in many cases is deteriorating over time. Ways are known by which productivity could be increased substantially, and from this it appears that the main obstacle to overcome is the "traditional" herders' reluctance to adopt improvements.

This is a most misleading formulation because in reality, some of the major problems of the livestock sector derive precisely from attempts to impose inappropriate "modern" methods without regard to the nature of the systems into which they are introduced. Local "traditional" systems of livestock herding, far from being "primitive", represent complex adjustments to the environment. The multiple facets of environment and the response by herders must be taken into account before an attempt is made to change a specific livestock system. Moreover, there is a tendency to use a notion of "modernity" which is completely divorced from economic viability. As a result "improvements" which are routinely recommended would actually impoverish herders were they adopted.

Another area of confusion and inconsistency relates to the purpose of developing the livestock sector. Here one can distinguish three sorts of
aim. First, livestock production is seen as a major potential source of surplus for investment, particularly foreign exchange, through the export of meat and other products. Second, it is often proposed – on the grounds that livestock products have a high protein content – that the production could play a major part in improving nutrition in East Africa. Finally, since a certain proportion of the region's population is necessarily dependent upon livestock production (the only alternative being migration to unemployment in the towns), development of the sector would improve standards of living while increasing production at very low opportunity cost.

The contradictions between the three aims can easily be seen. What is exported cannot be consumed locally and improve diet. It can, of course, provide the foreign exchange for food imports but this is neither a major purpose of export policy nor likely to result in dietary improvements where they are most needed. One can question the reality behind such "nutritional objectives" even where livestock products are produced for local sale. All the evidence from budget surveys indicates that the vast proportion of edible livestock products are consumed by a small, wealthy minority of the urban population in East Africa; those whose diet is in least need of improvement.

Even where land is marginal or unviable for crop production and thus has zero opportunity cost, there may still be major conflicts between the first and third objectives. Commercialization and export production are commonly assumed to require the development of ranches (primarily to produce beef). This involves either "transforming" populations of pastoralists into commercial ranchers or setting up large-scale ranches in their midst. Because of the major problems inherent in the former, attention has turned increasingly to the latter of these two possibilities.

It is often claimed that ranches benefit the surrounding population through a "demonstration effect". In reality, what is demonstrated is usually unfeasible for the pastoralists – and in many cases economically unviable as well. One of the major effects of the spread of ranching has been to reduce the rangeland available to pastoralists and thus to exacerbate problems of overgrazing.

In addition, the viability of many of these ranching schemes is dubious even in narrowly economic terms. Certainly this is true in Tanzania, where even the direct economic returns of the state-run ranches are poor. In Kenya, as might be expected given the greater participation of private capital, the direct returns are more favourable. But if one is to include in the costing, the back-up services provided by the state in the form of stock-routes and veterinary services and the negative effect of some of the
veterinary restrictions upon non-ranch producers, then it is doubtful whether these developments can be considered economic in the broadest sense.

When one turns to policies towards the "traditional" livestock sector, the record is not generally very encouraging. Perhaps the most outstanding example in the region has been the development of dairy production from grade cattle by peasants in Kenya, yet this has its roots in the spontaneous efforts by peasants to develop in the face of colonial government opposition. There have been some successes, notably the programmes for the eradication of major infectious diseases of cattle. But even in this field certain programmes contributed little to their stated purpose while obstructing the achievement of other aims. In general, one finds the East Africa range areas littered with the carcases of failed livestock projects, some of which have only hastened the over-grazing and land degeneration.

This brief sketch indicates that there are major problems in the definition and implementation of livestock policy in East Africa. The problem is not simply the ineffective implementation of basically correct policies. Nor indeed is it simply one of incorrect policy choices arising from lack of information or incorrect assumptions. Even if these defects could be miraculously overcome, major problems would still remain because of inherent conflicts of interest and aims.

It would, I think, be pointless to embark at this stage on a lengthy analysis of these conflicts and their political implications. It is better to let the problems emerge in the course of the book and consider their implications for policy in the final summary. Recognition of these underlying conflicts has profoundly affected the form of analysis and conclusions of the book, for it follows that there can be no "neutral", technically optimal solutions. Conflicts of interest exist at various levels. All policies have political implications and are affected by the general political-economic tendencies; the very notion of a generally optimal policy is meaningless.

The purpose of the book then is not to propose any specific set of policies but to contribute to informed discussions of the livestock sector, its development and the policies which have affected it. For this purpose, it is divided into four main sections and one final concluding summary.

This section will give a brief introduction to the livestock sectors of East Africa and highlights some of the processes which have impinged upon them. The discussion will show that while there are similarities between the two countries studied, there are also significant differences in climate, geography and recent history, which makes it hazardous to conclude that
observed differences in the livestock sectors relate solely to current policies. The last chapter in this introductory section looks at one set of misleading assumptions which have underlain and provided the justification for some of the more misguided policies towards the "traditional" sector of the livestock economy.

The second section of the book outlines the general aspects of livestock production in East Africa and includes a summary of analyses I have found useful in trying to understand the technical and other processes involved.

This section concludes with an attempt to bring the material together to draw some general conclusions about "traditional" systems of production. The third and fourth sections look at production and marketing respectively. They focus on the two most important livestock products in the area: beef and cow's milk (together with other dairy products), and set out recent trends in development and government policy. The final section looks at some of the policy conclusions arising from the discussions in earlier sections. This does not take the form of a set of proposals, for the reasons outlined above. Its purpose is to raise questions for consideration and provide pointers towards areas of particular relevance.

Finally a few brief, general points are in order. I make no claim to personal expertise in the more technical aspects of livestock production; in this, I am an interested outsider depending on the work of others. As far as the socio-economic aspects are concerned, although I have done no detailed field study myself, I have followed the progress of research in the area and been concerned with short-term-policy-oriented research.

A general point to stress at the outset is that most of the "hard" data available on the livestock sector in East Africa are in fact anything but hard. The prevalence of informed (or uninformed) guesswork extends through almost every aspect of livestock data "collection" including carrying capacities, incidence of and vulnerability to disease and the impact of disease control measures. Beyond this, one "guesstimate" is used to provide the basis for another which is then sometimes used to adjust the first or provide "independent" confirmation of its validity. Since there are relatively few "points of entry" at which more reliable data can be used to confront such estimates, the best one can do is indicate how dubious is the basis upon which they rest and consider their mutual consistency.

The book is mainly concerned to raise questions about policy and this accounts for what might be considered a somewhat negative tone. I have no doubt that there are many areas of the world where the livestock sector is so poorly run as to make East Africa seem a paradise by comparison.
This hardly seems relevant to the problems of East Africa. Nor is there any doubt that much competent and careful research has been done in East Africa or that considerable care has gone into the forming of many of the policies for livestock development. If the first were not the case, the book could never have been written, since I have relied on the findings of others. If the second were not, there would be little point in writing it.

Nevertheless, this does raise problems. It is sometimes claimed that the only useful criticism is "positive criticism" which makes tactful suggestions for minor changes within the existing framework of operations and assumptions. If one believes, as I do, that fundamental misconceptions lie at the root of many problems of livestock development, no such approach is possible, for it would be pointless (not to say dishonest) to ignore them. But if a study involves conceptions which depart too radically from those if its readers, then it may be rejected out of hand by them without careful scrutiny, especially where the study implies criticism of the policies made by those who read it. There is no doubt that this is a problem. I can only say that if one sets out the issues, as one sees them as clearly as possible, this at least provides the opportunity for policy-makers to read and form their own conclusions. If all major issues are evaded or sugar-coated with "tactful" phraseology, then there is no chance of the point getting across at all.

One final note: the criticisms made in this book are not intended to be either personal or moral. I am not concerned to attribute failures and mistakes to the ill-intentions or incompetence of the makers or implementers of livestock policies in East Africa, most of whom are anxious to do a reasonable and honest job and who are frustrated at the enormous problems which they face. For there is no doubt, the problems are major and intractable.

Chapter 1.2: Outline of the East African Livestock Economies

1. Introduction

Since this study will be concerned with both Kenya and Tanzania, some elements of comparison can hardly be avoided. It is thus necessary to start by making clear that the differences between the two have their roots in geographical and climatic factors and their expression in the development of different forms of production before and during the colonial period. One
Map 2. Mean Annual Rainfall over East Africa.
must thus be very cautious in drawing conclusions from current growth trends and levels of productivity, as to the efficacy of their respective government policies.

2. Basic Geography

Map 2 shows the very different patterns of climate between Kenya and Tanzania. In Tanzania, some 60% of the land surface receives enough rainfall for some form of non-irrigated cultivation (though much of this is non-cultivable for other reasons). In Kenya, only about 20% falls in the same category. On the other hand, a much larger proportion of that part of Kenya which has enough rain for non-irrigated cultivation can be classified as 'high potential land' where rainfall and soils are adequate for the cultivation of permanent crops like coffee, tea or pyrethrum or for intensive dairy production. In Kenya, one finds a very sharp contrast between the well-watered, fertile highlands and the much larger areas where rainfall is insufficient for any form of land use other than livestock herding. In Tanzania the majority of the land surface falls into an intermediate category in which there is enough (though sometimes barely enough) rainfall to permit the cultivation of annual crops. In this zone, rainfall reliability ranges from "reasonably reliable" to "highly insecure" (two crop failures in every five years, on average). The ecological zones of the two countries are shown in Table 1.1.

The significance of this contrast is enhanced by the location of the different types of land. Tanzania is a large country with a semi-arid centre in which small high-potential areas (mostly situated on the southern slopes of mountains or near to large bodies of water) are scattered around the periphery. In Kenya, high potential land forms one consolidated block in the centre and south-west of the country. Most of the major towns are found there and they are connected by a fairly effective and well-coordinated transport infrastructure. Many major towns in Tanzania, including the capital Dodoma, and the major city Dar es Salaam, are situated outside the high potential areas. Urban centres are widely dispersed, and this has made the development of an effective transport system much more difficult.

Significant differences also exist in colonial history, reflecting in part the

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1 According to Peberdy (1969:159), some 83% of Kenya's land surface is medium or low potential rangeland and sub-marginal for cultivation. Other estimates diverge slightly from the above, but all are far too rough on which to base arguments over minor variations.

2 This is my own (arbitrary) classification.
Table 1.1: Extent and Proportion of Land-Surface Falling into Different Ecological Zones in Kenya and Tanzania (’000 km² and per cent)

<table>
<thead>
<tr>
<th>Ecological Zone &amp; Characteristics</th>
<th>Thousand km² Kenya</th>
<th>Per cent</th>
<th>Thousand km² Tanzania</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>I &amp; II: Highland &amp; High Agricultural Potential</td>
<td>54</td>
<td>9</td>
<td>40</td>
<td>5</td>
</tr>
<tr>
<td>III: Medium Agricultural Potential</td>
<td>58</td>
<td>10</td>
<td>255</td>
<td>29</td>
</tr>
<tr>
<td>IV: Marginal Agriculturally; High Potential Range</td>
<td>56</td>
<td>10</td>
<td>303</td>
<td>34</td>
</tr>
<tr>
<td>V: Medium Range</td>
<td>300</td>
<td>51</td>
<td>282</td>
<td>32</td>
</tr>
<tr>
<td>VI: Semi-Desert</td>
<td>112</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>580</strong></td>
<td><strong>100</strong></td>
<td><strong>880</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Proportion Tsetse-Infested (%) . . . 25 65


Notes: The following zone definitions are simplified from Peberdy (1969:156–9) and apply to Kenya. For Tanzania, six standard rainfall categories were taken (by Peberdy) to be roughly comparable.

Zone Remarks
I Afro-alpine, high-altitude grassland and moorland. Of limited range use and potential. Very limited in extent. Rainfall, 40" and upwards.
II High potential agricultural land. Climate: humid to dry sub-humid (rainfall mostly over 40"). Vegetation: forest and derived bush/grassland. Potential for forestry and intensive agriculture/stock raising. Carrying capacity 1–1.5 ha per Livestock Unit (LSU).
VI Semi-Desert. Climate: very arid (less than 12" p.a.). Low potential range requiring flexibility and seasonal movement (as does much of zone V).
underlying geographical factors. Kenya was colonized by the British, and its potential for European settlement was rapidly recognized and exploited. To a very significant extent, the high potential areas became the "White Highlands". The settlers were mostly British and, as a group, they were influential in their relations with the metropolitan and colonial states. Their numbers and concentration provided the "critical mass" for the formation of a variety of political and economic institutions including some for the marketing and processing of livestock productions.

The Germans initially colonized Tanzania. At first, they followed a similarly enthusiastic policy of settlement, but this faltered later, due to the wide dispersion of areas considered "suitable for European domicile" (roughly above 1500 m altitude) and the discovery that some areas settled were much less fertile than anticipated. The colonial system was based to a greater extent on plantations. which produced industrial raw materials for export, many of them located near the coast.

Plantations are usually owned by large expatriate companies and are run by managers. This form of production has different implications for political and economic development than systems based on permanent settlement by colonists. For example, it is often worthwhile for the plantation owners to build and operate their own infrastructural facilities, while private settlers normally lack financial resources and rely on political pressure to force the state to provide or underwrite the investment. Production on a plantation is strictly determined by the specific requirements of the parent company, while settlers are less tied and can shift their patterns of production in accordance with the appearance and profitability of markets. There was a sufficiently large settler population in Kenya to permit the development of a local market for agricultural produce. And settlers used their political influence to protect this market.

After 1918 the difference was exacerbated when Tanganyika became a League of Nations Mandated Territory. Britain, the new effective colonial power, was not concerned with this area of apparently low potential. The settler community was smaller, more scattered and more nationally heterogeneous: all factors which reduced its political effectivity in respect to colonial and metropolitan states. This was recognized by the white settlers of Northern Province (mainly the Kilimanjaro and Arusha areas) who made a number of efforts, during the 1930s, to get their areas transferred to the more congenial political climate of Kenya. This move was strongly opposed by the African population, supported by the Tanganyika colonial authorities which had already developed a distinctive identity and methods of operation.
MAP 3.

DISTRIBUTION OF CATTLE IN EAST AFRICA IN 1967.

* 10,000 head of cattle.


One sees the reflection of these experiences in the livestock sectors. The majority of cattle and other livestock were, and are, kept by African herders who can be considered peasants. Apart from some intensive dairy production, most of these livestock are grazed and browsed on uncultivated "natural pastures" which are neither rotated with crops nor privately owned.

Maps 3 and 4 depict the geographical distribution of cattle. Map 3, shows that the heaviest single concentration is close to Lake Victoria, most of the stock being in the north of Tanzania and the south of Kenya with the density falling off as one leaves this central area. However, Map 4 shows that the distribution of tsetse-flies is of overwhelming importance as the determinant of livestock distribution in Tanzania.

As a result the two largest towns (Dar es Salaam and Tanga, both on the coast) are separated from the main livestock areas by several hundred miles. In Kenya the majority of cattle are found in or near the high-potential areas and thus are far more favourably located in relation to the major urban centres which constitute markets for surplus meat and milk. In both countries, the distribution of sheep and goats resembles that of cattle.

A further important difference between Kenya and Tanzania is the distribution of types of livestock production and their relation to urban development and demand. In Kenya, one has something approaching the "concentric ring" structure beloved of textbooks on the spatial analysis of agricultural production. A relatively high proportion of the livestock in the high potential areas are grade cattle kept for intensive dairy production. Around this centre are some larger dairy farms and feeder ranches, while beyond this zone there have been attempts to encourage the sale of immatures for fattening by the pastoralists who graze their herds in the semi-arid areas. Though most of the cattle and other livestock are kept by peasants of various types with the primary purpose of producing milk, this centralized structure can still be seen in outline. This roughly concentric pattern does not derive only from factors usually considered in spatial analyses, i.e. land prices at different distances from centres of economic activity, transport costs, etc. but arises as well from the fact that the

3 The term "peasant" is used loosely here to include small-scale producers of both subsistence products and commodities for sale. Most livestock producers of East Africa can be considered peasants from another angle in that they are very much a subordinate class. This brings up the problem of the extent to which they do form a single class, since even the "traditional sector" includes herdsmen owning several thousand head of stock, who can be considered rich by any standard. In pastoral and settled agricultural societies the ownership of livestock tends to be concentrated among the wealthier members and in some cases, is confined to them.
CATTLE POPULATION AND TSETSE FLY INFESTATION

10,000 head of cattle.

Tsetse infested areas.


concentration of economic activity and climatic factors reinforce one another strongly.

In Tanzania, one can find no such pattern because the primary determinant of cattle distribution is the incidence of tsetse-infestation. Though most cattle are kept in the drier north-central areas of the country, the relatively small intensive dairy sector is scattered in the highland areas and near to major towns. This dispersal makes virtually impossible any close coordination of the dairy industry. Dar es Salaam, both the major market for dairy products and the site of the cannery for export corned beef, is separated from major producing areas by several hundred miles of tsetse infested bush. Plans have been made to impose a stratified structure of production in Tanzania, but the patterns emerging will inevitably be considerably more complex than in Kenya. New investments in the livestock sector, are at least as likely to be made on the basis of existing facilities and their spatial organization, as on the basis of what could be considered most appropriate in more general terms.4

Livestock Population

Recent estimates for the total livestock populations of Kenya and Tanzania are shown in Table 1.2.

Table 1.2: Livestock Numbers in Kenya and Tanzania (million)

<table>
<thead>
<tr>
<th></th>
<th>Kenya</th>
<th>Tanzania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>9.5</td>
<td>10.0</td>
</tr>
<tr>
<td>Sheep</td>
<td>4.0</td>
<td>2.9</td>
</tr>
<tr>
<td>Goats</td>
<td>4.0</td>
<td>4.6</td>
</tr>
<tr>
<td>Donkeys</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>Pigs</td>
<td>0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>Camels</td>
<td>0.5</td>
<td>–</td>
</tr>
<tr>
<td>Chickens</td>
<td>11.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Livestock Units</td>
<td>11.5</td>
<td>11–11.5</td>
</tr>
<tr>
<td>Grade dairy cows (mature females)</td>
<td>0.8</td>
<td>0.05</td>
</tr>
<tr>
<td>Improved beef steers</td>
<td>0.05</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Source: See chapters 3.1 and 3.4 for references and more refined estimates.

These figures are very approximate and it is to emphasize that fact that they have been rounded severely and left undated. Kenya does not publish annual statistics of its national herd, mainly because of the difficulty in

---

4 See Chapter 4.3, in relation to the siting of a canning plant. This undercuts any notion that the spatial distribution of economic activity is determined by current market optima. On this see also Raikes, 1975 (Den Ny Verden).
obtaining estimates of the cattle herd (roughly half) kept in the northern semi-arid areas. Tanzania does publish figures of the national herd and flock on an annual basis but their accuracy has recently been thrown into considerable doubt. An agricultural sample census in 1972 and an independent survey based on satellite photographs have both indicated that existing official figures for cattle numbers were overestimated by some 40%. The revised figures are shown here.

This finding requires that a revision is made of the introductory sentence of all those studies which start by saying that Tanzania has the largest livestock population in Africa (it is now down to about fifth place). Much more importantly, it throws doubt on assertions about the behaviour of "traditional" herders which were based on comparisons of sales with a population overestimated by 40%.

The overall livestock population of the two countries are similar. Cattle are the most important in terms of numbers and even more so in terms of livestock units (with cattle counting five times as much as small stock). But once one moves from overall numbers to any finer classification, the differences immediately begin to show. The number of exotic and grade (mixed exotic and zebu) dairy cows in Kenya is variously estimated at 0.7 and 0.9 million, which compares with some 30–40,000 in Tanzania. The figures are not at all secure but at least they indicate a very different scale of production. The ranch sector in Kenya accounts for over 0.5 mn head of cattle compared with upwards of 120,000 in Tanzania. In this case, the difference in numbers is not so marked, but the productivity of the Kenyan beef ranch sector is markedly higher than that of Tanzania.

Other types of livestock receive very much less official attention in both countries, making it even more difficult to find reasonable data. There are some 350,000 wool sheep in Kenya, almost all kept on large farms. At one period they were also kept at Kitulo State ranch in Tanzania, but this was discontinued since the problems of marketing small amounts of wool overshadowed the benefits. Goats have a considerable potential for upgrading for dairy production. But this has been largely ignored by government authorities. mainly because the sale of surplus product is less easy to organize officially. Pig production in Central Kenya finds market

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3 The Livestock Unit (LSU) is a means of reducing different sorts of domesticated animal to a single standard on the basis of their feed requirements. In most such computations, an adult bovine (hull, steer or cow) is taken as the standard (1.0), donkeys are 1.2, calves 0.5 or 0.6, sheep and goats 0.2. If this is taken as a measure of production (which it sometimes is) it overstates the importance of cattle. Dairy goats are more efficient converters of grass into milk, and sheep and goats are sometimes able to convert forms of vegetable matter (scrub bushes: for example) which are not available to cattle.
outlets in the urban centres and the Uplands Bacon Factory which processes both for local sales and export.

While there is very little information on the poultry sector, there can be no doubt of its importance. Most rural households keep a few chickens which feed on household waste and insects, and provide eggs and meat for occasional use. In many areas, this represents the most important source of animal protein for the average to poor peasant. Around the major towns, more highly organized and commercialized egg and poultry meat production units have developed, dependent in large part upon the purchase of day-old chicks from hatcheries.

Livestock Production

When one turns from livestock populations to the production deriving from livestock, the figures become even more dubious. Kenya's livestock sector is said to account for some 30% of officially marketed agricultural production compared with about half that proportion for Tanzania. Livestock products account for 6.5–7% of Kenya domestic exports, compared with 3–4% for Tanzania. In Kenya, some 45% of total livestock exports are composed of meat and meat products, another 45–50% of hides and skins, with the small remaining portion divided between butter, ghee and wool. Tanzania's rather smaller exports are composed primarily of canned meat, its by-products and hides and skins.

The major difference between the two livestock sectors is revealed by the imports. Kenya imports few livestock products, and there are net exports in all major categories. The total is valued at over Sh. 200 mn per annum, though there has been little increase in real terms during recent years. Tanzania, by contrast, has imported increasing quantities of dairy produce in recent years, much of it from Kenya until the border was closed in 1977. Although during the 1960s, Tanzania's net exports of livestock products amounted to some 40 million shillings, this surplus had almost disappeared by 1975, owing to the growth of home consumption of meat and imports of dairy produce.

Livestock productivity is measured in a number of ways, one of the more common (for meat) being the "rate of offtake". There is some ambiguity about this term, since it can refer either to the number of cattle slaughtered as a proportion of the total herd, or to slaughterings plus deaths. The normal measure is based on exports of hides and skins, the only parts of stock sold unofficially which pass through channels from which data can be collected. But this does not discriminate between cattle which are slaughtered and those which die.

The standard figure normally quoted for total offtake is around 10%.
This is considered to be low and is used to demonstrate the reluctance of "traditional herders" to sell their stock. Some experts have given higher figures. Meyn estimates the rate in Kenya at over 13% and although he also cites a rate of under 10% for Tanzania, this calculation was based on old estimates of herd size. After revision, the rate of offtake would increase to 11–12%. Mackenzie has estimated the rate in the range 12.5–14%. All of these include both slaughter and such deaths as do not spoil the hides. For comparison, the rate of offtake on a well-managed ranch may reach 20–25%, though the latter figure is only likely if some immatures are bought in for fattening. It is claimed that 15% offtake (as slaughter) can be achieved from a well-managed peasant herd with an efficient marketing system, though whether this is in fact a reasonable estimate, given the poor standard of veterinary services and likely death rates, is another question.

Sheep and goats have a shorter breeding interval and so rates of offtake are considerably higher. For goats rates of up to 40% per annum are possible even under the range conditions prevailing in East Africa. Lower rates (25–30%) seem more common for sheep: the difference resulting from the fact that goats often have more than one kid while multiple lambing is not common.

The only reasonably accurate figures for slaughter, production or sale of cattle refer to animals passing through official marketing channels to major abattoirs or processing plants. These represent only about 2.5–3% of the total herd per annum in Tanzania and Kenya. In neither case have deliveries increased in recent years, though for somewhat different reasons. In Kenya, the development of a local market for fresh meat has diverted supplies away from KMC, the monopoly export processor. From some 30% of total recorded at the end of the 1960s, its proportion has fallen to less than half that level. In Tanzania, the situation is hard to gauge since there are few usable data for the 1970s. Among the more important factors stimulating sales on nonofficial markets are price policies, failure to maintain local cattle markets or their use as foci for the extraction of taxes and other dues, and the major disruption of the marketing chain in the early 1970s, when meat wholesaling and retailing was handed over to District Development Corporations.

The contrast in dairy production is most marked. Kenya possesses geographical and climatic advantages to which can be added the development of a dairy marketing and processing infrastructure during the colonial period. Deliveries of whole milk to Kenya Cooperative creameries have exceeded 200 million litres per annum (about 550,000 litres/day) since 1967 (and for most years have exceeded 250 million litres per annum). This is processed in eight plants ranging in capacity from 20–
70,000 litres per day and producing whole milk (current over two-thirds of the total) cream, butter and ghee, cheese, evaporated and powder milk.

Tanzania has two plants for the production of processed dairy products (skimmed milk powder and butter), both operating at well below their capacity of about 50,000 litres/day. Two main urban dairies in Dar es Salaam and Arusha achieve full capacity only by using large amounts of imported skimmed milk powder for re-constitution. There are plans to build more dairies although current capacity is well in excess of the supply of raw milk.

In addition there are several small pasteurization plants in both Kenya and Tanzania, serving the needs of smaller towns and also a number of plants which simply cool and keep milk for home boiling. These are more suitable for small town populations since their costs are considerably lower.

Nutrition and consumption of livestock products
The major justification for favouring livestock production in cropping areas rests on the nutritional value of the products to the people most in need of protein supplement. I have not found data on this for Kenya, but figures for Tanzania are not encouraging. The Tanzania Household Budget Survey of 1969 indicates that consumption of meat and dairy products is considerably higher in the towns (about 20 kg per capita per annum) than in the rural areas (about 7½ kg per capita per annum). Within rural areas, as might be expected, consumption was very much higher in the north and north-west where 75% of the livestock are kept, and which rank among the better-off parts of the country. Most striking is the relationship between consumption and per capita income. For the mainland as a whole, 50% of the population with household incomes below 1000/- per annum, purchased only 9% of total livestock products by value, while the top 7.6% of the income scale purchased 63% of all such products. The top income group spent on average about 50 times as much per household as the bottom 50%. Thus although livestock products are claimed to provide some 23% of the inadequate level of protein intake in Tanzania, this figure markedly overstates their importance in the diet of those most in need. This is in spite of government control over prices, which have been depressed to levels that allow little or no incentive for increased production and indeed require that subsidies be given to the state livestock sector.6 Recent data indicate that the situation

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6 Since the above was written, consumer prices of meat have been raised substantially in Tanzania and have apparently depressed demand. The effect on production is as yet unclear.
has worsened since 1969: per capita consumption in the rural areas has
dropped and undoubtedly will continue to do so, at least up to 1981.'

Consumption of livestock products is probably a little more evenly
distributed in Kenya, mainly on account of the much higher dairy
production. The few figures that exist suggest that protein intake is slightly
higher than in Tanzania. In general however, one can assume that broad
patterns of consumption are fairly similar in both countries, in that meat
and dairy products make a very small contribution to the diet of the
poorer inhabitants.

Summary
a) Climatic and historical differences prevent simple comparisons being
made between the efficacy of current government policies in the two
countries.

b) While Kenya is divided into two highly distinct climatic zones,
Tanzania falls into an intermediate category, both in terms of climate
and productivity. One result is that Tanzania suffers a far greater
problem of tsetse-fly infestation.

c) Livestock production in Kenya has become organized into the "classic"
spatial pattern of concentric rings around major economic centres. This
stratification is non-existent in Tanzania.

d) While there are certain similarities in beef production in the two
countries, the sector in Kenya is more commercially developed. In the
case of dairy production, Kenya's level of development is very far ahead
of Tanzania's.

e) In both countries, cattle are the most economically important form of
livestock, but the development of production from goats and chickens
could well offer more to the average member of the rural population in
so far as both cash income and nutrition are concerned.

f) While Kenya is a net exporter of livestock products, these exports seem
unlikely to grow rapidly in the future. Demand prospects for processed
dairy products on the world market are not good and in any case local
demand is currently growing more rapidly than production.

g) Tanzania was a net exporter of livestock products during the 1960s,
though on a smaller scale than Kenya. Since then, canned beef exports

have stagnated or declined while imports of dairy products have grown substantially. These trends have almost eliminated the net export surplus.

h) Livestock products currently provide only a small proportion of energy and protein. There is no reason to suppose that current policies, especially in Tanzania, will improve the nutrition of poorer inhabitants.

Chapter 1.3: An Outline Historical Sketch

In the pre-colonial period, the majority of peoples in East Africa kept cattle or other forms of livestock; conditions and methods of production varied widely ranging from the stall-feeding already practised in Kilimanjaro and the intensive systems in parts of highland Kenya to the transhumant pastoralism of the dry zones. The fragmentary evidence suggests that though some long-distance and local trade in livestock and products did take place, this was generally unimportant. Stock was kept for subsistence and for reasons unrelated to commodity exchange.¹

A precursor of the colonial incursion into East Africa was the arrival of rinderpest. The disease had spread from Egypt, hastened on its way by the quickening tempo of trade and travel in the last quarter of the nineteenth century. Its impact upon the East African livestock keepers was catastrophic. Some 90% of all cattle are thought to have died (though this may refer to the worst hit areas). This was a disaster of previously unknown dimensions, which in some cases, permanently eliminated cattle herding from the production patterns of the peoples afflicted.² Rinderpest triggered a series of secondary catastrophes; famine, smallpox and jiggers, which together with the ravages of colonial subjugation (including burning of villages and seizure of crops) led to a substantial decline in the human population. In Kenya, a major effect was the partial depopulation of the highland areas, which facilitated the rapid spread of European settlers. In Tanganyika, the entire system of land-use was disrupted. Regeneration of the bush brought with it infestation by tsetse-flies, which

¹ Hides and skins were exported and some dairy produce was sold in towns by peri-urban producers, though on what scale is not known. There would probably also have been exchanges between pastoralists and agriculturalists (of grain for dairy produce).
² Karagwe District in West Lake Region as well as Bukoba District to the east of it, were both previously major herding areas with a social structure based in part on cattle ownership. Since then, the area has been a livestock and meat deficit area.
even to this day precludes livestock herding in some areas where explorers noted an abundance of cattle and milk during the nineteenth century.\(^3\)

As a result, the area available for grazing by African herders was reduced in both territories. Apart from this, the impact of the pandemic was entirely different. The areas mainly affected in Tanganyika were located in the south and far west where the few inhabitants could no longer keep a sufficient proportion of the land cleared to prevent the advance of tsetse-flies. The main "economic opportunity" open to the people was migration for work at very low wages on the coastal plantations. Domestic plots were retained at a low level of production to provide family subsistence. These areas also suffered most from the campaigns of the First World War when both German and British armies routinely burned villages in their way to preclude provisioning by the other side.

In Kenya by contrast, areas which had previously supported a high population were alienated during the phase of temporary population reduction. The initial setting-up of the settler sector and development of domestic markets for meat and dairy produce provided opportunities for Kenyan peasants which, as documented by Cowen, were seized by a class of "indigenous accumulators".\(^4\)

Both human and livestock populations increased with more than normal rapidity once the cycle of disasters had played itself out. So it was likely that a series of collisions would occur when the population began to press on the reduced grazing (and cultivation) areas. Predictably, the processes took very different courses. In Tanganyika, the most important manifestation was an outbreak of human trypanosomiasis and an increased concern by the colonial government with overstocking. Although there was some conflict with settlers in the north of the country, this was not very strenuous as no important settler beef production had been initiated. Nor are there any records (available to me) to indicate development of African dairy production with improved animals. It seems reasonable to assume that few exotic or grade animals were found even on settler farms, given the low density of settlement and the greater difficulties involved in segregating these cattle to prevent the spread of disease. The urban population was small, so too was the local market for livestock products.

In Kenya, the collisions found expression in the direct conflict between

\(^3\)See Kjekshus 1977 who cites Sir Richard Burton on the abundance of milk available in Kigoma town, currently in the centre of one of the most heavily tsetse-infested areas in the country.

the consolidating settler population trying to erect protective walls around its own production, and the few emergent African producers. Cowen documents the variety of means by which these latter were excluded entirely from production.\(^5\) In general throughout East Africa, products for local European consumption which could be produced by European settlers, were almost invariably precluded by law from African production. This was less evident in Tanganyika only because the settler sector was often incapable of supplying these markets and could not develop a marketing infrastructure which excluded Africans. The difference however was to be of considerable significance. Legal exclusion from an economic activity at which others can be seen to be making profits, is almost enough on its own to secure rapid adoption once legal barriers are removed; the absence of an activity has precisely the opposite effect.

The differences with regard to beef production were also considerable. In Kenya the restrictions on African sales were more savage and Africans were almost entirely excluded from supplying any but local African markets up to World War II. In Tanganyika by contrast, relatively little beef was sold in Dar es Salaam prior to the 1950s because of difficulties in driving cattle on foot through the coastal tsetse-belt. Even in northern Tanganyika, there appears to have been no very strong pressure to exclude Africans from beef production, mostly because the alienated land was fertile and well-watered mountain areas where crops gave much higher returns. Indeed, the problem was soon seen as one of inducing African cattle-herders to part with more stock, partly to provide meat for urban and plantation consumption and partly to lessen the perceived damage caused by overgrazing. There were, of course, similar complaints from Kenya officials. In neither case were low prices thought to be to blame. Yet even a brief scrutiny of the marketing figures makes the point clearly.

In Tanganyika, African sales of cattle grew rapidly during the 1920s. Prevailing price levels were not subsequently reached, even in money terms until 1948. With the depression, reductions in the export price of sisal were passed on in the form of reduced wages on plantations and peasant proceeds from export crop production also fell drastically. This led to an enormous reduction in the price of slaughter cattle which, by 1932, was less than one quarter of the 1928 peak level. Sales fell to less than half the previous level. Since then official sales as a proportion of total herd size reached the 1928 level only during the Second World War when sales were boosted by forced procurements. The current proportion is

\(^5\) Cowen, 1974.
some half of the 1928 level and the price almost certainly also lower in real terms.\(^6\)

While colonial policy before the Second World War was mainly concerned with restricting African entry to lines of production in which settlers were engaged, the post-war period saw a reversal. A canning factory was built in Kenya in 1938 and in Tanganyika in 1948. The same firm also built an abattoir and chilling plant in northern Tanzania with the aim of providing supplies for the local market, Dar es Salaam and the coastal plantations. Efforts were made to secure supplies of cattle from African herders, and this involved setting up (or expanding in Tanganyika) systems of local markets, and initiating a series of compulsory destocking campaigns ostensibly on account of overstocking and erosion. Figures for Tanganyika show little significant change as a result of these policies. Total livestock sales were slightly lower in 1964 (227,000) than in 1954 (282,000); in both years the vast bulk were sales by African herders.\(^7\) For Kenya, sales on official markets grew quite rapidly from 1954 onwards, though from a very much lower level. Total official sales of livestock in Kenya in 1954 were about 76,000 head, of which sales from Africans constituted only some 30,000 or about 40\%. By 1963, total sales had increased by 113\% to 162,000 with African sales representing the same proportion.

In the post-war period the first efforts were made (mostly in Tanganyika) to improve methods of production among African herders, mainly through the provision of hafirs and piped water, accompanied by efforts to induce controlled grazing. The latter failed entirely and the net effect seems to have been to intensify over-grazing in the vicinity of water supplies. Also at this time, the Tanganyika colonial government attempted to introduce compulsory dipping of cattle in a number of areas, the most notable being Iringa. The main effect of this was to provide further political fuel for TANU and the Independence struggle. In Kenya by contrast, there were relatively few positive initiatives.

To summarize very crudely the policies of the two colonial governments, the Kenya Government was considerably more severe in its efforts to exclude Africans from protected European economic activities. Given the greater size and concentration of the settler sector, this was in part because

\(^6\) Data from Annual Reports of the (Tanganyika) Veterinary Dept. show prices in primary markets of 60/- per head in 1928 and 53/92 in the following year. By 1932, the average had fallen to 14/- per head and it was not until 1917 that the average price again exceeded 60/-.

\(^7\) Annual Reports of the Veterinary Dept., loc.cit.
there was a much wider range of activities from which they could be excluded. As indicated above, exclusion from a visibly profitable activity is a much more effective stimulus to production than encouragement (or enforcement) to produce what is not profitable and this seems to account for much of the subsequent difference in rates of growth. Observers of Kenya's efforts at African livestock marketing during the 1950's were not especially impressed. In the early 1960's the Kenya Government copied some aspects of the Tanzania system in an attempt of reorganization. Even less encouragement was given in Kenya to African dairy producers. But the gradual and reluctant lowering of protective barriers was enough to secure a fairly rapid increase in the numbers of exotic and grade stock held by smallholders. Cowen gives figures for Nyeri District where the number of grade cattle grew from about 1,000 in 1955 to 4,500 in 1959, doubling again to 8,650 in 1961 and increasing even more rapidly to 30,000 in 1965. The number of grade cattle held by small-holders throughout Kenya had probably reached some tens of thousands by the early 1960s, while at that date, there were only a few hundred in Tanzania. Another reason for the more rapid rate of increase in Kenya was the much greater availability of grade cattle for sale. Settlers who owned some 300,000 grade cattle (in 1962) were disint- esting in anticipation of the transfer of land and assets to Africans from 1959 until the mid 1960s. The small group of settler dairy producers in Tanzania did not feel themselves so threatened and though farms and production declined, there is no evidence to suggest that this led to any significant transfer of stock to Africans.

To conclude, much of the difference in policy towards the livestock sectors of the two countries in the post-Independence period and a substantial part of the divergence in their subsequent development could already have been predicted at Independence.

Chapter 1.4: Pastoralism and "Economic Rationality"

One problem which must be confronted at the outset is the widespread view that pastoralists and other herders are economically (or sometimes without qualification) irrational; this being evidenced by their assumed tendency to accumulate cattle without regard to the economic benefits accruing from sale, their supposed unwillingness to sell and
unresponsiveness to price incentives and phenomena like preferences for particular colours of cattle or shapes and sizes of horns.

One might suppose that this sort of thinking had largely disappeared with the colonialism which spawned it, but one would be wrong. Not only is the question still considered worth discussing among some social scientists, but it is widely assumed among officials and politicians in East Africa, that pastoralists are irrational. A rather extreme statement of this kind can be cited from the Tanzania "Daily News", where a correspondent castigated the Barabaig as an "ignorant and barbarian" people whose minds were "small and backward". But one has only to turn to a number of government and aid agency reports to see a similar message relayed in somewhat less brutal terms.

Much of this book will be concerned with combatting this sort of thinking in its various forms and guises, since it seems to me totally misconceived and has led to some strikingly bad government policies. For the present, a brief outline of the form of the argument will suffice. In the first place two obvious questions. Is the evidence drawn in support of the proposition of irrationality correct? And if so, does it in fact imply irrationality? Behind the second question lie two even more basic questions. What does the attribution of irrationality mean, and what does it imply about the approach of whoever makes the attribution? What are the implications for policy of the assumption that those upon whom it is to be imposed are irrational?

1 Livingstone (1977) cites a number of contemporary adherents to this viewpoint and even shows some doubt on this score himself. In an account of a political meeting in Pokot (a pastoral area of Kenya) he found the Pokot aim "to accumulate wealth (equating wealth with animals owned)" to demonstrate a "cattle complex", failing apparently to enquire what other forms of wealth were available. He found it curious that they saw the main benefit from a proposed scheme to be finance for water development and dipping facilities rather than control of grazing and the level of stocking (the main governmental aim). That they expected a forced de-stocking campaign and were unanimously opposed to it, was shown when he asked whether they would "prefer a reduction of, say, ten goats or one cow", intending this as a hypothetical question to elucidate "preference functions". The audience plainly saw this as a substantive question (or threat) and "the hostility engendered by it caused the meeting to be terminated soon afterwards". Personally, I could find nothing in this report which suggested irrationality on the part of the Pokot.

2 Daily News, Feb 20th and March 15th. 1973. The context was a discussion of plans to move the Barabaig forcibly into settled villages despite severe negative effects on their grazing patterns. It was no coincidence that these people, who have come under regular criticism (and punitive government action) for their "barbarity" should have lost more of their previous grazing lands to cultivators (including one state farm) than any others in Tanzania. In the same context, one could also cite the lengthy controversy in the Tanzania Standard (as the Daily News was then called) in 1967 or 1968 concerning and administrative campaign to force the Maasai to wear trousers and stop decorating their hair in the traditional way.
Regarding the first question, we have already seen that some of the evidence upon which it is based is simply incorrect. Low rates of offtake, claimed to demonstrate unwillingness to sell, result in part from incorrect calculations of herd size. As will be shown, they also derive from improper use of evidence with regard to exports of hides. Further evidence will be drawn to show that accumulation of herds is nothing like the simple matter often supposed. Pre-colonial herding societies usually had quite strict controls over the use of pasture and among the major causes of overgrazing have been alienation of land and destruction of the social systems upon which such controls were based – both beginning during the colonial period but continuing since then. We shall also have occasion to observe at a number of points in the book that the proponents of "modernization" almost invariably exaggerate the productivity and economic returns of the sorts of programmes they propose, while consistently underestimating the same parameters for the "traditional" sector. This is not to propose that the "traditional" livestock sector is highly productive, still less a model of harmonious rationality – far from it. But it does point to serious bias in the evidence for irrationality.

The second question evidently requires some working definition of what is implied by rationality (and whether it is a useful concept), but first, a few examples of the sorts of argument which have been used may be illuminating.

Among Tanzania policy-makers, there is a widely held notion that transhumant pastoralists move because they are footloose, have a "nomadic predilection" and lack the perseverance to remain in one place. In reality, there is abundant evidence from all over the world, that this is the only way in which arid and semi-arid rangelands with sharply seasonal rainfall can be used – at least until it is possible to invest in piped water and irrigation or stored fodder. Far from wandering at random, the movements of pastoral herders describe rather regular patterns, based on the availability of pasture and water in different places at different seasons of the year and in some cases also on disease avoidance. Here one can see how the prior assumption of irrationality precludes study which would show the rational basis of the phenomenon. At the level of policy, this has led to programmes to settle herding peoples permanently without taking account of their seasonal pasture needs.

Another example of the misreading of evidence comes from Tanzania

\[3\] On this, one could cite a huge variety of sources. Among those referring to East Africa are included Gulliver (1955), Jacobs (1963), and Rigby (1968).
Masailand. During the 1960s, sales of cattle through official markets in Masai District steadily declined and were claimed by officials to demonstrate the unwillingness of the Maasai to sell their cattle and unresponsiveness to price incentives. Since cattle prices lagged behind those of most other commodities, this was an unconvincing argument even on the surface. More detailed study shows it to have been thoroughly misconceived. Up to 1969, District Councils in Tanzania had revenue raising power, in the form of "cesses" on each kilogramme of crops or head of livestock sold through District markets. These taxes were extremely unpopular and were recognized to limit the amount of produce passing through the markets; the two major reasons for their withdrawal in 1969. Since Masai District is very largely composed of rangeland, there are few crops to tax, and the tax on cattle was thus much higher than in surrounding Districts, in addition to which, cattle markets were used as a convenient venue for the collection of TANU membership fees and various other dues. Tanzania Masailand has a lengthy border with Kenya, where prices were increasing steadily in comparison with those paid in Tanzania, while from 1967 onwards, Tanzania's stricter exchange control led to a divergence in the blackmarket exchange rates for the two currencies. The real reason for the decline of cattle sales in Masai District was thus diversion of cattle onto other more profitable markets and clear evidence of price response at least as regards where the cattle were sold. Examples of this sort could be multiplied, where more detailed study of a process claimed to imply mere conservatism indicates a complex but coherent rationale, though not all would show the same degree of market response.

Another type of argument for the irrationality and backwardness of pastoral herders relies on the notion from outmoded anthropology and debased marxism, that herding was historically prior to cultivation and thus less advanced. In the first place, the notion that because a form of

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4 Inconsistencies in the spelling of Masai arise because the people tend to call themselves Maasai, while the official spelling of the District is Masai.

5 Yet another argument in favour of pastoral irrationality is the "cattle complex" discovered by Herskovits (1926) and resting on a supposed sentimental attachment to their cattle by East African herders, together with phenomena like preferences for particular skin colours or shapes of horns. The term "complex" (as in Oedipus or inferiority complex) implied the irrationality of such feelings. At one level, this shows no more than that a lengthy, detailed and humourless description of the personal habits of virtually any group of humans would make them appear obsessional if not insane. At another, it fails entirely to relate the different phenomena to the social contexts in which they occurred. The most exaggerated concern over horn size and shape was characteristic of the "semifeudal" Inter-Lacustrine Kingdoms and seem comprehensible by analogy (if perhaps somewhat stretched) with the patterns of display to be found in feudal courts elsewhere. By contrast, some personalization of
production is temporarily prior to another, it must necessarily be more backward comes from a simplified unilinear evolutionism, which runs counter to historical experience (while the further argument from there to irrationality is a complete non sequitur). Secondly, most of the historical and archeological evidence indicates that this "stage theory" is simply incorrect. The distinction between cultivation and herding is not generally one of temporality but of resource-base. Pastoral herding is one way to make use of large tracts of land, where the rainfall is insufficient to support viable crop cultivation. Given the difficult nature of the sorts of environment in which it is generally practised, it requires not only considerable skills but complex and specific forms of social organization both for production and for mutual protection in the face of a large variety of potential disasters. It is worth stressing that social organization was (and is) an essential condition for the continuation of production and the survival of the producers and their herds and that the forms which this took were in large part specific and related to the environment and form of production. The social bonds, norms and structures which organize herders living at low population densities and often on the move in arid or semi-arid areas, will necessarily be different from those prevailing in settled agricultural (let alone industrial) societies.

This brings one to an important point in the discussion of "rationality" for it is perfectly plain, as soon as one thinks about it, that there is no "rational" form of conduct or social organization, applicable to all human beings. What is rational within one society or context may be absurd in another. Rational conduct is thus conduct which conforms with prevailing social norms of reasonable behaviour. These norms in turn are related to the form of production upon which the society depends, the environment within which it operates and the social organization which ensures its survival. Occupational specialization and class differentiation may also lead to different patterns of activity as being considered reasonable for individuals or groups holding different position, within a given society. Moreover, to propose that patterns of activity are rational or coherent within a given society is not necessarily to imply that they are socially beneficial.

In thus becomes clear that there can be no absolute standard of rationality against which people, social systems or processes can be judged. The question whether pastoral herders (or anyone else) can be relations between humans and livestock seems always likely to occur where they live in close proximity, and has certain practical advantages. It is, for example, useful if cattle are sufficiently docile to be herded by children and to be driven in and out of their section of a dwelling house without causing structural damage.
considered "rational" in an absolute sense is clearly misconceived. Far more to the point is to study pastoral systems of production and social organization in order to find out what are the most important underlying forces and processes which shape them and by means of which they survive and cohere. This provides the basis for explaining the rationale for specific patterns of activity, which may otherwise appear puzzling to the outsider. Once again, it must be stressed that this does not imply portraying such societies as fully harmonious or coherent. Indeed one important aspect of the study will be to consider internal conflicts and contradictions.

But although there are many who refer to pastoral herders as being irrational in a general sense, it is far more common to hear them described as "economically irrational"; that is, their activities do not conform to the norms of rationality for a capitalist market economy. In brief, this implies behaviour aimed at maximizing profit or income to the individual or family in terms translatable into money.

A number of the examples already given have shown that, even on this score, much of the evidence is incorrect, exaggerated or misconstrued. Nonetheless, there can be no doubt that there are differences between the norms and behaviour appropriate to, and followed in, pastoral herding societies and those of capitalism. It would be most remarkable if this were not the case. Given the sorts of social organization necessary for herding livestock on extensive pastures under conditions of great seasonal stress and necessary transhumance, individual competitive behaviour would generally be inappropriate, not to say suicidal.

The necessity for movement severely restricts the sorts of material possessions which can be accumulated, placing major emphasis on livestock, which can move themselves. When social position and political influence depend upon the ownership of cattle and their deployment in a variety of social transactions, they are hardly likely to be treated simply as commodities to be realized for money income. Chapter 2.6 attempts to draw out the implications of some of these forces which, together with environmental constraints influence forms of accumulation and production.

The position is complicated by the fact that all pastoral (and other) societies within East Africa have been drawn within the orbit of the market and commodity production, while their previous political systems have been subordinated to the national states, both colonial and post-colonial. One would thus expect to find some degree of market-determined behaviour combined with, and conflicting with, patterns based on the requirements of continuing to exist as pastoralist societies. One would not
expect to find completely market-determined behaviour prior to the complete destruction of the pastoral societies and the transformation of their members into capitalist ranchers (the small minority), wage-workers and unemployed. Even then, given the importance of political manoeuvring as a means to accumulate and safeguard wealth, one would not expect to find "economic behaviour" simply in its textbook forms (as indeed one would not anywhere else).

To portray the relationship between pastoral herders and the "modern" sector as simply one of conflicting norms and patterns of "rational behaviour" would be extremely misleading, for one of its most important underlying bases is a marked conflict of interests. During the colonial period, the attribution of irrationality and backwardness was one of the main ideological justifications for the alienation from pastoralists of some of their most fertile and strategic grazing lands. In Kenya, this, together with the closing of markets, did much to produce the overgrazing which was then taken to demonstrate the original assumption. Similarly, the notion that herders are not responsive to prices has been used to justify paying prices for their cattle so low and undifferentiated as to discourage sales and improvement of quality. Time and again, this sort of reasoning has been used for the promotion of policies which have benefitted others to the loss of the herders. Small wonder then that one finds among such people a considerable distrust of government programmes – construed, as always, to be "resistance to change". One should add that the above is not confined merely to pastoralists in the sense of people relying solely or mainly on livestock production, it is largely true of most cattle and livestock keepers in East Africa.

One could perhaps find some justification for this – albeit a callous and "hardheaded" one – if the "modern" production which is proposed as a replacement was in fact highly productive or socially beneficial. But when one surveys the generally dismal results of most such programmes, the high proportion of total production which continues to emanate from the "traditional" herds and the unsuccessful nature of government policies to develop this sector, such a justification becomes untenable.

This brings one finally to the second set of questions posed at the beginning of the chapter. What is the impact on the formation of livestock policy of the assumption that herders are irrational? The answers are already implicit in the account so far, but are worth specifying.

The attribution of irrationality to a person, process or system implies that it is not amenable to rational or scientific study and is thus an abdication of the need to make such study. At the same time, it provides a handy pseudo-explanation for various phenomena which cannot be
properly understood without serious study. It is, in short, a recipe for continued and wilful ignorance.

At the same time, it has important political implications. The term irrational carries a general implication of inferiority. It also implies that the person, society or process so described is not amenable to reasonable argument or discussion and thus provides a justification for the forceful imposition of unpopular policies (and the ever-present excuse for their unpopularity as "resistance to change").

Later chapters attempt to spell out in more detail some of the specific processes and policies involved and will, I hope, show clearly some of the dire effects of this set of assumptions.
SECTION 2: ASPECTS OF LIVESTOCK PRODUCTION IN EAST AFRICA

Introduction

The present section aims to provide information on the various components of herding systems in East Africa.

The first chapter outlines the nature of livestock production and discusses how it has changed over time and specifically in relation to the development of capitalism. It finishes by noting some of the differences between East Africa and those areas where commercial livestock husbandry first developed.

The following three chapters look in slightly more detail at three of the major technical components of livestock production; grazing land and water; livestock breeds, genetic potential and breeding; and some of the more important diseases of livestock and the impact of measures for their control and eradication. Chapter 2.5 looks at certain standard assumptions about herd composition and growth. And the final chapter tries to bring together a number of the points discussed previously, to illustrate a few of the complex dynamics operating in herding and herding/cultivating societies in East Africa. It is argued that more work in this area is vital if some of the inappropriate policies, noted elsewhere in the book, are not simply to be repeated.

Chapter 2.1; Livestock Production and Development

Livestock production involves the control and use of energy converted by domesticated animals from vegetable matter, in the form of meat, milk, leather, manure and other products and in the form of draught or other work power. The three basic components are thus a source of vegetable food and water, a stock of animals and human labour to control the process of conversion, its reproduction and to perform further transformations.

The activity is distinguished from hunting (the exploitation of products
from non-domesticated animals) in a number of ways. First, the forms in which the energy converted from vegetable matter can be used is much more varied (i.e. draught power and manure). Second, greater control can be exercised over quantity, location and occurrence in time. This greater intensity of production alone has significant consequences for the social and spatial organization of the human society involved. But the differences go far beyond this. Human skills and labour are applied in livestock production not simply to extract an “offtake” from an animal population which organizes its own reproduction. Instead they are applied to channel the energy conversion process and the reproduction of the herd or flock in ways specifically designed to achieve a required set of products and effects. They will also be applied to producing and maintaining the pasture or other vegetable foods upon which the system depends. This is true even in systems depending on areas of so-called "natural" grazing.

The term "control" refers to the skills and labour involved in achieving production and also the social relations under which they are performed. This is obvious in the case of stock. Domestication implies that the animals are at the disposal of humans and thus constitute "property", though not necessarily private property. Control over grazing land and water is also a pre-requisite since the production process depends on continued access to these in sufficient quantities for the system to be maintained. This involves the safeguarding of access to such means of production by the livestock producing society and the institution of some method whereby they are allocated among groups within that society: whether families, clans or individuals. It also necessitates the organization and division of labour and the distribution of product to and effects arising from it. Finally, it requires some way of ensuring that available skills and knowledge are applied to the whole process and are transmitted. The process of production will be concerned not simply with current output but with the reproduction of pasture, livestock, labour and skills in the future. In the case of livestock, this is primarily a question of maintaining a sufficient stock of females, since normally relatively few males are required for reproduction.

The list contains only a few of the requirements necessary for the "technical" reproduction of livestock production systems; by themselves, they are insufficient to characterize even the simplest of these. While it is possible to imagine a society in which grazing land and livestock are held in common by all members, the labour organized and products divided through some form of communal council, I know of no such society. In reality, control over livestock generally rests with families (though varying greatly in type and internal organization), and access to livestock is
usually very unevenly divided. This raises a number of questions of political and economic organization. How shall grazing land be allocated? On what basis are stock and other forms of family property to be handed down to succeeding generations? How are those with insufficient herds to subsist? What sorts of transactions take place between families within the society or between different societies? What bonds bind families together to ensure long-term collective control over pasture and water and the maintenance of various other aspects of production and social life for which the single family is too small a unit? These questions will be deferred for the moment in order to consider the production process "proper" in more detail.

The labour and skills needed in livestock production can be divided very roughly into two parts. Some labour is primarily devoted to reproducing (and expanding) the herd or flock or the size and conformation of its members, while the purpose of other forms of labour is to realize the energy converted by the animals into a product or effect. This includes slaughtering for meat, milking, collecting and using manure, training, guiding and controlling work oxen. The ways in which the two forms of work are performed will be related to one another in that the sort of products required from domesticated animals will be among the factors which determine how they are kept. An emphasis on meat production implies a different process of breeding and culling than would emerge if milk was the primary product required, since in the latter case, the emphasis is on females as direct rather than indirect producers. Similarly the type of meat required will be among the factors determining how stock are kept and fed. For example, the precise specifications imposed by marketing authorities for meat in Western Europe, require a precision in feeding which could hardly be achieved in the absence of purchased feeds (especially for pigs and chickens). On the other hand, where oxen are kept for draught, this implies a system of mixed farming in which the stock will be kept differently than would be the case in a pastoralist herd, mainly aimed at producing milk for subsistence.

In the case of feeding and water, the major requirement is access to land (or to its products in the case of stall-fed cattle). Where rainfall and thus the availability of grass and surface water are seasonally variable, it is important to stress that this means year-round access (though not necessarily exclusive access). The same land need not necessarily be available or used throughout the year. In fact, there may be risks of disease or other factors which prohibit this.

A variety of other requirements for livestock production fall under the general headings of husbandry skills and veterinary medicine. Discussion
of these is complicated for they take very different forms in different systems of production. Roughly speaking, the less "developed" the society and production system, the greater the degree to which they are embodied in knowledge and skills. Thus, the survival of herding societies in the drier parts of East Africa depends in no small measure on the knowledge of people about grazing lands and water, combined in a rough but purposeful geomorphological model. The skilled herdsman learns a number of crucial husbandry practices which are just as important to the health and survival of the herds as are the drugs provided by the veterinary service. These may include practices (like selective grazing to reduce tick-infestation) which are scarcely even known to outsiders calling themselves "experts". Most pastoral peoples rely on an extensive pharmocopia of plants and other natural substances to cure disease. At least some of these remedies appear effective and most plants are free if they can be identified and found.

The process of "development" usually leads to an advance in the skills available for husbandry and treatment of disease. But it also involves a process of separation from the herder and in many cases, their embodiment in specific products like drugs. This may emerge at a very early stage, for example, when ritual and herbal specialists start to monopolize the knowledge of healing plants, thus increasing dependence and the opportunity for social control. It is taken very much further with the introduction of modern drugs, acaricides and feeds, for control of these is external to the livestock production system. The subsequent dependence can be illustrated by a dramatic example from Dar es Salaam when in 1976 large numbers of chickens died because of toxins in the feed supply. Less dramatically, but more commonly, the dependence is demonstrated by the vulnerability of poultry producers to disruptions in the supply of feedstuffs and dairy producers to breakdowns in the efficacy of dipping against ticks.

In the remainder of this chapter I shall look at some of the more significant developments and processes of change which have occurred in various systems of livestock production and especially at those occurring with the development of capitalist agriculture. The purpose is to provide a schematic overview as a context for later discussion of specific developments.

Most herding systems start out on the basis of some form of scavenging. Stock graze, browse or scavenge in the narrow sense on pasture land or crop residues not required for other purposes. In purely pastoral societies there will be no alternative use of land, except perhaps for hunting. In cropping societies this usually means that grazing or browsing is allowed
on "common" land that is separate from crop land and on stubbles and crop residues in fields or refuse around the homestead.

It is misleading to speak of pasture lands as being "natural"; almost all grazing land in tropical Africa has been created by man, mostly through burning the bush and forest. Over time, pasture land as well as cultivated land must be defended against encroachment and regeneration of forest, wild fauna and tsetse-flies.'

Livestock are kept for a variety of purposes, though these are limited in this type of economy and society to directly usable products of the live animal (milk, eggs, wool) or its carcase (meat, fat, hides and skins, feathers, horns), or to directly realisable energy as beasts of burden. This form of production will change in response to two sorts of pressure; pressure of population on the land and pressure to produce a surplus over consumption requirements. The first of these should not be thought of simply as population growth. Exclusion of herders or other agricultural producers from land by European settlers, or their "compression" within a given area by martial neighbours, lead to increased pressure on land without any necessary increase in overall population. Similarly, pressure to produce a surplus may take a number of forms which have very different results. It may arise through an internal redistribution of produce related to the production of a "normal surplus" for insurance against subsequent poor harvests or droughts. Or it may take the form of an enforced extraction (or tribute) by a ruling class. It may result from the development of markets in which the "surplus" is exchanged for commodities which gradually come to constitute an essential item of household consumption.

One effect of pressure on land is to bring different systems of production and producers into direct competition. This implies that, where land can be used for either stock or crops, choices have to be made as to which should be produced. At the same time, under the spur of pressure on land,

' See Ford, 1971.
2 Most of the areas in pre-colonial East Africa where intensive forms of agriculture (like irrigation, erosion control and use of manure) were found, come under this heading. For examples, see Ludwig, 1968, on Ukara; Allan, 1965, for a number of systems; and Raikes, 1975, on Iraqw.
3 This is the term used by Allan, 1965, for production in excess of the subsistence requirements of a normal year in order to make sure, so far as possible, of having enough to eat in years of drought or other shortfall.
4 I have put the word "surplus" in inverted commas because, to the extent that produce is sold in order to purchase items of normal consumption or means of production, it can hardly be considered as surplus. Such production is commonly, but incorrectly, referred to as a "marketed surplus" – a usage which is sometimes hard to avoid.
techniques tend to develop allowing more intensive land utilization, often at the expense of increased labour input.\textsuperscript{5} This often leads to a greater integration between livestock and crop production. The grazing of stubbles and household refuse are examples of this, but stock (especially cattle) can also be used for ploughing and haulage and their manure used to maintain soil fertility. In addition, stock may be used to concentrate soil fertility, as when they are grazed during the day on common range land but stalled at night on the homestead and the manure used to build up fertility on the crop farm.\textsuperscript{6} In this way further livestock "products", power and manure, are introduced into the system but as means of production rather than items of final consumption. Associated with this trend is the use of products like leather as means of production as techniques advance.

Another effect of increasing pressure on land is that agriculture penetrates onto lands previously kept only for livestock. In some cases (as in much of northern European) this may not require major change in techniques of cultivation (though it may generate them). In other more marginal areas it may require the introduction of new (perhaps drought resistant) crops, irrigation or dry-farming techniques as well as changes in the production system to allow for fluctuating outputs by holding sufficient good year stocks to survive droughts.\textsuperscript{7} When previously common grazing lands are put under crops, usually by individuals, this will have major ramifications on the control of land and forms of land tenure.\textsuperscript{8}

One of the major productive advances of European agriculture illustrates this; the enclosure of common land and its use for the production of fodder crops. By providing a source of winter foods this made unnecessary the previous practice of slaughtering most stock in autumn and allowed a substantial increase in the livestock population.

\textsuperscript{5}See Esther Boserup The Conditions of Agricultural Growth. This very useful book provides an account of why and when agricultural producers are likely to innovate and to intensify their methods of production; a topic entirely lacking from "analyses" of innovation from the "diffusion of innovations" standpoint.

\textsuperscript{6}For a brief account of one such process, see P.L. Raikes "The Production of Coffee in West Lake Region, Tanzania", 1976. More detailed accounts can be found in Friedrich. 1968: and Rald. 1975.

\textsuperscript{7}Such forms of production also require means of storing produce or forms of market exchange which allows the transformation of the product into money or storable forms of value.

\textsuperscript{8}In Europe this involved enclosure of common (grazing) land. In East Africa, though pre-colonial tenure systems differed widely, it was usual for grazing land to be held and used in common, while crop land was worked by households, though not under private ownership. The notion of private property in land was normally lacking since the society retained control over its re-allocation. But there are many exceptions to this rough generalization.
This in turn increased the production of manure which, combined with the introduction of new crop rotations incorporating fodder, increased grain yields.

Of course this was not the first use of fodder crops and manuring, which had been practised in many parts of the world and was established in at least one part of Tanzania long before the colonial period. But the problems of introducing systems based on stored fodder are rather different in tropical Africa from those of northern Europe. In the latter, vegetative growth ceases during a wet cold season, which aids the storage of fodder and encourages the concentration of livestock within easy reach of it. In East Africa, the season of shortage is hot and dry, crop wastes and grasses become too fibrous to be palatable or nutritious, while the problem of storage is complicated by the fact that both water and grazing are in short supply.

But there are other reasons for the failure to integrate livestock and cropping systems more closely in contemporary East Africa, for the level of integration at farm level has declined elsewhere as well. In part this arises from a still greater degree of integration into commodity production. In rotational systems of the sort described above, livestock and cultivation are complementary and bound by the necessity of exchanging fodder for manure.

In systems involving purchased feed, crop rotation may be retained but is not a necessary aspect of the system of production. With rising labour costs and the development of chemical fertilizers, the use of farmyard manure has declined in importance. Crop yields and land rents have increased considerably, while crops and livestock have increasingly become competitive rather than integrated production processes.

As Ray Crotty has pointed out in a recent book, these developments have generally gone hand in hand with the achievement of a certain level of non-agricultural production and increased incomes (or income differentiation). Not only is this necessary for the production of fertilizer

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9 The best known case is Ukara Island in Lake Victoria (Ludwig, 1968) which was already supporting populations thought to be over 500 per square mile in the late nineteenth century. These were maintained through strict conservation of fodder, use of animal and human manure and complex crop rotations, all of which required a very long working day simply to maintain subsistence.

10 In the previous period, it also made the storage of livestock products much easier since this had mainly to be done during the winter.

11 So long as crop rotation includes fodder crops or pasture leys, the element of integration remains. But, at least for tenant farmers, market forces impinge and determine the pattern of production in a more direct and detailed way than was previously the case.
but also because this form of production requires an increase in the price of livestock products relative to those of grains and other crops. As he shows, the price of beef, relative to that of wheat rose in English cities from about 4.75:1 in the early nineteenth century to about 12:1 by 1966. In Ireland, the increase has been even more dramatic, from 2:1 in the early years of the present century to 17:1 in 1976.\textsuperscript{12} If one takes maize (as the most important staple crop in East Africa), the corresponding proportion for Kenya (1977) was between 5:1 and 9:1 and in Tanzania (197617) between 3.5:1 and 4.5:1.\textsuperscript{13} Though somewhat rough, these figures do suffice to show that East Africa has rather low meat prices in relation to major staples. One cannot propose any single proportion as being indicative that feeding is worthwhile, since various other costs of production must also be considered. However, since the conversion of vegetable protein into flesh is normally at a rate of 9:1 or more, one can propose that this ratio represents an absolute minimum.\textsuperscript{14}

The use of purchased feed is by no means the only innovation in livestock herding which has accompanied the expansion and generalization of commodity production and capitalist farming. Specialization and stratification have also been extremely important. Beef and dairy production are generally separate operations in commercial production systems, though there will be some integration between the two through the sale of male calves from dairy herds for slaughter or fattening. The transfer of female calves from beef to dairy herds is much less common since the characteristics of beef and dairy animals differ considerably.\textsuperscript{15}

Stratification is the separation of either beef or dairy production into different types of production unit, according to climate, land type, population density and land price. The latter are affected not only by the quality of the land and the climate but by the economic distance from market and consuming centres.\textsuperscript{16} Stratification refers both to the method

\textsuperscript{12} Crotty, 1979.
\textsuperscript{13} These figures are for producer price, while Crotty's are for consumer prices, presumably because producer prices are harder to come by for the earlier periods. In any case the producer price ratios for East Africa are not substantially different.
\textsuperscript{14} One must however take into account the value of by-products (bran, hides, offal etc.) which is not included in the above.
\textsuperscript{15} There are, of course, "dual purpose" cattle and a range of "dual suitability". Some efforts have been expended in Tanzania, in an attempt to develop a suitable dual-purpose improved zebu animal for African farmers (see 2.3).
\textsuperscript{16} Economic distance concerns costs of movement between two points and is thus measured in transport costs rather than miles. For example, of two areas equidistant from a given town, the one on or close to a railway line will usually be less than half as "economically far" from it as the other.
of production and to the product itself, the two being closely related. In areas of low potential or far from markets, one finds more extensive methods of production, based on natural grazing. Dairy output tends to be directed to lower priced products like hard cheeses or powder milk. The seasonal flush of produce is therefore transformed into more storable forms in areas of marked seasonality in rainfall and milk production. Extensive beef ranches may also transform a seasonal surplus into storable form producing various types of canned meat using relatively low grade beef. At the same time, since the product is autoclaved at high temperatures, it avoids the need for strict health controls when the product is intended for sale in markets where restrictions exist.

Production of beef for fresh meat can be both stratified and vertically integrated. Extensive ranches breed animals which are sold as immatures for fattening before slaughter in areas of higher rainfall and pasture quality and/or areas closer to markets. Depending on the relative prices of land and purchased feed, the latter will use various combinations of pasture, produced fodder and purchased feedstuff. At the extreme end of this scale is the feedlot in which almost all feed is purchased and the stock kept in confined conditions to prevent their losing weight and (beef) condition through excessive movement. In some cases, a three stage integration is found in which immatures are sold first to fattening ranches and then to feedlots or final fattening ranches close to the slaughterhouse, where they can be "finished" (i.e. fed to peak weight) before slaughter.

Similar types of stratified, integrated and specialized animal production are found in the production of pigmeat, eggs and poultry meat and for the production of veal. These perhaps represent the ultimate in "factory" production with breeds of animal which would be entirely unviable outside their confined environment, kept "healthy" through massive doses of medication and with all emphasis placed on the most rapid possible throughput. In this way, "maintenance costs" of feeding are reduced to a minimum and the conversion ratio from vegetable to animal protein and energy substantially reduced. At the same time, this produces a tender, though somewhat tasteless, meat through which the flavour of feedstuffs or medication may be noticeable if great care is not taken."

One can summarize some of the more important aspects of this development process as follows:

17 The pros and cons of such systems will not be considered in this book since, with the exception of some deep-litter poultry production, they are not yet found in East Africa.
a. Over time, there has been a change from natural grazing and scavenging of waste to the production of fodder and finally to the use of purchased feed. This process demands increasing inputs of labour and means of production such as fencing, farm buildings, mechanization and chemicalization of the agricultural process and use of medicines.

b. There has been increasing separation of different types of livestock and production; from the mixed herd of multi-purpose animals to specialized meat production distinct from that of (say) wool, eggs and dairy products. This is normally accompanied by specialized breeding and the development of specific production and management techniques.

c. Stratification occurs within particular lines of production. The example of this noted above was stratification within a single country and sector. Increasingly such stratification crosses national borders with particular forms of livestock production, such as canned beef or leather production situated in countries where labour costs are low and in areas where land is either "free" or cheap.

d. As the dominance of the market grows, there is increasing concern to maintain a steady flow of fresh (or frozen) produce or, where seasonal variation is most marked, to transform the cheaper products into more storable forms.

These relate in a variety of complex ways to other processes:

e. Technical advance – The technical complexity of the overall process tends to increase with specialization, but this does not necessarily imply that the skills required of the livestock producer increase, though they will inevitably change. To take one example, the "traditional" herdsman, without access to modern drugs, may have to exercise more skill to ensure the health or even the survival of his (or her) animals, than does the modern farmer who can rely on drugs and on vets to prescribe and apply them.\(^{18}\)

f. Integration of the production process – This is a complex subject not easily analysed in terms of trends since one must also take account of the specific forms of integration. From one angle it might appear that the four-course rotation with fodder crops and manuring represented the

\(^{18}\) To an increasing extent, recent studies in veterinary epidemiology and management make clear that management of a herd is still a vital aspect of disease control.
high-point of integration between cattle and crop production. From the point of view of the farm as the operating unit, this has some plausibility. Systems that have developed more recently, however, are integrated into larger economic units, and not simply "the market" considered in general. To an increasing extent, it is the abattoir or dairy which is the most important unit of production, since it can coordinate and control the activities of its component livestock producing units through delivery contracts, regulations as to weight, conformation or quality and health of animals delivered. At the same time, the livestock producer is increasingly dependent upon various sorts of infrastructure, both state and private, in the form of veterinary services, produce collection and transport. (S)he is also, of course, dependent on national policies with respect to export promotion, protection from imports, price support, etc. Though under the heading "integration", important questions can be raised, they can only be discussed at such a level of generality as to be virtually useless. Nonetheless, such factors evidently have a bearing on the way in which particular production units operate.

g. Scale, Specialization and Organisation of Labour – Integration of the production process by large processing units, necessarily implies an increase in scale. This can also be seen at the level of the individual production unit. Several factors account for this trend. With higher income levels in those countries where the most advanced means of production have been introduced, larger production units are necessary to maintain a "normal" standard of living. Fixed costs of production have risen greatly as a result of mechanization of feeding and milking, disease control, and the provision of housing for stock. Through competition, larger and more technically advanced producers drive land prices up or product prices down, thus forcing others to follow suit or to go out of production.

Associated with the increasing scale are changes in labour input and organization. Smaller producers are driven out of production and are thus "available" as wage labour for larger producers (though mechanization and increased scale normally implies that far fewer are required than are extruded). The low demand for labour is not a "technical necessity" of advanced production, (cooperative or communal production can achieve a similar scale of enterprise), but it is overwhelmingly the most common in capitalist agriculture. There is a tendency towards greater separation between owners and those who work for them on a wage basis; though in some branches of livestock
production (for example dairy farming) the owner-operator may still employ only part-time wage labour even in the most advanced economies.

This process leads to the development of a complex, multi-stage hierarchy of production in which the owner of an individual production unit usually hires some labour, but is himself subject to control by a large processing unit to which his produce is often contracted. This is not simply control over the final product; or rather, because of the degree of control over the quality of the product and the timing of deliveries, it amounts to substantial control over the entire production process. The production unit will also be dependent on deliveries of feedstuff, drugs and equipment and usually credit from financial institutions.

h. Market Dependence – with the increasing integration of the system of production, dependence upon market prices and terms of exchange steadily increase. In the least commercialized systems aimed mainly at the production of "subsistence", there will still be a need to allocate land, means of production and products between different people. There will be certain preferences for different products and effects but only with some straining (and, I would argue, only with severe distortion) can these be represented in the form of rates of exchange. There will certainly be social pressures acting on individuals and families to produce and behave in accordance with social norms. But this can scarcely be considered market determination.

When one considers the "modern" livestock producer, the situation is entirely different. As in the former case, consumption requirements are determined by various necessities imposed by living and producing in a particular society with an accepted pattern of consumption. But unlike the subsistence case, they are expressed almost entirely in the form of purchased items. Usually steadily increasing production costs in money terms have to be considered. Finally and perhaps most importantly, there is the rising value of land. All these factors severely constrain the ability of the producer to deviate from the most "economic" methods of production.

Market forces constraining the activities of individual producers are not "impersonal" or neutral in the sense that they emerge simply from the celestial workings of supply and demand. They are subject to political pressures of various sorts, monopoly powers and tariff protection – as the beef and butter mountains of the EEC make abundantly clear. Owing to these sorts of pressure the process
described above may be modified; small, inefficient producers are not necessarily "extruded", as the survival of peasants in southern Germany and France makes clear. The processes by which capitalism in agriculture advances are complex and livestock production is certainly no exception to this.

Livestock Development in East Africa
Since much of the above discussion concerned processes of technical advance originating in western Europe, it is necessary to point out certain major modifications which can be expected under the climatic, economic and social conditions of East Africa.

1. Seasonality – In northern temperate climates, the main shortage of pasture occurs in winter, when the weather is cold and water shortage poses no problem. The need to store fodder and provide shelter, tends to lead to a spatial concentration of livestock. In the drier areas of East Africa, the seasons of pasture and water shortage coincide, but since the weather is hot, fodder conservation is much more difficult. The stock have to converge on the limited supplies of water (available only at particular points in space). This intensifies pasture problems, since the grass is most scarce and should, other things being equal, be grazed in a more dispersed fashion. Even if the problem of fodder conservation could be overcome (work has scarcely even started on this for range cattle) there is no guarantee that it could be provided at the same place as the water.

In response, pastoralists operate a spatial rotation on the basis of transhumance or the movement of stock between different grazing grounds. But at present, this system is breaking down in number of areas because of the alienation of dry-season grazing and water reserves and the break-down of social norms which previously controlled such movements.

2. Disease Control and Common Grazing
East Africa is afflicted by a very great number of livestock diseases. These include infectious diseases and others transmitted through the common grazing of pastures, and the spread of secondary hosts of the organisms concerned. Since it is neither feasible nor desirable to eliminate common grazing, this means that the problem of disease control is necessarily the concern of larger groups of herders than would be the case (at least since enclosure) with the segregated herds of most temperate countries. Among the major obstacles to the achievement of greater control has been a tendency by the authorities to see the problem as one of "policing" and thus as a set of regulations to be imposed upon herders. This derives in part from the fact that many disease control measures were originally
designed to prevent the spread of disease from local zebu herds to European owned cattle, with little regard for the former. Though this is not to deny the difficulty and complexity of the problem.

3. Problems of Phasing – In northern Europe in the past the only way to increase soil fertility was through the integration of crop and livestock production and the development of practices such as crop rotations and the spreading of farmyard manure. Now fertilizers and purchased feeds are available and make possible the development of a non-integrated structure of production. Only a single product need be considered; its insertion within an overall system of agriculture can now be ignored. This is particularly evident where food crop production is concerned, which extension agents are inclined to see as "non-income producing" and therefore of lesser importance than, say, dairying. In other cases, there is a tendency to consider that because the milk output is required by a processing plant, this must necessarily be the most important use to which it could be put. This milk might have given greater benefit if used for feeding children in the production area. The central point to stress is that while the use of purchased inputs leads to a greater degree of integration of the productive process at the market level, at the same time it facilitates dis-integration at the level of the primary producing unit.

Chapter 2.2: Pasture and Water

There is no such thing as "natural" pasture; virtually all the land used by grazing or browsing animals has been subjected to control by man. These activities may be aimed at transforming land into pasture or, alternatively, at maintaining it as such.'

Under the former heading comes the use of fire, one of the earliest and most effective aids to agriculture, yet one of the most neglected by experts in "modern" agriculture. Fire is used by livestock herders for many purposes. It can be used to clear trees and scrub and so allow the growth of an improved sward of grass. Burning can destroy the habitat of tsetse-flies, other insect pests or vermin. Fire may also be used to alter the state or composition of existing pasture, as when pastoralists burn grass which has

1 Ford (1971:p482) indicates that "it is now widely accepted that, with the exception of some flood-plains, natural climax grassland did not occur in tropical Africa and that the "natural vegetation" was almost everywhere ungrazeable and tsetse-infested woodland". From this it follows not only that pasture resulted almost everywhere from the actions of man but that, in most cases, cultivators would have been those to perform the initial clearing.
become too fibrous to procure the growth of a "green flush" of more nutritious and palatable grass. Fire may also affect the range as a by-product of burning for other reasons to drive wild animals for hunting clear land for cropping. The effect will vary according to the time of year at which it is done as the degree to which the vegetation cover is destroyed will depend upon the temperature and moisture content of the air, the amount of combustible material and on the speed and direction of the wind.

Control of grazing is the single most important means to maintain a pasture. Grazing land consists of an association of grassy and other plants whose precise composition depends on factors such as climate, soil, and land. Ecologists have used the convenient, though often misleading term "climax" to refer to the vegetation cover that finally develops in a specific area, given time and lack of disturbance. In "naturally" forested areas, the progression after cessation of cultivation may be from grassy species, through scrub and bushes to larger and slower-growing trees, with each stage providing the conditions for the development of its successor until the "climax" is reached. Where the "natural" or "climax" vegetation is savannah, the progression will be in terms of different types and associations of grasses. Among the factors affecting the types of grass found will be the degree of past cultivation (as this alters soil structure and nutrient composition and favours those grasses, weeds, which can compete with cultivated plants), fire and the grazing or browsing of livestock. Cattle (especially zebus), sheep and goats are selective feeders taking only those species they find most palatable. Over-grazing will tend to reduce the proportion of these species in the pasture. At the same time, the stock trample the ground with their hooves and can destroy the grass-cover in the process of grazing. This reduces the ability of the land to withstand wind or rain erosion. Once again, the precise effect of heavy grazing will vary according to the time of year at which it occurs.

While the ill-effects of over-grazing are well-known, "under-grazing" though seldom mentioned, may have effects which are equally serious. "Under-grazing" can lead to a reversion of rangeland to bush or forest vegetation in which grazing becomes entirely impossible either because the dense vegetation precludes the growth of grasses or because tsetse-

The term "climax" is misleading if used to imply the reversion of the land to some "natural" state. (See note 1) One authority goes so far as to say that the falsity of this conceptualization makes generalized maps of tropical vegetation "as false as the mediaeval maps which filled in unknown areas with mythical monsters and one-legged or two-headed men" A.S. Thomas "Ecology and Human Influence" in Davis and Skidmore (eds) 1967.
infestation makes the area uninhabitable to man and cattle. One reason
why under-grazed land is a less remarked phenomenon is that while
overgrazed range still remains identifiably pasture, range which has
reverted to bush and forest comes under a different land-use classification.
The causes of the two conditions are asymmetrical. Overgrazing is
"caused" by attempts to pasture too many cattle on too small an area (the
reasons for which then have to be considered). "Under-grazing" by
contrast, does not arise from having too much land to graze, instead it
occurs because herders previously grazing the area have been moved out
for a long enough period for bush regeneration to get started. Or a massive
loss of stock due to some disaster may leave the range ungrazed for a
sufficient period for the same to happen.

The impact of under-grazing can be pursued a little further. It was
mentioned above that use of the concept "climax" vegetation can be
misleading if too rigidly applied. Use of the term can easily lead to an
implicit supposition that vegetation patterns always tend towards some
fixed characteristic association of plant types, be this forest, savannah or
some intermediate type, determined solely by soil and climate. In reality,
this is not true; there have been a number of major irrevocable changes in
vegetation within recent historical periods.

This is particularly the case in Tanzania in which climate and soils can
support vegetation patterns which vary considerably in their openness and
suitability for pasture. To a very considerable extent, the pattern emerging
depends upon human and livestock densities and upon land use. This is
ture to a lesser extent in Kenya where the ranges of climate and vegetation
are much greater than in Tanzania, the gradations sharper and the
proportion of "intermediate" land smaller.

"The actions of man" should not be defined narrowly to include only
the activities of the herder to improve or maintain pasture. The different
forms of social relations which occur in different groups of people (and
which relate to the forms of production in which they are engaged) will
affect both the size and composition of their herds and the way in which
they are pastured. It will also affect the relations between groups of people
who may be competing for or sharing the same grazing areas. Finally, as
Ford shows, the impact of colonial incursion and related disruptions of the
existing system had an immense impact upon grazing practices and
pastures in almost every part of East Africa.

**Dry Season Grazing Reserves**
For livestock to subsist without supplementary feeding (for example from
crop residucks) or piped water supplies, the rangeland must be capable of
supplying herds with their feed and water requirements on a year-round basis. Many of the livestock in East Africa (and almost all of those kept by pure pastoralists) inhabit areas where rainfall is low, variable and seasonally concentrated into a few months. The major problem for these herders is to find enough water and grass for their animals at the end of the dry-season. This seasonal stress leads not only to loss of weight and sometimes starvation but to a general lowering of resistance which leaves the stock more vulnerable to disease.

Among all transhumant pastoralists and man) other herders, the answer to this problem is to maintain "dry-season grazing reserves". These are commonly areas of slightly higher rainfall, often on the slopes of hills which are so situated in relation to prevailing winds and monsoons that they catch most of the rainfall. The requirement for an adequate dry-season grazing reserve is that it should have enough drinking water for the needs of the livestock and sufficient grazing within reasonable reach of this water. Specific conditions vary greatly. The water may lie far below the surface and so have to be drawn up from wells. "Adequate" reach may in reality necessitate travelling such great distances that the stock can only be watered every two or three days. But whatever the specific characteristics of the dry season grazing area, its purpose is to allow life to continue during the latter part of the dry season.

For such an area to exist, some system of discipline and grazing control must be practised during other times of year so that herders do not use up the pasture. Such controls take a variety of forms. In some cases, they are expressed in "custom"; that it is normal to move to a particular area on, and not before, a certain date or change of weather. In other cases, more formalized prohibitions operate, whereby certain areas are not available for grazing until elders or ritual specialists have given their permission. Competition over dry-season pasture and water will evidently represent a focal aspect of inter-group relations and figure prominently in treaties or alternative) lie at the heart of conflicts. In a number of cases, the dry-season part of the transhumance cycle brings pastoralists into closer contact with cultivators than during the rest of the year. Sometimes conflicts result, but by no means always. Relationships may be recognized as symbiotic and be cemented with an exchange of products or an energy exchange as the cattle graze the stubble in the cultivators' fields and return manure.

In some cases the cycle of transhumance is determined not only by availability of pasture and water but also by the varying seasonal patterns of disease.

Maasai herders living around Monduli in northern Tanzania, use dry
season grazing reserves situated on the southern and eastern slopes of Monduli Mountain, where the rainfall is considerably higher than on the surrounding plains and where there are permanent streams. The people move down into the plains shortly after the onset of the rains, not only because this helps preserve the grazing in the highlands but because the tick population increases substantially with the rains. Since the breeding cycle is timed so that calves are born at this season, the people wish to reduce the likelihood of their catching East Coast Fever or other tick-borne diseases."

The dry-season grazing reserves are the most vulnerable part of the pastoralist production system; their loss would make large areas of rangeland unsuitable for herding. But they are also vulnerable for another reason, as they are most likely to attract the attentions of cultivators whether local or foreign.

Since the beginning of the colonial period, the pastoralists of East Africa have seen their grazing lands greatly reduced by the spread of settlement onto their dry-season grazing reserves. This was the case in large parts of the "White Highlands" of Kenya, as evidenced by the predominance of Maasai, Nandi and other pastoralist place-names throughout the area.4 The effect was to force these people to restrict their movements to less fertile and drier parts of their previous domains, where attempts to maintain previous levels of stock led to overgrazing.

The direct alienation of grazing lands by European settlers was far from being the only effect of colonialism. The colonial governments changed the existing balance of power between pastoralists and local cultivators, usually to the benefit of the latter. One major reason for this was that greater stress was placed on cash crop exports than on livestock products. This was probably more marked in Tanganyika than in Kenya, because of the greater emphasis on African peasant export crop production and the larger area of land suitable for either annual cropping or herding. The pressure took two forms. In some cases, cultivators moved, with tacit or explicit government approval, into the dry-season grazing areas of neighbouring pastoralists. Almost all the major wheat-growing areas of northern Tanzania had formerly been grazed by Maasai or Barabaig pastoralists.5 In other cases, herding peoples themselves increased their

3 It seems highly likely that this pattern has changed now that the area comes under the Komoionik Association Ranch as part of the Masailand Range management and Development Programme.
4 For example, Nairobi, Laikipia and Uasin-Gishu and many others.
5 West Kilimanjaro was once a grazing area of great ritual importance. Mbulumbulu was used by Maasai for dry-season grazing until the mid-1930s, when it
areas of cultivation to such an extent that insufficient space remained for livestock. This led to overgrazing or to attempts to establish new settlements, often in previously tsetse-infested areas. This trend has probably accelerated since Independence, especially in Kenya.

The above account is not intended to read as a romantic lament for the passing of pastoralist systems. Most of the agricultural systems which have replaced extensive herding produce more, whether assessed in energy or value terms. However, two points are worth making in summary. Although overgrazing is commonly attributed to increased levels of stocking, and these in turn to "traditional" irrationality, reduction in the effective size of the areas grazed is at least as important a cause. In a number of areas, it is not possible to provide for family subsistence without overgrazing.

The other point is more general. The penetration of those pastoralist areas which are usable for commercial ranching or crop production is still proceeding and seems likely to continue in future, possibly at an accelerating speed. This process has the full encouragement of the governments of East Africa. No scheme for the "preservation" of pastoral production has the remotest chance of succeeding except in areas of such low potential that there is no competition from other users.

Pasture and Water
If one may risk a crude generalization, while lack of water will kill stock more quickly than shortage of food, the latter is probably responsible for

was transferred to Mbulu District. Since the 1950s, it has developed into the largest single wheat-growing area in the country, though there is still hostility between the Iraqw who cultivate the wheat (and have their own cattle) and the Maasai. This erupted into raiding and shooting in which people were killed, as recently as 1976. The most recent area of wheat development, the area around Bassotu in Hanang District, was previously Barabaig range; these people also have lost large areas of pasture with the gradual encroachment of peasants from all sides (Kjaerby, 1976–79). For some years, policy-makers in the Ministry of Agriculture have been casting hungry eyes at Loliondo in the far north of the country (another Maasai grazing area) and it appears that all that is saving it from ploughing up for wheat is the lack of an all-weather road. I have no information for other areas of Tanzania and Kenya but no reason to suppose the process to be any less pervasive.

This can greatly increase the area available for grazing, as in the case of the settlement of the previously tsetse-infested and largely uninhabited east of Biharamulo District by Sukuma herders and cotton cultivators during the 1950s and 1960s (Raikes, 1976).

6 Livingstone, 1975, makes this point about Pokot. Peberdy (1969: 168) has this to say of the Turkana in Kenya “Their plight...is exceedingly serious. Their livestock resources are insufficient to maintain them and famine relief is becoming a regular feature”. Meyn (1970:10) cites a table indicating that among pastoralist societies in Kenya, the average holding is 2.64 head of cattle per capita, which is clearly insufficient to maintain life on a diet of milk.
more deaths. Inadequate feeding reduces the ability of the animal to withstand water stress, disease or the sheer effort of travelling long distances to food or water. Lack of accessible water for drinking will lead to the under-utilization of pasture and perhaps to bush regeneration. In this sense, the pasture is adjusted to the water supply. In the opposite direction, there is no comparable adjustment mechanism; indeed, the opposite tendency has resulted from policies for the installation of piped water. Where water supplies are sufficient for larger numbers of stock than the range can adequately feed, the result is a deterioration of the pasture which further increases the imbalance. This can happen even where the total supply of pasture is sufficient, if water outlets are so sited as to concentrate stock on certain parts of the range, which then become denuded of nutritious grasses, while the soil is pulverized by the constant passage of hooves. Although attempts may be made to restrict particular sources of water and land for use by certain herders, others will invariably migrate to the area, especially in years of drought. The water and pasture may therefore have to serve many times the number of stock for which they were intended. This is a problem seldom overcome, and it raises the issue of land tenure.

Land Tenure in Grazing Lands

With relatively few exceptions, grazing land in pre-colonial Africa was controlled by the herding society as a whole and not allocated among individuals or families. While the historical reasons for this probably have more to do with the necessity to remain a single undivided unit for purposes of defence and social reproduction, there are certain "functional" reasons why this should continue to be the case, apart from the continued reproduction of the various social mechanisms concerned. Among these is simply the fact that when herders have to move with the stocks between different seasonal grazing grounds, the definition of private grazing lands and paths between them, would become absurdly complicated. Moreover, given the lack of boundaries or any practicable means for specifying them in detail, this would become a fruitful source of internal social tension. Apart from this, it is often convenient, both for reasons of disease control and for economy of labour, to graze herds together.

It should not be supposed that "communal grazing" meant a free-for-

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8 While these are distinct from the common access of most grazing lands, they do not amount to private property, since there is no right of sale or transfer outside the society. How widespread this is, I do not know. It was noted in the case of the Iraqw (herders and cultivators) of Mbulu District by a District Officer that the system was "a very undemocratic one" (Raikes, 1975:Ch.5 Note 25).
all, in which anyone could graze any stock anywhere. Most peoples instituted relatively strict rules for the reservation of dry-season grazing areas, as mentioned above, while in some areas, wealthy cattle-owners could maintain their own private grazing reserves. There is some evidence to suggest that such land-use regulations operated by the herding societies have less force now than previously. This is predictable for three main reasons. First controls affecting grazing were developed when herding societies were sovereign. After colonisation their political leaders were subordinated to the superior authority of the colonial state and lost influence thereby. Since Independence, this trend has continued and leaders have suffered still further losses of authority and legitimacy. Second, far greater pressure has been placed on the systems by the reduction in rangeland and increases in stock numbers compared to the time when grazing regulations were first developed. Third, and perhaps the most important of all, the economic and political interests of former leaders have changed. Many previous political authorities are now proprietors of substantial economic assets. This is particularly marked in Kenya where this process has been actively encouraged by the state.

The most common complaint made about systems in which grazing land is held in common while animals are held individually, is that they lead to overstocking and deterioration of the range. The argument maintains that since no single herder can significantly alter the overall level of stocking by reducing his own herds, there will be no incentive to reduce total stock numbers. All stock owners will aim to increase their herds as rapidly as possible until the pasture deteriorates to such an extent that even a minor rainfall shortage can lead to catastrophe. It is claimed that in some cases the consequent erosion brings a permanent degeneration of the range from which it is unlikely to recover.

This argument cannot be dismissed lightly. It appears logical and can be substantiated by the evidence of widespread overstocking and range degeneration. Just the same, I shall argue that it is inadequate as a conceptualization; because its beguiling simplicity leads one to ignore certain other highly significant factors. To analyse overstocking adequately, one has to look in more detail at the ways in which shortage of land makes itself felt and at the pattern of herd composition and growth. The pattern that emerges depends on rainfall variability and disease as well as on choices made by herders whose subsistence is based on milk. The argument that I wish to advance is that periodic but irregular and unpredictable droughts kill off large numbers of stock through starvation, water shortage and lowered resistance to disease. In the aftermath herds build up exceptionally rapidly. This is because the most viable animals
have survived and owners make every effort to replace their losses. There is more grazing available per animal and the incidence of certain diseases, like East Coast Fever, is likely to be temporarily reduced as a result of the previous diminution in stock numbers and thus in the number of ticks. As a result, more calves survive to maturity.

This is not inconsistent with the argument about communal land and individually-owned livestock, but it does modify its conclusions in some important respects. The long-term rate of growth of the livestock population is likely to be rather lower than might be assumed by those who observe short-term increases after a drought. This is because calf deaths increase again after the initial "grace-period" and also because a larger proportion of stock is sold, once the required herd level has been reached (if it is before the next drought). There is confirmation from both Kenya and Tanzania that herd growth in recent years has been much more modest than had been thought for some time. Another modification that should be taken into account is that changes in the rate of growth of the herd derive in the first place from factors like the incidence of disease and its impact on calf mortality. Thus, a herd composition and breeding policy which produces a relatively low rate of growth at one period will lead to much greater growth at another.

Related to this is the concentration of stock ownership in most East African pastoral and other herding societies. In the simpler forms of the "communal land" argument, it is proposed that "the pastoralist" aims to maximize his herd because of lack of restraints, implying that in doing so, he is usually increasing the herd well beyond subsistence requirements. In reality, in areas like Turkana and Pokot, the average herd is barely capable of providing subsistence. In many more cases, there are great inequalities in ownership and most families barely keep enough livestock for subsistence. This seems to be as true of semi-pastoralists like the Sukuma and Iraqw as it is of pure pastoralists. This concentration is probably accentuated by the pattern of rapid increase in stock, followed at irregular intervals by drought and disaster. Larger livestock owners are better placed to withstand such stresses and when all else fails, can call in loans made to others, thus starting the subsequent period of growth from a firmer base.

To some observers, the implication follows that while most pastoralists are rational, the large stock-owners who build up herds beyond their subsistence requirements are irrational. This line of argument has been considered above and rejected. Suffice it to say that given current rates of inflation in East Africa, cattle or other stock can be seen as a superior store of wealth even in narrow economic terms. Furthermore, the ownership of
large herds gives access to political power through loans and various other patronage links; and more so than if wealth was held in money. Given the importance of government expenditure in determining local incomes and access to facilities like water, such political influence is far from insignificant.

This raises one other reason behind overgrazing. Pastoralists and other herders have seen their grazing grounds reduced substantially during the past fifty years, as foreign settlers, local cultivators and state ranches have moved in taking the better areas. Almost all these invaders have argued that the lands they took were "unused". Like most peasants, herders are accustomed to look for an ulterior motive behind government pronouncements; they assume that advice to de-stock masks an attempt to clear the land for other users. Maintaining large herds on the range is one way to make it more difficult for this to be justified. Where schemes are introduced to control grazing, similar pressures may operate in the period immediately before they are set up. It is reasonable to assume that regulations will require stock reduction in proportion to existing herd size, so that those who enter with the largest herds will remain the largest herders after destocking. In some cases, control of schemes is based on livestock numbers, which gives a further impetus to the build up of herds. Finally, where individual titles to grazing land are to be given out, as in some cases in Kenya, this will often be done on the basis of previous use. Since this is directly related to the numbers of stock held, there is every incentive to hold large herds to ensure large allocations. In short, the stock-owners who build up their herds are probably taking account of the future to a greater extent than their critics.⁹

While one can argue about the reasons for overgrazing, there can be little doubt that grazing and use of water must be controlled if livestock productivity is to be raised. Solutions derived from the standard argument have emphasized individual ownership of land, or the introduction of systems for the unified operation of the herds. The first was tried in Kenya’s Masailand shortly before and after Independence. Predictably enough, it led to the exclusion of a large proportion of the population as tracts of land were allocated to large stock owners. Since then, opinion has moved away from such schemes (though the private development of ranches still

⁹ In a different context, I have found this to be the case with cultivators in northern Tanzania. With the opening of new land for settlement, a number of rich peasants moved rapidly into tractor cultivation, this being widely held to be "uneconomic" and motivated by "prestige". In reality, with control of land based on user-rights, this was a most important means of securing access to land, even if cultivation did not always in the first instance prove profitable (Raikes, 1970).
continues) towards systems of group and cooperative ranching. These are considered in greater detail below, but one crucial feature is worth mentioning here. The setting-up of these schemes normally requires that a registered group is granted title to land. At first glance, this policy appears little different from pre-existing communal systems where all members of a society had rights of access to land. In fact it is fundamentally different. In the first place, the previous land right was akin to a citizenship right and not alienable. Registered title, just like any other form of private property, can be sold. This becomes significant when a group cooperative is formed, for it may then borrow money on the security of the land in order to undertake various improvements (though this is normally at the behest of the Range Management Division rather than the mass of the members). If the cooperative fails then its land can be taken in payment of these debts. How widespread the practice is, I do not know, but Livingstone cites at least one case where a group ranch passed into the hands of a private company because of failure to repay debts. In this case, it was probably significant that the directors of the private company included some of the larger cattle-owners from the area, who would presumably have been committee-men for the cooperative.

In Tanzania, freely alienable private property in land does not exist formally. Emphasis has been placed on the development of various forms of group ranch in which water and veterinary services are provided in exchange for agreement to limit stock numbers and follow certain prescribed practices. While relatively little information is available on the development of these ventures, they have not yet had a noticeable impact on the numbers or quality of stock sold (though given the problems of the marketing system, this would hardly be expected).

Chapter 2.3: Livestock Breeds and Breeding

Most livestock found in East Africa are small, hardy and relatively unproductive in terms of either meat or milk. These characteristics are closely inter-related since the existing herds and flocks have been selected by droughts, famines, and disease until only the hardiest remain. Size is closely related to hardiness for the smaller an animal the greater is the proportion of hide surface to weight and volume and thus the greater is its ability to withstand heat. There is some evidence pointing to a relationship between small size and disease resistance. The only cattle which have achieved some form of immunity to tsetse-flies and trypanosomiasis are
the dwarf cattle of parts of West Africa and the Zambezi Valley.' The relationship is symmetrical in that breeding or selection for increased productivity leads to some loss of hardiness. This highlights a point of crucial importance; there is little or no point in upgrading livestock unless the improved animals can be provided with adequate food and water and protected from disease far more effectively than is presently the case.

Apart from animals imported from Europe during and since the colonial period and their pure-bred and grade descendants, the cattle of east Africa are humped zebu and sanga; different types of the general group Bos indicus.2 By far the major proportion of these are zebras. The major concentration of sanga cattle has long been to the west of Lake Victoria, in Tanzania, Uganda, Rwanda and Burundi, where they are associated with the Tus/Hima aristocracies of the interlacustrine bantu kingdoms. During the period of the kingdoms, these "Ankole" cattle were bred as much for width of horns as for productivity and can still be found with spreads of over 6 or even 8 feet. However, in recent years, this breed has been losing ground to zebus even in its home areas, because of the greater productivity and disease-resistance of the latter.

Most zebu cattle in East Africa are humped animals with relatively short horns. Their liveweight varies between roughly 180 and 360 kgs, and the carcase weight or c.d.w. (cold dressed weight) is slightly over half of this. The killing percentage or dressing percentage (the proportion between liveweight and c.d.w.) is thus between 50 and 55 % in most cases.3 This compares with upwards of 450 kg liveweight, 250 kg c.d.w. and a dressing percentage of about 55 % for an improved zebu steer under ranch conditions. Exotic beef animals might range upwards from about 530 kg liveweight with a similar dressing percentage. As indicated by the figures for unimproved zebu cattle, an enormous variation is found among

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1 See Ford, 1971:484.

2 The two main species of domestic cattle are Bos indicus, humped zebu cattle, and Bos taurus, non-humped european cattle. The only cattle indigenous to Africa are thought to be long extinct, having been displaced by Bos indicus. This history is discussed briefly in Webster and Wilson (1966:30–29) and at greater length in Mason and Maule (1960:passim). The term "exotic", as used here, refers solely to Bos taurus, although it would be quite reasonable to include foreign zebu breeds like Sahiwal, Gir and Red Sindhi under this heading. The term "grade" cattle refers to crosses between Bos taurus and local zebu cattle, without distinction as to the proportion of local and exotic blood. Given the Mendelian probabilities, the appearance of grade cattle can vary from almost pure zebu to almost pure exotic.

3 These estimates have been collected from a number of sources, including Meyn, 1970, Ruthenberg. 1974. Meyn is probably the most useful single source.
animals depending on the sub-species to which individuals belong and the conditions under which they are reared. In general, the larger zebu cattle come from the drier areas inhabited by pastoralists. In Tanzania, the liveweight of Maasai cattle was said to be about 70 kg above the national average in 1964. The breed most favoured for ranch production is derived from the cattle herded by the Boran people of northern Kenya. That this is no accident or the result of natural conditions is attested by Jacobs, who records that in the pre-colonial period, the Maasai used to get their breeding stock from Boran. This exchange was prevented during the colonial period by the presence of a band of settler ranches between the two areas, across which the Maasai were not allowed to drive cattle. Jacobs also records that Africans were forbidden to purchase breeding stock at auctions in Kenya during the colonial period, even when they had the cash to pay.\(^4\)

Although weight at maturity is a convenient measure of productivity in terms of meat, it is not the only one, nor even necessarily the most relevant. Under commercial ranching conditions, the measure most widely used is weight gain for a specific period of time, since this relates the product more closely to the various costs of production. In general, the shorter the time taken to reach maturity and maximum weight, the lower the unit cost of production. This derives both from the reduction in variable labour costs and from the lower proportion of the feed intake which goes to maintenance. That is, a proportion of the feed intake of any animal goes to replace energy expended and to "maintain" the animal. Only feed above that ration contributes to weight increase. Since the total maintenance requirement is directly related to the time taken to reach maturity, it follows that reduction of the one reduces the other. In addition to this, the shorter the time taken to reach maturity, the more tender the meat is likely to be and the lower the proportion of hide, bones and inedible offals to liveweight. In high-income markets, tenderness commands a premium. This is not true, however, of low income markets in East Africa where the preference is for a stronger taste, which in turn is related to greater age. Apart from custom, one reason for this is that meat constitutes a smaller proportion of the total meal than among high-income consumers, so it and its sauce must flavour a much larger amount of staple food.

In general, zebu cattle take longer to reach maturity than \textit{Bos taurus}. Under ranch conditions, improved zebu cattle reach maturity and full weight at 3 \(\frac{1}{2}\) to 4 years\(^5\), while under similar conditions and exotic might

take up to one year less. But relatively few pure-bred exotics are kept for beef in East Africa, even on the ranches of highland Kenya, because of their much greater vulnerability to disease and heat stress. Under "normal range conditions", zebu animals may not attain full weight until 5, 6 or even 7 years of age and it is thought that most are not sold until they reach that age range. Among the reasons for this slow rate of growth is the shortage of pasture and water during the dry season which leads to considerable loss in weight. This is often followed by even greater loss during the early part of the wet-season from "unthriftiness" (diarrhoea). On the other hand, it may be argued that this last factor does not, of itself, have much impact, since the weight is rapidly regained in a good season. Experiments with supplementary dry-season feeding have not shown economic increases in overall weight-gain for specified periods of time.⁶ From this, it can be seen that efforts to persuade the herders of range-zebu cattle to sell their cattle at four years of age rather than six, are not likely to succeed. From the point of view of the livestock planner, lower weight at sale may well be compensated for by the reduced herd level and the larger numbers of cattle sold. For the range herder for whom the variable costs of herding one more animal for an additional two years may be minimal, the weight loss is likely to be important.

The difference between improved zebu animals and exotics is not enormous, so far as meat production is concerned and what difference there is, is outweighed by greater resistance to disease and other stresses. But the difference in milk yield is much greater. Estimates of the average yield of range zebu cows vary enormously and are usually based on only informed guesses. Moreover, the picture is confused by the number of different measures used. Figures expressed as yield in litres per lactation normally refer to individual cows and give the average daily yield of milk over the lactation period, roughly one year. The yield per cow per annum is usually derived from this by multiplying this figure by the calving percentage (the proportion of cows in milk) to give an estimate of the herd yield, including those cows which are not in milk. Some estimates refer to gross production, others halve this to get the proportion net of calf requirement (assumed to be roughly 50%) which can be consumed by humans or sold. Thus one estimate for Tanzania claims an average yield per lactation of 250–500 litres, which, with a calving percentage of 50–

⁶ Meyn 1970; 125–7. Supplementary feeding does lead to overall increase in weight gain, but not sufficient to cover costs. For dairy, however, it is much more likely to be economic, since the aim is to continue milk production through the dry season rather than to preserve the weight of stock which will probably be sold after the following rains.
55% reduces to about 125–275 litres gross and a net production in the region of 65–140 litres per annum. Another estimate, apparently based on a field study in Mara Region where yields are generally thought to be higher than average, claims a yield per lactation of 240 litres, reduced by a 57% calving ratio to about 137 litres, of which half is in excess of calf needs. Data for Kenya indicate similar orders of magnitude and variability. All agree, however, that the genetic potential of even improved zebu cows for milk production is not great under intensive conditions of rearing.

It is worth mentioning that this is not the experience in India, where quite highly productive dairy herds are composed of improved zebu cows of breeds like Sahiwal and Red Sindhi. This difference may be because relatively little attention has been paid to breeding zebu cattle for milk in East Africa. As dairying is a more intensive activity, commercial dairy farms can achieve better disease protection than ranches producing beef. As a result, European settlers were able to introduce a greater range of exotic breeds for milk production and crossing with zebus. The settlers saw little need for research to improve the pure-bred zebu. The best-known attempt to breed an improved "dual-purpose" (milk and meat) zebu animal is the "Mpwapwa breed", called after the livestock research station in central Tanzania where it was developed. This animal was bred for distribution to Africans, at a time when the introduction of exotic and grade cows was strongly discouraged. In consequence, it inevitably became associated with "second-best" despite being highly suitable for the drier areas where milk is produced for home consumption and sale.

There are basically four different ways in which the genetic potential of herds can be improved for meat and milk production; selection of the best animals in the existing herd for breeding; upgrading by cross-breeding with improved zebus; cross-breeding to exotic or grade cattle; importation and maintenance of pure-exotic herds. Since the first of these is commonly practised by most East African herders and the last restricted to a very few dairy herds in Kenya, the second and third possibilities are most relevant here. In general, upgrading with improved zebu animals is the favoured method for beef cattle and crossing with exotics or grade animals preferred for dairy production.

For most extensive ranches, the method used to upgrade is relatively simple. A herd of local cows is run with an improved zebu bull (say Boran,
Sahiwal, Red Sindhi or perhaps Mpwapwa) and their female progeny further upgraded in the same way. Once the herd has reached an acceptable standard, male progeny may be selected as bulls for further breeding. The degree to which any herd of cows or heifers is put to a specific bull of particular breed will depend on the level of management, including the degree to which the pasture is divided into paddocks. In some of the more intensive ranches in Kenya, more complex systems of crossing may be adopted. This can involve exotic crosses and the selection of a homogeneous foundation herd of cows produced by strict selection within the breeding herd and with testing of the progeny of particular crosses or even particular sires and dams. In such cases, breeding stock to supply other ranches often becomes the major purpose of the herd, rather than direct production of beef, except from those animals which are culled from the herd.

These breeding farms allow ranches to operate on systems of "commercial-crossing" in which the breeding animals are all pure-bred; the same cross being made each time and all the crossbred progeny sold for slaughter. There are two and three-way variants of this system. One alternative is "crisscrossing" in which the sire breed is alternated by generation and the crossbred dams used for further breeding. This also has a rotational variant in which more than two breeds are used. The advantage of the former is that it appears to achieve higher productivity, though at the cost of buying in breeding stock or maintaining a separate breeding herd, both of which are avoided in the latter system.9 The latter is, however, much disliked by those concerned with scientific breeding since it makes statistical progeny testing almost impossible. Most ranches in East Africa operate at lower levels of intensity and have simpler breeding programmes aimed at upgrading to improved zebu standard. The most popular breed for this purpose is Boran, though Mpwapwa breed achieves similar results.10

Upgrading for dairy production is done almost entirely through crossing with exotic breeds or grade cattle. The major distinction is between the use of bulls and artificial insemination (A.I.). It is in this area of livestock production that the most marked differences between Kenya and Tanzania are found. During the colonial period a substantial dairy industry was developed in Kenya by Europeans on the basis of grade and exotic cattle. Although initially Africans were barred from participating,

10 Meyn 1970:155. Meyn has a number of other tables showing weights of different types of cattle at various ages and under a variety of rearing conditions.
once restrictions were relaxed there was a substantial foundation from which they could develop. The settlers had sizeable numbers of cull cows for which they could get better prices from peasants than for slaughter. The rapidity of growth in peasant dairy production is indicated by the fact that of an estimated grade dairy herd in 1962 of some 330,000, all but a few thousand were on large farms. By 1974, an estimated 1.5 mn “improved stock” were owned by peasants, of which 0.6 mn were cows.” Up to the mid-1960s, this growth was achieved primarily through transfer; peasants purchased cows and in-calf heifers, though some use was made of grade bulls and A.I. In the late 1960s, A.I. developed more rapidly, especially after 1970 when a relatively large-scale SIDA programme was initiated. At the same time, the price of an insemination to the cow-owner was reduced from an already subsidized rate to a nominal 1/-.

The number of inseminations has subsequently increased rapidly; by 1973, some two-thirds of the small-holders in areas considered capable of supporting grade dairy stock, had access to A.I. However, the precise contribution of A.I. to the growth of the grade herd is less certain. The same source indicates that in spite of this availability, the bulk of grade calves were still produced by grade bulls in natural service and that only 15 % of inseminations were carried out on zebu cows.

In Tanzania, the development of dairy production and upgrading of cattle is much less advanced. One recent estimate put the total number of grade dairy cattle in the country at about 29,000 in 1977, of which about 50 % are held by small-holders, mainly in the Kilimanjaro area. However a more detailed study of the Kilimanjaro area in 1973 found the population of grade dairy cattle to be 88 % higher than that given in the above source, from which one can reasonably assume that the current population could be as high as 35–40,000 in all.

Until 1962, it was Tanganyika government policy to discourage the use of grade dairy cattle by smallholders, on the assumption that only expatriate farmers were capable of caring for them. With the very much smaller expatriate grade herd, there was an insufficient base for

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11 For 1962, see Kenya Agricultural Census, 1962. For 1974, Rural Survey Statistics, table 124, in (Kenya) Statistical Abstract 1977. If one includes heifers and heifer calves, the total female improved stock was 1.3 mn. By the following year, however, the total number of improved stock had declined by some 9 %.


13 Recent draft planning report from Tanzania government.

14 Zalla 1974:14. Zalla estimates the grade herd in Moshi and Rombo Districts alone as 16,900 for 1973, as compared with 9,000 for the whole Region in 1977 from the above source.

development thereafter. A small A.I. service had been started in northern Tanganyika in 1958, but seems to have had little impact. This was expanded slightly in 1966, when the production of semen was started at Mpwapwa (situated in a dry area in central Tanzania several hundred kilometres from areas of important dairy production). This did not achieve very much either. There were constant problems of keeping the semen fresh in the absence of portable nitrogen coolers and even in Kilimanjaro where there was more activity than elsewhere, service was available to only a small proportion of the farmers. In 1973, Zalla found that less than 40% of the grade cattle owners in Kilimanjaro in his fairly large sample had ever used A.I., while not one single case of A.I. to zebu cattle was observed. Due to a lack of grade bulls, almost 9% of those with grade cows had been forced to backcross their animals to zebu bulls. In almost all cases this was because grade bulls or A.I. were not available since the demand for upgrading was high.\textsuperscript{16} Given that Kilimanjaro has the most grade cattle in Tanzania, it can be seen that the impact of government provision of A.I. and grade bulls elsewhere can only have been minimal. Current Tanzania government policy is to concentrate both imported grade heifers and A.I. upon a number of large state dairy farms.

One of the striking aspects of upgrading programmes in both Kenya and Tanzania is the degree to which A.I. services are concentrated upon those who already have at least first-cross grade cows. To some extent that is predictable in Tanzania where the services are insufficient to go round and where grade cattle owners are generally richer and more influential. But in Kenya the services are sufficient to cater for much larger numbers and are provided at a minimal charge, so other reasons must be sought. Many owners of zebu cows do not have the facilities for keeping the cattle free of ticks and are thus vulnerable to East Coast Fever, which is perhaps the major single cause of calf-mortality in endemic areas. Another reason probably relates to the fact that only some zebu cows are suitable for upgrading. For those which are too small and weak, the strain of bearing the larger calves produced by A.I. may be too much. This concentration has led to the formation of a grade herd with such a high proportion of exotic blood that the animals are highly vulnerable to tick-borne and other diseases. It also reduces the overall genetic potential for yield increase since the bulk of this derives from the first cross out of unimproved zebu. The maximum gain would thus be achieved, other things being equal, by spreading the exotic blood as widely as possible.

\textsuperscript{16} Zalla: 1974:34–40
Other Livestock
The fact that this Chapter has been largely devoted to cattle is a reflection of the current emphasis of policy by both governments.

Sheep – although a certain number of wool sheep are kept on large farms in the Kenya highlands, the vast majority of sheep in East Africa are hair sheep kept for their meat. To the best of my knowledge, there has been almost no work performed on upgrading.

Goats – most of the goats in East Africa are small, hardy and kept for meat rather than milk. This is unfortunate since dairy production from improved goats has a number of advantages. Dairy goats produce more milk from given pasture, browse or feed even than exotic dairy cattle; they are well suited to the majority of peasants who have insufficient land or money for grade dairy cattle; and the milk is more digestible by infants and children and has a superior nutrient content.

A few half-hearted efforts have been made to introduce improved dairy goats, notably Saanen, in both Kenya and Tanzania. Though it is generally claimed that little interest has been shown by peasants, this is certainly not the case in Kilimanjaro. Zalla records that 90% of the households in his survey of Rombo District kept goats and over half of these milked them. At every meeting held with farmers in Rombo, the research team was asked about the availability of exotic goats which few had but many wanted. A multiplication station in West Kilimanjaro (not many miles away) has been operating in an apathetic manner for some years without noticeable impact. There is no doubt that given a reasonable allocation of funds and energy, the multiplication of goats could have a considerable impact since the breeding interval is low, and the possible rate of herd growth is much faster than for cattle. Although it might be difficult to provide credit for dairy goats since the product could not and would not be sold through official channels, the cost could without difficulty be set low enough to bring them within the cash purchase range of large numbers of farmers.

There is no evidence relating to the demand for goats from other parts of the country, but this does not necessarily mean there would be no response. One point of possible significance is that when surveys are conducted it is usual to ask questions of men, who, being less directly concerned with family nutrition might not be interested in dairy goats whose production is primarily for subsistence. Enquiries from women might well elicit a more positive response.

Chickens – the vast majority of the 25 million chickens in East Africa are

\[Zalla: 1974:62-3\]
“unimproved” birds, scratching a living from insects and household waste. But around all major towns and even some smaller ones, more intensive forms of poultry and egg production have developed, based on the rearing of day-old chicks from hatcheries on purchased feed, or household and restaurant waste. Producers range from large-scale commercial farmers (in terms of turn-over) to rich peasants and the wives of government officials. Almost all birds, whether for poultry meat or eggs, reared under such intensive or semi-intensive conditions, are hybrids and are bought in afresh for each production cycle. Thus they are highly dependent upon an even flow of production from the hatcheries, of which there was one in Tanzania in 1975 and several in Kenya. The system of production also depends on the supply of feedstuffs which necessitates reliable transport and distribution networks.

In recent years, transport disruptions have raised problems for producers in some smaller towns in Tanzania. Another problem particularly acute in Tanzania has been the highly variable quality of feedstuffs available from the National Milling Corporation and in some cases, the presence of toxic materials in the feed. However, some indication of the relative size of poultry and egg production is gained by the fact that about 85% of all animal feeds produced in Tanzania are for chickens. The rest are used by dairy cattle. It is claimed that cattle could use up to 5–6 times the present supplies, from which it can be inferred that chickens take feed equivalent to the amount which could be used by about 30,000 dairy cattle. Doubtless they could use more if it was available.18

Pigs – About pig breeds and breeding I know very little. All domestic pigs in East Africa have been imported relatively recently and those kept for bacon processed by the Uplands Factory in Kenya come mainly from large farms where presumably breeds are maintained. Most other pigs kept for market production are found in highland Kenya. In Tanzania, there are only a few areas where peasants keep pigs; a large proportion of the small herd being kept by Missions, and various state institutions. Pig meat cannot be marketed or slaughtered through channels which handle cattle, sheep or goats since this would defile these in the eyes of Moslem consumers and be unacceptable to the mainly Moslem population who work in the cattle and meat trade.

Apart from these stock, donkeys are kept mainly in the drier areas and are used for transport and sometimes as draught animals for ploughing (though the use of oxen is more common). In the north and north-east of Kenya, camels are a very important component of the herds kept by

18 Draft planning report referred to above
pastoralists, because of their ability to withstand drought and to yield milk even under the driest conditions. In addition, some peasants keep a few ducks and geese. I have even visited one small-holding where guinea-pigs were kept for their meat and possibly their skins.\textsuperscript{19}

In summary, almost all the controlled breeding and upgrading of livestock in East Africa has concerned cattle, though far more attention to dairy (and perhaps meat) goats would certainly be warranted. For beef cattle, crossing with improved zebu animals seems likely to be the most economic and feasible method of upgrading in the future. For dairy cattle, exotics will probably continue to be used, though there is some scope for improved zebu animals in some of the drier areas where it is desired to produce seasonal surplus milk or supply small towns. Finally, the point made at the outset is worth re-iterating. Breeding for improved productivity almost always involves some loss of hardiness and disease-resistance so that upgrading is only worthwhile so long as it is accompanied by provision of veterinary services and improved levels of feeding.

Chapter 2.4: Diseases of Livestock

1. Introduction

East Africa is afflicted by most of the major livestock diseases and these have a very great impact on the ways in which stock are reared. The purpose of the present section is to indicate some of the more significant influences of disease on livestock husbandry and development. The section does not aim at comprehensiveness. Even if space permitted, I have not the information necessary to give an adequate account of all diseases mentioned. Detailed sources are available to readers who wish to pursue the subject further and some sources are referred to below.

I have selected only a few of the many diseases for mention; these are not only major causes of mortality or morbidity, they affect other aspects of livestock production and marketing significantly. Tick-borne diseases, and chief among them East Coast Fever, are the major cause of cattle deaths and debility. Their control is essential if major steps are to be made.

\textsuperscript{19}This is the only case I have heard of, and does not seem likely to become more common. The peasant in question complained that they ate more than they were worth and, if my own children's guineapigs are anything to go by, I can well believe this.
in increasing the productivity of beef, and especially dairy herds. Trypanosomiasis is responsible for far fewer deaths but is nonetheless of very great economic importance since it precludes huge areas from livestock herding and even human settlement. Foot and mouth disease (FMD) is included for a very different reason. It is not an especially important cause of death or debility among zebu cattle and its impact can be reasonably well controlled among grade and exotic animals by vaccination. But because freedom from FMD is an absolute sine qua non of exports of fresh, chilled or frozen meat to Europe and other high-priced markets, extensive systems of quarantines have been set up in both Kenya and Tanzania, with the eventual aim of creating disease-free zones. It is my contention that such export markets are not currently of sufficient importance, nor are they likely to be in the long run, to justify the considerable expense of such programmes. The cost must be counted not simply in terms of cash expenditure and time of state officials involved. More importantly, it disrupts the flow of slaughter stock to markets and, by encouraging illegal movements to avoid the regular stock routes, probably makes more difficult the task of controlling East Coast Fever.

2. East Coast Fever and other Tick-Borne Diseases

Ticks are insect parasites which attach themselves to the skin of mammals where they feed on blood. They harm livestock in two ways: direct loss of blood and damage to the hide or skin lessens productivity and produces irritation leading to further deleterious effects. Ticks are the vector for some of the most destructive livestock diseases to be found in East Africa, among them East Coast Fever (Theileriosis), Anaplasmosis, Babesiosis and Heartwater.¹

The life-cycle of the tick is divided between its animals hosts and periods spent on the ground or in grass. The cycle and habitats vary for different types of tick, but the major means of transmission onto animals is from blades of grass. This is facilitated when the grass is long and lush, providing continuous contact with more vulnerable parts of the body surface of the animal. Ticks are not generally a serious problem in semi-arid areas grazed by pastoralists. But they become a real menace in areas

¹ X female tick can suck up to 2 ml. of blood, and heavily infested animals may carry several thousand ticks.
² The different diseases are carried by different sorts of tick, of which the following are among the more important: Rhipicephalus spp (Brown Ear Tick, Red Legged Tick) carry ECF. Amblyomma spp (Bont Ticks) carry heartwater (rickettsia). Boophilus (Blue Ticks) carry anaplasmosis and redwater. Most of the discussion refers to Rhipicephalus ticks and ECF.
of rather higher rainfall in which livestock (and especially cattle) can be grazed more or less continuously and in the dry season grazing grounds.

There are two different patterns of East Coast Fever (ECF). In areas of high rainfall and lush pasture it takes an endemic form, killing a certain proportion of all calves while the remainder recover to achieve a partial immunity to subsequent attacks which, for the most part, debilitate rather than kill. However, the disease takes an epidemic form with much higher levels of mortality when it spreads outside endemic (enzootic) areas. This happens when there is temporary under-stocking after heavy losses of cattle by starvation. This allows greater grass growth than usual and hence enlarges the environment available for the growth of the tick population.\(^3\)

Losses among calves in enzootic areas are often said to amount to between 10% and 30% of livebirths for unimproved zebu cattle, which start life with some degree of immunity imparted in the colostrum (first few days' milk) and of this, a substantial but unquantified proportion is due to ECF. Among pure-bred exotic cattle, calf mortality to ECF is said to reach almost 100%, while vulnerability later in life is also very high. Though this figure is probably exaggerated, there is no doubt that mortality is very high. Grade cattle are generally thought to be only slightly less susceptible than exotics, though presumably this depends on the proportion of exotic blood.

These findings (or rather estimates) raise questions about differences in genetic susceptibility. Losses among non-immune zebu cattle in epizootic areas are certainly far higher than in areas where the disease is enzootic. Great efforts are normally made to shield grade and exotic animals from contact with ticks, which has the side effect of limiting their opportunities to acquire immunity.

While the acquisition of immunity varies from disease to disease, it is to some extent a general phenomenon that when populations (livestock and other) are in contact with a given pathogen, a variety of processes of adjustment occur, which reduce the impact of the contact to manageable levels. Ford makes a useful distinction between two forms of adjustment.\(^4\)

One of these he terms "physiological" and refers to processes such as the development of antibodies in the host and attenuation in the pathogen. Such processes tend to occur most strongly in areas where contact between host and pathogen are fairly constant and unavoidable; that is, in areas where the disease in question is enzootic. The other form of adjustment he terms "ecological" and refers to the various ways in which herders can

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adjust their patterns of grazing and movement so as to minimize contact between host and pathogen. In this respect, it will be recalled that abundant grass growth is among the major factors determining the size of the tick population and thus the intensity of contact with ECF.

It will also be recalled that mention was made above that "overgrazing" might sometimes be purposeful and aimed at the control of disease. There is good evidence to suggest that the grazing practices of pastoral and semi-pastoral peoples have had among their major aims the reduction of the incidence of ticks. This is achieved by grazing sufficiently large numbers of cattle on a particular pasture so that the grass is kept short. Failure to do so can cost the herder heavily as evidenced by the large numbers of cattle which die in epizootics of ECF.

A further implication is that since reduced contact with ECF considerably increases the vulnerability of cattle to the disease in the event of subsequent contact, efforts to control ticks which are only sporadically successful may well be worse than none at all.

Although effective (and expensive) drug treatments have been discovered for some tick-borne diseases, none has yet been found for ECF. Since it is not possible to inoculate against the disease the only effective method of combatting it is by controlling the tick population. It is impractical to think in terms of eradicating ticks entirely from East Africa. This means that if some areas are to be kept tick-free, they must be continuously protected, because of the likelihood of reinfestation from cattle or other animals passing through. Since it is not possible to kill ticks while in the grass without the use of massive amounts of highly expensive and toxic chemicals, the only possible method of control is to kill them while on the cattle. Treatment must be administered sufficiently often to prevent those ticks which are present from reaching that stage in their life cycle when they can either transmit disease or reproduce. Generally, stock require weekly dipping or spraying in Kenya (twice weekly in some areas). In Tanzania, fortnightly dipping seems more common, though this is probably insufficient to achieve effective control of ticks and disease.

Tick control demands the application of acaricides (tick-killing chemicals) either through spraying or dipping. Spraying can be done mechanically, though this is normally feasible only on large and well-organized ranches because of the vulnerability of spray-races to mechanical breakdown. Hand-spraying is time-consuming and expensive since it uses more acaricide than other means, but it does allow the owner of grade stock some degree of control. The disadvantage is that if the job is not done thoroughly, ticks may remain in places hard to spray like inside the ears, folds of skin, or under the tail.
Dipping is the most common method of tick-control in East Africa. Cattle are totally immersed in a large tank filled with a dilute solution of acaricide. All dips in Tanzania (except those on ranches and large dairy farms) are run by the government and operated as a free service. In Kenya, large numbers of dips are owned by groups of farmers and some by local councils or cooperatives. Recently, most of these have been taken under the control of the Department of Veterinary Services (DVS) of the Ministry of Agriculture, though the process is not yet complete. In almost all cases, a charge is made for dipping though this may be low due to subsidies.

Dipping is potentially the cheapest and most effective method of tick control, but a number of problems must be overcome in practice.

A major problem is the use of understrength acaricide. The proportion in which acaricide should be added to the dip-wash is in the region of 1:1500 to 1:2000, though this considerably overstates the proportion of the active ingredient. It is not easy to make accurate tests of dip strength simply and at the dip-site. The normal method used for dip-testing is gas-chromatography but the expense and delicacy of the equipment means that the tests can only be carried out at a few locations. This in turn means that dip-test results are not available at the dip-site until one month to six weeks or more after the sample was taken. Thus, even with the best will in the world, it is extremely hard for the official or dip committee in charge to maintain full strength. As acaricide is extremely expensive, dip-committees in Kenya, which have to run the dip economically are inclined to "economize" especially when funds are short. In addition, since the cost of one five litre can of acaricide is more than the monthly wage of a dip assistant, there is considerable temptation towards misappropriation. Recent investigations in Kenya, found that between 30% and 50% of the dips tested were being run below strength at any one time, and since the strength of the solution at any one dip will vary over time, this would imply that a larger proportion were being run below strength some of the time. In Tanzania, there is probably no market for acaricide because the government runs all the dips. The major problems arise when local veterinary departments run short of funds or are unable to get supplies in time. The result is that a number of dips are run at below the proper strength all or part of the time.

So disastrous is the outcome of inadequate dipping, one may ask...
whether the situation would not have been better if dipping had never been started at all. In the first place, below-strength dipping fails to kill all of the ticks and thus does not provide adequate protection from tick-borne diseases. This discourages cattle-owners from bringing their stock and, where operation of the dip depends on fee payments, leads to financial losses making it even harder to run the dip at full strength. But more critically, the use of below-strength dip-wash significantly accelerates the speed at which ticks become immune to the acaricide used. In Kenya, this was one factor forcing a change from chlorinated hydrocarbon to more expensive organophosphorus acaricides.\textsuperscript{6} It has also apparently pushed a number of peasant owners of grade cattle back into using hand-sprays; those with sufficient land to keep their cattle separate from others can maintain effective control although at the cost of extra time and acaricide.' Most seriously affected are smallholders with insufficient land on which to graze or grow fodder for their cattle. Their animals are forced to graze on common land and roadsides where they rapidly become infested with ticks. 

The response of the Kenya Government has been to place the running of dips under closer control by the DVS and to propose measures for the subsidization of acaricide, though with what success it is not yet possible to say. Veterinary authorities in both Kenya and Tanzania have tried to shift the blame onto herders for failing to dip their cattle. But so long as effective dipping services are not provided, herders have little incentive to use them. 

If dairy production is to be further developed tick control is crucial especially on small farms (large-scale farms can organize their own dipping). Control would also have important consequences for beef production. Some of the more productive beef areas are extremely vulnerable to a rapid expansion of tick populations and the high death-rates associated with epidemics. So far as range cattle are concerned, some negative comfort can perhaps be drawn from the fact that ineffective dipping programmes neither protect cattle against tick-borne diseases nor reduce their immunity in the process, but this is small comfort. Among the most potent dangers is that a dipping programme may start out efficiently and be enthusiastically received. This is maintained long enough to reduce

\textsuperscript{6}Another reason for this was that chlorinated hydrocarbon residues in milk and meat exceed international limits and threatened to prevent exports of Kenya meat and dairy produce. 

\textsuperscript{7}In some areas of Kenya, the purchase of hand-sprays is made a condition of receiving credit for the purchase of grade cows, even where dips exist.
the previous immunity of the cattle, but then deteriorates causing greater losses than if nothing had been done.

The central point of my argument is worth repeating: tick-control is vital but if attempts at control are ineffective or irregular, they may well be worse than useless.

_Tsetse-Flies and Trypanosomiasis_8

Some two-thirds of the land surface of Tanzania and 25% of Kenya are infested to some degree by tsetse-flies (_Glossina spp._). This is shown in map 4, which indicates that tsetse-infestation is the most important single determinant of the distribution of cattle. In both Tanzania and Kenya, a central fly-free area is surrounded by areas of infestation. But while in Tanzania, the central area is semi-arid and the areas of infestation cover most of the country, the high-potential areas of Kenya are largely free of tsetse. The economic importance of tsetse-fly is clearly of a much greater order in Tanzania.

The tsetse is a biting and blood-sucking fly whose major hosts are specific wild animals. It is thus misleading to suppose that type of vegetation is the primary determinant of its distribution, since the main impact of vegetation is through the presence or absence of host animals. This distinction is of crucial importance when one considers strategies for the control or eradication of tsetse-fly. However, wild hosts and tsetse-flies favour certain types of bush vegetation and these develop most easily and rapidly in areas of East Africa where the rainfall is sufficient for annual cropping.

The maps indicate some overlap between tsetse-fly and cattle since there are small areas within the major zones of infestation which are either fly-free or infested lightly enough to allow an "ecological adjustment" of the sort mentioned above. An important example of such an adjustment has been the clearing and cultivation of sufficient land to provide a fly-free area for grazing cattle, interspersed with fly-zones small enough in extent that cattle can be driven through them at night. Clearing for cultivation required the hunting of vermin like wild pigs and certain sorts of deer,

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8 The following account aims to do no more than present some of the major problems. There is a substantial literature on the subject, among which Ford’s (1971). The Role of the Trypanosomiases in African Ecology stands out. In spite of the daunting title and size of the book, it is both extremely readable and most fascinating and informative about a number of different aspects of East African livestock production and history. Jahnke (1975) takes a more explicitly economic viewpoint, based on Ford’s work, and, though no substitute, is also very interesting and useful. Both books contain extensive bibliographies.
which are included among the favoured wild hosts of some of the more important species of tsetse-fly. By such means, the pre-colonial peoples of western Tanzania managed to pursue livestock herding in areas which otherwise would have become infested. Between the zones of settlement, there existed areas of grenzwildnis or march (the uninhabited borders between neighbouring, but non-contiguous settlements) which remained tsetse-infested. Infestation could spread from this source if anything upset the existing balance. The essential characteristic of this grenzwildnis, as Ford makes clear, was not that it was tsetse-infested and thus would not be cultivated. Rather the reverse, it was land “inherently poor or otherwise difficult to cultivate” which remained uncultivated and for that reason tsetse-infested.

Ford is concerned to combat what he calls the "Pax Britannica" theory of tsetse-infestation. Very briefly, this theory proposes that the ubiquity of inter-tribal war in the pre-colonial period limited the movement of people from the nucleated settlements in which they were believed to have lived. The imposition of colonial peace allowed both greater movement and denucleation of settlement which led to the more rapid spread of tsetse-infestation. This in turn led to a prescription for combatting the advance of tsetse by renucleating the people in villages.

Ford shows that this theory obscures the actual processes leading to the major advances in tsetse-infestation which occurred during the colonial period in Tanganyika. Most important among these was the Great Rinderpest Panzootic of the 1890s which decimated cattle herds throughout East Africa. In western Tanganyika, this was followed by a series of secondary related catastrophes, including epidemics, starvation and the impact of colonial "pacification". All of these caused very considerable social disruption (to put it mildly) and the reduction of human and livestock population. As the existing ecological balance was broken down, bush and tsetse could spread. The impact of this on human and livestock populations was delayed because of their withdrawal from these areas. But after 1920, the ecological upset showed itself in the first recorded epidemics of human trypanosomiasis. At this point, the "Pax Britannica" theory had its most dire effect, for it seems highly likely that nucleating the population in villages merely hastened the further advance of the fly. Clearing barriers had little impact, so long as these were not cultivated since this did little of itself to reduce the wild game population. It was also at this time that, under the influence of a game officer turned

\[9\] By comparison, the recent rule of Idi Amin, hideous though it was, achieved nothing like the destruction and disruption among the mass of the population.
tsetse-controller, the role of wild animals in the transmission of tsetse-infestation began to be de-emphasized. While the previous policy had led to wastefully indiscriminate slaughter of game, the subsequent policy of game conservation probably had more serious negative consequences. As Ford shows, only a small proportion of the land cleared from tsetse after 1940 (up to which time, infestation had advanced) can be attributed to the efforts of government. The main factor was increasing population pressure on land and new settlement, especially in Sukumaland. Significantly he shows that in part of Geita where very thorough clearing apparently got rid of every last fly, the reluctance of people to settle led to reinfestation within a short period. In western Biharamulo District where the policy of concentrating the population to stop the spread of human trypanosomiasis continued throughout the colonial period, tsetse continued to encroach and human population to decline. Ironically, between these two areas lay parts of Geita and Biharamulo Districts which had been completely unpopulated and heavily tsetse-infested during the early 1950s. From 1955 onwards, a largely spontaneous influx of peasants, looking for land for grazing and cotton cultivation has eliminated much of the tsetse habitat and made the land habitable. Population in this latter area has grown at about 8% per annum over the period up to 1975, while to the west it has continued to decline, hastened by villagization in the 1970s.

Since Independence, the main thrust of tsetse-clearing in Tanzania has been for the development of state and parastatal ranches. This has been done largely by barrier clearing with heavy mechanical equipment plus use of persistent insecticides. Costs were calculated to be around Sh. 50 per hectare in the late 1960s though the real figures were much higher once labour costs were included and the calculation reflected the clearing actually achieved. With these emendations, the cost would rise to about 140/- per ha.

As Jahnke makes clear, the cost of tsetse-clearing is only one aspect of the economics; there remains the use to which the land is subsequently put. This affects the calculation in two ways. The direct economic returns

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10 The game population of Tanzania is thought to be substantially higher now than in the mid-nineteenth century, and most notably in those areas where tsetse-infestation has advanced. To what extent the colonial policy of transforming hunting into “poaching” and forbidding it, contributed to this is not clear, but to the extent that it was effective it may be assumed to have done so. See Kjekshus, 1976.


12 Information collected while working as a regional planner in the area. See Raikes, 1976 (Cotton in WLR).

may not justify the substantial costs of clearing. Still more importantly, later land use may not be sufficiently intensive to prevent subsequent reinvasion by tsetse. Jahnke also makes clear that reinvasion has been a major problem. This together with the poor organization of some of the original clearing programmes has very substantially increased costs. One problem is that extensive ranching is often not a sufficiently intensive form of land-use to maintain land tsetse-free.

Both Ford and Jahnke stress that there is a clear negative correlation between intensity of land use and level of tsetse-infestation. Moreover, there is good reason to believe that in many cases, the low level of land-use intensity achieved derives from factors other than tsetse-infestation, such as poor soils or groundwater or other obstacles prohibiting cultivation under existing techniques. The best way to eradicate tsetse-fly and keep the area clear of fly afterwards is to intensify the land-use; if this is not possible, there is a strong likelihood that reinvasion will take place and a good deal of time and money may be wasted for little purpose.

Little has been said about tsetse policy in Kenya. The problem there is less acute and so has generated a lower-key policy aimed at using the most economical methods to combat human trypanosomiasis and spending relatively little on clearing for livestock development. However, where tsetse has been cleared for ranching, this has usually been done in areas where pressure for land engenders more intensive forms of ranching which seem to have been capable of preventing reinvasion. Clearly, it is the difference in intensity of subsequent land-use which has been the significant factor.

5. Foot and Mouth Disease

Both European and South African types of foot and mouth disease (FMD) are enzootic to East Africa and a large proportion of the livestock has been infected at one time or another. The disease occurs in a relatively mild form and in some cases is scarcely noticeable. It does not appear particularly serious even in grade cattle though it does cause some reduction in productivity and in some cases, high levels of mortality. It would thus not seem to be very high on the list of priorities for elimination.

But the smallest risk of FMD infection is sufficient to secure the absolute prohibition of live animals or fresh, chilled or frozen meat from European and certain other markets. Only canned meat escapes prohibition. Thus

where livestock policy is premissed upon the export of beef, control of FMD becomes an issue of major importance. It is out of the question to consider clearing FMD from the whole of Kenya or Tanzania, so the only feasible policy is to clear "disease-free zones". Within these major export-oriented ranches are located, having links directly to ports of export which do not pass through infested zones. Even this is no easy undertaking since it requires absolute control of stock movements into the designated areas and a strict observance of quarantine regulation.

So far as I know, Tanzania has plans for only one disease-free zone in the south of Mbeya Region, adjoining the Zambia border, for the purpose of exporting stock to Zambia. The plans have been discussed for almost a decade now. Quarantines are imposed on other areas in the event of outbreaks of FMD and are said to have restricted stock movements to Dar es Salaam in recent years.

Kenya has launched an extensive campaign in recent years to tighten up the system of FMD control in order to diversify exports to Europe. Ironically, this has coincided with a decline in the availability of cattle for export, as local demand for meat had grown more rapidly than production. Prior to 1971, the FMD control area consisted of most of the former "scheduled areas" (White Highlands) and was divided into an inner circle in which vaccination was not practised, surrounded and protected by a zone in which vaccination was compulsory. In 1973 and 1974, the controlled area was expanded to include most of the remaining former scheduled areas, Kajiado and Narok Districts, lying between the control area and Tanzania and a region to the north, through which cattle from the northern semi-arid areas travel to market. A system of movement permits and quarantines provides additional safeguards. In response to any "focus" (outbreak) of FMD, a quarantine is declared over a specified area (usually a location outside the large farming area, often a farm within it) for a period of not less than 8 weeks. Feedlots exporting beef to Europe, have to suspend exports for six months from the last date of any outbreak of FMD within a 30 km radius of the lot. But it is doubtful whether these regulations have much impact, for the following reasons. Data showing the numbers of cattle authorized to leave districts for sale elsewhere from 1971–76, show no very close relation with figures from KMC records of cattle slaughtered from these districts, the latter figures being significantly higher. Figures for the number of cattle affected by quarantine over the same period are in the range of 80–100 million cattle-weeks per annum, which would seem to indicate quite a substantial restriction on marketing. In addition it is well-known that large numbers of cattle move to Nairobi and other urban markets without permits and even during quarantines.
The data for overall imposition of quarantines show no significant decline over time and it is plausible that outbreaks are not being reported.\textsuperscript{15}

Data on the illegal movement of livestock do not exist, for obvious reasons. Estimates of its importance vary, but it is probably substantial. In the midst of a discussion with a Kenyan veterinary officer on this subject one evening in 1975, he was called out to deal with a case in which over one hundred cattle were being driven illegally down the main street of the town. With just a modicum of care (say, driving them through the outskirts) detection could have been avoided.

One major purpose of instituting designated stock-routes for slaughter cattle is to segregate them from other cattle in the surrounding areas in order to restrict the transmission of disease and re-infestation by ticks. Anything which encourages illegal movements outside these routes, defeats their purpose. The more regulations are imposed, the greater is the likelihood of illegal movements. Since the export surplus of beef appears to be declining and since the FMD programme does not seem likely to be effective there is a strong possibility that attempts made at control do more harm than good.

4. Intestinal Parasites

There is a huge variety of intestinal parasites of livestock found in East Africa; they account for considerable loss of production. In addition, they reduce the resistance of stock to other forms of infection and render them more vulnerable to food or water stress. Most parasites can be eliminated by regular use of medication, but for the average keeper of stock, this is far too expensive and time-consuming to be worthwhile.

The only other form of control possible is through controlled grazing, since the parasites are normally passed in the excreta of the stock and transmitted through the grazing of other stock on infected pastures. This, however, is easier said than done for it is simply not feasible for most of the herders of East Africa to raise their stock in isolation from the stock of others.

\textit{Summary}

One gets no inkling of the complexity of the tsetse problem from the brief notes in the average government or agency report, nor any impression that other ways of clearance are open besides the use of heavy equipment and/

\textsuperscript{15} All the above data come from a draft memorandum by J. Cree (n.d. but 1977). It should be noted that the conclusion in the text is mine not his.
or chemicals. Nor is the problem of ECF treated adequately. Reports call for more dips and for their more efficient operation, but this is hardly sufficient. By contrast, FMD is usually included among the major livestock diseases, even though it can be argued that intestinal parasites, tick-borne diseases other than ECF, Brucellosis and a number of other diseases have a far more serious negative impact on cattle health and productivity.

Some diseases which caused catastrophes in the past, have been controlled. Rinderpest has been completely eradicated from Tanzania and virtually so from Kenya, though in the north of Tanzania vaccination still takes place against the possibility of re-infection from Kenya. Contagious Bovine Pleuropneumonia (CBPP) has also been eradicated from Tanzania and in Kenya is confined to the northeast and some parts of Masailand (which adjoins Tanzania). The last case of re-infection in Tanzania occurred in the late 1960s and was promptly and effectively suppressed.

Due to the range, complexity and inter-relationship among diseases, the prospect for large disease-free zones does not seem good. The major priorities for the present would seem to be the control of tick-borne diseases and the reduction in quarantines and other restrictions on stock movement which in reality serve to obstruct rather than assist control.

**Postscript**

Since the piece on tick-control was written, there has been some development in thinking about both the impact of tick-borne diseases and the proper means for their control. Two very interesting papers by J. Grindle, presented to the international conference on "Advances in the Control of Theileriosis", held in Nairobi in Feb. 1981, indicate that current estimates of economic losses from ECF and other tick-borne diseases may be substantially exaggerated, although the author is cautious in drawing general conclusions from case-studies of two specific areas (Malawi and Sukumaland, Tanzania). In these cases, he finds that current tick-control is only marginally economic. This combines with another development, presented at the same conference by Dr Southerst, proposing a move away from "maximal" (weekly) towards "strategic" (seasonally varied) dipping. The reasons for this are twofold, firstly to cut costs in the face of increases in the price of acaricide and secondly to find "robust" methods, which are able to withstand a breakdown in the regularity of dipping. The latter point arises largely from the experience of Zimbabwe, during the civil war, when a previously well-run dipping service broke down and over one million cattle are reported to have died. Current aims are to combine a lower level of intensity in dipping with
means to reinforce or achieve immunity among cattle. Work on the latter is proceeding along a number of different lines, though no practical solution can be expected in the next few years.

Chapter 2.5: Herd Composition and Growth

The vast majority of cattle in East Africa are "unimproved" local breeds and these are responsible for by far the largest proportion of meat, milk and other products. This is likely to continue to be the case for some time to come. In short, the quantity of produce available will continue to depend to an important extent upon rate of herd growth, herd size and composition.

The purpose of this chapter is to show how these factors are interrelated. To this end, the first part of the chapter discusses some of the basic coefficients into which herd growth and composition can be divided for purposes of analysis and measurement. The second part starts with two rather simplified ways in which these coefficients can be put together in order to estimate their relative impact upon growth and productivity. It goes on to mention and discuss briefly some more sophisticated "models" which can be (and have been) used.

For more extended discussion of this, and of the topic in general, the reader is referred to the very interesting and informative book, Having Herds, by Dahl and Hjort (1978).

Components of the Rate of Offtake

As previously mentioned, the basic measure of herd productivity for meat production (excluding for the moment weight increase), is the rate of offtake, and the various measures below decompose this in order to show how it is related to herd composition. But first it is necessary to specify what is meant by "offtake" itself, since definitions vary.

In the first place, offtake can be defined as a potential – the number of cattle which can "leave" the herd annually without reducing its size or affecting its capacity to reproduce itself. Alternatively (and more commonly) it can be defined empirically, as the number or proportion which do leave the herd annually.

The next (and most difficult) distinction relates to what should be included in "leaving" the herd. It may include only the number of cattle slaughtered and sold for slaughter. Alternatively, it may also include the
number which die – the distinction being further complicated in practice by the difficulty of categorizing those cattle which are "pre-emptively" slaughtered on the point of death or when it is considered that they will die before they can be brought to market. Although of some importance, this latter problem will be ignored for the present, and a distinction made between “offtake (s)” which includes only slaughter and sales, and “offtake (t)” which includes deaths. (In both cases, normal practice is followed and the deaths of calves under the age of one year excluded from "offtake"). Neither magnitude is susceptible of direct measurement, since hide sales are likely (other things being equal) to fall between the two. That is, some hides of cattle which die will be saleable (and sold) while others will be so spoiled by disease or decomposition as to be unfit for sale. Apart from this, there are the various strictures on the use of hide sale data to estimate offtake, which are mentioned in Chapters 1.2 and 3.5.

At present, total hide exports from each country seem to lie in the range 1.0–1.2 million per annum. This would appear to give an offtake rate in the area of 10–12 %, but McKenzie has estimated that for Tanzania, hides sales under-estimate offtake (t) by as much as 20 %, thus revising the estimate upwards to between 12 and 15 %. He also gives one of the few available "estimates" of offtake (s), when he claims that deaths and pre-emptive slaughter account for 50–60 % of offtake (t).¹

Offtake may in turn be broken down into four other rates or "herd coefficients", mortality, rate of calving, age at first calving and the respective ages at which males (including castrates) and cull cows are sold.

The Mortality Rate
Figures for calf mortality are generally thought to range between 20 % and 35 %, most sources putting the rate in the region of 30 %. Dahl and Hjort cite a variety of estimates, ranging from 10–40 %, including one source which claims that rates are much higher for sedentary herds than for pastoralists. Given the greater significance of ECF as a cause of death in the former case, this seems likely to be true. at least in years when drought does not lead to dramatic increase in calf mortality in pastoral herds.²

It seems fairly generally agreed, though more for want of an opposing argument than from firm data, that mortality among immature cattle is in the region of 10 %, while figures for mortality among adult cattle are put

¹ McKenzie 1973b:26–31, 35.
between 5 % and 10 %. These annual averages ignore systematic variations in mortality which will be considered briefly below.

Calving Rate
The calving rate or percentage is the proportion of mature cows in calf at any one time, or the proportion which calve during any one year. This can also be expressed as the calving interval, the number of months between successive calvings, but for present purposes the former seems the more useful measure. Estimates of this coefficient vary widely. Meyn gives a range of 55–70 % in areas with two rainy seasons and from 40–60 % in areas with only one. Mackenzie cites various figures for Tanzania, most of which are based on the assumption of relatively high rates of infertility among cows. The most detailed study he cites is that of Zalla (1974) for Kilimanjaro (where stall-feeding maximizes the calving interval). This he finds compatible with a 60 % calving rate on fertile cows and 50 % on all cows. Allowing for the shorter calving interval under range conditions when cows and bulls are run together, he assumes an overall rate of 54 % (or 62 % on cows which have calved at least once). Two World Bank studies estimate (or assume) the calving percentage to be 65 % on average for Kenya range beef production. Dahl and Hjort cite estimates varying between 40 % and 80 %, most of which are in the range 45–60 %. To put this in some perspective, calving rates on commercial ranches in Kenya are in the region of 85 % or higher, while calf mortality rates in the better run ranches seem not to exceed 3–5 %. For adult cattle the mortality rate is very low, at 1 %, this reflecting the earlier age at which stock are sold or culled.


3 Mackenzie, Meyn and various IBRD reports cite these rates. Dahl and Hjort op.cit: 38–40, cite various estimates in a similar range and make the correct point that few of the authors specify precisely what they mean, since 10 % mortality on the original population is very different from 10 % on survivors. I have assumed this to mean the proportion of the relevant age-cohort which dies during the year in question, which seems to make as much sense as any other basis.


7 Dahl and Hjort 1976:34–37, who also give comparative figures for calving intervals.
Age at First Calving

It is generally agreed that this lies between 2½ and 4 years. Zalla finds 3 to 4 years for Kilimanjaro, but this probably reflects the reduced opportunities for calving for stall-fed cattle.8 Dahl and Hjort cite estimates ranging between 1½ and 4½ or even 5 years, but centring on 3½ to 4 years.9

Ages at which Males and Cows are sold

These coefficients are of a different nature, since they depend directly on owners' decisions, though unless cattle are sold as immatures, they do relate quite closely to maturity. Most sources agree that steers and bulls tend to be sold from 5 to 7 years, usually between 6 and 7. This is confirmed by figures for the cattle purchased by Tanganyika Packers in Tanzania (TPL) and from KMC in Kenya.10 Under the better feeding conditions of ranching, even unimproved zebu cattle can be finished within 4 years; with intensive ranching, this can sometimes be reduced still further. Data for cow sales are less easy to find. One reason for this is that until recently TPL has followed a policy of not buying cows because, with rail transport, mixed herds lead to excessive movement and bruising. This removes the most direct source of data on age at sale. In addition to this, while most males are reared for slaughter eventually, the major purpose of cows is breeding and milk, so that they are unlikely to be sold before they are judged to have finished their useful life. Under ranching conditions, fairly close check is kept on the calving performance of a cow and when this drops below some standard level, she is culled for slaughter. Under range conditions, it probably takes longer to weed out infertile cows or those with much lower calving percentages, and drops in performance would be less easy to spot immediately.11 In any case, range herders do not have access to the statistical techniques and do not make the precise market-oriented judgements of the ranches. One common assumption is that cows tend to be culled at 12 years. Mackenzie has pointed out that acceptance of a figure of this magnitude for age at sale is sufficient to eliminate one estimate of adult mortality; if this was really at 10 %, there

8 Meyn 1970:140, Mackenzie 1973b:16–20, Zalla 1974:22. For those who find the dating of Zalla's and Makenzie's papers inconsistent with the fact that the latter cites the former, both were written in 1973, but Mackenzie's was not actually issued until 1975.
11 In addition, as shown below in data from Kjaerby, there is some evidence that "infertility" is also subject to seasonal variation.
would be no cattle left to sell at these ages – or rather fewer males than are sold and no cows.\textsuperscript{12}

**Construction of Herd "Models"**
The above coefficients can be put together to form simple mechanical models of herd growth and composition, showing how these vary with the choice of different assumptions. But before giving one example, figures 1a and 1b show graphically how the different flows may be represented. Both are static (i.e. assume simple reproduction of the herd without growth) since this allows representation in a two-period diagram. Since this model generates no changes in herd composition, this has to be built in by assumption at the start.

The four "flows" shown in the figures are:

- **Births** – note that calves under the age of one year are not included in the herd-size columns.
- **Advances** – meaning simply the advance from one age-cohort to the next through aging.
- **Deaths** – Computed mechanically from the coefficients assumed.
- **Sales** – Computed mechanically as the sale of all males on maturity apart from a few to maintain a small constant "adult" herd (which might be bulls), and a rounded figure to represent the sale or culling of cows at the end of their productive life (around 10 years)

Plainly the implications of these figures could be explored in more detail if they were put in the form of equations so that by algebraic manipulation, the effect of changing each coefficient upon the others could be shown. However since the assumptions, and especially that of a stable herd, are somewhat unrealistic, there seems relatively little point in doing this. It is worth noting though, that with standard herd coefficients assumed here, even a static herd does not allow offtake (s) to rise above 10–12 %.

**Maximum Herd Growth**
Table 2.2 shows a simplified model, based not on a static herd and maximum sales but on maximum herd growth, all other coefficients being similar to those of A and B respectively, shown in Table 2.1. The difference between the two is simply that in the latter case, no cows are culled before total loss of fertility, but are added to the stock of breeding

\textsuperscript{12} Here Mackenzie is using the original herd as the basis for the mortality rate. This is no longer the case if one considers the mortality rate to refer to the percentage of the survivors in the cohort which die.
Mature Females as % of Herd 38%

Total Females as % of Herd 63%

All Males sold at 4 years except replacement to 100 Mature

All Females sold at 3 years except replacement to 1000 Mature
### Two-Period Table for Reproduction of a Stable Herd

#### Period 0

<table>
<thead>
<tr>
<th>Female</th>
<th>Mature</th>
<th>1-2</th>
<th>2-3</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>175</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>158</td>
</tr>
</tbody>
</table>

#### Period 1

<table>
<thead>
<tr>
<th></th>
<th>850</th>
<th>150</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>175</td>
<td></td>
<td>158</td>
</tr>
</tbody>
</table>

#### Mortality

<table>
<thead>
<tr>
<th>Mortality</th>
<th>% of Cohort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calf Mortality</td>
<td>30%</td>
</tr>
<tr>
<td>Cow Mortality</td>
<td>5%</td>
</tr>
<tr>
<td>Mort 1-2 (Male &amp; Female)</td>
<td>9.7%</td>
</tr>
<tr>
<td>* 2-3 (» &amp; »)</td>
<td>5%</td>
</tr>
<tr>
<td>* 3-4 (» only)</td>
<td>5%</td>
</tr>
<tr>
<td>TOTAL, Non-Calf</td>
<td>6.6%</td>
</tr>
<tr>
<td>TOTAL, Calf &amp; Non-Calf</td>
<td>12.5%</td>
</tr>
</tbody>
</table>

#### Sales

<table>
<thead>
<tr>
<th>Sales</th>
<th>% of Herd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales of Males</td>
<td>55%</td>
</tr>
<tr>
<td>Sales of Calf &amp; Cows</td>
<td>45%</td>
</tr>
<tr>
<td>TOTAL Sales</td>
<td>10%</td>
</tr>
<tr>
<td>TOTAL Sales &amp; Mort</td>
<td>15.8%</td>
</tr>
<tr>
<td>TOTAL, do incl Calf</td>
<td>22.5%</td>
</tr>
</tbody>
</table>

#### Births

- **Total Herd** 2221
- 175
- 158
- 150
- 142
- 135
- 128

#### Deaths

- **Total Herd** 2221
- 175
- 158
- 150
- 142
- 135
- 128

**Mature Females as % of Herd 45%**

**Total Females as % of Herd 60%**

---

*Two-Period Table for the Reproduction of a Stable Herd, under Highly Simplified Assumptions.*
Table 2.1 shows the assumptions as to herd coefficients upon which each figure is built and the implications of each.

Table 2.1: Assumptions and Implications of Two Simple Models of Stable-Herd Reproduction

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Model A</th>
<th>Model B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving Ratio</td>
<td>60 %</td>
<td>50 %</td>
</tr>
<tr>
<td>Mortality: Calf</td>
<td>20 %</td>
<td>30 %</td>
</tr>
<tr>
<td>Yearling</td>
<td>10 %</td>
<td>10 %</td>
</tr>
<tr>
<td>Over age two years</td>
<td>5 %</td>
<td>5 %</td>
</tr>
<tr>
<td>Age at first calving</td>
<td>3½ yrs</td>
<td>2½ yrs</td>
</tr>
<tr>
<td>Sales of males at</td>
<td>4 yrs</td>
<td>6–7 yrs</td>
</tr>
</tbody>
</table>

Implications

<table>
<thead>
<tr>
<th>Implications</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Offtake (S)</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Deaths</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Offtake (T)</td>
<td>18%</td>
<td>16%</td>
</tr>
<tr>
<td>Mature Cows as % of total herd</td>
<td>38</td>
<td>45</td>
</tr>
<tr>
<td>All Cows as % total herd</td>
<td>63</td>
<td>60</td>
</tr>
</tbody>
</table>

Table 2.2: Coefficients Emerging from Two "Maximum Herd Growth" Models

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 5</th>
<th>Year 10</th>
<th>Year 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model A (Growth)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calving Rate 60 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calf Mortality 20 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mature Cows as % of total herd</td>
<td>41</td>
<td>46</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>All Females as % of total herd</td>
<td>57</td>
<td>63</td>
<td>62</td>
<td>62</td>
</tr>
<tr>
<td>Sales as % of total herd</td>
<td>6</td>
<td>4</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Non Calf Deaths of total herd</td>
<td>5.5</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Sales + Deaths of total herd</td>
<td>11.5</td>
<td>11</td>
<td>11</td>
<td>11</td>
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| Model B (Growth)    |        |        |         |         |
| Calving Rate 50 %   |        |        |         |         |
| Calf Mortality 30 % |        |        |         |         |
| Mature Cows as % of total herd | 47 | 50 | 50 | 50 |
| All Females as % of total herd | 62 | 65 | 65 | 65 |
| Sales as % of total herd | 5 | 3.5 | 3.5 | 3.5 |
| Deaths as % of total herd | 5.5 | 7 | 7 | 7 |
| Sales + Deaths of total herd | 11 | 11 | 11 | 11 |

Rate of Herd Growth Between Previous Year and that Specified

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<tbody>
<tr>
<td>Model A (overall 10.75 %)</td>
<td>6</td>
<td>13</td>
<td>11.7</td>
<td>11.5</td>
</tr>
<tr>
<td>Model B (overall 7.25 %)</td>
<td>4.5</td>
<td>7</td>
<td>8</td>
<td>8</td>
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females. As can be seen, the models (which were built up through a rather tedious and unsophisticated iterative method) stabilize after a few years.

The assumptions upon which the two models are built are rather unrealistic, but even so, two quite interesting conclusions emerge. Claims have been made that herd growth rates of over 30% are possible for short periods but these models show clearly that this must imply much reduced rates of mortality. Again, it has been claimed that the proportion of mature cows may rise beyond 60% of the total herd, which again seems likely to be a very temporary and exceptional phenomenon as it would imply either that males composed no more than about 10% of the herd, or that the proportion of calves was well below the requirement for continued herd growth.¹³ In reality, it seems most likely that where such proportions have been observed, they apply to one portion of a split herd (as in the example of the Samburu Grazing Scheme examined in Chapter 3.2.).

Once again, algebraic presentation and manipulation would allow further conclusions to be drawn but the unrealism of the basic assumptions probably makes such effort unwarranted at present. It seems more useful to indicate briefly some of the work which has been done in the area.

a. Computer Simulation – Several studies exist in which herd growth of various types of stock have been simulated under different conditions; the most relevant to present purposes being that of Dahl and Hjort (1978), who look at female herds of cattle, small stock and camels under the arid conditions of northern Kenya and Somalia. The models are largely based on “subsistence herds” and consider both "normal growth" and the types of pattern likely to occur in the aftermath of a major disaster. In all cases, they are extended for periods of 15 to 30 years. Space permits no adequate summary of either methods or conclusions, but two results are well worth mention. In the first place, herd growth in the aftermath of a disaster always shows a definite cycle, this being derived from well known characteristics common to demographic simulation models. Secondly, by combining the results and growth rates for different types of stock, they are able to predict a common aspect of mixed herd composition in the aftermath of a drought. Pastoralists start by building up flocks of small-stock as rapidly as possible, since birthrates are much higher. These are then gradually exchanged for cattle and camels, which are better suited to the provision of a milk diet and are less vulnerable to disease. (In arid areas; it is not clear that the latter would apply to areas where ECF is important.)

Interesting as such models and conclusions are, they would require further elaboration for use in relation to East African herds and commercial offtake, for a number of reasons including the following:

- the models being based on female herds, tell one nothing about what happens to males. This is fair enough for a "subsistence" herd and for indications of potential size, but tells one nothing about exchanges or sales, many of which will concern males.

- the extension of the models over periods up to 30 years is, as the authors would no doubt agree, primarily a heuristic device, since it will seldom be the case that such a period elapses without a further destabilizing drought or pestilence.

- perhaps more importantly, disease cannot be considered "exogenous" to a model of herd growth, since there are definitely patterns and sequences of disease incidence which relate to herd density and the length of time/intensity with which a particular piece of land is grazed.

- the pattern of accumulation outlined is that of a single herd. If pastoralists exchange small-stock for camels and cattle, then those must come from somewhere and the exchange must generate rather different patterns of herd composition elsewhere.

As can be seen, these are hardly criticisms of such models so much as questions raised by them which require further study.

b. Detailed Short-term Study – Chapter 3.5 presents some of the results of a study of a group of Barabaig pastoralists in northern Tanzania by Finn Kjaerby. Among the interesting results to emerge from this are the very substantial changes in birth and calf mortality rates which occur between drought and post-drought situations. In Kjaerby's sample post-drought calf mortality fell to about 60% of the previous level, while the birth-rate rose by about 70%. It thus begins to look as if the wide variation in estimates of these parameters, cited above, derives not only from differences in the areas surveyed and the base of calculation (as it assuredly does) but from differences between years in points on a rough and irregular cycle. Moments of this would include disaster, rapid recovery in its immediate aftermath (once worked through) and slower recovery in the subsequent period, this being interrupted by the next disaster. It also throws doubt on those estimates of the calving rate which rely heavily on high rates of infertility without further question. It seems more likely that fecundity and fertility can be affected by the state and availability of grazing and by the urgency with which the herders are concerned to build up the herd.
All of the above suggests the need for considerable modification of studies which operate on the basis of straight-line trend growth rates, broken by irregular and exogenous disasters, replacing these by models in which the various coefficients change in response to the effects of past growth, through increasing herd density and the build-up of various diseases, as well as to the differing degrees of urgency with which the herders approach the problem. But even this is unlikely to provide a sufficient explanation of herd composition and growth. Dahl and Hjort mention exchanges to achieve preferred herd composition and one may suppose that analogous (though different) processes would occur in areas of higher rainfall. One would also expect changes in the rate at which stock are sold for slaughter.

Any relatively long spell of growth uninterrupted by major disaster would probably have varying effects depending on the availability of "marginal" grazing land into which surplus stock could be pushed. Here it is tsetse-infested land which comes to mind and it can be seen from Map 4 that the major area of overlap between tsetse and livestock is that between Dodoma and Sukumaland in Tanzania, where herding cultivators have moved cattle into areas which were previously bush, under the combined stimulus of increased herds and expanding cultivation. More dots could probably have been inserted in the period between 1964 when the map was made and about 1970, though drought and disease since then may well have led to withdrawal.

This implies a need for study of the patterns of agriculture, domicile and division of labour which accompany different combinations of crop production and herding and which may also change at different points on the rough cycle outlined above. This in turn takes one further, to consideration of the systems of social relations which accompany and underly different forms and combinations of crop and livestock production. This is considered in outline in the following chapter, but there is much further to go before such information can be systematized into a form which allows quantitative analysis of patterns of herd growth and composition in any detail.

Summary
This chapter started out by listing some of the "herd coefficients" in common use for predicting herd growth and composition and potential or actual levels of commercial offtake. During the discussion, it has become apparent that apart from the considerable doubt which surrounds most attempts to measure them, such coefficients are by no means so stable or so "technically determined" as might seem the case from casual inspection
or assumption. Given the present state of research into East African systems of livestock production, such coefficients will doubtless continue to be used for some time as if they were stable and empirically justified. But this points to the urgent need for more detailed study in order to provide more accurate and nuanced methods of estimation. A substantial amount of interesting and useful work has been done into individual herding societies, mostly by anthropologists, and some of this is mentioned in the following chapter. But relatively little of this work has had much impact upon the assumptions or actions of "livestock experts", while in many cases, it could also benefit from the addition of such technical expertise. An area which seems to me hardly to have been touched is the whole area of cyclical variations in herd coefficients.

Chapter 2.6: Herd Accumulation and Responses to Government Policies

We are now in a position to put some of the material from previous chapters together and make an intermediate summary. The point was made in Chapter 1.4 that "irrationality" and "conservatism" were not useful concepts for the study of how and why herders respond as they do to different government policies and initiatives. While pastoral and other herding societies can no more be considered perfectly rational than others, many of the phenomena which are claimed to demonstrate "irrationality" become coherent and reasonable when set within the context of the productive and social systems within which they operate. Moreover, while some such phenomena are inconsistent with capitalist rationality, there are at least as many cases where the conflict is rather with capitalist interests. But these points were made in very general terms and thus not sufficient for confrontation with specific policies and problems.

In subsequent chapters, it will be shown that mis-specified policies must take much of the responsibility for the failure to date of the East African livestock sectors to achieve their full potential. The present chapter forms a link between that demonstration and the material presented hitherto in trying to summarize some of the major pressures upon and processes within herding societies and how they affect efforts to develop livestock production.

The most important area of discussion is that surrounding the questions of herd accumulation and overgrazing. Do East African herders tend to
accumulate stock beyond the level at which this reduces total livestock production and limits possibilities for herd upgrading, disease-control and other means to increased productivity? To the extent that this is the case, why is it, and what are the proper policies for such a situation? What has been the impact of past and current policies in this area? Other important questions relate to breeding, disease-control, the intensification of fodder and pasture production and possibilities for the integration of cattle and other stock within a system of improved mixed farming.

One of the major problems in drawing material together is the enormous heterogeneity of livestock production systems in East Africa. Even if one ignores private and state ranch production, the problems and pressures facing a peasant dairy producer with grade cattle in highland Kenya, have relatively little to do with those facing pastoral herders in the arid and semi-arid areas of either country. For the most part, the remainder of the chapter will focus primarily upon cattle-herding under extensive grazing, covering both pastoralists and herders who also cultivate crops.¹

**Overgrazing and Herd Accumulation**

There is no doubt that overgrazing is a serious problem in parts of East Africa, as evidenced by bare pastures, gully erosion and periodic large-scale losses from starvation and associated diseases. Nor can there be any doubt that this is related in part to the fact that the cattle population of East Africa has more than doubled during the present century. But this leaves a host of questions unanswered, including the most important of all – what is to be done about it? Certainly not much will be achieved by simply repeating assertions about the irrationality of herders and policies based on that assumption, like enforced destocking, seem to have done as much harm as good. They have generally been ineffective in achieving their direct aims and at the same time generated much suspicion on the part of the herders involved about the motives of government authorities.

**Communal grazing and individual herds**

One line of thinking which has been advanced is that the combination of individual (family) control of herds and flocks, combined with common use of grazing lands, leads almost inevitably to overgrazing. The reasoning

¹ It was my original intention, in this chapter, to survey and summarize some of the anthropological material on livestock herding societies. While I am still convinced of the importance of such a survey, I have come to realize that my own knowledge in this field is as yet insufficient to do justice to the subject. In the future, time and funds permitting, I hope to get round to this.
behind this is that none can capture the benefits from lower stocking densities unless all herders using the range agree to reduce their herds while, in the absence of such agreement, individuals stand to gain (however marginally) from increasing their herds. The latter part of the argument is often strengthened by claiming that herders are interested solely in the number, rather than the quality or value of the cattle they own.

In this form, the argument is a rather curious amalgam, since it assumes the herders to be motivated as individual maximizers without social controls, though what they maximize – the number of cattle – derives from processes and forces more commonly associated with non-market herding systems.

The argument does seem to have some validity, though it is oversimplified. Social controls over the use of grazing land, and especially dry-season reserves, have been mentioned (Ch. 2.2) but seem to have broken down with the subordination of local political authorities to national state administration and their subsequent involvement in the implementation of unpopular policies. One can also find good reasons why even herders who are quite heavily involved in the commodity economy and capitalist accumulation might find it useful to accumulate cattle as such as part of a strategy to retain a political and economic base within their local community. But before discussing this, it is worth considering some of the other factors affecting stocking densities.

**Climatic Variation**

There is a certain tendency to think of overgrazing as a simple and static relationship between land area and the number of livestock units upon it. This is given further currency by the use of concepts like "carrying capacity", indicating that deterioration of the range will occur whenever the stocking density exceeds (say) 1 LSU per ten acres (4 ha). Without denying that such concepts have their uses, it is not hard to see how they can mislead. The amount and quality of pasture on a given area is obviously determined, to a large extent, by rainfall and can probably carry two to three times as many stock in years of good rainfall as in poor years.

The effects of overgrazing tend to show themselves, not in a steady deterioration of the condition of the stock as the better grasses are selectively eaten and the ground cut by the passage of hooves (though these certainly occur) but in periodic crises, deriving from famine and associated disease usually occurring during years of drought and in their aftermath. To limit stocking densities to what can be carried during a severe drought would imply considerable undergrazing during 'normal'
years and thus loss of production. This is not to claim that overall production would not be increased by some control on stocking density combined with other improvements. It does indicate one reason why herders might consider it worthwhile to increase their stock numbers and accept drought losses. Another related reason, is that given the unpredictable nature of such crises, herders who have more stock initially will tend to have more from which to rebuild their herds once the crisis is over. Nor is this simply a matter of equal probabilities of loss with different herd sizes, for there are strategies open to the large herder, but not to others, which can result in the survival of a larger proportion of his stock. Herds can be divided and grazed in different areas, since larger herd-owners commonly have both larger families and greater numbers of clients who may herd them on behalf of the patron or borrow them.

Especially among societies in which crops are also grown, this gives a major advantage over small herd-owners who are often precluded from the use of distant pastures by the labour-requirements of cultivation.

Apart from this, there are a number of 'external' factors which have intensified overgrazing in certain areas of East Africa.

*Loss of grazing land* has already been mentioned in Chapter 2.2. During the colonial period, large areas of dry-season grazing, previously controlled by pastoralists and other herders, were alienated for European ranching and farming, while both during and since that time, there has been a steady encroachment on the better pasture lands by neighbouring cultivators. In other cases, as in Sukumaland, Tanzania, herding people have themselves expanded cultivation of cash crops into previous grazing areas, pushing the cattle into areas of marginal rainfall or tsetse-infestation.²

Apart from direct loss of grazing land, the imposition of national and regional administrative boundaries often cut across the migration routes of herding peoples, thus reducing their value by the loss of part of the land.

*Reduction in mortality from disease* – although rinderpest was only introduced into East Africa for the first time in the 1880s, from then until about 1940, it was responsible for a series of epidemics which killed large numbers of cattle. Since then, it has been virtually eradicated in Kenya and completely so in Tanzania (though not necessarily permanently). More recently dipping programmes against ticks and tickborne diseases

²Such pressures do not always lead to a reduction in available pasture. In the case in question, this also stimulated migration by cattle-herders and/or cotton growers in Geita and Biharamulo Districts, where clearing for cultivation led to the elimination of tsetse-fly from a previously infested area.
have been successful in some areas. Where this has reduced the incidence of East Coast Fever, this also tends to increase the cattle population since the primary impact of this disease upon zebu cattle is to kill a proportion (commonly said to be 10%) of calves. The issue is complicated however by the fact that successful tick control reduces immunity to tick-borne diseases so that in any subsequent outbreak, the death-rate will be higher than before. In general however, the effect of veterinary programmes has probably been to reduce mortality from major diseases and thus to accelerate the rate of herd increase.

**Herd Accumulation**

If one looks simply at the (corrected) figures for overall national herd in either Kenya or Tanzania, for the past decade or so, it becomes clear that the rate of herd growth has been quite slow. But to assume from this that internal limits to herd accumulation are effective, would be misleading. The major single cause of this low growth-rate has been livestock death as the result of drought, while between droughts the rate of herd growth has probably been quite high. (In the absence of comparable figures for successive years, it is impossible to say how high.)

From this it is deduced by some that overall growth in the national herds proceeds along a sort of 'saw-tooth' cycle, though one with very irregular teeth because of the irregularity of occurrence of droughts and other disasters. The problem with such a conception is that it assumes a rapid and straight-line growth in the period between disasters which, as was shown in the previous chapter, is unlikely.

Apart from the long cycles in growth-rate indicated by the research of Dahl and Hjort, it is reasonable to assume that growth would be most rapid in the immediate aftermath of a disaster once all of the secondary effects had worked themselves out. At such times, the range would be least heavily stocked and grass most abundant, the disease level would often be lower, in part because many of the weaker animals have succumbed to the effects of drought and the herders are more than usually concerned to build (or rather rebuild) their stocks. Data from Kjærby, presented in Chapter 3.5 shows this quite clearly for a sample of Barabaig semi-pastoralists in northern Tanzania. In the year following a major drought, not only is calf mortality lower than usual but the calving-rate increases significantly. I have insufficient evidence to be able to claim with assurance that this pattern can be generalized but, for the reasons given, it does seem likely. One would also expect the rate of growth to fall off as the range filled up, reducing the availability of grass and increasing the opportunities for disease transmission.
The motives for herd accumulation seem obvious enough once one considers the situation in which most herders find themselves. On the one hand, they are herding cattle and other stock on an open range, grazed in common and subject to unpredictable and unpreventable disasters every few years. Since they are not able to control a large number of diseases and since the range conditions, at almost any time, require considerable hardiness from the stock, their opportunities for upgrading are strictly limited. The labour requirements of extra cattle are very small, as are the costs of purchased inputs.

On the other hand, there are a wide range of benefits which accrue with increased numbers of stock. Almost all people who keep cattle include milk in their diet as a valued item and even among pastoralists, only a few wealthy families are able to consume as much milk as they would wish. Meyn cites a figure of 2.64 cattle per head on average for all Kenya pastoralists, which is patently inadequate to provide a milk diet throughout the year under range conditions and with existing milk yields.\(^3\)

Jacobs estimates (on the basis of calculations for the Maasai) that 10–15 cows per person or 30–80 cattle in all, would be required to assure a wholly milk diet throughout the year.\(^4\)

From Meyn's figures, only the Tanzania Maasai, with some 15 cattle per head, come even within range of this target and even here inequality of cattle distribution implies that only a minority would be able to subsist without purchasing grain.

But the argument about overgrazing does not turn primarily upon the number of milking cows kept but rather on the number of males past the age for slaughter and the number of old and barren cows. Here, the evidence from herd composition indicates the mere accumulation of cattle for the sake of numbers is far from being generally the case. The proportion of mature cows in pastoralist and other range herds is commonly said to be in the range of 40–50%. Since the sale for slaughter of all males not required for breeding purposes would imply only some 30–35% mature cows in the herd, one can assume that male calves and immatures are also disposed of in substantial numbers. Plainly most herders are concerned to increase their number of cows both to increase the supply of milk and increase the rate at which they can increase their herds in general but particularly in the aftermath of disaster.

When one looks at the distribution of cattle between families and the composition of herds of different sizes, an interesting fact emerges. Not

\(^3\) Meyn, 1970:10.
\(^4\) Jacobs, 1963:25.
only are the disparities between different family herds considerable, but the larger herds tend to contain a significantly higher proportion of adult males. Kjærby (see Chapter 3.5) explains this by reference to the fact that smaller herders usually have to sell almost all 'spare' cattle in order to purchase grain for consumption. Larger herders have more milk for consumption and since the disparities in herd size are much greater than those in family size, would in any case have to sell a much smaller proportion of their herd for grain purchase. The implication is that consumption of purchased items, apart from grains, is not very high and that per capita cash purchases increase more slowly than implicit 'potential cash income' (estimated value of annual potential offtake).

This raises the question why such potential income is held in the form of livestock rather than converted into cash. Again the reasons are obvious enough, given the conditions. If the alternative to be considered is consumption, then it becomes clear that life under range conditions (especially with migration or transhumance) does not lend itself to the accumulation of consumer durables, while expenditure on immediate consumer items, veterinary medicines and other livestock inputs is also relatively small – and limited in part by unavailability. If one considers cash saving as the alternative, the superiority of livestock over (say) bank deposits or simple hoarding of cash is again obvious enough. Apart from the virtual absence of bank branches in rural areas, cattle increase in value (roughly) in line with the general rate of inflation, while the rate of interest on bank deposits is commonly below this. In addition, livestock are (with luck) self-reproducing. This leaves aside the third possibility that of selling stock to invest either in increasing the productivity of livestock production or in some other activity. This is considered below. This seems to be quite common but often implies prior saving until the necessary sum is reached.'

But such flatly 'economic' reasons are by no means the whole of the answer. In societies where cattle have been the mainstay of life for many generations social structures obviously accommodate themselves to that fact and to the reproduction of this basis. In particular, various transactions, exchanges and patronage relationships are expressed in terms of livestock. Since many of such transactions are not defined in

\[3^\text{To some extent, this can be a reason for accumulating herds – in order to save a sufficient sum to invest in some bulky piece of equipment or other asset. Realization in cash of a whole herd for investment purposes at one time seems highly unlikely. It would involve a total change in life style and a complete (and probably risky) change of productive base. Given the political strings which surround many areas of investment, it would probably be unwise. both economically and (micro) politically to cut all of the links involved in herd ownership.\]
terms of commodity exchange they are often not easily translatable into cash terms. For example Fosbrooke mentions mutual lending of cattle among the Iraqw and indicates that this is also quite common among other livestock herding peoples. These are often of similar livestock types and thus not explicable in terms of specialization or other concepts relevant to commodity production. Nor do they cancel in the way that mutual exchanges of value would. That is, if A lends cattle to B and also borrows cattle from him, this does not cancel to a single net obligation (A's borrowings less those of B, or vice versa). Rather, each owes the other the full number of cattle borrowed. Far from indicating financial clumsiness, this is a major part of the purpose of the transaction; to set up mutual and continuing bonds of obligation. Similarly, when loans are one-sided, the obligations of the borrower to the lender were (and often still are) defined not in terms of specific values or numbers of cattle to be repaid but rather in the general and undefined obligations of a client to assist his patron when required to do so. Even when defined more specifically there is no need for this to represent any sort of value equivalence.

There can be little doubt that the importance of such transactions has declined with the growth of commodity exchange, monetization and availability of credit. But, given the rather loose structure of extensive herding societies, determined by the large amount of space required for the livestock to graze, such lateral bonds and patron-client relationships, continue to perform an important function integrating the activities of dispersed families and groups.

That the function of cattle in this respect is at least partly symbolic in no way reduces the reality of their importance, which is further underscored by the fact that cattle are much more easily identifiable and form a much better reminder of an obligation than (say) 100 shilling notes.

Large holdings of cattle and other livestock thus represent security, political influence, economic power and respect in a number of ways. The stock themselves can always be sold in the event of drought or other reason for needing money. With both larger numbers and a higher probability of survival, the herd itself is better placed to withstand drought or disease. The owner has enhanced opportunities for accumulating obligations

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7 It is worth noting that so long as such transactions include obligations and duties defined in broader terms, they will never be strictly commensurable in terms of the objects exchanged, lent or given.

8 For a “modern” example, see the cattle buying described by Rigby below.
through lending cattle and otherwise helping those less fortunate, and obligations which are by no means only usable within the "traditional" society.

**Effects of Colonialism and Commoditisation**

In spite of the fact that both colonial and post-colonial governments in East Africa have spent much time and energy trying to limit stocking densities there is not much evidence of positive effects from these efforts. There have been a number of self-defeating aspects of such programmes.

**Colonial subordination**

The first 'destocking' came as part of the military subjugation of herding peoples and was quite directly intended to reduce their ability to withstand colonial subordination. For obvious reasons, it was resisted as such and, beyond that left a lasting suspicion about the motives of the state in respect of livestock owners. The extreme case was northern Kenya, where the colonial government was still subjugating pastoralists militarily during 1920s, while at the same time excluding their cattle from markets through quarantine regulations designed primarily to protect European beef producers from competition. The result was accelerated overgrazing.

**Cheap slaughter stock**

The next major round of destocking campaigns came in the 1930s and 1940s with the construction of factories for the production of corned beef in Kenya and Tanganika. In both cases, the opening of the factories coincided with forced campaigns for destocking, justified by colonial veterinary authorities in terms of overgrazing but also having the intended effect of supplying cheap stock to the factories. In the event, the campaigns failed in both of their aims in both countries and further fuelled the suspicions of herders about government motives.

**Improvement and Incentives**

During the 1950s, state policy moved away from coercion to improved prices as an incentive to sell cattle, combined with construction of water facilities to increase the area of usable range. The former was relatively successful, at least getting more cattle to market. The latter introduced a new element into overgrazing. That is, the relatively few water-supply points installed attracted large numbers of cattle from other parts of the range, most particularly during times of drought and water-shortage. Areas in the vicinity of piped water were often denuded of grass, while the passage of hundreds of thousands of hooves pulverized the soil into fine dust.
State policies since Independence are considered in detail in following chapters and no summary will be included here. Among the factors which have affected livestock sales and so stocking densities have been low prices in both countries, disorganization of livestock marketing in Tanzania and, to some extent, the way in which land has been allocated in schemes to achieve controlled grazing. In both Tanzania and Kenya, there have been a number of attempts either to privatize grazing land entirely or to allocate land to specified groups of herders to be run in common or as cooperatives. While there are enormous differences between these different schemes, one thing which most have had in common was allocation of land on the basis of livestock (and especially cattle holdings). Given the quite substantial time which many of these schemes took to get started, this provided a further incentive to the herders involved, to increase their herds as rapidly as possible in order to increase the land allocated to them.

Response to Other Government Initiatives
Most of this chapter has been concerned with the question of land-use and overgrazing, since this seems to be the most basic problem at issue. The final conclusion will take up the theme again.

Sale of cattle
This has been considered here only by implication as being one of the alternatives to herd accumulation. As will be made clear in later chapters, not only are official views of herders' reluctance to sell cattle exaggerated, but the reluctance observed is at least in part due to low prices and poor organization of marketing. By way of contrast, the following account, from Rigby, describes a marketing system operated by Ilparakuyu (otherwise Baraguyu or Wakwavi), a Maasai speaking people, living in east-central Tanzania.

In order to rebuild their herds Ilparakuyu ilmurran now travel from their home areas in Morogoro, Bagamoyo, Tanga etc., to purchase cattle from other areas, mostly semi-pastoral or agro-pastoral (such as Dodoma). Since the overhead costs are high, they travel with large sums of money and buy large numbers of cattle, frequently five hundred or more (this would involve upwards of 100,000 shillings – P.R.). These cattle are then driven (with the aid of hired labour) or trucked to urban areas such as Morogoro, Dar es Salaam, Moshi (or) Tanga, where meat shortages are chronic. They are fattened on local grazings, then sold in hulk to private buyers who may then retail them (at considerable profit) to small butcheries. Alternatively Ilparakuyu may sell them direct to companies, state and parastatal organizations who cannot get sufficient supplies of meat through the "normal" channels. . . (The) profit is then re-converted to carefully selected animals which are taken home to re-build the herds and ensure the means of production necessary for the reproduction of the pastoral community (my emphasis).\(^9\)

\(^9\) Rigby (1976).
The example demonstrates, among other things, the importance of strong ties between the final controller of the funds and those who do the actual trading. These must be stronger than that between employer and employee, since sums equivalent to several years' wages are to be carried personally in cash and far from home. It makes an interesting contrast with the experience of Tanzania District Councils in the early 1970s, when they sent out employees with cash in hand to purchase cattle. Some of the employees and more of the money just disappeared, covered by fictitious transactions and other falsification. Further discussion of marketing is deferred until Chapter 4.

*Disease Control and Veterinary Medicine*

Vaccination against rinderpest and other important contagious diseases has been accepted quite willingly by the vast majority of herding peoples, and the problem with medicines for the treatment of diseases is more their short supply than lack of interest. There is a not inconsiderable grey trade in veterinary drugs to herders for application themselves. The response to dipping has been a more complicated affair. A compulsory campaign in Iringa Region, Tanganyika, during the 1950s, provoked sufficient opposition to be of significance to the development of the nationalist movement. But this involved both payment and quite considerable distance to dips. After Independence dipping was made free and compulsion relatively seldom enforced, so that the problem relatively soon became the inability of the relevant authorities (District Councils and subsequently District employees) to provide sufficient labour, funds and control to keep the dips repaired, in operation and supplied with acaricide. Doubtless there are herders, living far from dips and in relatively dry areas, who do not consider it worth-while to dip, perhaps in defiance of direct administrative or political instructions to do so. But this does not seem to be a major problem where the dips can be run effectively. In Kenya, where farmers still pay for dipping, at least in theory, there are areas where herders refuse to dip their cattle. But these are usually places where the dips are poorly run to the point of uselessness or where herders have long distances to travel in conditions not favourable to heavy tick-infestation. These areas do not include Maasailand, where dips are

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11 In mid-1980, the Minister of Livestock Development announced in public that in future the Kenya Government would provide free dipping, to be paid out of tax revenue. Since then, although the new system has yet to be implemented, it has proved extremely hard to collect dipping fees in areas where the dips are government-run.
commonly so heavily attended that they stay open for the whole day six days per week. With weekly throughput in some dips at some 20,000, some of the cattle must come considerable distances, when one considers that in the better served areas of Central Province, potential throughput does not exceed 800 or so.\textsuperscript{12}

\textit{Upgrading of Cattle}

As indicated in Chapter 2.3, many herders, and especially pastoralists have selected cattle for size and productivity for many years and continue to do so – including through purchase, as in the quotation from Rigby above. While there have been limited and sporadic government attempts, in Tanzania and Kenya, to supply improved beef animals to herders, this has almost always been within the context of "schemes" including some degree of control over methods of herding through an external management input. In Kenya, the degree of upgrading in most cattle is rather higher, because of the much longer period over which Africans have been using exotic cattle to upgrade their dairy cows, the much larger expatriate dairy and beef ranch herd to provide a source of grade animals and the subsequent introduction of A.I. on a wide scale. Extensive herders of cattle tend to upgrade only with improved zebu bulls and semen as indeed do many ranches. While there has been no resistance to the idea of upgrading cattle, the response in Kenya to artificial insemination has not been overwhelming. A large proportion of those seeking A.I. are already owners of grade cows, others being put off by increasing vulnerability to disease with exotic blood, failures to conceive under A.I., deriving from a combination of the short oestrus of zebu cows and the unreliability of some of the motorized runs and, conversely, the greater convenience and reliability of a farm bull. The falling real price of milk in relation to prices of inputs may also be a factor.

In Tanzania, A.I. services are nowhere sufficient to meet requirements and though some effort has been made to distribute improved bulls, the funds allocated for this purpose have been limited. In general, the demand for upgrading in East Africa exceeds the capacity of either state to provide, although the definition of upgrading used by herders and by the state is different.

\textit{Cattle feeding, fodderproduction and integrated farming}

One of the most difficult areas to summarize briefly is that which relates to the integration of cropping and livestock production, since this can take such a wide variety of forms.

\textsuperscript{12} 5000 head per week is normally considered to be very heavy utilization.
Stall-feeding of cattle has been practised in a few areas since before the colonial period and these are also the areas in which fodder production has taken most hold. These, in general, are areas of dense population with dairy cattle and it is this, together with upgrading which seem responsible for the adoption of fodder production as much as government encouragement. It is, of course, more widespread among large-scale dairy producers in Kenya, where the "contract" price for milk paid by KCC used to include an element to cover the cost of seasonal supplementary feeding. There was even an attempt in Kenya to introduce intensive beef feedlots, with stall-feeding of maize, but these have failed in recent years with the increasing price and scarcity of maize. Where stock are grazed extensively on common pastures, there is little or no supplementary feeding other than the grazing of crop residues. In some parts of East Africa, oxen are widely used for cultivation and draught; in others hardly at all, in spite of the availability of cattle and seeming suitability of the cropping system to their use. Of some significance here is that tractor-hire services are also available in many areas where oxen could be or are used, and sometimes at heavily subsidized prices. The use of oxen for draught (especially water collection) seems, curiously enough, to be more prevalent in areas like the Central Province of Kenya than in areas where alternative means of transport are much less easily available and distances to water far greater. It would seem likely that the opportunity cost of female labour (as seen by men) is an important determinant in this case.¹³

Otherwise, one finds the continuation of various practices by which manure is used for fertilizing fields and crop residues used for feeding livestock but not very much development or intensification of them. One problem is that – as in other spheres – extension advice in relation to fodder production is seldom adjusted for the seasonal labour requirements of the peasant household, which results in the presentation of advice which involves extra labour at inconvenient times of year.¹⁴

**Inter-relationships**

One of the main points emerging from the above summary is the inter-relationship between all of the above factors and the need to try to solve a

¹³ In areas of intensive crop production and widespread wage employment among men, women will be heavily involved in the production of agricultural commodities. Where they are "only" involved in collection of wood and water, food crop production, child-minding, housework, milking and looking after calves, the extra time devoted to water collection may not seem (to the male herder) to be so directly related to production. In Central Kenya, moreover, it is not uncommon for men to collect water – with oxcarts. Another entirely separate reason is the greater availability of such equipment and better roads in intensive agricultural areas.

¹⁴ See the discussion of extension advice in P.L. Raikes (forthcoming: Chapter 7).
variety of problems together. Improved feeding and upgrading are necessary conditions for any major increase in productivity. Improved feeding requires either the production of fodder (in crop-producing areas) or control of the number of animals on the range. Without improved feeding and the control of economically important diseases, upgrading will achieve relatively little. For extensive range areas, it is also important to try to find some solution to overall and periodic failures of pasture and water. But improved water without control of grazing is likely to lead to accelerated overgrazing in the vicinity of the water. The possibilities of achieving improvements in any or all of these areas is also affected by prices of livestock products, the availability and convenience of market outlets and relations between state officials and herders.

In the range areas, control of grazing is both a condition for other improvements and partially dependent upon them, and this is the most intractable single problem. In areas where rainfall is low and unreliable, there will always be pressures for herders to increase their stocks to prepare for the next drought or recover from the last. At the same time, these also tend – for good reasons – to be those areas where the social structures of herding societies remain stronger than elsewhere. There is little doubt that control over grazing will be particularly difficult to achieve in these areas, not only because the accumulated mutual distrust between herders and the state is greatest in these areas. As an illustration of how this can come about, the chapter finishes with a brief outline sketch of Tanzania state policy in relation to the Tanzania Maasai.\(^{15}\)

Before the colonial period, the Maasai grazing area ranged across the Kenya-Tanzania border and occupied a much larger area than at present. Colonial incursion was preceded by a few years by the great rinderpest pandemic, which reduced their herds to a fraction of their previous size and left many of the pastures under-utilized. This resulted in severe losses of grazing land to European settlers and neighbouring agriculturalists, especially in Kenya.

During the period 1930–50, the Tanganyika Maasai also lost a good deal of land to agricultural settlement. Mbumbulu was settled for wheat production during and after the War of 1939–45, a transfer which produced bitterness and ongoing repercussions.\(^{16}\) Ardaai plains were

\(^{15}\) In relation to an apparent inconsistency in spelling, the people call themselves "Maasai" but officialdom terms them "Masai" I have used the former, except where referring to administrative units.

\(^{16}\) There have been sporadic outbreaks of violence, including at least one shooting incident, in this area between Maasai and Iraqw. The most recent of which I have information was in 1978.
almost permanently ruined for cropping or pasture after a war-time wheat scheme, with heavy mechanization, had led to accelerated gully erosion. Monduli Juu was lost to European and African producers of wheat and seed beans, as was Makuyuni. Close to the latter, several hundred thousand acres were alienated to one European rancher. Ol Molog (a dry-season grazing area and the site of important Maasai rituals) was alienated to Europeans in 1948, for wheat production. More recently, there have been plans to take another important dry-season grazing area, Loliondo, for wheat production, the main obstacle to date being the lack of an all-weather road.

Even before this, the colonial state had begun to impose boundaries restricting freedom of movement. First was that between Kenya and Tanganyika, followed by Provincial and District internal boundaries, together with tribal boundaries under Indirect Rule. Among the major purposes of such boundaries was to reduce movement as a means to maintain control and prevent hostilities between different groups, which certainly restricted the movement of pastoralists. There were cases of single individuals being "deported" across District borders, though in the present case, they would have been a barrier mainly to migrations of groups with hundreds or thousands of cattle. Combined with land alienation, this left the Maasai with quite severely reduced grazing land and mobility by Independence.

Since Independence, the system of internal boundaries has become more extensive and constrictive – since the passing and implementation of the Range Management Act of 1914. This allows for the setting-up and gazetting of 'range management areas' and 'group ranches', after agreement with the inhabitants of an area under which they should abide by certain regulations in return for government assistance. The most important of these regulations was that members should only herd animals within the gazetted area and that they should keep all other livestock out of it.

The act, schemes and ranches were developed largely in response to the failure of programmes, during the 1950s, to provide drinking water for cattle in various parts of Masai District. Failure to contain concentration of livestock upon the water supplies had led to accelerated erosion around them, so the new policy aimed to contain smaller groups of Maasai and their livestock within areas intended to contain sufficient pasture and water for the registered livestock population on a year-round basis.

Although some attempt was made to settle people where they were, this resulted in the disruption of some migration patterns and probably also restricted more casual movements – at least those accompanied by
livestock. At least they attempted to. One of the more enduring problems of the ranches has been to stop cattle movements. Most particularly when pasture and water outside the schemes run out, while the schemes themselves still have "plenty of" water and grass, large numbers of other Maasai tend to concentrate as near to the border as possible, to graze and water their often starving cattle.

Even when the group ranchers wish to keep others out, the social pressures against their doing so are strong, while in cases of desperation, physical force would often be needed. They could call in the police, but that would probably be considered a particularly vicious and treacherous thing to do.

Within each group ranch, a certain proportion of the land is supposed to be set aside for the development of commercial ranching, to be developed as a cooperative venture by the members. In reality what this means is the appointment of an external manager with the members working as unskilled labour on their own farm, if they can be persuaded to. Most skilled jobs will go to outsiders. Far from developing their own production system, the people simply cede a bit more of their land to be run externally. They may participate in the returns, but since I have yet to hear of such a scheme which was not a dismal failure in economic terms, this is unlikely to mean much."

Nor is there much evidence from livestock sales that government policy has had much favourable impact upon livestock production in Masai District. Admittedly the evidence in this area is more than usually unfirm.

Government officials have been complaining since at least the early 1920s about the failure of the Maasai to sell cattle. While the sorts of reason discussed above certainly had something to do with this, another reason has been the higher prices and better conditions outside the official markets of Masai District.

Up to 1969, livestock markets were run by the District Councils, which saw them largely as a means for collecting revenue. This was forced upon the District Council by its need to collect tax somewhere and the absence of crop income (except from large farmers who were exempt from local cesses). The result was that prices to herders were lower within the District than elsewhere and its effect to encourage sale elsewhere. Since 1969 a disparity in black-market exchange rates between the Tanzania and Kenya shilling has led to further unofficial sales. These are virtually impossible to stop, given the length of the border between the two countries and the Maasai population on both sides. This provides yet

17 See also Chapter 3.5.
another reason why cattle might be considered a superior form for holding savings as compared with Tanzania shillings.

But government policies in Tanzania Masai District, as elsewhere, cannot be considered simply in the light of their economic results or lack thereof. Their purpose is to settle the people and limit their movements to an ever increasing extent and this is by no means simply for economic purposes. Neither Tanzania nor Kenya Governments want large numbers of people on the move. They are less easy to control administratively, they may drift to the towns, where they are expected to end up unemployed or engaged in petty crime. There is also the notion that if people can be stabilized for long enough for state officials to get control of them, they can be persuaded to work harder for more national production. One may also guess that a profound source of irritation to many officials is that herding does not appear to involve “work”.  

**Summary**

All the above suggests that problems of grazing control and the more general development of extensive livestock production are even more complex than suggested previously. It is hard enough to find ways in which existing forms of extensive livestock production can be integrated into the economic requirements of Kenya and Tanzania, though one can see technical solutions to at least some of the problems.

But further problems arise from the broader political and economic relations between herders and the state, and the conflict inherent in these relations is responsible for a significant proportion of what might otherwise seem to be the result of ignorance or technical mis-specification. Settlement and villagization schemes (especially in Tanzania but also in Kenya) tend to make insufficient (if any) allowance for the grazing requirements of livestock herders, in part because they regard the herds as largely worthless from the national point of view (although they provide over 90% of national meat consumption and a similarly large proportion of milk). They also tend to regard migrant herding as an antediluvian

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18 This has also been among the underlying motivations for villagization in Tanzania. See, for example Hyden 1980.

19 This is related to one apparently trivial matter – dress. It is perhaps no coincidence that the forms of dress which have been banned in Tanzania include both those of "degenerate youth" (wigs, "mini-skirts" and whatever trousers are currently fashionable) and those of pastoralists (a campaign from 1967–70 to enforce the wearing of trousers by the Maasai, banning of Barabaig women's leather skirts). Among other reasons for official disapproval of such clothing is that it is not seen by the authorities as "work-dress".
practice, to be transformed as quickly as possible, though most have no consistent (still less economically viable) alternative with which to replace it. Against that, herders are concerned not only to "optimize" economically, within a static framework. Even within an optimization framework, one can explain over-stocking, so long as one is not too tightly constrained by the notion of market optima defined in money terms. But beyond this, the situation of the herder and especially the pastoralist is far from static – to a large extent, it is changing for the worse and it is not hard for those involved to see this as the result of government policies and encroachment.

The policy of a national state is never simply to develop production, but to do so in such a way as to increase its own control over the product and the producers. This is particularly the case in East Africa where, in the absence of any firmly rooted local capitalist class, the state itself is heavily involved in programmes relating to production ranging from "development" and infrastructural projects, which require the expenditure of funds, to marketing, which provides one source of revenue. In particular, the state is concerned not with the level of output as such but with production which is commercialized through official channels. Of course this arises in part from the difficulty in gaining information about other production, but there are far more important reasons. Officially recognized commercial channels account for by far the major proportion of both exports and supplies to the urban areas, the latter being important both politically and in relation to the wage-level. At the same time, only production which passes through official channels is available for revenue collection, and taxes of this sort account for the majority of public revenue in East Africa.

At the same time, there is a tendency to see development as being closely related to the imposition of "order". Prior to World War II, development was scarcely even mentioned as an aspect of colonial policy, being subsumed under the introduction of "good order". Current policies do, of course, emphasize development but, as perceived by state officials, the notion still contains a strong core of "orderliness" and the imposition of control.

One can see how pastoralists "wandering about" must be a standing affront to such a notion of development and that the maintenance of large herds which appear to be potential wealth kept unavailable for development purposes, scarcely less so. Nor is it hard to understand the suspicions of herders towards many aspects of state policy, and most particularly any that have to do with de-stocking or grazing control. It is not just that they have seen their grazing lands taken when temporarily
under-utilized, nor that administrative boundaries have played havoc with their migration patterns. They suspect, and with good reason, that both Kenya and Tanzania governments are concerned not only to integrate them within the national economy, but to transform their production system and way of life radically. Finally, their experience to date of such transformation has not been happy. This will be one of the points discussed in the following section.
SECTION 3: MEAT AND DAIRY PRODUCTION IN EAST AFRICA

Introduction

The purpose of this section is to present some general information about livestock production systems in Kenya and Tanzania in such a way as to raise questions about the present direction of livestock policies. It is thus intentionally selective rather than comprehensive, for the subject is too vast, complex and unwieldy to fit the space available.

I have tried to provide reasonably full references, so that those who wish can pursue their particular interests in greater detail. Two important references can be noted at this point.

Those interested in the technical parameters of beef production (liveweight, c.d.w., weight gain per day or year, age at calving, effects of feeding regimes, etc.) will find a mine of information in Meyn (1970) which, in addition, contains an extensive bibliography of published material up to 1970. In general the study is much better informed on ranch and research station production and coefficients than on other systems of production about which the author is inclined to accept established myths at face value.

I have found Dahl and Hjort (1976) to be a very useful general reference, not only for its analysis of systems of production among arid land pastoralists but also because it collects and evaluates information on herd production coefficients from a number of different sources. Unfortunately, the livestock systems between these two extremes seem less well served with general or even descriptive material. This is a pity since most of the cattle and other livestock of East Africa fall into this middle category.

Chapter 3.1: Livestock Production in Kenya

Introduction

To recapitulate briefly some of the major points touched on so far; over 80 % of Kenya's land surface has insufficient rain for non-irrigated crop-production. Most of this area is suitable for some form of livestock herding,
albeit of a very extensive type as indicated by the fact that over 70% of both cattle and small stock are kept by herders other than pastoralists. The largest proportion of marketed livestock production comes from areas in which cropping is also possible. Table 3.1 shows recent estimates of livestock population.

Although Kenya's livestock sector has been characterized as more commercially developed than that of Tanzania, this should be seen in perspective. It was estimated in 1970 that in Kenya 75% of all milk and 80% of meat "were consumed on farms where produced". It seems highly unlikely that this statement was strictly true for it would have been impracticable for individual herding families to consume all the meat of cattle slaughtered (or which die) in the absence of refrigeration. What the figure represents is a rough estimate of the proportion of livestock or products which do not pass through organized or official markets. Whatever the problems with such measures, this does at least indicate a relatively low level of commercialization.

The commercialized share of livestock production accounts for some 30% of national marketed gross agricultural product. Assuming that the non-marketed proportion of crop production was in the range 40 to 50%, this would imply that livestock production accounted for some 45–55% of the total value of agricultural production. This figure seems excessively high and points to the problems with this sort of calculation. In the first place, it assumes the same (market) value weighting for marketed and non-marketed production, which is a rather dubious assumption. Second, the estimates of the non-marketed proportion are little better than guesses, since it is never clear where non-official market transactions are to be categorized.

About 55% of marketed livestock production (by value) is composed of stock for slaughter (95% cattle), another 35% being dairy produce, with

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1 Statistical Abstract 1975: Tables 88a, b, c (referring to 1969–70). More recent data (e.g. Rural Survey Statistics in Statistical Abstract 1977) omit the pastoral areas.
3 Even this is not without problems since the definition depends on what constitutes an "organized market". On the one hand, in pastoral societies such as the Pakot (Schneider 1957, Ch. 2. above) one finds organized mechanisms not amounting to markets (ritual feasts) for the regulation of social consumption of cattle meat. On the other hand one finds "casually organized", often illegal but often well-established market transactions in which several hundred stock per week may be traded. It would appear that both forms would be included under "on-farm consumption" in the statement cited above.
Table 3.1: Livestock Population of Kenya by Species and Farmer Category, 1970 and 1975 ('000 head and per cent)

<table>
<thead>
<tr>
<th></th>
<th>High Potential Sm'holder Districts</th>
<th>Range Subs'ncce Cultivator Dists.</th>
<th>Pastoralist Districts</th>
<th>Large Farm Districts</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1970 '000 head</strong></td>
<td></td>
<td></td>
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<tr>
<td>Grade Dairy Cattle</td>
<td>418</td>
<td>57</td>
<td>1</td>
<td>226</td>
<td>702</td>
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<tr>
<td>Improved Beef</td>
<td>35</td>
<td>42</td>
<td>-</td>
<td>345</td>
<td>422</td>
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<tr>
<td>Indigenous Zebu</td>
<td>3446</td>
<td>2292</td>
<td>3062</td>
<td>-</td>
<td>8807</td>
</tr>
<tr>
<td>Total Cattle</td>
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<td>2391</td>
<td>3070</td>
<td>571</td>
<td>9931</td>
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<td>Sheep &amp; Goats</td>
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<td>3018</td>
<td>2719</td>
<td>268</td>
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<td>Donkeys</td>
<td>36</td>
<td>30</td>
<td>116</td>
<td>-</td>
<td>182</td>
</tr>
<tr>
<td>Camels</td>
<td>-</td>
<td>516</td>
<td>-</td>
<td>-</td>
<td>516</td>
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<tr>
<td>Pigs</td>
<td>27</td>
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<td></td>
<td></td>
<td>57</td>
</tr>
<tr>
<td>Poultry</td>
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<td><strong>1970 Per cent</strong></td>
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<td></td>
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<td>100</td>
<td></td>
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<tr>
<td>Indigenous Zebu</td>
<td>39</td>
<td>26</td>
<td>35</td>
<td>-</td>
<td>100</td>
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<tr>
<td>Total Cattle</td>
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</tr>
<tr>
<td>Donkeys</td>
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<td>16</td>
<td>64</td>
<td>-</td>
<td>100</td>
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<tr>
<td>Camels</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>100</td>
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<td><strong>1975 '000 head</strong></td>
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<td></td>
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<td>Dairy Cattle</td>
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<td></td>
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<td>All Improved Cattle</td>
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<tr>
<td>Zebu</td>
<td>5559</td>
<td></td>
<td>-</td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td>6951</td>
<td></td>
<td>738</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


- = None
. = Not available
the remainder divided between hides and skins, wool and eggs.\textsuperscript{5} Here, the danger of applying the same price weights to non-marketed produce is seen more clearly. If these figures are taken in combination with the estimates of non-marketed proportions given above, the implication would be that meat is by far the most valuable subsistence product from livestock. This is certainly not the case. As has been mentioned already, milk is overwhelmingly the most important product in most cattle-producing systems which are not primarily concerned with supplying the market. This is revealed by the very high proportion of cows in most herds, and by the fact that cattle are infrequently slaughtered for domestic consumption. Much of the meat eaten by herders comes from cattle which die and its value to the consumers is thus reduced because it is not necessarily available when needed most.

Livestock produce accounts for only about 8\% of total exports; a far smaller figure than the exports of crops. Meat and meat products again show up as the most important, accounting for about 45\% of total value. But in this category hides and skins account for about 28\%, and are worth more than the exports of milk and dairy produce (24\%). This arises because the bulk of dairy produce is consumed domestically.\textsuperscript{6}

Cattle are by far the most important livestock, representing over 80\% of all livestock units, 90\% of marketed production and 95\% of livestock exports. Out of a total cattle herd of between 9 and 10 million head, some 15\% are grade cattle bred for production of meat or milk, and the remaining 85\% are "indigenous zebu". Grade beef cattle are mostly Boran or Boran crosses with either European exotics or local zebus (ranging from almost pure exotics on a few ranches, to Boran x zebu first crosses). Grade dairy cattle are mostly crosses of indigenous zebu with European dairy breeds, with Friesian currently predominant. The percentage of exotic blood varies very greatly and there is a tendency towards a greater differentiation between zebu and grade herds as a large proportion of all inseminations are to already upgraded cattle.

85\% of the cattle and virtually all the small stock are indigenous breeds kept by peasants. Some 20\% of the cattle are classified as "large East African Zebu", with the remainder being "small" or "intermediate" (although the categories are anything but clearcut). In general, larger animals are found in the drier areas where the method of herding is extensive pastoral grazing. For example, the Boran breed which forms the

\textsuperscript{5} Tables of "Value of Gross Marketed Production" as Note 4.
\textsuperscript{6} IBRD 1973, Annex 5:1. The small remainder is composed of wool (3\%).
basis of so much beef ranching, derives from the cattle kept by a pastoral
group of the same name in the very arid area astride the Kenya/Somalia
border.

Almost all improved beef animals are kept on commercial ranches,
which include a few cooperative and communal ranches. Although the
beef cattle on commercial ranches amount to only 6% of the national
herd, they account for almost half the official sales for slaughter. While this
disparity does reflect much higher levels of productivity and off-take, the
figures exaggerate the difference for two reasons. First, commercial
ranches account for a smaller proportion of non-official sales. Second, a
number of ranches purchase immatures from the pastoral and other
extensive grazing areas and fatten them before sale for slaughter. This
practice has grown over the past decade, though to a much lesser extent
than planned.

In the dairy sector, the relation between improved stock and large farms
is much weaker. At Independence in 1961, the vast majority of the grade
dairy herd of some 390,000 head, almost solely composed of females, was
kept on large farms, nearly all of these being owned by Europeans. Since
then, the grade herd on large farms declined to a low of about 250,000 in
1967 and has since recovered to about 300,000. A growing proportion are
owned by Africans. During the same period, the number of grade dairy
animals kept by African smallholders has grown from a few thousand to
almost 1.4 million by 1975. The proportion of mature females in the large
farm herd is about 62% compared with only 42% for smallholders. This
reflects both the higher proportion of males and the younger age-structure
of the latter herd. The high proportion of heifers (about 22% of the herd)
indicates later first calving, and also the younger age structure of the herd.
While the growth rate of this herd has been very rapid, it seems to have
slowed or even stopped in recent years. Rural Survey statistics show a
decline of some 100,000 head between 1974 and 1975, and although this
may be partly differences in counting, it fits with the decline in milk
deliveries since 1973.

Kenya's policy for livestock development reflects the structure of

Taken over the whole period, some 62% were mature females.
9 Statistical Abstract 1977:145. No strict comparison is possible, since data for the
large farms distinguish strictly between males and females, while the Rural Survey
classifies all calves together, thus missing an opportunity to contribute to information
on differential calf mortality.
10 Statistical Abstract 1977:145, for milk deliveries see Chapters 3.3 and 4.4.
ownership outlined above. Most attention and by far the major part of all state funds have been spent on efforts to develop the ranch sphere of beef production, especially for export. This has involved giving credit to existing and prospective commercial ranchers, encouraging the development of various groups of cooperative ranches and integrating ranch and pastoralist production through the sale of immatures for fattening on feeder ranches and feedlots. More recently, there have been efforts to improve disease control and to develop disease-free zones from which fresh chilled meat could be exported to Europe; this despite a decline in the availability of beef for export.

Development policy for the dairy sector has been more concerned with smallholder production, in the light of its greater commercial importance. The wide range of dairy products produced at Independence has been supplemented by spray-drying, ultraheat treated ("long-life") milk and increases in the scale on which other products are processed. Processing facilities are now probably in excess of requirements since investment in new plant has continued even after production has

11 Importance, that is, to the state-controlled marketing agency, the Kenya Cooperative Creameries (K.C.C.)
Table 3.2: Value of livestock production: £ K.mn

<table>
<thead>
<tr>
<th>Year</th>
<th>Cattle &amp; Calves for slaughter</th>
<th>Sheep &amp; Goats for slaughter</th>
<th>Pigs for slaughter and Eggs</th>
<th>Wool</th>
<th>Hides' Skins</th>
<th>Dairy</th>
<th>Total of Agric. Prod.</th>
<th>Livestock &amp; Dairy as % of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1959</td>
<td>4.3</td>
<td>0.4</td>
<td>0.8</td>
<td>0.4</td>
<td>0.3</td>
<td></td>
<td>4.6</td>
<td>11.6</td>
</tr>
<tr>
<td>1960</td>
<td>4.5</td>
<td>0.5</td>
<td>0.8</td>
<td>0.4</td>
<td>0.3</td>
<td></td>
<td>4.9</td>
<td>12.2</td>
</tr>
<tr>
<td>1961</td>
<td>4.6</td>
<td>0.5</td>
<td>0.6</td>
<td>0.4</td>
<td>0.4</td>
<td></td>
<td>4.7</td>
<td>11.7</td>
</tr>
<tr>
<td>1962</td>
<td>5.7</td>
<td>0.6</td>
<td>0.6</td>
<td>0.5</td>
<td>0.4</td>
<td></td>
<td>4.7</td>
<td>13.3</td>
</tr>
<tr>
<td>1963</td>
<td>5.5</td>
<td>0.6</td>
<td>0.6</td>
<td>0.5</td>
<td>0.4</td>
<td></td>
<td>4.7</td>
<td>12.9</td>
</tr>
<tr>
<td>1964</td>
<td>9.4</td>
<td>0.4</td>
<td>0.5</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>4.0</td>
<td>15.9</td>
</tr>
<tr>
<td>1965</td>
<td>9.4</td>
<td>0.4</td>
<td>0.6</td>
<td>0.2</td>
<td>0.4</td>
<td>0.5</td>
<td>4.7</td>
<td>16.2</td>
</tr>
<tr>
<td>1966</td>
<td>10.9</td>
<td>0.4</td>
<td>0.6</td>
<td>0.3</td>
<td>0.5</td>
<td>0.6</td>
<td>5.7</td>
<td>18.9</td>
</tr>
<tr>
<td>1967</td>
<td>11.4</td>
<td>0.4</td>
<td>0.6</td>
<td>0.3</td>
<td>0.5</td>
<td>0.7</td>
<td>6.4</td>
<td>20.1</td>
</tr>
<tr>
<td>1968</td>
<td>11.7</td>
<td>0.4</td>
<td>0.9</td>
<td>0.4</td>
<td>0.5</td>
<td>0.7</td>
<td>7.1</td>
<td>21.7</td>
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<tr>
<td>1969</td>
<td>12.2</td>
<td>0.5</td>
<td>0.6</td>
<td>0.3</td>
<td>0.6</td>
<td>0.7</td>
<td>6.1</td>
<td>20.9</td>
</tr>
<tr>
<td>1970</td>
<td>13.3</td>
<td>0.5</td>
<td>0.8</td>
<td>1.0</td>
<td>0.3</td>
<td>0.8</td>
<td>6.8</td>
<td>23.3</td>
</tr>
<tr>
<td>1971</td>
<td>13.3</td>
<td>0.7</td>
<td>0.6</td>
<td>1.0</td>
<td>0.2</td>
<td>0.8</td>
<td>9.3</td>
<td>26.0</td>
</tr>
<tr>
<td>1972</td>
<td>16.5</td>
<td>0.8</td>
<td>0.5</td>
<td>1.2</td>
<td>0.2</td>
<td>1.0</td>
<td>11.7</td>
<td>31.9</td>
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<tr>
<td>1973</td>
<td>16.4</td>
<td>0.8</td>
<td>0.7</td>
<td>1.4</td>
<td>0.5</td>
<td>1.2</td>
<td>11.3</td>
<td>32.2</td>
</tr>
<tr>
<td>1974</td>
<td>17.6</td>
<td>1.1</td>
<td>0.7</td>
<td>1.1</td>
<td>0.5</td>
<td>1.3</td>
<td>11.1</td>
<td>32.5</td>
</tr>
<tr>
<td>1975</td>
<td>19.8</td>
<td>1.3</td>
<td>0.9</td>
<td>1.6</td>
<td>0.3</td>
<td>1.5</td>
<td>10.8</td>
<td>36.1</td>
</tr>
<tr>
<td>1976</td>
<td>20.2</td>
<td>1.2</td>
<td>1.0</td>
<td>1.6</td>
<td>0.4</td>
<td>1.5</td>
<td>12.1</td>
<td>37.9</td>
</tr>
<tr>
<td>1977</td>
<td>22.9</td>
<td>1.2</td>
<td>1.0</td>
<td>1.6</td>
<td>0.4</td>
<td>1.7</td>
<td>16.8</td>
<td>45.6</td>
</tr>
</tbody>
</table>

Per cent of Total. Selected Years

<table>
<thead>
<tr>
<th>Year</th>
<th>Livestock &amp; Dairy as % of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>37 4 7 3 2 1/2 7 40 100 26</td>
</tr>
<tr>
<td>1965</td>
<td>58 21/2 4 1 2 1/2 3 29 100 28</td>
</tr>
<tr>
<td>1970</td>
<td>57 2 3 4 1 21/2 29 100 27</td>
</tr>
<tr>
<td>1975</td>
<td>55 21/2 4 1 4 30 100 22</td>
</tr>
</tbody>
</table>


1 Includes some minor products.
slowed down. Policy for smallholder production first stressed the purchase of grade cows and heifers, and later artificial insemination, combined with disease control.

State policy is little concerned with other livestock. Although there are several million sheep and goats, sales through official channels have steadily declined from 1960, when an average of 150,000 sheep and goats passed through such channels, to an average of 26,000 in the period 1973–76. There have been a few experiments with upgraded stock but apart from the completely separate category of wool sheep kept on large farms, these have had little impact on production. The smaller pig population has declined over the period since 1961, and so have sales through official channels (to the Uplands Bacon Factory and large butchers). Poultry production for urban consumption has increased considerably since Independence, with the development of large-scale commercialized production units based on purchased day-old chicks. There are no usable figures for sales of poultry or eggs, and the figures for value of production available are only rough guesses. Figure 2 shows the deliveries of certain major livestock products to official markets. But in assessing these trends it must be remembered that official markets account for only a minor (and for cattle declining) proportion of total sales.

Table 3.2 shows the value of production of various livestock products, but once again the data refer to production channelled through official market outlets. The problems which this poses can be seen by the discontinuity in the data for poultry and eggs and in the fact that 60,000 pigs are implied to produce as much as 8.3 million sheep and goats.

Chapter 3.2: Beef Production in Kenya

Herd Size and Distribution

Data on the size of the Kenya national herd are not published regularly largely because of the difficulties in deriving any firm estimate for the cattle population of the drier pastoral areas. It is thus impossible to get an

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14. There are discontinuities in the data for milk deliveries in 1966 and 1971, across which the data are not strictly comparable. They are however adequate for present purposes.
accurate estimate of the growth of the national herd. An FAO team produced an estimate of 6.7 million for 1964, which provided the basis for the figure of 7.7 million for 1967 made by Aldington and Wilson. Survey data presented in the Statistical Abstract for 1969 and 1970 give total cattle populations of 9.9 and 9.7 million respectively. Since then, figures for the pastoral areas have not been presented. Data for recent years are shown in Table 3.3.

The only obvious anomaly here is the figure for 1971-72, though a more detailed breakdown shows further inconsistencies between the different series. But while these figures indicate a rate of growth of 6½ % per annum for the total herd between 1964 and 1970 and a rate of 3½ % p.a. for small farms, most commentators agree that since then, the herd has grown slowly, if at all. Aldington and Wilson revised the FAO figures not to take account of herd growth, but to correct what they considered were mistakes in the estimation. Changes in stock numbers shown above must relate as much to changes in the base of computation as to herd growth. This is especially true for the 1970s when the herds were hit twice by major droughts.

All that can be said is that the total herd appears to be in the region of 9.5 to 10.0 million head of which 20 to 30 % are found in the pastoral areas. Roughly half of these cattle are found in the Maasai rangelands to the south of the high potential agricultural area; another 35 % in areas of medium potential range to the north and east; and the remaining 15 % in the most arid areas to the far north and north-east with less than 15 inches (450 mm) of rainfall.

By far the densest concentrations of cattle are found in Nyanza and Western Provinces, where they are kept by peasant cultivators. Herds in

2 Statistical Abstract 1975:113–115, Table 88a, b, c.
3 Meyn 1970:4–10, citing a classification by Griffiths in Morgan (ed) 1969, has the pastoral areas containing 4 % of the human population and about 21 % of the cattle. Table 3.1.1, taken from a World Bank study (1973) which quotes Peberdy (1970) and the Central Bureau of Statistics, gives 31 % of the cattle in the pastoral areas. Clearly much depends on the definition of areas containing small parts which can be cultivated (because of micro-climatic variations or groundwater sources) within areas which are generally non-cultivable, and in which one finds both "range subsistence cultivators" and "pastoralists".
4 Peberdy 1969, p. 159, follows the standard classification of Kenya into six "ecological zones". Zone VI (semi desert, low potential range) is defined as the area receiving less than 12" (330 mm) rainfall per annum. On the other hand, one could also include parts of Zone V (medium potential range), which has from 12–20" (330–550 mm) rainfall.
Table 3.3: Cattle Population on Large and Small Farms, Excluding Pastoral Areas ('000 head)

<table>
<thead>
<tr>
<th>Year</th>
<th>Large Farms</th>
<th>Small Farms</th>
<th>Pastoral Areas</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>773</td>
<td>5577</td>
<td>2931</td>
<td>9787</td>
</tr>
<tr>
<td>1970</td>
<td>784</td>
<td>5778</td>
<td>2607</td>
<td>9675</td>
</tr>
<tr>
<td>1971</td>
<td>609</td>
<td>3844</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>1974</td>
<td>774</td>
<td>6720</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>1975</td>
<td>738</td>
<td>6951</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>


these areas are kept for milk, some meat and to provide draught-power. Some surplus milk and male cattle are sold in Kisumu town, the surrounding heavily populated rural areas and in south-eastern Uganda. Relatively few cattle from this area are sold to Central Province, apart from some of the commercial ranching areas to the north.

About two-thirds of all the cattle in the country are found in Rift Valley and Eastern Provinces. The largest number of cattle are kept in Districts like Kericho, Kajiado, Narok, Machakos and Kitui, where some agriculture is also practised – much of it on land which was at one time dry-season grazing for the pastoralist herders. Livestock from this area, as well as from the north and the east (except for a small catchment around Mombasa) are sold in Nairobi and to the nearby KMC canning plant at Athi River. Most of the large commercial beef ranches are located on high potential grazing land in Rift Valley and Eastern Provinces.

**Herd Productivity**

Offtake from the "traditional herd" is usually said to run at a low 9–10 %, this being attributed to lack of interest by the herders. But both parts of this statement are open to question. The most detailed and careful study of livestock marketing in Kenya by Aldington and Wilson (1968), found an overall average offtake rate of 13.2 %, which they expected to reach 14 % by the early 1970s. They found a range between 27.5 % in the commercial ranching area of Uasin Gishu, and 7.5 % in the most arid pastoral areas. The latter figure is a conservative estimate based on natural mortality rates and is almost certainly too low. In addition, some of the disparity arises from the sale of immatures from the pastoral areas for fattening on the ranches.\(^5\)

More recent figures confirm the expected increase in offtake, though some caution is required since they are not strictly comparable with those

Table 3.4: Adult Cattle Hides Produced and Graded for Export ('000)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Deliveries to KMC</th>
<th>KMC Deliveries as per cent of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968</td>
<td>669</td>
<td>184</td>
<td>28</td>
</tr>
<tr>
<td>1970</td>
<td>861</td>
<td>196</td>
<td>23</td>
</tr>
<tr>
<td>1971</td>
<td>1062</td>
<td>210</td>
<td>20</td>
</tr>
<tr>
<td>1971</td>
<td>796</td>
<td>210</td>
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</tr>
<tr>
<td>1972</td>
<td>804</td>
<td>199</td>
<td>25</td>
</tr>
<tr>
<td>1973</td>
<td>1010</td>
<td>155</td>
<td>15</td>
</tr>
<tr>
<td>1974</td>
<td>1079</td>
<td>159</td>
<td>15</td>
</tr>
<tr>
<td>1975</td>
<td>1000</td>
<td>134</td>
<td>13</td>
</tr>
<tr>
<td>1976</td>
<td>1272</td>
<td>229</td>
<td>18</td>
</tr>
</tbody>
</table>


of Aldington and Wilson. As Table 3.4 shows, one set of figures for 1971 is 25% below the other and there are the usual problems of adjusting for illegal movement of cattle across borders and live deliveries. But, if one accepts the assumption of stable herd size, then offtake appears to have risen.

More significant is the declining proportion of total offtake which passes through official channels, indicating that the trend in Column 2 results from diversion rather than declining sales.

If one accepts that the arguments of MacKenzie for Tanzania probably also have some validity for Kenya, in that hide sales understate total sales of cattle, this would concur with the above finding that offtake in the "traditional" herd is probably around 12% rather than 9–10%. However, there is no doubt that there is a large disparity between this and offtake on commercial ranches.

But there is no reason to accept lack of interest in commercialization as the reason for this disparity. As indicated in Chapter 2.5, current levels of calf and adult mortality are high enough to preclude a marketed offtake much above 10–12%, even with a static herd, while Chapter 2.6 suggested a number of reasons why herders should (perfectly reasonably) wish to increase their herds from existing levels. But while such factors are undoubtedly important in limiting sales, there is good reason to believe that state policy itself has been of similar importance, both during and since the colonial period. While complaining volubly about the failure of "traditional" herders to sell their stock, successive administrations have in fact placed substantial obstacles in the way of herders (and especially pastoralists) attempting to sell cattle. These have operated both directly and through lowering prices.
The Colonial Period

The colonization of Kenya took place in the aftermath of the rinderpest "pandemic" of the late 1880s, which killed up to 90% of all cattle in many parts of East Africa. As a result huge areas were left ungrazed and uncultivated. This opened the way for alienation, and the emergence of the "scheduled areas" of White Highlands, a consolidated block of land running through the most fertile parts of the country and enclosing the railway. This process took away dry-season grazing, water and salt-licks, and also severely inhibited patterns of movement for many of the pastoral or agricultural peoples.

Having alienated the land and set up commercial farms and ranches, the colonists found it necessary to protect markets for their produce. The pastoralist areas were still able to supply abundant high quality beef which, if allowed to compete on the same markets, would have lowered prices. At the same time, the improved stock introduced on the commercial ranches and dairy farms were more susceptible to diseases which were endemic within local herds or common in epidemic form. As a way of pursuing both these objectives Africans were excluded from markets through quarantine regulations. As van Zwanenberg points out, this not only protected European markets directly, it also provided an excuse for the discouragement of the "pernicious pastoral proclivities" of the transhumant pastoralists of the drier areas, whose patterns of movement made them more difficult to subdue militarily. The imposition of limitations on movement of stock across District borders certainly disrupted the way of life of pastoralists. And the ceding of one of the ports in the area to Italian Somaliland closed off the possibility of exporting live cattle. Thus by the 1930s, the pastoral areas were closed off from all major markets "as if shut up in a tin box made of quarantine regulations".

There is no doubt that this policy was quite deliberate. To cite another official source quoted by van Zwanenberg:

"For many years the pastoral native reserves have been in perpetual quarantine. This has been caused partly by the presence of disease, but largely by economic considerations. The expenditure at any time of comparatively small sums on veterinary services for these areas would have enabled them rapidly to be liberated from quarantine with disastrous effect upon the price of stock and stock products within the Colony" (emphasis added).


In short, in the early colonial period pastoralists were clearly willing to sell their cattle. Regulations were therefore imposed to prevent them from doing so. Even so, most officials of the colonial territory saw no contradiction between operating this policy and bemoaning the "conservative" attitudes of the pastoralists which led them to accumulate stock, to the extent of overgrazing the pastures.

By the 1930s, the problem of overgrazing was becoming increasingly evident to Kenya Government officials. The chosen solution was to build a canning factory as an alternative and segregated market in which African cattle could be bought at low prices and processed for export, without affecting the prices paid to European ranchers. However, the company and officials over-estimated the effectiveness with which they could block off access to other markets and, in consequence, offered prices so low that no stock were forthcoming. These prices were about one-quarter of those prevailing elsewhere. In response, a compulsory culling campaign was initiated in Machakos which was enforced with such severity that it provoked political protest and questions in the British parliament. This brought a temporary halt in the programme, though compulsion was later used on a smaller scale to procure cattle for the factory.\(^9\)

In the post-war period a number of significant changes took place. These included new programmes to develop the pastoral areas, rather than simply segregate them from the remainder of the economy. Pressure for this change came from two sources. First, the canning factory (taken over by the Kenya Meat Commission (KMC) in 1950) had to be supplied and compulsion was proving unsuccessful since pastoralists were able to move stock temporarily into "safe" areas. Second, while quarantines might offer effective economic protection, they did not prevent the spread of disease. For this purpose, preventive campaigns in the pastoral areas would be far more effective, especially, since a rinderpest vaccine existed.

To solve these two problems while continuing to protect local urban and high-income markets, the African Livestock Marketing Organization (ALMO) was set up. Its specific brief was to develop supplies of cattle from the pastoral areas for KMC. To this end, stock-routes and holding grounds were established, as well as series of field abattoirs to slaughter old and sick cattle incapable of trekking to Athi River. This latter was also intended to improve the composition of pastoral herds by encouraging herders to get rid of culls which otherwise grazed range resources for little production. When ALMO was closed down in 1963 on account of its

serious financial losses, it was later found to have "fulfilled an indispensable function". Its period of operation coincides precisely with the most rapid and sustained increase in deliveries of stock to official markets (see Figure 2). It had lost money because it had offered a fixed floor-price which, it was claimed, prevented price reduction through collusion on the part of buyers. However, this was below the butcher-price. The ALMO was replaced by the Livestock Marketing Division (LMD) of the Ministry of Agriculture which operated on similar lines, though declining attention was paid to the purchase of culls and increasing emphasis placed on purchasing immatures from "graziers" for supply to commercial ranches and feedlots. These grazier schemes were the forerunners of a major strand in post-Independence state policy for beef production.

The purpose of the grazier schemes, and communal ranching schemes, was to improve the productive potential of the most favourable pastoral areas of higher rainfall. Improvement was to be achieved at first through reduction in stocking levels and the introduction of rotational grazing. At a later stage, these would provide the basis for further intensification including dipping, better veterinary services and piped or reservoir water. Later still it was envisaged that these schemes would eventually be transformed into group ranches under the control of "tribal elders". However, in the meantime, they depended heavily on discipline imposed externally, the lack of which was said to have contributed to their almost universal failure after Independence.

Meyn gives information on the Samburu Scheme, known as one of the more successful of those schemes. It was started in 1955 on an area of some 240,000 ha with an estimated carrying capacity of 60,000 LSU (roughly one per 4 ha or per 10 acres). Permits were issued to 8,000 families willing to join and accept the conditions. The zone was divided into 9 "clan areas", each with its own grazing rotation. 15 dams and many wells and boreholes were constructed, veterinary services were substantially increased and grazing control instituted. About 80% of the cattle on the scheme were adult cows, the calving rate was about 65%, and the rate of calf mortality was about 17%. This led to a much larger annual production of live calves than would be expected from a "normal" herd. In most years, some 25,000 immatures "had to leave the scheme", about half of which were sold to KMC for slaughter, the remainder going to "tribal

10 Aldington & Wilson 1968:3 and ff.
areas outside the scheme". In 1961 the scheme collapsed, reputedly on account of a decline in discipline.12

However, the figures quoted above make perfectly plain that the scheme was seen by the people as a "breeding camp" for in-calf cows and heifers. Even if "discipline" had been maintained the scheme would have contributed to accelerated overgrazing in the remainder of Samburu through such increased rates of calf production. In such a case, it is rather surprising to find that most accounts look only at the internal organization, operation and problems of such schemes, ignoring their effect on herders elsewhere.

Post-Colonial Policy

In spite of the failure of almost all these schemes, they were chosen as the basis of policy for the development of the pastoral areas in the post-Independence period. But there was one very significant addition. Since the purpose of state policy was to give incentives to commercial production in the pastoral areas with better potential, some form of registered property was thought to be a necessity. "Communal tenure" was said to lead to overgrazing (as indeed, with the breakdown of previous control mechanisms, it may have done) and it was hoped that by allocating specific land areas to particular groups of herders a remedy would be found, while at the same time making it possible for the land to be pledged as security for loans. This opened the way for further pressure to be applied. Once loans had been accepted, the producers would have to sell on the market in order to repay the debts – or else lose their land to others who were more commercially oriented. This second aspect was obscured by various forms of group and communal tenure, though even in these cases the land was transformed from the status of inalienable "tribal land" to landed property which could be alienated.

The variety of ranch and ranching programmes in Kenya is considerable. Apart from large-scale commercial ranches and feeder lots with professional management, there are three main types of ranching programme open to "smallholders", though not all of them are in fact small. In the early years after Independence much emphasis was placed on efforts to promote individual ranches in Maasai and other pastoral areas, many of these being under 1,000 ha in size and intended for herds of

12 Meyn op. cit.: 34. Since these figures imply a cattle herd of some 56,000, there would also have been some 20,000 smallstock.
at most a few hundred cattle. Since then, the emphasis has shifted towards various forms of group or cooperative ranching, for several reasons. One was the expense of providing water and other facilities for each small ranch, as would be necessary if the ranches were to perform their stated purpose of stabilizing herds on a particular piece of land. Apart from this, it soon became clear that such schemes would benefit only the wealthier cattle owners, and that apart from the few who gained employment as stockmen, the remainder would lose their rights to land. This repercussion made them unattractive to at least some of the foreign donors who initially had been prepared to fund the schemes. Nonetheless, some Sh. 3 mn. was spent on the development of ranches under the IBRD/IDA First Livestock Credit Programme from 1968–72, and more are being financed under the second programme.

Of the Sh. 3 mn, 46% was spent on commercial ranches, 20% on group ranches and 26% on company cooperative ranches. Under group ranching, the land is registered in the name of a specific social group living on it and exercising "traditional land rights". The land can continue to be used individually by the members or alternatively, all or part of it can be run as a cooperative (a "communal cooperative society"). In either case, the land title can be pledged for loans and is thus alienable, though only with the permission of the state.

Davis describes in detail how these group ranches are structured and intended to operate. Control over the allocation of land and day-to-day management is divided between an annually elected committee and Group Representatives, who are a "council of elders". Though this division of control does help safeguard land rights of the members, Davis suggests that it is responsible for the ranches' failure to achieve the changes in patterns of stocking and production (which are among their primary purposes). For this reason, he proposes that alterations should be made to the tenure system to allow the less successful to rent or sell their land to the "more successful". This, he claims would be equitable, because every member would start out with equal shares of land. This argument seems a trifle naive; even where land is allocated in equal portions this means little if some people (usually members of the committee and group

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13 Livingstone 1975:18. Cooperative ranches in Machakos were originally designed as individual ranches with about 600 acres (250 ha) each. Meyn 1970:40–5, gives figures for Kaputei indicating a mean size of individual ranch in the region of 850 ha (2100 acres).
14 IBRD 1973, Annex 5:14. This was 8% of the total lent for ranch development.
representatives) have more cattle than others, and consequently greater political influence. This would inevitably lead to the accumulation of land rights in a few hands and bring about the gradual (or not so gradual) extrusion of the remainder.

Livingstone cites the case of a group ranch in Kwale District, Coast Province.\textsuperscript{16} The area involved is a whole location, Mwereni, with a population of about 13,000 (3000 families) living on 113,500 acres (46,000 ha). Of these families, only 200 (7\%) own any cattle at all, while 30 families (1\%) own over half the total, having on average 120 head each. The expressed purpose of the scheme was to operate a centralized herd, and to this end the land title was pledged for credit (from IDA) to finance dips, water supplies and firebreaks. The projected rate of offtake was 25\% (a rate demanding the most optimistic assumptions about all parameters like calving ratios, calf mortality and sales). So far as can be judged from the available data, even this high rate would give an annual average income per member of only 40/- (or 173/- per family).\textsuperscript{17} But it is misleading to talk in terms of averages; it would be highly unlikely that the proceeds would be shared equally between all group members, when so very few families owned cattle. The underlying reason for this and similar schemes is probably a desire by the larger cattle owners to gain access to credit through the mortgaging of land to which they could not get individual registered title and also find support for land allocations in their favour through the "neutral" device of technocratic planning for ranch development. It seems unlikely that the vast majority of cultivators will derive much benefit from turning their crop land over to livestock, however successful. In this case, however, major technical problems hindered ranch development. Although first started in 1968, only in 1974 was the problem of tsetse-infestation considered, when an "expert" was sent to survey the area and found "the whole of the Kwale area is infested with three species of tsetse flies . . . the future of any ranching scheme is therefore very problematical . . . .\textsuperscript{18} One wonders if the 3,000 member families were expected to repay the loans of over £ 30,000 which had been spent on the scheme prior to this report.

Apart from the tsetse problem and the non-viability of this ranch in "technical economic" terms, there are broader questions about what it is intended to achieve and at whose expense. Livingstone's account does not

\textsuperscript{16}Livingstone 1975:3–8.
\textsuperscript{17}Op. cit.: 4. My calculations from data presented.
mention the opportunity cost of ranch development in terms of potential agricultural development – or over the longer run in terms of the production and livelihood of the present residents who do not own stock. One of the cheapest and most effective methods of clearing tsetse-flies is to encourage colonization by peasant crop producers (who may also own cattle) as they keep a sufficient proportion of the land-surface clear of flies to permit permanent settlement. From an official point of view, the disadvantage of such a policy is that it may not lead to increased production for the market and almost certainly not to increased livestock production to supply official markets. Nor, since peasant-settlement is the means to clear the fly does it make land "available" for ranching. One highly relevant point Livingstone makes in this context, is that once land is gazetted as "rangeland", it comes under the aegis of the Range Management Division of the Ministry of Livestock Development, whose interest is solely in ranching, whatever the best use of the land might be.

At first sight it seems surprising that cooperative ranches are classed together with "company" ranches, rather than with group ranches. In group ranches the whole population is enrolled on the land title, but the cooperative, like the company ranch, is an autonomous productive enterprise (at least in theory). Group ranches may form "communal cooperative societies" to operate their common herds, but even where they do, the two aspects remain separate.

Cooperative ranches and "directed companies" are mostly found in areas previously farmed or ranched by European settlers (or newly gazetted for registration as private property). The major difference between them is that the directed companies have less than 50 members, while the cooperative ranches normally have more. In most cases the members will already possess land elsewhere. Rights to land are purchased. They do not derive from prior residence rights. Purchase is normally funded through the Agricultural Finance Corporation, which is said to justify the official supervision to which such companies and cooperatives are subject. It is stipulated in both cases that at least 60 % of the members must "participate wholly or partly"; a clause which refers to the provision of cattle for the enterprise rather than labour, since most are run by hired managers and workers. These enterprises are controlled by cooperative committees or boards of directors, but their effectiveness varies and depends in part on the degree of state supervision. Though the land is alienable, the likelihood of foreclosure is lessened by the fact, that loans are channelled through the AFC rather than through private lending institutions. But foreclosure has occurred. Livingstone cites the example of Taru Ranchers Ltd. in Kwale District, which had taken over the land
formerly operated by the defunct Busho Cooperative Ranch. Among the directors of the former were members of the cooperative committee.\textsuperscript{19}

Livingstone presents information on six cooperative ranches in Machakos, located on land taken over under the Million Acre scheme.\textsuperscript{\textasciitilde} As they were formed from existing European ranches, there was generally no need for investment in basic infrastructure. From the data presented on one ranch, it appears that proceeds per member per annum varied from 323/- (or 407/-, if the value of increases in the numbers of stock are included) down to 4/- (or minus 249/-, this indicating considerable decline in the number of stock). On this basis, it is not clear why the higher figure is taken to indicate a "huge income" (in comparison with peasant incomes from crop production of 4–500/-), until one realizes that this comes after a division between nearly 740 members of proceeds previously accruing to one single European rancher (some £12,000 p.a.). The precise way in which the proceeds are distributed is not revealed. Each membership involved the purchase of a share at Sh. 7,000. Since most could not afford this, registered members were backed up by a group of "shadow members" who contributed to the share. Thus, on one ranch, out of a total of 737, only 90 were registered members. More important than shares in the distributed proceeds from the cooperative herd would have been the 20 acres of land to which each was entitled for individual herds (and in some cases no doubt, crops as well). About one-third of the land was allocated among individuals. This ranch and one other surveyed by Livingstone can be judged as relatively successful, even in commercial terms. However, both were "settlement cooperatives" subject to considerable supervision (and some expenditure of funds) by the Department of Settlement. The remaining four ranches (including one settlement ranch) did far less well, and Livingstone concludes that "the description of ranching in Machakos as the 'success story' of ranching in Kenya is not borne out".

He stresses that a division of the proceeds previously accruing to one European rancher between as many as 1500 members makes it virtually impossible that they each could receive a worthwhile income. But in Machakos, as in other even less successful schemes, access to land is

\textsuperscript{19} Livingstone op. cit.: 11. He notes that this company with 20 members, was to receive public (loan) funds to a total of £65,000 (or £3,250 each) while the nearby Mwereni Group Ranch was to receive £30,000 for its 3,000 families or £10 each (or £150 per livestock-owning family).

\textsuperscript{20} This was one of the schemes under which loan funds were made available for the transfer of previously European-owned land to Africans, after Independence.
probably more important to most members than the cash proceeds, especially where there is a possibility of irrigation in the future.\footnote{Livingstone \textit{op. cit.}: 17–26. In summarizing his account, a lot of interesting details and description have had to be omitted.}

In addition to group and cooperative ranches, one also finds "grazing associations" which are an intermediate form between the "grazier schemes" of the colonial period and group ranches. These are found in pastoral areas where formal agreement has been reached on the limitation of stock numbers and control of grazing, but where no agreement has been achieved over the formation of "development units". Such areas receive certain facilities (mostly water) and make contracts to supply a specified number of stock to the Livestock Marketing Division at a negotiated minimum price.\footnote{Meyn 1970:45–50.} Finally there are "rehabilitation areas" where no formal agreements have been reached, but where the problems of overgrazing and range deterioration have been identified as being particularly severe.\footnote{Op. cit.: 50–54.}

Most of these programmes have applied to the "marginal areas"; that is areas which are either marginal or sub-marginal for crop production, but which are medium or high-potential range. It is hoped that these areas will supply the bulk of slaughter cattle for official markets. In a revealing phrase, Meyn refers to the fact that although 50 \% or more of all cattle are kept in high potential areas, "marketed production is much lower than in the range areas because of local demand in the densely populated areas"."

"Marketed" thus means "marketed through official channels".

In the lower potential pastoral areas, and the medium range areas outside ranching schemes, policy has increasingly been directed to persuading the people to sell immature males for fattening on commercial ranches or feedlots. The policy of the government and foreign aid donors has increasingly been to encourage the development of a stratified structure of beef production. As in the early years of the colonial period, disease control and veterinary regulations are of great importance.

\textit{Stratified Production}

The aim of current policy is to divide the country into different zones for the purpose of disease control and to guide investment to increase production. At the centre (figuratively) are disease-free zones capable of producing chilled meat for export even to Europe where the veterinary regulations are extremely strict. Surrounding these are areas where it is hoped virtually to eliminate disease, through restrictions imposed on

\footnote{Op. cit.: 54.}
movement of stock and segregation of holdings and through innoculations and curative measures. Beyond lie the extensive pastoral areas in which inoculation and other veterinary measures are unlikely to be economic. But since these areas remain a pool of potential infection, there is a need to institute some effective barrier separating the two zones and at the same time provide a market outlet to dispose of surplus animals and prevent over-stocking. Segregation will be achieved by establishing a defensive line of ranches to which surplus stock from the extensive pastoral zone are sold for fattening. Stock may be subject to quarantine before purchase by the ranches or will remain on the ranches for a longer period.

This is the model on which beef development programmes, such as that of the World Bank, are premised. Official policies have tended to follow this model and have included efforts to develop ranches and feedlots, and institute effective quarantines for Foot and Mouth and contagious bovine pleuropneumonia (CBPP). As noted in Chapter 2.4, quarantines constitute a major hindrance to the sale of stock, and are relatively ineffective in preventing the spread of disease.

Local demand for meat is increasing rapidly and increasing proportions of total supply are diverted away from exports (either of chilled beef or low-priced canned beef) to more lucrative non-official markets. This form of marketing by its very nature is much more difficult to control, especially given the preponderance of small and medium sized butchers, who buy directly from traders or owners of cattle. The likely response by butchers to the imposition of quarantines on their sources of supply is to bid up prices in order to maintain a sufficient flow of meat. This in turn encourages evasion of the quarantine and the movement of stock (usually illegally) from other parts of the country. Quarantines will become steadily less effective if implemented in their present form.

The incidence of illegal movement is impossible to measure, but most officials admit that it is considerable. Given the nature of the terrain and the paucity of resources available to the Veterinary Offices, it is inconceivable that full control could ever be achieved when this would be fought by stock-owners, traders, butchers and consumers.

Since the aim of the regulations is to protect the grade and exotic beef animals and so shore up the declining export market it seems a mis-spent effort. It is beyond the scope of this study to make any predictions of world market prospects for Kenyan beef, but they do not seem especially good. Kenya is a relatively cheap producer though low prices derive in part from government support of veterinary services and control programmes. So long as the EEC is producing surplusses of meat, further impositions of tariff protection and direct controls in the form of tightened veterinary and
hygiene regulations are to be expected. Under the circumstances, to aim at supplying this particular market would seem a waste of resources, especially in view of the growth of domestic demand.

These policies have had relatively little effect on production as shown in Figure 2. The number of beef cattle on large farms is still below the level at Independence, and though the number of improved cattle kept by smallholders has increased enormously, few of these are beef animals. Taking deliveries to official markets as the criterion for assessment, it can be seen that these have not increased significantly since Independence, although total offtake has grown steadily. The rise in home demand is reasonable enough, given the expansion in urban population and growth of an African middle class with incomes high enough to purchase meat. But the assumptions on which policy has been based do not take account of the home market. All things considered, it would be far easier to realign policy to conform to this reality than to continue struggling for unrealistic objectives.

Chapter 3.3: Dairy Production in Kenya

Almost all references to dairy production in Kenya refer to the "modern" dairy sector, that is to sales of dairy produce on official markets (Kenya Cooperative Creameries). This is despite the fact that the major proportion of all milk produced does not pass through such channels and that milk is the most important subsistence product where cattle herding forms the major basis of livelihood. However, there is some logic to this definition, as state policy is aimed almost entirely at the officially marketed proportion and it is unlikely that existing policies could be applied with positive effect to the other producers or areas. State policy is concerned mainly with efforts to upgrade stock by cross-breeding and A.I. and with improvements in husbandry and veterinary services. These services and husbandry improvements are unlikely to be economic for the herder who keeps only zebu cattle, for the possibility of changing to grade cattle depends not only on access to various complementary resources but on living in an area where the rainfall is sufficient to provide high quality pasture.

There is little accurate information on the size and structure of the dairy industry in Kenya, apart from the recorded deliveries to KCC. One often hears confident statements made about herd size and various production coefficients, yet these are not firmly based. Indeed, the underlying estimates are often mutually inconsistent.
Table 3.5 illustrates this point. A variety of standard estimates of herd size, and yield per cow in different sectors are put together to form a combined estimate of total milk supply for "the mid-1970s". Since the data are composites for various years, it would be misleading to attribute them to any one year or to claim any great degree of precision.

As can be seen from the table, between 35 and 60% of all milk is produced by zebu cattle, according to assumptions made about the size of the pastoral herd and yields of zebu cows. Taking a mean figure for deliveries to KCC over the period 1973–76 of some 240 million litres then, it appears that official deliveries amount to between 12 and 20% of total milk production. This is lower than the World Bank estimate cited above.

More significantly, if one assumes that almost all the milk delivered to KCC comes from large dairy farms and the improved cattle of smallholders, then such deliveries accounted for about 35% of this production. Since a very high proportion of large farm production would be delivered to KCC, this implies that only approximately one-tenth of the milk produced by improved dairy cattle on smallholdings was delivered to KCC. All of these conclusions, it must be remembered, depend on various standard assumptions about yields, calving ratios and stock numbers, not one of which is firmly established.

The unreliability of the table is highlighted if one changes from the lower to the upper estimate of milk yield for zebu cattle. Altering this assumption increases the estimate of total production by 60%. It is generally claimed that the yield of zebu cows varies between “150 and 380 kg per cow and year, the lower figure being the more realistic” but there is reason to believe that a mean or higher estimate may be just as realistic. Not only does independent evidence point in this direction, there is a definite tendency among animal husbandry and veterinary specialists in East Africa to choose the worst possible coefficients of productivity when describing "unimproved" systems of production, in order to "strengthen" the case for improvement. Another point emerging from the table is that, since the proportion of total production delivered to KCC is so small, quite minor variations could affect the amount delivered significantly.

There are further complications to be considered, relating to the definition of "improved" and "unimproved" zebu cattle, the numbers of

3 This can also be deduced from the doom-laden tones of pronouncements about what will happen if proposed improvements are not implemented and will be considered further below.
<table>
<thead>
<tr>
<th></th>
<th>Total Herd '000 head</th>
<th>Proportion of Mature Cows in Herd (%)</th>
<th>Number of Cows '000</th>
<th>Milk Yield per Cow (litres)</th>
<th>Total Milk Production (mn litres)</th>
<th>Proportion of Total under Assumption &quot;A&quot;</th>
<th>&quot;B&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy Cattle (large farms)</td>
<td>290&lt;sup&gt;1&lt;/sup&gt;</td>
<td>60</td>
<td>175&lt;sup&gt;1&lt;/sup&gt;</td>
<td>1050&lt;sup&gt;2&lt;/sup&gt;</td>
<td>184</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td>Beef Cattle (large farms)</td>
<td>460&lt;sup&gt;1&lt;/sup&gt;</td>
<td>33</td>
<td>150&lt;sup&gt;1&lt;/sup&gt;</td>
<td>750&lt;sup&gt;5&lt;/sup&gt;</td>
<td>113</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Grade Cattle (small farms)</td>
<td>1,450&lt;sup&gt;3&lt;/sup&gt;</td>
<td>40</td>
<td>600</td>
<td>850&lt;sup&gt;2&lt;/sup&gt;</td>
<td>510</td>
<td>41</td>
<td>26</td>
</tr>
<tr>
<td>Zebu Cattle (small farms)</td>
<td>5,400&lt;sup&gt;3&lt;/sup&gt;</td>
<td>36</td>
<td>1940</td>
<td>150–380</td>
<td>291–737</td>
<td>24</td>
<td>37</td>
</tr>
<tr>
<td>Pastoral Herds</td>
<td>2,000–2,500&lt;sup&gt;4&lt;/sup&gt;</td>
<td>45&lt;sup&gt;5&lt;/sup&gt;</td>
<td>900–1125</td>
<td>150–380</td>
<td>135–427</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>9,600–10,000</td>
<td>40</td>
<td>3765–3990</td>
<td>300–500</td>
<td>1232–1971</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

**Notes:** Totals do not add due to rounding.
Assumptions "A" and "B" refer to lower (A) and upper (B) estimates for the milk yields of zebu cattle and pastoral herds. No adjustment is made in respect of differing estimates for the size of the latter, a mean figure having been used.

**Sources:**
2. IBRD 1973, Annex 5:3–5
4. Residual figure (rounded)
5. Own estimate, based on mid-point of range.

**Alternative estimate**
It was assumed for the purpose of working out the above table, that yield estimates (stated in litres per year) included an adjustment for the calving ratio, although this is not specifically stated. If this was not the case, then total production should be reduced by weighting according to the calving ratio. This is done below:

<table>
<thead>
<tr>
<th></th>
<th>Calving Ratio (%)</th>
<th>Total Production &quot;A&quot; (mn. lit.)</th>
<th>&quot;B&quot;</th>
<th>Proportion of Total &quot;A&quot;</th>
<th>&quot;B&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy Cattle (large farms)</td>
<td>70</td>
<td>129</td>
<td>129</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>Beef Cattle (large farms)</td>
<td>70</td>
<td>80</td>
<td>80</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Grade Cattle (small farms)</td>
<td>66</td>
<td>337</td>
<td>337</td>
<td>41</td>
<td>26</td>
</tr>
<tr>
<td>Zebu Cattle (small farms)</td>
<td>68</td>
<td>200</td>
<td>500</td>
<td>24</td>
<td>38</td>
</tr>
<tr>
<td>Zebu Cattle (pastoralists)</td>
<td>63</td>
<td>86</td>
<td>270</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>832</td>
<td>1316</td>
<td></td>
<td>101</td>
<td>99</td>
</tr>
</tbody>
</table>
each type and the implications these estimates have for yields and production. But these can best be elaborated after a brief outline of the history of dairy development in Kenya since the colonial period.

Dairy production was undertaken by European settlers from the early years of the colonial period. As was the case for all such activities, dairying was stringently protected against potential competition from African producers. Not only was this policy designed to maintain prices and prevent the diversion of labour; since some African producers were "squatters", it prevented Africans from claiming some form of usufructuary title to the land. Cowen notes the considerable and effective efforts made to exclude a group of African "primitive accumulators", who owned larger herds⁴ and how African livestock were moved out of their grazing areas in Central Province. At an early stage, the settlers extracted a rent in milk from squatter cattle-owners – from which they then separated the cream for sale – but later expelled these stock as they built up their own herds. In spite of official discouragement, Africans owned a few grade cattle in the early 1920s, but a combination of East Coast fever and the closing of sources of new supply kept the number minimal.

But contrary forces were being set in motion. With the development of the settler herds, greater selection took place within them for increased yield and poorer stock were culled. Africans were prepared to pay prices above the rate for slaughter cattle, and some settlers sold their inferior animals, especially during the 1930s when the price of milk had fallen drastically. Genetics being the probabilistic science it is, not all of these culled animals could have been worthless. Cowen cites evidence that African owners charged quite high stud fees for their improved bulls, indicating a process of reselection among African-owned grade cattle and zebus crossed with Boran and Sahiwal. Cowen charts in detail the growth of African grade dairy production in one part of Central Province, but little information is available for other areas. Nevertheless, by the late 1950s quite substantial proportions of some herds in Central Province had been affected by upgrading. The milk was mostly sold to Asian or African

⁴ For the purposes of the present account, I have taken from Cowen's paper only those parts which refer to the growth of grade dairy production. His own major purpose is to demonstrate how pre-colonial "primitive accumulators", the owners of large cattle herds, were largely destroyed by colonial pressures while a stratum of educated "athomi" emerged based on both wage-employment in clerical and lower-level bureaucratic jobs and "modern" agricultural production. In this case, the form of "modern" agriculture in question was dairy production with grade cattle. In doing this, he charts their progress through the various obstacles placed by colonial policy and settler interests, in some detail (for Nyeri District).
consumers and to teashops in smaller towns, though some was sold for ghee production and smaller amounts for cream.

During the early years of the Emergency of the 1950s, there was a major setback to the development of African dairy production since both the authorities and the forest fighters were liable to seize cattle on suspicion that their owners were supporting the other side. This markedly reduced the incentive to venture into grade cattle ownership. At the same time, such programmes as had been proposed were largely suspended. Even so, in 1955 some 1,000 grade cattle were recorded in African hands in Nyeri District, which would imply a total of up to ten thousand for the whole of Central Province (allowing for the tendency for underestimation).'

Growth was increasingly rapid from the mid-1950s as official policy turned from discouragement into an effort to guide and control what had already started. The first programmes for distribution of grade bulls and A.I. were started during this period. As in later programmes, regulations were imposed on the recipients of cattle. Thus a programme to distribute Sahiwal x local zebu stock carried with it the following requirements,

1. To spray the stock regularly against ticks, for a minimum period of nine months
2. To erect a perimeter fence around the farm and to maintain fences in stock-proof condition
3. To record all milk yields in a simple record book
4. To make adequate provision for a minimum quantity of dry-season feed
5. To innoculate or vaccinate all cattle regularly against anthrax, blackquarter disease, brucellosis, and septicaemia on a full-payment basis

It is worth underlining the quite explicit assumption made by such programmes; peasants would obey rules only when they were forced to do so in order to get cattle, not because they saw the rules themselves as beneficial. This assumption has been repeated in recent policy and will be considered again.  

By the late 1950s, it was also realized that the KCC would have to purchase produce other than ghee and cream. If this was not done, African producers, selling through private traders would be in a position to take over a large proportion of the urban supply. The KCC could only impose a monopoly (or retain one) when it was willing to accept produce from all those currently supplying the market. Yet, while this change in policy

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5 Cited in Cowen op. cit. Appendix I.
undoubtedly contributed to a major upsurge in African ownership of grade cattle and to increased production of milk, it would probably be incorrect to attribute the growth to the positive effect of the policies themselves. A stronger case can be made that the growth resulted mainly from the dropping of various forms of restriction. In any case, the correlation between growth in the grade herd and dairy production and the implementation of government policies (other than price changes) is far from perfect.

As can be seen from Figure 2, the increase in deliveries to KCC has not been particularly rapid. From 1960, the average annual increase has been about 1%, while from 1973 to 1976 it declined quite sharply though it later recovered. Production from grade animals of smallholders has certainly grown more rapidly, for large farm production (which accounted for the vast bulk in 1963) has stagnated or declined, especially during the past few years. However, the increase in deliveries of milk from peasants (about 9% per annum) does not seem to have kept pace with the growth of the grade herd even after subtracting large farm production. Since the apparent rate of growth of the grade herd is in the order of 20–30% per annum, this indicates a decline in deliveries per head for some other reason. The problem is to determine the extent to which this reflects diversion of products onto non-official markets, a decline in productivity or the mis-specification of the rate of growth of the dairy herd. It is also important to consider the part played by state policy in contributing to this result.

There is some evidence to suggest that at least some of the reported growth, especially in recent years, comes from changes in definition and not from an actual increase in animal numbers. At different times, "dairy cattle" have been defined as including mature females only (dairy cows), or all females, or even all grade stock. But in the present case, this does not seem to be the problem. Rural Survey Statistics for 1974/75 give a figure for the grade dairy herd (all stock) of about 1.5 million. This represents a

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7 See Figure 4.4.1, where deliveries to Nakuru and Eldoret plants (serving the large farm areas) show the most rapid decline.

8 In spite of the introduction of some limited sales to KCC of liquid milk from the late 1950's, it seems likely that in 1960 the vast proportion of African deliveries were still in the form of ghee of which 23.5 mn litres milk equivalent were received – so total African production might have been in the region 25–30 mn litres. By the mid-1970's, this had grown to over 100 million litres, giving a rate of growth in the region of 8–10% per annum.

9 Taking Rural Survey Statistics for 1974/75 (Statistical Abstract 1977:145) and comparing these with a grade herd in African hands for 1960 which is often referred to as negligible, but which in fact probably amounted to at least 30,000 head, if not more.
substantial increase over the previous estimate of 0.7 to 1.0 million which had been based on a series of assessments and forecasts made between 1970 and 1975, and recorded in an unpublished World Bank report.\textsuperscript{10} According to this estimate the population of grade dairy stock in 1970 was about 0.7 million, of which about 40\% were on large farms and the remainder on smallholdings or settlement schemes. The number of grade dairy cows was forecast as rising to about 0.5 million in 1975, from 0.36 million in 1970. Assuming the proportion of cows in the herd to remain constant, this would give a total herd size of about 1.0 million. If one then subtracts the grade animals held on large farms in 1976, one is left with an estimate of 0.71 million grade cattle on small farms and settlements, or about one half the rural survey estimate.

It appears that the two surveys used different definitions of an "improved dairy cow". Once rid of the assumption that improvement of dairy stock is something introduced from the outside to ignorant traditional herders with the post-Independence upgrading and A.I. schemes then enumeration becomes complex. As noted above, African herders have used cull grade and exotic stock, crossbreeds of various sorts, improved zebu stock and whatever improved bulls or cows were available at prices which they could afford. This has involved the admixture of Ayrshire, Red Poll, Channel Island and Friesian among the exotic breeds and Boran, Sahiwal and Red Sindhi among the improved zebu. These stock have not been subject to controlled systems of breeding but have been used on the basis of availability and what seemed to improve yields most effectively at the time. There are therefore large numbers of cattle with indeterminable proportions of various exotic breeds in them, whose genetic composition is extremely hard to tell from observation and for which there are no records. It is thus hardly surprising that one finds variations in the numbers of "grade" cattle recorded. Furthermore, dairy husbandry "experts" would have a tendency to choose the most stringent definitions especially when engaged in programmes for the upgrading of stock with one particular exotic breed. For example, experts working in areas where A.I. programmes are based on Friesian semen, might well fail to notice the Jersey blood in cattle (especially those with humps).\textsuperscript{11}

In conclusion it can be suggested that while the figures, taken crudely, seem to indicate a major increase in the grade herd on small farms and

\textsuperscript{11} The example is only partially hypothetical since there are a number of Jersey crosses in the highland areas, this having once been the favoured exotic of the Dept. of Vet. Services.
settlements between 1970 and 1975 (25% per annum), in reality this seems unlikely to have been the case. On the contrary, certain well-informed observers have claimed that in Central Province, it has actually declined (along with production) since 1973. No figures exist to confirm this, but at least the finding is not so inconsistent with the figures available as might seem the case at first sight.

Government policies towards the smallholder dairy sector have consisted of three main components; upgrading of stock, dipping and tick control and more general husbandry improvement, including feeding.

Though A.I. programmes began before Independence, they were strengthened with foreign assistance after 1966 and further increased in scope after 1970 with a much larger foreign aid component. Government policy has led to the expansion of the service and subsidization of the price. One shilling is charged per pregnancy (involving up to three inseminations, though on average less than two) in comparison with a real cost of about 10 shillings per insemination.\textsuperscript{12} By 1973, two-thirds of smallholders were said to have access to A.I. though this probably refers to smallholder areas. One may doubt whether the availability to peasant farmers was so high.\textsuperscript{13}

From the late 1950s until the mid-1960s, the main policy emphasis for upgrading of dairy cattle was placed on schemes for the purchase of grade heifers and cows, and for the provision of grade bulls for natural breeding from zebu cows. A number of programmes made credit available to smallholders for this purpose, yet it appears that the rate of growth of the grade herd was far more rapid than could be accounted for by these. Many of those who upgraded their stock or purchased grade stock did so from their own accumulated funds. Cowen demonstrates how this was achieved in Nyeri District, both of his examples involving the purchase and fattening of sheep as a preliminary step in order to get hold of the money.\textsuperscript{14}

What effect the stepping-up of the A.I. campaign has had is extremely hard to assess on account of the non-comparable figures for the total grade herd. Data from Kericho District can be taken as an example. They

\textsuperscript{12} According to an unpublished report citing figures from the Dept. of Veterinary Services, the total cost of the A.I. programme from 197112 to 197516 was 13.1 mn shillings for a total of 1.4 million inseminations.

\textsuperscript{13} IBRD 1973, Annex 5:6. Although the coverage of A.I. crushes and centres is quite thorough, there will inevitably be areas from which it is either inconvenient or impossible to reach these in time, so that there is an "accessibility gradient" rather than a sharp cut-off point. Apart from this, the larger peasant farmers will tend to be served better in this, as in other, respects by the staff of the Veterinary Dept., some of whom charge (illegally) for their services.

\textsuperscript{14} Cowen op. cit. Appendix II.
indicate relatively little change in that area. While the number of inseminations increased from 5,500 in 1970 to 12,800 in 1976, the estimated number of grade cattle in the District declined by about 27% from almost 100,000 to 72,500. The recorded number of grade cattle on small farms declined during the same period by an even greater proportion, 44%, that is by almost 31,000 head. But the figures show signs of a change in the basis of computation, so that not too much should be read into them. Nor are figures for recorded deliveries to KCC much help since they change little from 1971 to 1975 and then suddenly jump to three and one half times the 1975 level in 1976. Once again, this is clearly a result of improved recording rather than an indication of a real increase.

At the same time, it is claimed by the Veterinary Division, though without the support of statistical data, that the grade herd has increased substantially. There is another reason why A.I. would not be expected to increase the size of the grade herd markedly. A large proportion of all inseminations are performed on grade cattle. For the A.I. programme as a whole, 86% of all inseminations were on already upgraded cattle, while for Kericho the proportion was 80%. There is some reason for concern over the possible effects of this upon tick-resistance, but for the present, the point to be made is that such second-crosses do not add to the number of grade cattle except insofar as the total herd increases. It is sometimes assumed that this means a steadily increasing gap between a grade herd with an increasing proportion of exotic blood and an "unimproved zebu" herd which remains unchanged. Although I have seen no detailed study other than Cowen's for Nyeri, the above arguments make plain that such a simple picture is untenable. Large numbers of zebu owners probably upgrade their stock to some extent with crossbred or other bulls which have higher than usual yield for their progeny. It seems moreover, highly likely that the risk of death from ECF is one major determinant of who upgrades with pure exotic semen and under what circumstances.

The susceptibility of cattle to ECF seems to increase rapidly with the proportion of exotic blood, up to a claimed 100% calf mortality among purebred exotics and not very much less among zebu-exotic first crosses. Control of ticks is thus a sine qua non of economic dairy production.

But while dipping is potentially the most effective method of control this potential is by no means always achieved. It is a social production process on a wider scale than hand-spraying and thus involves the organization

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and coordination of efforts by various groups of people including peasants, chemical suppliers and agencies of the state. As indicated in Chapter 2.4, disorganization and corruption have led to serious problems; a high proportion of dips are operated below strength with the result that they fail to kill all the ticks and build up resistance to acaricide among the survivors. The ineffectiveness of dipping in turn discourages herders from using the dips and, at the same time discourages them from upgrading their stock since this would increase the risk from ECF.

The Veterinary Department is inclined to attribute much of the problem of tick-infestation to the presence of owners of unimproved zebu cattle who do not dip their cattle because it is not economic given the lower value of their production. But it is highly likely that if the standard of dipping and tick control could be improved, then the owners of zebu cattle would be far more inclined to avail themselves of A.I. than at present. The upgrading of the whole herd could then be accelerated and a greater proportion of owners be more highly motivated to dip.

The practical implication of the Veterinary Department's assumption about owners of zebu cattle is a tendency to rely on regulation to enforce dipping. The legal means for this have existed since the colonial period in the form of the Cattle Cleansing Act. Once Districts are gazetted as "cattle cleansing areas", it becomes compulsory for all stock-owners to dip their cattle on pain of fines for failure. Given this policy emphasis, the way dips are run is seen as largely subsidiary to the number of dips to cater for the cattle in cattle cleansing areas.

In my opinion, the attempt to enforce dipping in the absence of a properly organized programme capable of supplying an effective service is likely to be worthless if not worse, especially since an emphasis on legislation deflects attention from the primary task of improving the running of the dips. Currently, the Veterinary Department is engaged in a programme to improve the running of dips by putting them under the direct control of the Department. If this is successful, it will be of considerable benefit to herders. The question which remains unanswered is whether the Department can in fact run the dips effectively and this depends crucially on the proportion of its officers' time which is allocated respectively to running the dips and controlling the peasants.¹⁶

To date (1979), there is little evidence of improvement in the

¹⁶ While the case for concentrating on effective operation of dips seems to be accepted at central and planning level, this may be more difficult to impose at local level where officials are used to exercising control and derive status and political or economic benefits from doing so.
effectiveness of dipping or of tick-control. This clearly has affected the pattern of upgrading. Owners most at risk from tickborne diseases are those without enclosed pasture who must graze their stock on common lands and roadsides. At the other end of the spectrum, most secure are owners with segregated pastures for their improved stock, who can also avoid the risks inherent in driving them through tick-invested country to ineffective dips, by spraying their own stock by hand. In some parts of the country, the Veterinary Department only gives loans for improved stock, if the prospective owner possesses a hand-spray even where the department itself controls the dips. It is thus hardly surprising that one finds the owners of grade cattle taking the vast bulk of all inseminations. Though, as Cowen shows, ownership of improved dairy cattle is not restricted to a small minority, as a substantial number of "middle-peasants" fulfill the criteria." But the combination of higher risk and price puts this form of development beyond the reach of poorer peasants.

Since the early 1970s, another factor would help account for the decline in milk deliveries. As will be shown in more detail in Chapter 4.4, the price to the producer for milk delivered to KCC rose quite substantially in 1971 but did not change for the next 3½ years. During the same period, the price of inputs and agricultural products rose considerably. Since the price of grains rose rapidly during the period, the worst hit were grade dairy cattle owners who had to purchase or grow supplementary feed. The generally declining returns would have caused many to withdraw from various expenditures on improved husbandry or veterinary services they had previously made. On this basis, the claim is made that in parts of Central Province, the grade herd has actually declined. But whether or not that is the case, there seems little doubt that its productivity declined and that this (and not simply diversion of produce) would have accounted for part of the decline in production.

Nevertheless, as shown in Chapter 4.4, there can be no doubt that the direct effect of relative prices is considerable. Peasant dairy producers can consume milk at home, sell certain amounts locally and in nearby towns, or deliver to KCC. And there is little doubt that declining prices at KCC stimulate diversion of produce.

Conclusion
For the next few years, the future of dairy production in Kenya would appear to depend on peasant production since the large farm sector shows no signs of recovering from a pattern of stagnation and decline. As will be

17 Cowen & Kiyanjui (1977) Section III p.4.
shown in Chapter 4.4, peasant production is highly responsive to the relative prices of milk, alternative products and inputs which, together with the existence of alternative markets, makes official deliveries somewhat volatile.

But apart from market pressures, the growth of production is affected by three main factors: genetic potential, husbandry (especially feeding) and disease control (especially for tickborne diseases).

The rate at which zebu cattle are upgraded evidently depends not simply on the availability and direct costs of artificial insemination (the latter being negligible). While it is likely that owners of grade stock have preferential access to A.I. facilities, this cannot account for the enormous preponderance of grade cattle which receive A.I. Nor is there any evidence that owners of zebu cattle are "resistant to change". Upgrading of stock has been known and popular at least in Central Province for decades; for most of which period the supply of stock and A.I. for upgrading was generally insufficient to meet demand. It therefore seems likely that the decision by owners of zebu stock not to avail themselves of A.I. stems from a greater susceptibility to disease (and especially ECF) of grade cattle and a greater vulnerability of poor peasants to risk, because they lack the land for pasture or fodder, water and spray equipment which would allow them to avoid the risk of tick infestation.

It is also possible that "second generation" problems may have some effect. The second generation after cross-breeding results in genetic segregation and a relatively high proportion of culls. It could well be that these are available relatively cheaply to owners of zebu cattle from grade cattle owners who are improving their herds through further use of A.I. The purchasers would have the advantage of buying stock when they had passed the period of maximum vulnerability to ECF. Another point whose impact is unclear, is the variety of breeds used in upgrading programmes implemented in Kenya. Starting in the 1950s with Sahiwal and dual-purpose Red Poll animals, official favour then shifted to Jerseys, thought to be hardier than other exotics and better suited to the tropics, and finally to Friesian, on account of their higher yield. Together with all the other informal upgradings made by peasant farmers from stud bulls of various provenance, this has led to a grade herd of considerable heterogeneity.

The problem of feeding is again more market-determined than the result of "failure to adopt" improved practices. There is evidence to suggest that some decline in production from 1973 to 1976, at least in Central Province, resulted from deterioration in the nutrition of dairy cows.\(^{18}\) This was

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\(^{18}\) M.P. Cowen – personal communication.
probably due to the increasing opportunity cost of land and labour devoted to pasture as a result of increases first in the prices of maize and then coffee, while price of purchased feed went up as well. It seems likely that dairy production in densely populated areas will remain extremely vulnerable to such shifts, at least until productivity can be raised.\textsuperscript{19}

In this connection the role of tick-control is crucial. It is only worthwhile intensifying the production system to include the production of fodder with productive grade animals, if there is reasonable security from tick-borne diseases. Furthermore, it cannot be stressed too strongly that the major problem of tick control is not the failure of peasants to dip their cattle but the failure to run the dips properly. Difficult as effective operation will be to achieve, it remains the key to further advance in dairy production. If ticks could be eradicated from whole areas, rather than just individual farms or paddocks, then the range of farmers able to upgrade their stock would be expanded considerably.

This in turn would ease the problem of achieving further improvements in tick control and husbandry improvement. In addition, it would make a very considerable direct contribution to the success of breeding programmes since the first cross provides the most striking increase in genetic potential and a much greater number of grade calves could be expected to survive.

But this is not simply a matter of operating an efficient regular and comprehensive dipping service at reasonable prices. For however well an area may be "cleansed", it can be reinfested rapidly by the passage of tick-bearing animals. Probably the most serious cause of re-infestation at present is illegal movement of stock from the marginal and range areas for slaughter in the urban and wealthy agricultural areas.

Far from providing a solution to this, the various controls and quarantines imposed by the Department of Veterinary Services are to a considerable extent responsible for this problem. What prevents stock-owners from using the stock-routes, which are reasonably well segregated from other cattle and grazing grounds, is the plethora of regulations, prohibitions and delays to movement. Since the rationale for this is connected with the development of a beef export potential which appears not to exist, the restriction leads to enormous waste. It is time for the re-evaluation of a policy which has considerable indirect costs, borne by dairy producers (and others who fail to become dairy producers), for a

\textsuperscript{19} This is not to claim that raising productivity will necessarily eliminate such vulnerability. A more likely effect would seem to be reduced producer prices, given that most producers are peasants.

140
largely non-existent benefit. With the relaxation of some rules on movements of stock, it might be possible to attract (not force) more of the slaughter stock onto gazetted stock-routes and thus diminish the risk of tick infestation in the dairy areas.\footnote{It is worth stressing once again that attempts to force stockowners to use the stock-routes are likely to be worse than useless since their most likely result is to increase the dispersion of stock on the move throughout the countryside, since the owners will merely redouble their attempts at evasion. The carries the further danger that the whole policy comes to be defined in "police" terms, so that the number of arrests comes to be seen as the major criterion of success, even while the policies contribute to the worsening of the basic problem. For an analogy from a different area, one can consider United States official policies to combat heroin addiction which have turned smuggling into a billion-dollar industry.}

Chapter 3.4: Livestock Production in Tanzania

About 60% of the land-surface of Tanzania is infested with tsetse-fly and, as shown in Map 4, this is the major single determinant of the distribution of livestock. As discussed above, however, the level of infestation is associated with the density of settlement. This is shown with particular clarity in the case of Sukumaland, to the south and east of Lake Victoria, which contains the greatest single concentration of livestock in the country. Much of this area would have been tsetse-infested if settlement and herding had not cleared the natural flora and fauna.

Most livestock are kept in the north and centre of the country and Table 3.6 gives a breakdown according to region.

Several estimates have been made of livestock numbers; they are far from being in perfect agreement. The source used above is certainly incorrect in the case of Mbeya (which is simply omitted) while other estimates put the cattle population at about 0.5 million. Nonetheless, it does give an overall picture of stock distribution and shows that 55% and 60% respectively of cattle and small stock are kept in the three main regions, all in the central area.

This highly uneven distribution of stock is reflected in levels of meat consumption. Table 3.7 shows estimated levels of "expenditure" on meat and dairy products, which appears to include an allowance for the value of own-produce consumed.

Although the precise figures are not reliable, they are indicative of the general tendency; more meat and dairy produce are consumed in the northern areas where most of the cattle are found. It also suggests that
Table 3.6: Regional Distribution of Livestock in Tanzania ('000 & %)

<table>
<thead>
<tr>
<th>Region</th>
<th>Cattle '000</th>
<th>%</th>
<th>Sheep '000</th>
<th>%</th>
<th>Goats '000</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arusha</td>
<td>1800</td>
<td>19</td>
<td>706</td>
<td>26</td>
<td>843</td>
<td>21</td>
</tr>
<tr>
<td>Shinyanga</td>
<td>2142</td>
<td>23</td>
<td>543</td>
<td>20</td>
<td>762</td>
<td>19</td>
</tr>
<tr>
<td>Dodoma</td>
<td>1143</td>
<td>12</td>
<td>469</td>
<td>17</td>
<td>803</td>
<td>20</td>
</tr>
<tr>
<td>Mwanza</td>
<td>622</td>
<td>7</td>
<td>208</td>
<td>8</td>
<td>317</td>
<td>8</td>
</tr>
<tr>
<td>Mara</td>
<td>836</td>
<td>9</td>
<td>202</td>
<td>7</td>
<td>146</td>
<td>4</td>
</tr>
<tr>
<td>Singida</td>
<td>621</td>
<td>7</td>
<td>180</td>
<td>7</td>
<td>279</td>
<td>7</td>
</tr>
<tr>
<td>Total of Six</td>
<td>7164</td>
<td>7</td>
<td>2308</td>
<td>84</td>
<td>3150</td>
<td>77</td>
</tr>
<tr>
<td>Tabora</td>
<td>637</td>
<td>7</td>
<td>124</td>
<td>4</td>
<td>158</td>
<td>4</td>
</tr>
<tr>
<td>Iringa</td>
<td>618</td>
<td>7</td>
<td>97</td>
<td>4</td>
<td>141</td>
<td>3</td>
</tr>
<tr>
<td>Mbeya*</td>
<td>80</td>
<td>1</td>
<td>93</td>
<td>3</td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td>Total of Nine</td>
<td>8499</td>
<td>90</td>
<td>2622</td>
<td>95</td>
<td>3449</td>
<td>84</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region</th>
<th>Cattle '000</th>
<th>%</th>
<th>Sheep '000</th>
<th>%</th>
<th>Goats '000</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kilimanjaro</td>
<td>294</td>
<td>3</td>
<td>29</td>
<td>1</td>
<td>55</td>
<td>1</td>
</tr>
<tr>
<td>Tanga</td>
<td>290</td>
<td>3</td>
<td>10</td>
<td>–</td>
<td>200</td>
<td>5</td>
</tr>
<tr>
<td>West Lake</td>
<td>100</td>
<td>1</td>
<td>28</td>
<td>1</td>
<td>124</td>
<td>3</td>
</tr>
<tr>
<td>Morogoro</td>
<td>80</td>
<td>1</td>
<td>29</td>
<td>1</td>
<td>69</td>
<td>2</td>
</tr>
<tr>
<td>Kigoma</td>
<td>61</td>
<td>1</td>
<td>23</td>
<td>1</td>
<td>86</td>
<td>2</td>
</tr>
<tr>
<td>Coast/DSM</td>
<td>64</td>
<td>1</td>
<td>7</td>
<td>–</td>
<td>19</td>
<td>–</td>
</tr>
<tr>
<td>Ruvuma</td>
<td>11</td>
<td>–</td>
<td>2</td>
<td>–</td>
<td>34</td>
<td>1</td>
</tr>
<tr>
<td>Mtwara</td>
<td>10</td>
<td>–</td>
<td>5</td>
<td>–</td>
<td>51</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>9409</td>
<td>100</td>
<td>2757</td>
<td>99</td>
<td>4089</td>
<td>99</td>
</tr>
</tbody>
</table>

Source: Oforo (1975):50, attributed to "Livestock Census – 1975".

* Difference between total and total of all other regions, since not included in table.

The consumption of these products is positively correlated with total expenditures and thus with income, though in some areas the imputation of product prices may overstate the value of livestock produce.

There is also a marked disparity in the consumption of livestock products between urban and rural areas and also among different income groups. As indicated in the following chapter, these disparities seem to be growing rather than declining. Table 3.8 gives an estimate of the consumption of meat and dairy products by urban and rural areas in 1970.

Figures from the 1969 Household Budget Survey indicate that under 8% of the mainland population with household incomes above 2,000 shillings purchased 63% of all livestock products, while at the other end of the scale, the 50% of the population with household incomes below 1,000...
Table 3.7: Household Expenditure on Meat and Dairy Produce (excluding butter) Rural Zones, excluding main towns (Shillings/H'hold)

<table>
<thead>
<tr>
<th>Zone</th>
<th>Household Expenditure Meat &amp; Dairy</th>
<th>Total</th>
<th>Meat &amp; Dairy as % of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern (Arusha, Kilimanjaro, Tanga)</td>
<td>330</td>
<td>2188</td>
<td>15</td>
</tr>
<tr>
<td>Lake (Mara, Mwanza, Shinyanga, W. Lake)</td>
<td>221</td>
<td>2124</td>
<td>10</td>
</tr>
<tr>
<td>Southern Highlands (Iringa, Mbeya)</td>
<td>97</td>
<td>1403</td>
<td>7</td>
</tr>
<tr>
<td>Western (Kigoma, Tabora, Singida)</td>
<td>96</td>
<td>1265</td>
<td>8</td>
</tr>
<tr>
<td>East (Coast, Dodoma, Morogoro)</td>
<td>92</td>
<td>1218</td>
<td>8</td>
</tr>
<tr>
<td>Southern (Mtwara, Ruvuma)</td>
<td>58</td>
<td>1297</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Household Budget Survey 1969; Table 6.1 and Appendix 8m:152, 8n 1&2, Table 3.10.

Table 3.8: Consumption of Meat and Dairy Products (kg/head/year)

<table>
<thead>
<tr>
<th>Item</th>
<th>Mainland Rural</th>
<th>Dar-es-Salaam</th>
<th>Nine other Main Towns</th>
<th>Tanzania Mainland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle Meat</td>
<td>7.3</td>
<td>21.5</td>
<td>18.8</td>
<td>9.9</td>
</tr>
<tr>
<td>Sheep &amp; Goat</td>
<td>2.5</td>
<td>1.3</td>
<td>1.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Pork</td>
<td>0.2</td>
<td>0.1</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Offal</td>
<td>0.2</td>
<td>1.8</td>
<td>1.1</td>
<td>..</td>
</tr>
<tr>
<td>Chicken</td>
<td>1.3</td>
<td>0.5</td>
<td>1.5</td>
<td>..</td>
</tr>
<tr>
<td>Milk (all forms)</td>
<td>20.0</td>
<td>50.0</td>
<td>..</td>
<td>39.8</td>
</tr>
<tr>
<td>Animal fat</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>0.6</td>
</tr>
<tr>
<td>Fish</td>
<td>6.8</td>
<td>10.0</td>
<td>11.2</td>
<td>6.0</td>
</tr>
</tbody>
</table>


shillings per annum, consumed only 9 %. This is a much greater degree of disparity than between urban and rural areas. While the 8 % of the population recorded as living in towns consumed 2½ to 3 times as much livestock produce as rural dwellers, the top 8 % of the income scale consumed no less than 40 times the value of livestock produce consumed

1 Household Budget Survey 1969 (United Republic of Tanzania 1972), Table 8.1:1.
by the bottom 50%. There seems no reason to suppose that the urban poor consume significantly more than their rural counterparts.

To some extent, government policy is responsible for the widening disparities. These policies emphasize the production of ranch beef and milk from large dairy farms and the pasteurization of milk for urban consumers. In addition, the current import policy has a similar effect, especially as concerns the rural/urban differential. Imports of tinned milk have been limited and replaced with skim-milk powder and butter oil for reconstituting into "fresh milk". Not only is fresh packet milk more expensive, it cannot be delivered to many rural areas without souring, nor stored on arrival as few rural shops have refrigeration. Though official statements stress that the development of livestock production is intended to improve nutritional standards, it is evident that the policies pursued will do little or nothing to better the diets of those most in need of supplementation.

**Historical Outline**

Tanzania had a substantial livestock population before the colonial period. Livestock numbers probably declined greatly after about 1890, as the result of the Great Rinderpest Pandemic and related subsequent catastrophes, including the direct effects of colonial disruption. Table 3.9 shows that the estimated livestock population increased steadily after 1913, though almost certainly this is partly due to the increasing

<table>
<thead>
<tr>
<th>Year</th>
<th>Cattle</th>
<th>Sheep</th>
<th>Goats</th>
<th>Pigs</th>
<th>Donkeys</th>
<th>L.S.U. Million</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913</td>
<td>1700</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>1923</td>
<td>3800</td>
<td>3900</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>4.6</td>
</tr>
<tr>
<td>1925</td>
<td>4472</td>
<td>4333</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>5.3</td>
</tr>
<tr>
<td>1935</td>
<td>4793</td>
<td>1912</td>
<td>2566</td>
<td>.</td>
<td>.</td>
<td>5.7</td>
</tr>
<tr>
<td>1946</td>
<td>6402</td>
<td>2366</td>
<td>2805</td>
<td>.</td>
<td>.</td>
<td>7.4</td>
</tr>
<tr>
<td>1951</td>
<td>6263</td>
<td>2339</td>
<td>3478</td>
<td>15</td>
<td>105</td>
<td>7.6</td>
</tr>
<tr>
<td>1956</td>
<td>7005</td>
<td>2950</td>
<td>4117</td>
<td>12</td>
<td>.</td>
<td>8.5</td>
</tr>
<tr>
<td>1959</td>
<td>7720</td>
<td>2874</td>
<td>4335</td>
<td>15</td>
<td>134</td>
<td>9.3</td>
</tr>
<tr>
<td>1964</td>
<td>8783</td>
<td>2727</td>
<td>4057</td>
<td>21</td>
<td>107</td>
<td>10.3</td>
</tr>
<tr>
<td>1967</td>
<td>9997</td>
<td>2846</td>
<td>4252</td>
<td>16</td>
<td>160</td>
<td>11.6</td>
</tr>
<tr>
<td>1972</td>
<td>9500</td>
<td>2500</td>
<td>3500</td>
<td>.</td>
<td>.</td>
<td>10.7</td>
</tr>
<tr>
<td>1975</td>
<td>9408</td>
<td>2757</td>
<td>4089</td>
<td>.</td>
<td>.</td>
<td>10.9</td>
</tr>
</tbody>
</table>

*Sources:* Blue-Books, Reports of the Veterinary Division, rough estimate for 1972 from preliminary census figures. 1975 from Oforo 1975.
completeness of statistical coverage. It is generally agreed that the estimates for cattle during the 1960s are biased upwards, as a result of inappropriate extrapolation from unrepresentative figures.

These figures indicate that the cattle population has increased more rapidly than that of sheep or goats, though this could result from the declining government interest in small stock and decreasingly adequate statistical coverage. It seems unlikely, however, that the population of sheep and goats has increased very much.

Total offtake of cattle is generally assumed to be about 10% but, as will be discussed below, a more reasonable estimate would lie between 12–14%, to include cattle which die of disease, starvation or old age and whose hides are then sold. The proportion varies considerably from year to year, depending on both prices and weather. Owners sell more stock in years of drought in order to buy grains and recoup at least some cash before their animals die of starvation, thirst or induced disease. For goats and sheep, with shorter breeding intervals, the rates of offtake tend to be rather higher. For goats they seem to range between 30% and 55% and for sheep between 20% and 25%, the difference reflecting the fact that goats often have more than one kid.²

Figure 3 shows sales of cattle, sheep and goats on official markets. For

² Information from Ministry of Agriculture Livestock Marketing Reports 1956–66.
cattle, these sales vary between 15% and 25% of total offtake, depending on the weather and relative prices as between official markets and private butchers. Official sales of cattle have increased, though not particularly rapidly (about 2% per annum on average). The official sales of goats as a proportion of total offtake has declined from some 15% in the mid-1950s to about 5% by the end of the 1960s. For sheep, the proportions are even lower, having fallen from about 10% in the mid-1950s to about 2–3% by the late-1960s. Since 1972, no figures are available and, as explained below, those quoted for 1970–72 are of very dubious validity.

Figures for milk production and deliveries to official markets and processing plants are less easily summarized. These outlets handle only about 5% of total production.

Tanzania's major livestock exports are meat products (mainly canned meat and meat extract) and hides and skins. Until 1970, the former was more important but since then, meat exports have declined due to the rebuilding of the cannery. In spite of increasing prices exports of both categories have declined in terms of volume. Over the same period, imports of dairy produce both from East Africa and overseas, have increased rapidly in value. As Table 3.10 shows, net exports of all livestock produce have fallen from Sh 47 million in 1961–65, to Sh 4.2 million in

---

Table 3.10: Imports and Exports of Livestock Products 1961–75 (Sh. mn.) (average for five-year periods)

<table>
<thead>
<tr>
<th>Period</th>
<th>Exports of Meat Products*</th>
<th>Hides &amp; Skins</th>
<th>Total</th>
<th>Imports of Dairy Produce**</th>
<th>Net Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961–65</td>
<td>38.3</td>
<td>30.8</td>
<td>69.1</td>
<td>21.9</td>
<td>47.2</td>
</tr>
<tr>
<td>1966–70</td>
<td>44.3</td>
<td>33.2</td>
<td>77.5</td>
<td>39.7</td>
<td>37.8</td>
</tr>
<tr>
<td>1971–75</td>
<td>31.2</td>
<td>40.0***</td>
<td>71.2</td>
<td>67.0</td>
<td>4.2</td>
</tr>
<tr>
<td>1976</td>
<td>16.1</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td>1977</td>
<td>14.2</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
</tr>
</tbody>
</table>

Sources: East African Customs and Excise, Annual Trade Returns 1961–75 Hali Ya Uchumi ya Taifa (1978) for remainder

* Adjusted for net East African trade
** Adjusted for Tanzania's small inter-East African exports
*** Average of four years since no information for 1975.

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3 Ibid.
1970–75. Although complete figures are not available, it seems likely that Tanzania may currently be a net importer of livestock products.

The composition of the imported dairy produce has changed considerably over time. At Independence in 1961, the major imported product was tinned milk, but after local pasteurization plants were opened, local suppliers were unable to maintain throughput and skimmed powder milk and butter oil for reconstitution were imported instead. This is a sad example of an investment, initially justified as "import substitution", which has generated an increase in imports.

In general, the development of Tanzania's livestock sector can scarcely be considered a success story. The following chapters seek to indicate some of the reasons why.

Chapter 3.5: Meat Production in Tanzania

Tanzania's ranch sector is much smaller than that of Kenya. Its function is limited to supplying a few hotels and upper-income butcheries in the towns though there are also recurrent plans for exports. In spite of the prominence given in government policy to the development of ranch production, well over 95 % of Tanzanians depend for their supply of meat on the offtake from the "traditional" herd kept by peasants, pastoralists and semi-pastoralists. If one wishes to predict meat consumption and supplies, it is therefore necessary to estimate the size of herd, productivity and offtake in this "traditional" herd.

**Herd Size and Offtake**

It is now generally accepted that the national herd is between 9 and 10 million head (probably nearer the latter) although some government plans continue to be based on estimates made prior to 1971 which when extrapolated give a total herd of 15–16 million cattle.¹ These estimates were based on the straight-line extrapolation of a trend drawn from cattle counts in 1954 and 1965. Since the former was made during a destocking campaign, when one could expect undercounting due to concealment, while the latter is now accepted as an over-estimation, it is hardly

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¹ One working paper for the Third Five-Year Plan, written in 1974, was based on an estimated population for that year, of 16.2 million head. The Plan itself (Swahili version Vol. I:26) takes the 1974 population of cattle to be 11 million but estimates the 1981 population to be 16 million on the (highly unlikely) basis of a 5 % per annum growth rate from 1974.
Table 3.1: Estimates of Tanzania’s Cattle Population by Region (’000 head)

<table>
<thead>
<tr>
<th>Region</th>
<th>Pre-Census 1971 ’000</th>
<th>1971 Census ’000</th>
<th>&quot;1975 Census&quot; ’000</th>
<th>1976 Estimate ’000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Arusha</td>
<td>2000</td>
<td>2378</td>
<td>1800</td>
<td>1850</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>25</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Shinyanga</td>
<td>4240</td>
<td>1382</td>
<td>2142</td>
<td>1285</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>15</td>
<td>23</td>
<td>13</td>
</tr>
<tr>
<td>Dodoma</td>
<td>1641</td>
<td>773</td>
<td>1143</td>
<td>971</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>8</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Mwanza</td>
<td>798</td>
<td>874</td>
<td>662</td>
<td>940</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>9</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Mara</td>
<td>918</td>
<td>770</td>
<td>836</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Singada</td>
<td>821</td>
<td>778</td>
<td>621</td>
<td>780</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>8</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Tabora</td>
<td>574</td>
<td>873</td>
<td>637</td>
<td>895</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>9</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Mbeya</td>
<td>752</td>
<td>429</td>
<td>(80)</td>
<td>700</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>5</td>
<td>(1)</td>
<td>7</td>
</tr>
<tr>
<td>Iringa</td>
<td>847</td>
<td>239</td>
<td>618</td>
<td>311</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>3</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Kilimanjaro/Coast</td>
<td>583</td>
<td>458</td>
<td>584</td>
<td>710</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Morogoro</td>
<td></td>
<td></td>
<td>144</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>W. Lake/Kigoma</td>
<td>219</td>
<td>308</td>
<td>161</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Total 13702 9425 9408 9770

Sources:
1 and 2 MacKenzie 1973: p. 84
3 Oforo 1975: p. 50
4 NDDP 1978: p. 52 where it is quite specifically said to be a rough estimate and where reference is made to a forthcoming 1978 livestock census.

It is surprising that a grossly inflated figure was generated. It says something about the vagueness of the procedure that this could continue until official estimates were 40–50 % above what is now considered to be the accurate figure.

Even if the figures on which the extrapolation was based had been correct, there are serious problems with any straight line trend estimate, for reasons mentioned in Chapter 2.5. Thus while the work of MacKenzie, cited below, constitutes a major advance, one must remember that the growth-rate for 1954–70 is only an average. His own estimates for 1954–65, based on offtake data, show a clear cyclical pattern.2

Since the Agricultural Census of 1971, various estimates of herd size have been made (see Table 3.11); all of them show similar total herd size, but vary considerably in their regional breakdowns. While some of this variation seems to result from different bases of estimation, it is also likely

that there have been real changes in the location of cattle during the period. Serious droughts in 1972 and 1974 resulted in major losses of stock, with some areas being more affected than others.

Since the cattle-keeping areas of Arusha, Shinyanga and Dodoma are all located in more drought-prone parts of the country, it is reasonable to suppose that their cattle populations would have declined, at least up to 1976. The forced villagization programme of 1974 also undoubtedly had an impact, since in some areas (notably Sukumaland) the planning of villages took insufficient account of the needs of herders. In general, a village location is not suitable for herders who have to move their stock over long distances to pasture. There is some evidence (albeit largely anecdotal) of long distance movements of herders to areas of the country where they would be less subject to the attentions of the government and the villagizers. As can be seen from the table, the most recent estimate reduces the proportion of the total herd kept in the three main regions and suggests that there has been little, if any, growth in the herd since 1971.

The rate of offtake is generally assumed to be about 10% and to have stagnated or declined during the 1960s from rates of 14–16% in the late 1950s. But these figures result in part from overestimation of the herd in recent years, and they also demonstrate the tenacious hold upon officialdom of the widely held assumption that "traditional" herders are unwilling to sell their cattle. One striking example of this way of thinking is contained in the Third Five-Year Plan: The standard estimate is quoted on the very same page as data which indicate a rate of 12%3.

Estimation of the rate of offtake is bedevilled by lack of firm data and the need to integrate different types of information. The most usual source of "direct" data on aggregate offtake is export sales of hides and skins.

Mackenzie considers the various pieces of evidence on hides.4 He cites a study by Zalla, which indicates that in two Districts of Kilimanjaro Region, 9% of hides were thrown away (mostly those of cattle which had died from disease), while another 27% were used at home or for some other reason did not reach export channels.5 In other areas of the country, he quotes evidence suggesting that while standards for acceptance of hides have risen, the proportion rejected has not. Given that there is no evidence of improvement in methods of treatment, or quality of hides, it seems likely that an increasing number of hides are simply not offered for sale because rejection is expected. In other areas, disparities between figures of hides

5 Ibid. p. 26. Material from a study by Zalla which was then unpublished.
exported and those passing through the "hide bandas" operated by the veterinary services, have increased considerably. In summary, he concludes that hide exports probably under-estimate total offtake by 10–20 % which, given some of the evidence he presents, may well be a conservative estimate. From this he derives an estimate for the rate of offtake of 12.5–15 %: a figure substantially above most previous estimates, but in line with figures for the 1950s. Unfortunately no data are available (to me) for the 1970s, against which these estimates might be checked.

Before figures of crude offtake can be used to predict the likely availability of meat under different conditions, further information is needed, first on the proportion of total offtake represented by animals which die of disease, starvation or old age, and second on how pastoralists and other herders make decisions about sales of stock for slaughter.

Mackenzie surveys a number of the standard parameters for assessing herd growth and productivity. He makes plain that as there are no reliable estimates, one is forced to compare what amount to no more than different guesses. From these he selects the following coefficients.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of females in herd</td>
<td>60 %</td>
</tr>
<tr>
<td>Proportion of mature females in herd</td>
<td>40 %</td>
</tr>
<tr>
<td>Calving rate (all mature females)</td>
<td>50 %</td>
</tr>
<tr>
<td>Calf mortality (1st year)</td>
<td>30 %</td>
</tr>
<tr>
<td>Second year mortality</td>
<td>10 %</td>
</tr>
<tr>
<td>Adult mortality</td>
<td>5 %</td>
</tr>
</tbody>
</table>

From these, and unofficial estimates made by livestock officers, he concludes that 50–60 % of total offtake is composed of deaths and slaughter in anticipation of death, indicating that the proportion of offtake passing through official channels is currently between 20 % and 30 % of the total. Opportunities for increasing this proportion are limited, so long as death rates remain at their present high level. Maximum availability for slaughter is about 40–50 % of total offtake or double the present level. The general implication is therefore that availability of stock for slaughter is largely independent of decisions made by herders.

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6 Ibid. p. 31. The unweighted average of official estimates (hide exports) for the period 1955–61 (omitting 1957 for which there are no data) is 14.4 %, Tanzania Statistical Abstract 1962 Table G. 10.
7 Ibid. pp. 16–20.
8 Ibid. p. 35. This seems to ignore the possibility that some "sales in anticipation of death" might pass through official channels.
9 While Mackenzie's are among the best figures available and provide a useful basis for further work, there are a number of further refinements which could be added. Unfortunately for the present study, some very interesting and rather more detailed
Two most important qualifications can be made about Mackenzie's estimates. They concern inter-annual differences in herd growth and death rates, due to drought and the more rapid growth of herds in their aftermath, and variation in composition with size of herd. In addition, the computations made by Mackenzie assume that calf mortality is the same for male and female calves, where all available evidence indicates that this is not true. Since pastoral and semi-pastoral herders are largely concerned with the maintenance of a breeding herd and with the supply of milk, it is reasonable to assume that they take more care of heifer calves. Barabaig and Iraqw herders interviewed by Kjaerby claimed they produced more female than male calves: a finding which showed up clearly in his survey statistics in which female calves came to almost 60% of the total. This is because where a choice has to be made, males are allowed to die first.

Kjaerby’s data on inter-annual variations and the effects of differential herd size are also interesting. Table 3.12 from Kjaerby shows how mortality rates vary as between years and different sizes of herd.

Although Kjaerby is in agreement with Mackenzie, that the average calf mortality rate is probably about 30% (both 1974 and 1975 were drought work on the coefficients of herding production systems is now in process and the results are not available. In addition, I have not been able to consult a large study by Texas A & M University of livestock production in Tanzania, which should provide further useful information through (so far as can be told from citations of its results) this comes up with figures not significantly different from those provided by Mackenzie.  

10 Dahl and Hjort 1978:38, make this point and cite a number of references.  
11 Kjaerby 1979. Kjaerby notes that Danish farmers often make similar claims.
years), his data show clearly how wide the variation can be. Poorer herders are hardest hit, because the herds of the rich tend to be in “frontier areas” where the stocking density is lower and the grass more abundant in time of drought.

It is also clear that mortality rates such as those pertaining in 1975 can cause a considerable reduction in the size of the total herd. The total herd appears to have declined by about 10% in 1975 and the future breeding potential was reduced due to the death of many cows. Calving rates vary considerably; from 40–50% in 1975 up to 75–80% in 1976. The latter figure is probably due to the abundance of grazing and (perhaps) reduction in ticks and other disease vectors after two years of very poor grass growth. This calving rate, it may be noted, is as high as that achieved on well-managed dairy farms. It would also appear to indicate that "infertility" of cows is not the basic cause of low calving rates. A more likely explanation of "infertility" relates to temporary disease and pasture shortage patterns. It is also probably the case that herders make every possible effort to get their cows in calf in years after a major disaster.

Kjaerby finds that the smaller the herd, the larger the proportion of females in the herd. This makes sense when one considers that milk is the main product from the herd. But the finding can also be related to the pattern of sales; for the poorer a household is, the more it must rely on the purchase of grain for subsistence and the more cattle it needs to sell for this purpose. Even in absolute terms, poor households (with 0–40 head of cattle) were recorded as selling more cattle than the rich (over 80 head per household). In proportionate terms, the poor sold 10.8% as compared with 3.3% (each of these being an average for three years). Kjaerby concludes that the rich are able to accumulate cattle, which gives them significant local power and influence, whereas the poor are constrained to sell stock in order to purchase consumer necessities. He draws a conclusion from this which directly contrasts with that of Mackenzie. He notes that "the standard solution to the development of cattle production, namely an improvement of production coefficients of the herds, to be achieved through disease control, upgrading and better management, does
not bring about higher cattle sales. The issue of a low rate of offtake is not a technical problem but a social and economic problem”.15

This takes one into the sorts of problem discussed in Chapter 2.6. For the present, one can summarize that while offtake rates appear to be significantly higher than the conventional wisdom would allow, they, together with rates of herd-growth vary, as between seasons and categories of herders.

**Livestock Systems in Tanzania**

The above statements referred to one group of Tanzania herders and since the variation between different groups in considerable, it may be worthwhile to outline the characteristics of a few others.

At one end of the scale are the "pure pastoralists" like the Maasai of Arusha Region, though even they depend also on grain for subsistence. However, since they do not cultivate crops, they must exchange livestock or their products for this grain. Tanzania Masailand is one of the largest pastoral areas in East Africa. The rainfall is mostly too low for cultivation, and it is generally classified as "medium potential range". Within it are (or were) dry-season grazing areas with much higher levels of rainfall. Most herders have to move with their cattle during the different seasons of the year, but these migrations generally cover far shorter distances compared with those in the arid north of Kenya. They normally move less than 20 miles, though in droughts people may travel considerably further. According to data cited by Meyn, the average per capita herd of pastoralists in Tanzania (the majority of whom are Maasai) is 15.5 head of cattle. This compares with only 2.6 head per capita for all pastoralists in Kenya, though it is not clear on what these figures are based or how accurate they are.16 One of the primary "production" purposes of keeping cattle in such societies is to provide sufficient milk for family subsistence and this requires some 4-5 mature cows per adult equivalent. It can therefore be seen that even this relatively large average herd size does not suffice to provide full subsistence”, and suggests that Kjaerby’s findings

15 Ibid. p. 59. I suspect that in fact Kjaerby would be prepared to accept that the problem was both "technical" and "socio-economic" and that the two were closely interrelated.

16 Meyn 1970:10. Parkipuny (1973: pp. 3 and 8) provides the data from which an alternative (and probably more accurate) estimate of 9.4 cattle, 5 sheep and 4.5 goats per capita, can be extracted. A more general study of the Kenya Maasai is Jacobs (1973) and, for Tanzania, Parkipuny (1972, 1973 and 1975).

17 Applying an estimate of 20–25% of the herd, as cows in milk, to Meyn’s estimate gives some 3-4 pints per day, which is not far short of requirements. Parkipuny’s figures give only 2–2% pints per day. In either case, this is a mean figure and overstates the median level.
for the Barabaig, that the smaller stock-owners sell more cattle than the larger, are likely to apply here as well.

The Barabaig, together with the Maasai-speaking Baraguyu and other smaller groups are generally classed as "semi-pastoralists" since they cultivate as well as herd stock, though in many respects their systems of herding are similar to those of "pure" pastoralists.

In addition to the cattle which they raise themselves, the Baraguyu trade cattle which they purchase from Dodoma and Singida Regions and trek down to the coast. As shown by the quotation from Rigby in Chapter 2.6, this is still an important component of Baraguyu (Ilparakuyo) economy.\(^{18}\)

The dividing line between "semi-pastoralists" and "cultivating herders" such as the Gogo of Dodoma Region is extremely narrow. Although the latter probably depend to a greater extent on crop production, the rainfall in their area is so variable that they are crucially dependent on livestock both for milk and even more as a reserve which can be sold in times of crop failure. The "traditional" herding system of the Cogo has been studied by Rigby but has since been substantially affected by the compulsory villagization of most of the population of Dodoma Region.\(^{19}\) The policy has limited pre-existing patterns of movement not only between wet and dry season areas but also inter-seasonal movements. While this has been deliberately done to settle the people and stop them from "nomadic wandering", it seems to have disrupted the system of pasture rotation.

The majority of the cattle in Tanzania (say 50–60 %) are kept by people living in areas of somewhat higher and more reliable rainfall, for whom crop production is a more secure form of livelihood, but for whom cattle remain important as a source of income and wealth. It seems likely that pastoralists and semi-pastoralists account for some 20 % of the total cattle; while another 15–20 % are kept by cultivators in marginal areas such as Dodoma and Singida Regions. The remaining 10 % are scattered around the country, kept by peoples for whom cultivation is overwhelmingly the most important agricultural activity and who keep rather small herds. The definition of the boundaries between these groups is vague to the point of nonexistence and this reflects a reality which is characterized more by heterogeneity than by anything else.

\(^{18}\) For Barabaig see Kjaerby (op. cit) for Baraguyu see Ndagala (1974, 1978), Beidelmann (1955), Rigby (1978) and ongoing work in the Tanzania Ministry of Culture. See also Gulliver P. (1968) on the Arusha Maasai-speaking cultivators.

\(^{19}\) Rigby 1968, 1969, forthcoming work by the research team from the Ministry of Culture.
As Map 3 shows, the major concentration of cattle in the country is to the south of Lake Victoria and in a belt running south-east towards the drier centre of the country through a "corridor" between tsetse-infested areas. The most heavy stocking densities are found in Mwanza and Shinyanga Regions, where the Sukuma people are also the major producers of cotton in the country. The largest herds tend to be kept in Shinyanga Region at the margins of the cultivated area. With the expansion of cotton cultivation during the 1960s, these large herds were pushed steadily south and east into areas of less reliable rainfall. Reports suggest that this led to major losses of stock during the droughts of the early 1970s, as these grazing lands had become stocked beyond their capacity under rainfall conditions less favourable than those of the 1960s.

While one would expect different rhythms of herd growth and patterns of accumulation to operate in societies in which crops are an important source of income, the evidence indicates there are many similarities with "pure" pastoralists. There may, however, be a greater emphasis on trade in cattle for a number of reasons. First, crops contribute more to subsistence than livestock produce, and the latter is available for sale to purchase grain. Thus, other things being equal, one would expect to find greater sales during years of rainfall shortage, since that is when the major crop shortfalls occur. On the other hand, one tends to find the re-acumulation of stock in good harvest years, not simply through accelerated breeding as in pastoral societies but through the buying-in of cattle from the proceeds of crop sales.

This behaviour suggests that cattle are a preferred form for the accumulation of wealth and considerable evidence exists to this effect. There is a Sukuma saying: "Shilingi jitobialaga" (shillings don't breed). Returns from cattle accumulation certainly do outweigh returns from hoarding cash or keeping it in the bank, given current rates of inflation and bank interest, but at the same time it implies an absence of or lack of interest in other investment opportunities. It would be interesting to find out whether the behaviour results primarily from a dearth of alternative income-earning investment opportunities or whether it reflects the continuing importance of the social and political influence stemming from cattle-ownership.  

There have been several studies of Sukuma cattle keeping since the colonial period, yet no recent work treats this aspect of

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20 It may also be that cattle are in some senses a more secure form of accumulation, both in terms of re-sale value (as compared with, for example, agricultural equipment) and in terms of availability to tax and debt-collectors.
the production system in depth. It is seen merely as an adjunct (or obstacle) to the improved cultivation of cotton.  

One conclusion that can be drawn from this superficial review of herding systems is that while almost all were once based on the production of milk for subsistence and the accumulation of cattle as insurance against drought, as a form of wealth and as a means to achieve and exercise social and political influence, they have now been affected by the market. All cattle owners in Tanzania depend to some degree on purchasing items of normal subsistence, though this varies in extent and over time. Yet at the same time, most still accumulate cattle for reasons other than sale to the market. This is reflected in the tendency for cattle ownership to be concentrated among a wealthy and influential minority who sell a smaller proportion of their animals than those with fewer stock.

There is an inverse relationship between density of settlement and the degree to which purchased commodities and items other than cattle are accumulated. This does not result from any "nomadic predisposition" of pastoralists. On the contrary, it arises because pastoralism is found in areas of low, unreliable rainfall where the people are forced to travel considerable distances with their herds. The lack of settled domicile is thus imposed by the conditions under which production takes place, and this in turn makes less convenient the accumulation of chattels which would have to be moved in the process of transhumance.

It is worth noting in this context, that by depriving cattle herders of dry-season grazing areas, they have also been expelled from their secure "home base". The Maasai have already lost important dry-season grazing grounds: Monduli, West Kilimanjaro and Mbulumulu (to wheat cultivators), and are likely to lose Loliondo as soon as roads can be built to "open it up" for cultivation. The Barabaig have seen the best of their grazing lands taken, not only by the cultivating neighbours but also by the government for wheat cultivation at Bassotu, accompanied by surrounding private farm development. In the case of the Sukuma, the pattern is rather different; the development of crop production by the Sukuma themselves has pushed herders out to the margins of the area (though plenty of cattle remain in the cultivating area). Recent policies for the development of ranches, seem likely to have similar effects.

Among the more important social groups and areas not even mentioned here are: Iraqw/Mbulu District (mentioned in Raikes 1975, Kjaerby 1976 and references in the latter), Mara Region (apparently one major focus of a study by Texas A & M University); Nyamwezi/Tabora Region: Hehe/Iringa Region; Turu/Singida Region (Schneider 1970) and a variety of Tusi/Hima herding societies in West Lake and Kigoma Regions.
Commercial Sales of Cattle for Slaughter
As shown in Figure 3, sales of livestock through official markets have only grown at about 2% per annum since 1950; and there is reason to believe that even this estimate overstates the real rate of growth. The high figure for 1969 probably reflects the impact of drought and pre-emptive off-loading of stock while the figure for 1972 seems likely to contain some double-counting due to the disruption of marketing that year. All the growth of the 1950s occurred between the years 1950 and 1953. To a large extent the slow rate of growth can be attributed to variations in marketing policy and prices paid on different markets. There is some evidence that in recent years (since 1972), an increased proportion of total sales has occurred outside official markets, which take only 20–30% of total offtake and perhaps 40–50% of total "live" offtake, if Mackenzie's figures are to be believed. There is no indication of any increase in the liveweight of cattle delivered (other than the short-term shifts to be described in Chapter 4.3 which demonstrate the impact of different relative prices on who gets the pick of the cattle for sale). All this would seem to indicate that there has been little, if any, increase in productivity from the national herd. At the same time, the urban population has increased quite substantially, while government price and buying policies have encouraged the delivery of an increased proportion of total sales to the urban areas. Mackenzie estimates that urban consumption of meat almost doubled between 1961 and 1971, while rural consumption fell to 60% of the earlier level. This is shown in Table 3.13.

But as mentioned above, this rural-urban disparity is dwarfed by the difference in purchasing power between upper and lower income groups.

Policies for the development of meat production can be grouped under four headings; attempts to improve the health and productivity of range zebu animals through the normal activities of the veterinary service; marketing policies (which are considered in Chapter 4.3); various

<table>
<thead>
<tr>
<th>Year</th>
<th>Urban</th>
<th>Rural</th>
<th>Rural as per cent of Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>13.4</td>
<td>12.5</td>
<td>93</td>
</tr>
<tr>
<td>1962</td>
<td>17.1</td>
<td>8.3</td>
<td>49</td>
</tr>
<tr>
<td>1967</td>
<td>18.3</td>
<td>7.8</td>
<td>43</td>
</tr>
<tr>
<td>1971</td>
<td>24.5</td>
<td>7.5</td>
<td>31</td>
</tr>
</tbody>
</table>

Source: Mackenzie 1973b:63
ranching or range management schemes for the "traditional" sector; and
the development of large-scale ranches.

During the colonial period veterinary regulations and quarantines were
not used to anything like the same extent in Tanganyika (compared to
Kenya) as a means to protect settler ranch production, for the simple
reason that there was little such production to protect until the 1950s. The
major priorities during the whole period were first the elimination of major
epidemic diseases, like rinderpest and contagious bovine
pleuropneumonia which was more or less achieved by 1945, and second
the setting-up of a system of stock-routes and holding grounds. Reports
from the period make clear that African zebu cattle were accepted as the
main source of meat for the urban areas. So not surprisingly Tanzania's
livestock marketing and veterinary services for Africans were considered
superior to those in Kenya during the 1950s. In the area of veterinary
medicine, the major innovation of the 1950s was the building of dips.
During the 1950s, a number of campaigns were promoted to enforce cattle
dipping and charge dipping fees, all of which failed dismally. After
Independence, the policy was reversed; compulsion was dropped and the
service made free. This had much more success in encouraging herders to
dip their stock, though not as regularly as the department would have
liked. The main problems since then have been to keep the dips running
properly and supplied with acaricide, and to persuade stock-owners to dip
their cattle regularly. Despite the dipping policy, East Coast Fever
remains the major single cause of cattle deaths and reductions in
productivity.

The other major disease problem is caused by trypanosomiasis because
its presence prohibits huge areas from being grazed. The following extract
from a FAO paper indicates the official attitude to this problem:

"This disease... can be eradicated by clearing areas that are the habitat of the fly
through a combination of bush felling and insecticide spraying, and its effect on
individual animals can be controlled by treatment with drugs. Either of these two
approaches or a combination of both can be used, but large-scale ranching enterprises
find it more practical and economical (on areas over 80,000 ha) to eradicate the fly from
the farmed areas. An effective programme, involving ring-clearing of bush and aerial
and ground (spraying) is now in operation under the Ministry of Agriculture and
Cooperatives. A research project on sterile males is also underway". 22

This statement is most remarkable not for what it says but for what it
omits. It entirely ignores the fact that the most effective means to clear

22 FAO 1975:35 this seems to be a more or less direct quote from an IBRD paper (or
perhaps the other way round since neither cites the other).
areas of tsetse-infestation is to encourage settlement and cultivation by peasant farmers. This is also by far the cheapest method since peasant farmers do a job which otherwise would be done by large quantities of imported equipment and/or chemicals. The most important difference, however, is that the peasant farmers' war against crop-eating vermin is the most effective way of destroying the wild hosts of the fly. Re-infestation has proved to be a major problem on some ranches, especially those which cannot be rapidly stocked and further developed. Of course, settlement by peasants is not an option open where land is to be devoted to ranching. However, since peasant agriculture is a more land-intensive and productive form of agriculture than ranching, this should pose no problem except for those concerned with ranching.

Foot and mouth disease mainly affects the improved stock in dairy producing areas, though zebu cattle may suffer heavily when infected by types of the disease from which they were hitherto free. As in Kenya, vaccination is too expensive except for a few improved cattle and there is even less possibility that effective quarantines can be imposed than in Kenya because of the greater areas to be covered. There has been talk for some time of setting-up a disease-free zone along the Zambia border, so that ranch cattle could be exported live or slaughtered and chilled. This has been delayed for several years because of opposition from the Zambian authorities who doubted its effectiveness.

Until the mid-1960s, the Veterinary Department was responsible for the upkeep of stock-routes and cattle-markets, although the latter were actually run by District Councils. But because of the unsatisfactory division of responsibilities and insufficient funds, cattle markets deteriorated, especially during the major disruption of marketing in the early 1970s. The Livestock Development Authority has since taken over the responsibility and has considerably increased funds for upgrading.

Apart from a certain amount spent on bull centres for upgrading zebu cattle, programmes and policies for increasing livestock production have tended concentrate on specific projects and schemes aimed at the controlled improvement of pasture management and provision of services for specific areas. There has also been a strong trend in recent years away from programmes to improve production in the "national herd" and towards the development of large-scale parastatal ranches. Before describing some individual policies, it is worthwhile to illustrate this trend with figures for investment in different sorts of programme.

The main emphasis of the First Five-Year Plan was on disease control and the development of cooperative and settlement ranches, although three "breeding ranches and demonstration centres" were planned (and
Table 3.14: Expenditure under IDA Phase II Livestock Development Programme (U.S. $mn and Per Cent)

<table>
<thead>
<tr>
<th>Item</th>
<th>Local</th>
<th>IDA</th>
<th>Total</th>
<th>Per Cent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ranches:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NACO</td>
<td>2.44</td>
<td>5.70</td>
<td>8.14</td>
<td>34</td>
</tr>
<tr>
<td>District Devel. Corp’n</td>
<td>0.86</td>
<td>2.01</td>
<td>2.87</td>
<td>12</td>
</tr>
<tr>
<td>Maasai Ujamaa</td>
<td>0.18</td>
<td>0.73</td>
<td>0.91</td>
<td>4</td>
</tr>
<tr>
<td>Other Ujamaa</td>
<td>0.15</td>
<td>1.33</td>
<td>1.48</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>3.31</td>
<td>9.77</td>
<td>13.41</td>
<td>56</td>
</tr>
<tr>
<td><strong>Meat Processing</strong></td>
<td>1.65</td>
<td>3.85</td>
<td>5.51</td>
<td>23</td>
</tr>
<tr>
<td><strong>Marketing</strong></td>
<td>0.96</td>
<td>2.24</td>
<td>3.20</td>
<td>13</td>
</tr>
<tr>
<td><strong>Technical Services</strong></td>
<td>–</td>
<td>1.79</td>
<td>1.79</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6.25</td>
<td>17.65</td>
<td>23.90</td>
<td>100</td>
</tr>
</tbody>
</table>

*Source: Mackenzie 1973b:76–9.*

implemented). By 1969, when the Second Five-Year Plan was published, the development of state and parastatal ranches and dairy farms was planned to take nearly 34% of expenditure on the livestock sector. In addition, all of the 5½% for tsetse-control and most of the 18½% for disease control were directed at this sector. Direct expenditure on ranch development was planned to cost some Sh 57 million over the five-year period, and it included some 9 million shillings of an IDA ("Phase I") Credit for the development of ranches. In this plan there was a reduced emphasis on the development of group, association and communal ranches, although USAID was funding a programme in Masailand and discussions were in progress with FAO/UNDP over the extension of a similar sort of development to Dodoma and Shinyanga Regions.

Soon after this, discussions were initiated over the next "Phase II" IDA programme for livestock development which started in 1973 and involved expenditure of some $ U.S. 23.9 million (about Sh. 190 million) which was allocated as shown in Table 3.14.

As can be seen, the major portion of this programme was concerned with the development of large ranches. After subtracting expenditure on marketing and meat processing, ranches take some 73% of the total expenditure, though a large proportion of the technical services were also directed at large ranches. The only part which concerned the 99% of the

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Table 3.15: Planned Expenditures on Livestock, Third Five-Year Plan (Sh.mn)

<table>
<thead>
<tr>
<th>Item</th>
<th>Kilimo</th>
<th>Other Ministries</th>
<th>LIDA</th>
<th>Other parastatals</th>
<th>Total</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef Ranching</td>
<td>-</td>
<td>1.1</td>
<td>115.8</td>
<td>30.5</td>
<td>147.4</td>
<td>26)</td>
</tr>
<tr>
<td>Dairy Development</td>
<td>7.9</td>
<td>2.2</td>
<td>42.7</td>
<td>15.3</td>
<td>68.1</td>
<td>12)</td>
</tr>
<tr>
<td>Heifer Breeding</td>
<td>-</td>
<td>-</td>
<td>13.5</td>
<td>-</td>
<td>13.5</td>
<td>2)</td>
</tr>
<tr>
<td>Goat/Sheep Ranch</td>
<td>-</td>
<td>-</td>
<td>7.0</td>
<td>-</td>
<td>7.0</td>
<td>1)</td>
</tr>
<tr>
<td>Pig Production</td>
<td>1.2</td>
<td>10.9</td>
<td>-</td>
<td>-</td>
<td>12.1</td>
<td>2)</td>
</tr>
<tr>
<td>Poultry/Hatcheries</td>
<td>-</td>
<td>-</td>
<td>31.1</td>
<td>3.0</td>
<td>34.0</td>
<td>6)</td>
</tr>
<tr>
<td>Cattle Breeding/A.I.</td>
<td>43.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>43.2</td>
<td>7)</td>
</tr>
<tr>
<td>Veterinary &amp; Research</td>
<td>18.6</td>
<td>-</td>
<td>-</td>
<td>14.0</td>
<td>32.6</td>
<td>6)</td>
</tr>
<tr>
<td>Marketing, Processing etc.</td>
<td>-</td>
<td>-</td>
<td>155.6</td>
<td>63.7</td>
<td>219.3</td>
<td>38)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>69.7</td>
<td>4.5</td>
<td>376.6</td>
<td>126.5</td>
<td>577.2</td>
<td>100)</td>
</tr>
<tr>
<td><strong>Per Cent</strong></td>
<td>12</td>
<td>1</td>
<td>65</td>
<td>22</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Own compilation from the Plan (Vol. II, Part 3) Only expenditures for the five-year period are included. Longer term plans would bring the total up to Sh 973 mn of which ranching and processing are also major components.*

In addition to this, expenditure by the different regions in livestock development came to some 312 million shillings, of which Sh 177 mn (57%) was to be spent by Kilimo and the remainder by District Development Corporations. Much of this latter appeared to be for ranch development. (Kilimo = Ministry of Agriculture).

By far the largest expenditures are to be made by parastatals (especially LIDA) and much of this on ranching. If one excludes marketing, processing and fodder production, beef ranching takes about 41% of the total, to which can be added most of the funds earmarked for veterinary research since these are mainly concerned with tsetse-eradication, the formation of new ranches and with FMD control. Taking all planned large-scale production units together, they account for not less than 80% of total expenditure (other than marketing and processing). Apart from the chick hatchery, none of this is likely to have any direct (let alone positive) impact on producers other than large-scale units.
Thus while expenditure on livestock production has grown considerably from the 1960s, the proportion of this to be spent on programmes for the development of the national herd has steadily declined and it may well be that the absolute amount spent has also declined. The figures presented here for the Third Five-Year Plan cannot be compared directly with those for the Second Plan, since they include substantial amounts directed to marketing and processing. Just the same, the increase in expenditure on ranch development is striking, especially in view of measurements of its achievements to date. Before considering these, however, I shall trace the progress of programmes for the development of production among peasant herders.

**Peasant and Pastoralist Ranching Schemes**

Even assuming that the "correct" policy can be found there are likely to be difficulties and conflicts in developing commercial beef production among people whose cattle systems have previously been geared to milk production and whose accumulation of stock is based on premisses only partially determined by the market. But, as seen above, policy-makers have made the task harder for themselves by failing to analyse these processes and by reducing them to simple slogans about traditionalism. In doing this, they have been able to ignore ways in which their own policies have contributed to the problems and have lost opportunities for learning from experience. Even so well-informed and experienced an observer as Peberdy can summarize a discussion by saying "outside the commercial, government and newly established ranches, it is sad to say that much of the land occupied by domestic livestock is grossly mismanaged and in dire need of attention."²⁴ The impression left is of a dichotomy in which "modern" is efficient and "traditional" implies mismanagement, neither part of which is necessarily true.

Apart from building a few markets and the provision of veterinary services mainly aimed at the eradication of diseases such as rinderpest, the first serious efforts to "develop" African cattle herding for the production of beef came in the 1950s, with the building of the Tanganyika Packers factories for canned and chilled beef in Dar es Salaam and Arusha. This accelerated the building of stock-routes and was thought by many to have provoked a series of de-stocking campaigns in the early 1950s. These campaigns do seem to have achieved a once-and-for-all increase in the number of cattle marketed in the early 1950s but had no discernible effect.

²⁴ Peberdy 1969:164.
thereafter. They were dropped in the mid-1950s because of increased difficulties of operation and the rising tempo of opposition.

During the same period, a plan was initiated for the development of water-supplies and veterinary services in Masailand which, it was hoped, would increase the offtake of improved cattle for the Arusha plant. This plan failed in almost every way and was said afterwards to have contributed to increased overgrazing. The installation of water supplies was seen as having increased concentrations of cattle causing the virtual denudation of land in their vicinity. This experience provided the basic assumption for the Range Development Management Act of 1964.

The basic function and purpose of this act was to provide a framework for the imposition of rules regulating grazing and water use on areas declared (and officially gazetted as) "range management areas". Legislators saw this as an alternative to the registration of private landed property. Although the act was to be generally applied, the major scene of efforts to implement its provisions was Masailand. During the late 1960s, a FAO team planned to set up "range management" schemes in Dodoma and Shinyanga, but these came to nothing because of various disagreements between the government and the FAO team. "On 13 September 1971, the Government requested the cessation of field operations" on the ground that "recent changes in its rural development policy had resulted in the tactical objectives of the project, particularly the surveying, planning, establishing and operation of ranching associations, becoming irrelevant." The difference seems mainly to have hinged on the fact that the Government was aiming to villagize the whole population of Dodoma; a policy that did not fit with the ranching associations planned by the FAO/UNDP team.

The Masai Range Development Programme has for some years now been funded by USAID which also provides a number of technicians and experts. The first step of the programme was to divide the area (over 25,000 square miles) into units which were small enough to be managed by groups of Maasai cattle-owners (together with programme planners and administrators) yet sufficiently large to provide scope for rotation between wet and dry-season grazing, though in many cases this required the installation of water facilities. Once such units could be defined and agreed, the next stage was to secure agreement with the inhabitants over the level of stocking, how cattle and other stock should be grazed and (at least in theory) the setting up of a group commercial herd. This group

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herd was to become the highly developed nucleus within the group ranch. There would be fenced paddocks, rotational grazing and rates of offtake similar to those of commercial ranches. In short, the aim of the group or association ranches was to introduce "modern" ranching on these nucleus areas, while leaving the larger portion of the land for the people to follow (modified versions of) their previous herding system.

From the start, the scheme faced a number of organizational and political problems. In order to secure the cooperation of the people, the older and richer "opinion leaders" were approached and asked to take the lead in the formation of Ranching Associations to operate the ranches. At one level, this was successful and undoubtedly speeded up the process of registration, but in at least one case, problems appeared at another level. It had initially been suggested (reasonably enough) that members of the Associations should pay for various services provided through a levy based on the number of stock herded by each family. But this was rejected by the "opinion leaders", who as major stock-owners favoured a flat rate per member. Not only was this grossly unfair to those members with few stock, but the limited amount which poorer members could afford to pay meant that the fund was totally inadequate to pay for the services.26

By 1973, some 22 Ranching Associations had been registered, largely because the people were anxious to get dips and veterinary facilities. But members of the Associations paid little of the cost of facilities provided. They were accustomed to expect that these would be provided from the government's "endless coffers". The ideal on which the whole programme was based was that group registration as holders of the Right of Occupation would instil a feeling of "ownership" and encourage members to invest. But this simply did not work. The reason for this failure is not far to seek. In granting the right of occupancy to one such Association, the Regional Commissioner "made it known to the Maasai that the right of occupancy they had acquired was only valid so long as they used the land properly" and "if they failed to use the land properly, the government would not fail to take it away". Under such circumstances, it is hardly

26 Komolonik Association Ranch (the first set up). Personal Communication from the officer in charge during a visit in 1969. The size of the ranch was 250,000 acres, with 500 families and 19,000 Livestock Units. Capital investment to date had been Sh 1.5 mn (much of it on a pipeline) and since the flat rate was set at 201- per family, it can be seen that this would have been insufficient even to pay a fraction of the interest on the loan. 201- per L.S.U. would have paid loan and interest in four years with some to spare.
surprising that members did not feel disposed to pay for investment in the land themselves.\textsuperscript{27}

These schemes do represent an attempt to develop the system of livestock production within a framework related to existing social structures of the people and to define some way in which the people could participate in decision-making through councils instituted to the association ranches. At the same time, this policy has created a framework for the provision of some much-needed infrastructural investment. But whether they have solved the basic problems they were initially set up to overcome, is less clear.\textsuperscript{28}

The Masai Range Development Programme remains the only major programme to date which has been based on the Act of 1964, which applies to relatively large areas and the populations within them. Most other ranching developments for peasants have centered on the creation of new ranches and their settlement by groups of herders.

The earliest example at Kongwa in Dodoma Region was started during the colonial period as an agricultural settlement scheme on land cleared under the Groundnut Scheme. This consistently failed largely because the area had insufficient rainfall for more than the most marginal agriculture. In response to this failure and to the success of cattle-raising elsewhere it was gradually transformed into a "grazier scheme" attached to the nearby Kongwa Ranch (also formed on ex-Groundnut Scheme land). The scheme tenants were "loaned" cows-in-calf by the ranch and after bringing them through the first year, were then contracted to sell all but one of the immatures back to the ranch.

\textsuperscript{27} Parkipuny 1973:58. Parkipuny quotes the chairman of the ranching association as expressing his "great fear and disgust" at this speech and as saying "it seems this certificate is just a paper-tiger". Whatever the accuracy of the translation from the Maasai, this would seem a rather apt summary. This was particularly true of this one case, since the ranch faced boundary problems with nearby cultivators and the Regional Commissioner was known to favour them over pastoralists. This was the same Regional Commissioner whose popularity among the Maasai had not been enhanced by a campaign to force them to "become modern" by wearing trousers, with fines for any who were seen not to.

\textsuperscript{28} There is, for example, no evidence as yet, about the ability to cope with problems which arise when the range is fully stocked, since these have so far usually been postponed by temporarily increasing the carrying capacity through the provision of water. Given the series of droughts of the early 1970s, this may still not have been tested. On the other hand, serious drought would have sorely tested the ability of the association ranches to "defend their boundaries" against other stock-owners desperate for water, which is one of the assumptions upon which the division of the areas into separate ranches is premised. If this was "achieved" then it would point to a very significant destruction of the pre-existing Masai social structure.
Because the level of supervision was very high and expensive, the scheme was not an economic success (once overheads had been subtracted) but it did achieve high rates of physical productivity. Over a five-year period, the calving rate was 94% (perhaps not surprising since all the cows were in-calf before arrival) and calf losses only 3.6% (compared with the estimated 30% for the national herd). Rigby describes this scheme and another nearby at Matongoro as having been successful during the early 1960s. He considers them the most suitable form of development for the areas concerned, but notes that official policymakers have tended to ignore them in favour of ranches. Certainly, although these two schemes were still operating successfully in the late 1960s, there are no reports of any others having been set up on similar lines.

Just the same, some similarities exist between these schemes and some of the more recent projects for the development of ujamaa ranches, under the IDA "Phase II" programme. These are limited projects for the settlement of groups of herders, usually on newly settled land (or land from which the previous inhabitants have been expelled). As set out in the original version of the Phase II project, they were also relatively capital intensive for "peasant" schemes, with an investment of some Sh 12,000/- per family for groups of ten families each owning 20 head of cattle and settled on 6,000 acres. It was planned that some 90 of these should be started, thus affecting just 900 families out of the million or more cattle-owning households in Tanzania. In fact, they could be more accurately termed "progressive rancher settlements". The Third Plan document indicates that villages ranches will be set up in Dodoma, Singida, Arusha and Shinyanga Regions, with a total of 22,000 cattle, but no central funds seem to be earmarked for this purpose. When one turns to regional expenditures of the four regions mentioned, only Shinyanga has expenditure specifically allocated to village ranches, as do Lindi and Mtwara. If one takes these three programmes, together with the allocation for the Masai Range Development Programme, they come to Sh 29.2 million. This paltry sum compares with a total regional expenditure on livestock by government of Sh 177 million, and a combined expenditure of some Sh. 107 million by regional administrations and District Development Corporations in developments of beef cattle (which appear to be ranches). So far as can be discerned, some Sh 50 million is allocated to programmes which can reasonably be assumed to be for the

development of cattle health and production for the plan period. Taking central, regional and District Development Corporation expenditures together, one thus has a total of some Sh 254 million on large and medium scale ranches, almost 30 million on ujamaa ranches and the Maasai Range Development Programme and some Sh 50 million on all other aspects of beef development (excluding dips but including bull-centres and "livestock centres").

Ranch Development
There were few private ranches in colonial Tanzania, though one large one was set up during the 1950s in Arusha Region, another in Tanga Region, and a few smaller ones near to major towns, mostly owned by urban butchers. The first parastatal ranches were also set up during the 1950s by the Tanganyika Agricultural Corporation at Kongwa and Ruvu; the first as a breeding ranch on land cleared for the Groundnut Scheme and the second as a fattening ranch-cum-holding ground for steers bred at Kongwa and the Veterinary Department’s Mkata Ranch for sale in Dar es Salaam. Of these, Kongwa was the only one fully developed at Independence and indeed for some years after. All these ranches were situated where they could easily serve the Dar es Salaam market; Ruvu being close to the present offloading point for stock moved to Dar es Salaam by rail.

The First Five-Year Plan proposed the development of three more ranches; at Kitengule in West Lake Region (to produce mainly for the Kampala market), Nachingwea in Mtwara Region (to provide a source of meat for the southern towns in a livestock deficit area) and at West Kilimanjaro. These three were to be breeding ranches. By 1965 these six ranches were being operated under the direction of the National Development Corporation (NDC) and had a total stock of 44,000 head of cattle.

In 1968, the Phase I programme began, with finance from the World Bank, for long-term development of the ranching sector. The ranches were now placed under the new National Agricultural Corporation (NACO) and the project included the further development of Kitengule, Mkata and West Kilimanjaro ranches as well as the establishment of two more at Missenyi (in West Lake Region) and Mzeri (in Tanga). By 1969, the six ranches in operation held some 56,000 cattle.

31 Figures computed from Vol II, central and regional expenditure plans. It is hard to be quite sure of the precise totals, since the headings attached to the different expenditures are brief and not always very informative.
33 Meyn 1970.
The Phase II project was more ambitious, as shown in Table 3.14 and involved the development of seven more NACO ranches, as well as four to be run by District Development Corporations and the 37 “ujamaa ranches” of the Mwisa Scheme in West Lake Region. Three of the new ranches were to be located in Mbeya Region from where they could supply the Zambia market; three in north-eastern and central Tanzania aimed at the coastal and export markets; while the remaining one planned for West Lake would also export to Kampala. Thus, with the exception of Dar es Salaam, the ranches were all to specialize in export production, for the good reason that their output was not likely to find a market in Tanzania because it was considerably more expensive than local meat.

From 1968–1970, NACO made losses on its operations every year, but since it was judged to be in the phase of expansion, the losses did not seem to bother anyone. By 1973, the situation had not improved, and Jahnke estimated the accumulated losses by that date to be some Sh 15 mn. This he attributed to "excessive fixed costs, the largest proportion of which is due to the expensive NACO overhead organization and from poor on-ranch management as is indicated by the offtake figures, weaning rates and selling prices. Inadequate organization and poor on-ranch management have in Tanzania led to a situation in which annual overhead expenses are regularly higher than the gross revenue from cattle sales.”

Jahnke foresaw little likelihood of any change in this pattern, and he predicted that the level of profitability was unlikely to improve. This has probably been the case, though I do not have access to more recent data. Since the ranches are supposed to introduce "modern ranching" and be greatly superior to "traditional" herding, it is not insignificant that among the poor productive coefficients which Jahnke notes is a rate of offtake of only 10 %, the very rate which is supposed to demonstrate the irrationality of local herdsmen. Nor does the weight of the cattle sold appear very impressive. In the application for the Phase II Project, "trial weighings conducted in NACOs Ruvu Ranch indicate an average weight in excess of 270 kgs.”

While this is above the 249 kgs given by Meyn as an average liveweight for slaughter cattle delivered to Tanganyika Packers in 1965, it is not strikingly so and seems to be well below weights commonly recorded for Maasai cattle.

36 Ruthenberg (1946), cites 347 kg as a typical liveweight for Maasai slaughter cattle and 305 kg for Sukuma cattle.
Table 3.16: Numbers of Cattle and Sales: NACO/NARCO Ranches ('000 head)

<table>
<thead>
<tr>
<th>Year</th>
<th>Stocks</th>
<th>Sales</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>80</td>
<td>20</td>
<td>Econ, Survey 1971:73</td>
</tr>
<tr>
<td>1972</td>
<td>85.5</td>
<td>24.2</td>
<td>Econ. Survey 1972:81</td>
</tr>
<tr>
<td>1973</td>
<td>110.7</td>
<td>..</td>
<td>Econ. Survey 1975:57</td>
</tr>
<tr>
<td>1974</td>
<td>111.9</td>
<td>..</td>
<td>Econ. Survey 1975:57</td>
</tr>
<tr>
<td>1975</td>
<td>95.7</td>
<td>..</td>
<td>Hali ya Uchumi 1976:59</td>
</tr>
<tr>
<td>19771978 (?)</td>
<td>145.0</td>
<td>..</td>
<td>3rd FYP, Vol. I. 29.</td>
</tr>
</tbody>
</table>

Figures for the numbers of cattle kept on the ranches in recent years have only been published irregularly in standard surveys, but Table 3.16 gives such figures as could be pulled together.

So far as can be discerned from the accompanying text, the main reason for the build-up in 1973/74 was a lack of markets, leading to over-stocking and a build-up of unsaleable culls, though it would appear that either sales or the effects of drought in 1975, have solved that problem. The figure for 1977/78 is not very firm, since the Third Five-Year Plan is generally an unreliable source of information on the livestock sector.

There is no good reason to expect performance to have improved significantly more recently, indeed, the absence of figures for sales in the Economic Surveys would indicate the reverse. In the absence of overall data, it may be worthwhile to describe one ranching development project; the Kitengule/Misseyi/Mwisa complex in West Lake Region. Kitengule was one of the three ranches developed under the First Five-Year Plan and was, in 1971, reckoned to be the most successful of those run by NACO. It was a breeding ranch aiming to supply the nearby Kampala market, where prices were considerably higher than in Tanzania. Expansion was financed under the Phase I programme, as was that of Missenyi Ranch a few miles to the north (and across the Kagera River). Largely on account of the good market prospects for sales in Kampala, this area was chosen under the Phase II project for the development of Ujamaa Ranching at Mwisa just to the south of Kitengule. The loan application for the project also mentions the Congo (Zaire) market and includes a calculation of the (high) price of meat “f.o.b. Bukoba” though this seems a trifle fanciful, given that Bukoba’s airstrip is incapable of taking more than light planes. But in 1974, when the ranches were to be developed, the situation had changed.

37 Personal information, collected while working as a planning officer in West Lake Region 197415.  
38 Phase II Livestock Development Project vol. 2:57–9.
Under pressure from IBRD and probably without much counter pressure from NACRO, the "ujamaa" ranches were to be transformed into ordinary large-scale parastatal ranches.

Already by 1972, friction between Tanzania and Amin’s Uganda was making the prospect of sales to Kampala much less likely. In 1974, the border was closed except for smugglers and members of Amin’s army who raided Missenyi Ranch on several occasions. In spite of the loss of this market, it was decided to go ahead with the schemes, although it was already clear that the produce could not be sold locally. West Lake Region (and particularly Bukoba) is a meat deficit area, but the prices which the ranches needed to charge were too high for local markets and efforts by the ranch management to stop "imports" of cattle from Mara Region, across Lake Victoria in order to protect the price of meat, proved unsuccessful. So stock built up on the ranches and the new ranches were initially stocked with the overflow from those in existence.

When the loan application was made for the project in 1971, the Mwisa area was claimed to be uninhabited. Since much of the area was tsetse-infested, the major part was. But whether or not it was totally uninhabited in 1971 this was certainly not the case by 1974, when the funds had come through. Peasants from the heavily populated coastal strip of Bukoba had begun to move in to the northern part of the area and were cultivating bananas and coffee, while in the south, there is some evidence that others were moving in to cultivate groundnuts and sorghum. Ranch development had hardly started due to delays in delivering the heavy equipment needed for tsetse clearance. Although crops are a more productive and intensive form of land use than ranching and although the heavily populated area to the east of the ranch needed an expansion area, no plans were made to alter the boundaries. Instead NACO applied to expel the "squatters". As of early 1975, it was not clear what the outcome would be since, in addition to these two competing land uses, the Regional Authorities (apparently unaware of the boundaries) had planned a large irrigation scheme in part of the disputed area for the production of rice. Though the economic returns from rice seemed likely to be every bit as bad as those from ranching, at least it was development which offered a livelihood to some of the people of the areas.

I have no figures giving the financial position of these ranches; they would, in any case, be very difficult to disentangle from the centralized accounting system of NACO. It seems inconceivable that they were making profits, since very few cattle were sold and those that were, were sold at a loss. The only plans on hand were to trek cattle south (through tsetse-infested country) to Shinyanga, where they would be sold to the (as
yet unfinished) slaughtering and chilling plant, for on-movement by rail to Dar es Salaam for canning. Since Shinyanga is already among the largest single cattle surplus areas in Tanzania producing stock far more cheaply than the ranches, it does not seem likely that costs could have been covered by this expedient, to say nothing of the fact that corned beef is hardly the best use of ranch-bred cattle.

It may be that this particular ranching scheme was more poorly conceived than most, though there is no reason to suppose that it was. Certainly at the level of technical management, it is probably up to the average for NACO, which in turn is considerably better than that of some of the smaller parastatal ranches, run by such bodies as District Development Corporations.

The general conclusion is inescapable; Tanzania's ranch sector has not produced either the meat or the profits which were planned, and large sums of money have been concentrated on these developments mainly because of the prior assumption that most Tanzanian citizens who own cattle are too “traditional” to be worth trying to "develop". This is not to say that there is no room for ranch development at all. So long as there is a tourist trade, it makes sense to produce high-grade meat domestically for that market and for any others who will buy it. This could probably have been achieved much more effectively by the development of (say) five or six ranches in the period since Independence. Instead, more than 22 have been set up by NACO alone and several others by District Development Corporations.

For the remainder of the local market, a more appropriate marketing policy would probably have led to a much greater improvement in the meat supply than all the millions of shillings spent on ranch development and this would have benefitted many times the number of Tanzanians. One major problem is that now the ranches exist, there will be strong pressures in future to keep them going. And now that LIDA has control of all local marketing of slaughter cattle, there will also be strong pressures to tax local sales as a means of subsidizing the parastatal ranch sector. It is to be hoped that this does not happen, for it would be the worst possible policy by almost any rational criteria.

Chapter 3.6: Dairy Production in Tanzania

While dairy production and policy in Kenya have increasingly emphasized peasants, the reverse is the case in Tanzania. Though there have been sporadic programmes to encourage peasant dairy production in
Table 3.17: Estimated Milk Production in Tanzania – Mid-1970s

| Total Herd Size ('000) | Proportion of Cows in Milk (%) | Cows in Milk ('000) | Mean Yield per Cow (litres) | Total Milk Production (mn litres) | Proportion of total (%)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Zebu</td>
<td>9770</td>
<td>21</td>
<td>2068</td>
<td>153</td>
<td>316</td>
</tr>
<tr>
<td>Grade</td>
<td>(75)</td>
<td>(40)</td>
<td>30</td>
<td>790</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>9845</td>
<td>. .</td>
<td>2098</td>
<td>(162)</td>
<td>339</td>
</tr>
</tbody>
</table>


a few areas, these have never amounted to very much and the grade herd owned by peasants is still smaller than was the case in Kenya during the early 1960s. Similarly, the large farm sector, which has been the major focus of government policy in recent years, is also considerably smaller than that of Kenya either before or since Independence.

It is thus not surprising to find that the vast majority of all milk produced comes from zebu cattle kept by peasants and pastoral herders. Table 3.17 shows one recent estimate of total milk production from zebu and grade animals.

This table may underestimate the size of the grade herd, notably that part kept by smallholders on Kilimanjaro, but this would not make a significant difference to the results. Moreover, the estimates for milk production from zebus may also be on the low side. For all except five regions, the proportion of cows in the herd and the calving percentage are taken to be a flat 40% and 50% respectively and for all but four regions, the yield from zebu cows is taken to be 140 litres per annum. These figures are extremely low in comparison with the sorts of estimate common for East Africa; the yield estimates resulting from detailed studies are all higher. In the one region (Mara) where study of milk production from zebu cattle has been made, the estimated yield is over 70% higher than the standard estimate, and though it is generally reckoned that yields in Mara are higher than normal, the difference seems larger than warranted.'

Table 3.18 shows estimated milk production by main region, from the same source. As can be seen from this table, the major proportion of all milk is produced in the northern and lake areas of the country, while of the regions with significant numbers of grade cattle only Kilimanjaro is

\[1\] National Dairy Development Plan 1978: Vol I (hereafter NDDP): 57. "Main regions" were included in a study by Texas A & M University and resulted in the following estimates: (continued on p. 173).
among the major milk producers. The vast majority of this milk does not pass through official marketing channels. Table 4.12 in Chapter 4.5 shows that milk from zebu cattle constitutes 65–70% of the small proportion (less than 5%) which does. For comparison, the amount of milk passing through KCC in Kenya is around 17 times the amount which passes through all major dairies and processing plants in Tanzania (excluding imported powder milk for reconstituting).

The difference is certainly not solely the result of recent policies, for the development of the two countries' dairy sectors has differed since the 1920s. The much larger settler sector in Kenya combined with the geographical location of the main urban centres within high potential areas where intensive dairy production was possible stimulated the early development in Kenya of commercial production based on grade cattle.

In Tanganyika during the colonial period, the dairy herd never exceeded a few thousand head and almost all were found in Kilimanjaro, Arusha and Iringa Regions where they supplied urban whites and the settlers themselves. Not the same effort was made to suppress African production, but far fewer opportunities existed to be suppressed. The Tanganyika settlers did not seek to improve their herds much, so provided fewer culls for sale. At Independence, there were probably not more than a few hundred (at the most a couple of thousand) head of grade cattle kept by Africans in the whole country, almost all of these in Kilimanjaro. In addition, a few Asian commercial farmers kept dairy farms in the vicinity of Dar es Salaam, where they produced for a commercial dairy in the capital.

To use an analogy (though one which should not be pressed too far), at Independence, the dairy sector in Tanzania had not reached the critical mass from which it was capable of sustaining some form of “self-generating” growth. Nor does it seem to have done so yet. By this, I mean that the scale of production is not sufficient to supply a fairly regular consumption by considerable members of people or generate sufficient

<table>
<thead>
<tr>
<th>Region</th>
<th>Cows in milk as a % of total herd</th>
<th>Milk yield per cow (litres/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arusha</td>
<td>23</td>
<td>140</td>
</tr>
<tr>
<td>Kilimanjaro</td>
<td>20</td>
<td>160</td>
</tr>
<tr>
<td>Mara</td>
<td>24</td>
<td>239</td>
</tr>
<tr>
<td>Mwanza</td>
<td>25</td>
<td>161</td>
</tr>
<tr>
<td>Shinyanga</td>
<td>22</td>
<td>140</td>
</tr>
<tr>
<td>Tabora</td>
<td>20</td>
<td>140</td>
</tr>
<tr>
<td>All others</td>
<td>20 (Singida 18)</td>
<td>140</td>
</tr>
</tbody>
</table>
Table 3.18: Estimated Milk Production by Main Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Zebu Cows in Milk ('000)</th>
<th>Zebu Milk Mn lit.</th>
<th>Per cent of total</th>
<th>Grade Cows ('000)</th>
<th>Grade Milk Mn. lit.</th>
<th>Per cent of total</th>
<th>Total Milk Mn. lit.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arusha</td>
<td>425</td>
<td>59.6</td>
<td>19</td>
<td>5.4</td>
<td>4.28</td>
<td>19</td>
<td>63.9</td>
<td>19</td>
</tr>
<tr>
<td>Mara</td>
<td>180</td>
<td>43.0</td>
<td>14</td>
<td>0.9</td>
<td>0.6</td>
<td>3</td>
<td>43.6</td>
<td>13</td>
</tr>
<tr>
<td>Mwanza</td>
<td>236</td>
<td>37.9</td>
<td>12</td>
<td>0.4</td>
<td>0.2</td>
<td>1</td>
<td>38.1</td>
<td>11</td>
</tr>
<tr>
<td>Shinyanga</td>
<td>256</td>
<td>35.9</td>
<td>11</td>
<td>0.3</td>
<td>0.2</td>
<td>1</td>
<td>36.1</td>
<td>11</td>
</tr>
<tr>
<td>Dodoma</td>
<td>200</td>
<td>28.0</td>
<td>9</td>
<td>0.4</td>
<td>0.2</td>
<td>1</td>
<td>28.2</td>
<td>8</td>
</tr>
<tr>
<td>Tabora</td>
<td>179</td>
<td>26.9</td>
<td>8</td>
<td>0.0</td>
<td>0.0</td>
<td>0</td>
<td>26.9</td>
<td>8</td>
</tr>
<tr>
<td>Kilimanjaro</td>
<td>90</td>
<td>14.4</td>
<td>4½</td>
<td>13.1</td>
<td>11.1</td>
<td>49</td>
<td>25.5</td>
<td>7½</td>
</tr>
<tr>
<td>Iringa</td>
<td>80</td>
<td>11.2</td>
<td>3½</td>
<td>2.4</td>
<td>2.2</td>
<td>9</td>
<td>13.4</td>
<td>4</td>
</tr>
<tr>
<td>Coast/DSM</td>
<td>14</td>
<td>2.0</td>
<td>.</td>
<td>1.7</td>
<td>1.1</td>
<td>5</td>
<td>3.1</td>
<td>1</td>
</tr>
<tr>
<td>Mbeya</td>
<td>140</td>
<td>19.6</td>
<td>6</td>
<td>1.2</td>
<td>0.8</td>
<td>4</td>
<td>20.4</td>
<td>6</td>
</tr>
<tr>
<td>Singida</td>
<td>138</td>
<td>19.4</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>19.4</td>
<td>6</td>
</tr>
<tr>
<td>Remainder</td>
<td>130</td>
<td>18.1</td>
<td>6</td>
<td>4.0</td>
<td>2.1</td>
<td>9</td>
<td>20.2</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: As for Table 3.17
potential profits to attract the large-scale organization of trading and processing. One ramification is that there are no sufficiently large concentrations of grade cattle or potential dairy farmers that would warrant an A.I. service on the sort of scale which could make significant increases in the grade dairy population. As shown in Chapter 4.5, the major dairy "development" since Independence has been the steadily increasing import of dairy products. While it is quite possible that some programmes for increased dairy production may have had an impact, there is virtually no sign of this from the evidence of deliveries to large dairies and processing plants.

As stressed in Chapter 1.2, there are very serious obstacles to the development of dairy production in Tanzania. The two largest towns, Dar es Salaam and Tanga, are surrounded by zones with relatively poor soils and hot humid climates well suited to the dissemination of every sort of disease. They are separated from most of the remainder of the country by areas of tsetse-infested bush. Dairy production can be undertaken in both places (and is) but at relatively high cost, since most production systems to date have relied on purchased food (and have not been helped in recent years by the high cost and variable quality of feedstuffs available). The capital, Dodoma, lies in the drier part of a cultivated range. Although this is one of the larger milk producing areas, the supply is both highly variable seasonally and, like the herds which produce it, geographically dispersed.

Some other major towns are better placed for the development of local supplies. Arusha and Moshi are situated in the area where most of the grade cattle are kept. But the bulk of the output is consumed locally in the rural areas or sold unofficially to the towns by producers and small traders. The reason for this is that prices paid by unofficial markets are substantially higher than those paid by the Tanzania Dairies Ltd (TDL) dairy in Arusha, which receives most of what supplies derive locally from large farms. Nevertheless this area and Mara Region probably have the greatest potential for dairy development in the country. It is worth noting that while Arusha is by far the largest milk producing region according to Table 3.18, most is produced by pastoralists and range cultivators and so is highly seasonal.

Of other towns Iringa and Mbeya are both situated in areas of

\[2 \text{ NDDP: 48-49. shows a table of results from samples surveyed of NMC feedstuffs. While the mean proportion of crude protein was about } 20\% \text{ the range was between 14 and 35 } \% \text{ with similarly enormous variation for fat, fibre, ash and other constituents. In addition, problems are mentioned of the presence of } \text{"toxic substances including mycotoxins"}, \text{ all this quite apart from the inability to meet current demand.}\]
reasonably high soil fertility, rainfall and altitude. These areas could potentially produce sufficient milk for urban needs and already have a few thousand grade animals. Mwanza, by contrast, is a major milk producing area densely stocked with cattle, but very few of them grade animals. Many believe that the soils, rainfall and climate of this area are not suitable for grade animals, but in view of the high density of population and the large numbers of cattle competing with crops for land, there would seem every reason to press for the introduction of more grade dairy stock among peasant farmers since this could provide one means of intensifying land use.

For the first few years after Independence, no great emphasis was placed on the development of dairy production. Most of the large farms had been in foreign hands and were declining as settlers left the country or failed to expand their investments. Some grade bulls and heifers were imported for upgrading peasant cattle, especially in Kilimanjaro and Arusha. A large proportion of these were culls from Kenya, but they did provide for some expansion. Other programmes led to the importation of small numbers of stock for peasants, projects, government research farms and multiplication farms in various parts of the country but the numbers involved were relatively small. The veterinary services supposed to protect them from disease were not especially effective and the programmes for multiplication were far from energetic.

The most widely known schemes for peasant dairy production were a few "cattle-coconut" schemes in the coastal areas founded on the reasonable idea of complementarity between the two production processes. Coconuts are planted at a spacing which leaves ample land between them which is not best used for intensive cropping since this reduces coconut yields. But the production of pasture, especially if legume-rich, increases coconut yields as does the manure from the animals grazed. The schemes foundered on poor organization and on the fact that as owners of land and coconut trees were different, they had different interests which could not be reconciled. Even without these problems however, the bureaucratic style of planning and management characterizing the "settlement schemes" of the time, would probably have been sufficient to ensure failure.³

Before proceeding to consider government policies for large farm production, it is worth considering the two major dairy producing areas in the country.

³ See Groeneveld 1968 for description. For his analysis, Groeneveld leans very heavily on "traditionalism".
Mara Region, in the north of the country to the east of Lake Victoria, has the rainfall and soils capable of supporting higher than usual productivity in dairy production with zebu cattle. It is the only region in the country producing a regular surplus above local requirements. Surplus production of ghee was developed during the colonial period and in the 1950s formed the basis for one of the earlier cooperative unions. Producers delivered milk to the cooperatives or private traders for separation and were returned the skimmed milk. It is often claimed that this was thrown away though it is hard to believe that almost 30,000 litres per day of skimmed milk was not used. And it seems far more likely that it was consumed by the people and for calf-feeding.

Although the cattle are often described as "unimproved zebu", the animals are larger and more productive than in most parts of the country. The estimate cited in the tables above, giving almost 240 litres per cow per annum in this region, compares with a standard 140 for most other regions. As indicated, the disparity arises in part because the herd in Mara has been more closely studied than elsewhere, but it also reflects the greater productivity of the herds. This leads one to question what is meant by "unimproved zebu", since it seems certain that these stock have been bred for improved milk production, although limited by the availability of animals for upgrading. Recently a small A.I. scheme was set up in the area but it is too early to say what will be the effect. Otherwise, the main policy strategy has been to "develop" the market for surplus milk, though with generally negative results (which will be described in Chapter 4.5).

In Table 3.18, the number of grade dairy cows in Kilimanjaro Region was given as about 13,100, indicating a rate of growth of over 20% per annum (the population had been estimated at 6117 in 1973). But Zalla, in a detailed sample survey of two Districts, found a total grade population of almost 17,000 and considered even that to be an under-estimate due to gaps in the sampling and the reluctance of farmers to admit to owning income-earning assets. Even if one increases his estimates to 20–25,000 to take account of errors and areas not included, this would give a rate of growth of 7–10% per annum between 1974 and 1977.\footnote{Zalla 1974: 6, 14 and passim. If one takes the proportion of mature cows in the herd estimated by Zalla (41% for grade cattle), the 13,100 cows estimated by NDDP would represent a grade herd of some 32,000 cattle which may be presumed to be an estimate for 1977.}

One complication arises on this point. In the table from which 3.17 and 3.18 are taken, it is not specified whether the figures for grade dairy cows are only those in milk (i.e. deflated by the calving ratio) or not. If Zalla's

The following paragraphs lean rather heavily on Zalla's account.
figures are correct, they would appear to include all cows yet unless corrections have been in the estimates of yield (which may be the case), the total supply of milk from grade cattle may have been over-estimated.

Zalla provides much interesting detail on dairy production in Kilimanjaro. He finds milk yields per lactation, net of calf requirements, of 340 litres per lactation for zebu cows and 900 litres for grade cows. Taking his figures on calving intervals, this would give herd yields of 170 litres and 470 litres per annum respectively net of calf needs. About 80% of this amount was said to be consumed by the households themselves, only 20% being available even for local sale.

Some indication of the undeveloped state of A.I. is given by the fact that in this, the most developed dairy producing area of the country, he found that only 6% of cattle-owners in Moshi District and 1% in Rombo District had ever used A.I. For the owners of grade cattle, this was increased to 40% and 25% respectively. Both the farmers and Zalla attribute this to the non-availability of A.I. and the very poor organization of the service which reduced rates of conception. He notes that access to and quality of services from the Veterinary Department seemed quite strongly related to the income and political influence of the recipient. Owners of grade cattle are among the wealthier minority because of the cost of acquisition and preferential access through the cooperatives. They receive markedly preferential treatment in (if not the only) veterinary services in many places, while between the majority and the veterinary service "there is quite clearly an undercurrent of mutual distrust and deception". It is thus not surprising to find that few owners dip their cattle, whether grade or zebu. The 60-80% of owners of grade cattle who practice tick-control prefer to hand-spray, doubtless because they find the dips present as great a danger of reinfestation as a means to get rid of ticks. Calf mortality rates were found to be 18% for grade cattle and 17% for zebus; rates high enough seriously to impair the economics of dairy production. Finally, he notes that the present level of provision of A.I. not only fails entirely to achieve any upgrading of zebu cattle (he found not one example in a sample of 400 owners) but is scarcely sufficient to prevent the downgrading of the existing grade herd.

Feeding is also a problem. Cattle have been kept and stall-fed on Kilimanjaro since before the colonial period; herders are clearly familiar with such techniques. The problem arises rather from the high population density on the mountain and the steady filling-up of those areas at its foot which formerly were used for the cutting of grass by producers of annual crops or livestock kept at lower altitudes. The further development of dairy production will probably require an increased supply or purchase of
fodder. This in turn, will only be economic for owners of grade cattle who are able to sell sufficient produce to cover the cost of the purchased feed (or the opportunity cost of growing it instead of coffee or bananas). But this would depend also on a much more energetic programme for A.I. than exists at present and the more effective provision of preventive and curative veterinary services. None of these are favoured by the nature of the topography; a series of steep and separate valleys where roads are often impassable at crucial periods of the year. Despite the difficulties, more could undoubtedly be done than at present.

One major factor hindering development is that little of the milk is sold through official channels, and there is a tendency to consider produce which does not pass through these channels as “merely subsistence” and therefore of no importance. Certainly demand in the area seems likely to maintain prices above the official level for some time to come. Prices in future will only fall to levels at which deliveries to the dairy will be made regularly when development has proceeded far enough to satisfy this demand. Even then, there are likely to be problems of seasonality since local prices fluctuate quite substantially between the flush period after the rains and the period of scarcity just before. Zalla indicates a price fluctuation between 1/- and 4/- per litre; the latter being well above what could feasibly be paid by the dairy (and indeed above its selling price at the time).

Milk produced on Kilimanjaro is consumed by the rural population, though to a disproportionate extent by the richer rural dwellers. Among the more effective ways to spread milk consumption more evenly among the rural population would be a much broader-based programme for upgrading than at present.

In this context, Zalla makes the highly relevant proposal that more attention should be paid to the development of dairy goat production. In Rombo District, 90% of the rural households had goats (compared with 60% owning cattle) and over 50% milked them. A few households owned improved cross-bred goats which they had purchased from a government breeding and multiplication station near to the area. Significantly, at every meeting held by Zalla and his assistants to explain the nature of their research, the farmers brought up the question of the non-availability of exotic goats and their desire to get hold of them. Although goats can be multiplied very much more rapidly than cattle, the breeding station at West Kilimanjaro has been totally incapable of meeting the demand.5

5 Having visited the station in 1969, I can say that unless the style of management has changed markedly since then, it is less surprising that few goats are distributed
While the government has paid lip-service to the idea of developing dairy production from goats, little has been done.

If one is concerned with the nutrition of the rural population, especially poorer families, the introduction of exotic and crossbred goats is one obvious answer, especially in areas like Kilimanjaro and Arusha where land is in short supply. An exotic goat takes less than one-quarter of the grazing or fodder used by a zebu cow and produces more milk; it probably produces more per amount of fodder than grade cattle. The milk produced is nutritionally superior, especially for infant feeding, since the fat globules are smaller and the milk more easily digestible. In addition, it has certain hygienic advantages. But since goat milk is not suitable for delivery to large-scale dairies nor demanded by middle-class urban residents, it seems unlikely that the present neglect will change in the short run.

Dairy policy during the 1960s largely centered on schemes to import grade cattle and distribute them through cooperatives to individual “progressive farmers”, normally the members of cooperative committees. The policy changed in 1967, and with the gradual growth in the number of ujamaa villages, led to a re-direction of emphasis towards the provision of grade dairy cattle to villages. On the one hand, this was seen as a means to encourage peasants to join villages (or as a reward for having done so). On the other hand, it was intended as a way of taking advantage of economies of scale in milk production (veterinary facilities, building etc.).

There are virtually no figures available from which to evaluate these programmes; even if there were, they would refer only to milk sold through official channels. The general impression is that such schemes have not been very productive, and if the disorganization and poor planning of the few which I have seen is widespread, this would seem an understatement. There is some tendency to attribute failure to the impossibility of getting "communal production" efficiently organized. Although it cannot be

than that any are at all. On that occasion the farm management was largely uninterested in goats and keeping the flock simply on a "care and maintenance" basis as a holdover from a previous policy.

6 As is well-known, Tanzania shifted its policy towards "socialism" in 1967, one aspect of this being the attempt to develop ujamaa (communal) villages as the basis for rural development. This has continued to be policy though the cooperative or communal element in production (never large) has dwindled, and the policy now consists largely of nucleation in villages and state control over the production of peasants in these villages. In the case of dairy villages, the dairy herd is usually communal in the sense that it is run for the village as a whole, though it is quite usual for it to be run in the village, by a government expert or by a small committee and for most of the members to be involved in neither the keeping of the cattle nor the consumption of the produce.
denied that there are major problems in the organization of cooperative or communal production, in many cases the programmes were doomed by poor conceptualization long before such problems could even arise. The practice of distributing cattle as an incentive or reward or on the ad hoc directive of visiting politicians has led to their introduction in some extremely unsuitable areas; for example, where there is no access to fodder, or tick-borne diseases are rife or, in one case, next to a game reserve which was heavily tsetse-infested. At the same time cattle were often distributed before proper preparations could be made in the form of housing and veterinary facilities. Sometimes, it has been necessary to drive these cattle to the nearest public dip for tick-cleansing, and so risk infection due to contact with ticks and other diseases on the way. In the circumstances, it is hardly surprising that large numbers of cattle have died (though it may be that publicized instances overestimate the death rate). A report of 1975 stated that there had been "a great range of experience, from successful operation of medium scale dairy units to utter disaster, where all cattle died immediately and an elaborate milking parlour stands totally unused."  

More recently, efforts to develop ujamaa dairy production have become (in theory at least) more standardized, with plans for the formation of 20-cow "units" in some 50 villages. This is part of the current IBRD Phase I Dairy Development Project, which forms the basis of dairy programmes for the Third Five-Year Plan.

Planned expenditures are shown in Table 3.19. The 11% of the expenditure allocated to the ujamaa dairy units is the only part of this plan likely to have any impact upon peasant producers; the heifer breeding unit is aimed mainly at large farms, as are most of the "other services". Turning to the Third Five-Year Plan, one does find A.I. programmes taking a significant proportion of the funds to be spent by the Ministry of Agriculture in the dairy sector. But the bulk of the funds for dairy development, including the Dairy Development Plan above, are to be implemented by DAFCO, the parastatal corporation set up to run large dairy farms and Tanzania Sisal Corporation which is also a major dairy farming parastatal.

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8 Not to be confused with the Phase I Livestock Development Project which was concerned with beef production.
9 Vol. I p. 21 (Swahili version) where even the total estimated cost remains unchanged in spite of the lapse of two years.
10 Although it is hard to distinguish between some categories of livestock development expenditure, it would seem that of a total 577.3 million shillings planned
Table 3.19: Planned Expenditure under Dairy Development Plan 1975-80 (Shillings Mn)

<table>
<thead>
<tr>
<th></th>
<th>Local Funds</th>
<th>Foreign Funds</th>
<th>Total</th>
<th>Per Cent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gov't Dairy Farms + Services</td>
<td>21.3</td>
<td>23.8</td>
<td>45.1</td>
<td>64</td>
</tr>
<tr>
<td>Ujamaa Dairy Devel. + Services</td>
<td>4.1</td>
<td>4.0</td>
<td>8.1</td>
<td>11</td>
</tr>
<tr>
<td>Heifer Breeding Unit</td>
<td>9.3</td>
<td>1.0</td>
<td>10.3</td>
<td>15</td>
</tr>
<tr>
<td>Milk Collection &amp; Processing</td>
<td>0.5</td>
<td>3.0</td>
<td>3.5</td>
<td>5</td>
</tr>
<tr>
<td>Other services</td>
<td>1.6</td>
<td>2.0</td>
<td>3.6</td>
<td>5</td>
</tr>
<tr>
<td>Total before contingencies</td>
<td>36.8</td>
<td>33.8</td>
<td>70.6</td>
<td>100</td>
</tr>
<tr>
<td>Contingencies</td>
<td>20.1</td>
<td>18.6</td>
<td>38.7</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>56.9</td>
<td>52.4</td>
<td>109.3</td>
<td></td>
</tr>
</tbody>
</table>


A report of 1978 gives a more complete statement of the funds invested in dairy development over the past few years and makes the point that given the great importance of foreign assistance in the total, this makes for a bias towards large farm projects, since the "smallholder sector... is also a more difficult area for those providing foreign assistance and has received little investment".\(^1\)

In summary, by far the major part of Tanzania's state expenditure on the development of dairy production is aimed at the development of large farms under state or parastatal control, and for the provision of services and technical assistance to these.\(^2\) Yet, even with the most optimistic assumptions, it does not seem likely that these will contribute very significant amounts to national milk production.

Estimation is made more difficult by the fact that few figures on actual production are available and one is forced to explore a variety of estimates and forecasts. One table in the 1978 report estimates that milk sales from expenditure on livestock development during the plan, some 82 million shillings, or 14% was to be spent on dairy production, compared with 147.41- mn for beef (26%) and 209.31- mn (36%) for marketing and processing. Some of the latter was evidently also for dairy production, as was some of the 5% or so spent on veterinary services and research. This is my own computation from more detailed tables in Part III, Volume II of the Plan. It is hardly worth presenting the data in further detail since actual expenditures in Tanzania have not closely followed the past two plans and there seems no good reason to expect them to do so in this case.

\(^1\) NDDP: 30. This is also true of Tanzania Government however, and goes some way to accounting for its own predilection for large farms.

\(^2\) This excludes credit from TRDB, of some 33.7 mn shillings to the DAFCO large farms.
large farms in 1981 will amount to nearly 15 million litres per annum (out of a total marketed production of some 20 million litres).13 This still represents no more than 5% of currently estimated production (Table 3.17), though it would imply doubling present deliveries of milk to TDL dairies and more than tripling deliveries of milk from large farms (see Table 4.12).

If one looks more closely at these estimates, it can be seen that they are excessively optimistic. The estimate for DAFCO farms (the core of the investment programme) is about 9 million litres sold, which compares with an earlier estimate in the same report of 6 million litres.14 Similarly, projections for other large farms imply major increases in yields and productivity, although elsewhere in the report it is stated that corrective measures are required simply to prevent further decline. By picking out these disparities, my purpose is not to criticize the producers of a preliminary report which valiantly pulls together disparate data from different reports and areas and provides a more or less coherent picture in greater detail than has been done hitherto. The purpose is to stress that even by taking most optimistic assumptions, the large farm dairy sector is unlikely to help very much in the elimination of Tanzania's dairy deficit. This is currently the equivalent of 75 million litres of fresh milk and compares with an output of 15 million litres at most from large farms.15 There is no good reason to believe that the planned targets can be achieved.

The total project costs for the IDA/DAFCO programme are estimated to be 60 million shillings and the project is expected to produce between 6 and 9 million litres.16 But there is some doubt whether the farms can be made to operate economically by 1981, even given the present relatively high milk prices, because of high fixed costs. While no direct comparison is possible (because of the considerable prior investment in infrastructure and personnel), it is worth noting that Kenya's A.I. programme has cost 14 million shillings (1970–76) and resulted in some 13 million inseminations. The re-direction of a proportion of the amount spent on large farms in Tanzania (and the allocation of manpower to go with it) towards A.I. and veterinary services for the peasant sector would probably

13 NDDP: 66–67. Of this, 9.3 million are expected to come from the 15 DAFCO farms to be funded under the Dairy Development Plan (not all of which are new), and 4.7 million from other large farms.
14 Ibid p. 35.
16 NDDP: 35.
achieve much more, in spite of the formidable problems of organization. There is, moreover, reason to fear that control by LIDA over the whole livestock production and marketing sector is likely to lead to considerable subsidization of unprofitable large farms at the expense of peasant producers of slaughter cattle.

Some argue that lack of profitability is not a relevant consideration for programmes which are aimed at developing material resources for the long run, and in view of the nutritional impact of dairy projects. Data are presented in Chapter 4.5 which indicate fairly clearly that the bulk of dairy produce is consumed by upper income urban and rural residents. This moreover, is pre-eminently true of dairy produce from large farms, especially those operated by state and parastatal organizations which produce either for pasteurization plants or for local bureaucratic consumption, subsidizing this quite heavily at public expense. There seems, therefore, to be no justification whatever for "improving" the records of such farms by taking account of "social" benefits, although most concerned with dairy development do precisely that.

Available evidence suggests that managers of parastatal dairy farms and those in charge of policy are at best indifferent to their impact upon peasants. In one case, cited by a foreign aid official, the manager of a large dairy farm financed by foreign aid and with an agreement which specifically included assistance to peasant herders, was far more concerned to expel the "squatters" because he saw them as standing in the way of further farm development. It is not just use of the term "squatter" which is reminiscent of settler dairy farming during the colonial period, there is a real danger that if dairy policy comes to be defined solely as the development of large farms, the next step will be to restrict peasant production to prevent spread of disease, theft etc, and all the other excuses put forward by settlers for their own protection from competition. This may be an exaggerated fear since there is no likelihood of overproduction

17 In fact, some Sh 14.2 million are allocated under the Third Five-Year Plan, for A.I., under various schemes, by far the largest of which is Swedish funded, as was the Kenya Programme. Given the major problems which have been encountered in organizing the supplies of A.I. services in Tanzania, it would seem likely that the allocation of manpower is every bit as important.

18 For example most of the product from a small and rather lacklustre state farm in Bukoba District, together with that from an "experimental" herd kept on a government farm, was sold to civil servants in Bukoba Town. Those privileged to get on the list, were able to purchase milk, which was then delivered to the door, at half the going price for fresh milk in the town.

19 The farm in question was Kitulo Dairy Farm. Though I am unable to identify the source, I am not in doubt about his reliability.
in Tanzania and no problem of excluding peasant produce from markets for milk. Nonetheless, there does not seem much chance so long as present assumptions prevail of a change towards the encouragement of peasant production. In spite of this, it seems likely that the relatively small and scattered programmes for bull centres, provision of A.I. and less formal upgrading, are likely to contribute more to the total milk supply than these large scale investments.\(^{20}\)

If there is to be any switch towards encouraging peasant production, one vital priority would be to improve the organization of dipping. In some ways, the system in Tanzania is better than that in Kenya. The government runs all dips and provides dipping as a free service to stockowners. This has certainly led to major increases in the numbers of cattle dipped and is said to have significantly reduced calf mortality in some areas.\(^{21}\) It has the further advantage that since there are no commercially run dips, there is no market for acaricide (at least for dipping) and supplies are less likely to be misappropriated. On the other hand, there have been persistent problems due to the lack of acaricide (and failure to deliver even where the funds are available) and the deterioration of dips causing them to leak or become otherwise unusable. Recent reports indicate that the present number of dips should be increased by about 50\% in order to cater for requirements, but an even higher priority could be to get those in existence running properly.

As will be discussed in greater detail in Chapter 4.5, imports of dairy produce into Tanzania have increased substantially since Independence; government dairy marketing policy has contributed to this unsatisfactory state of affairs. The current emphasis on large scale production will probably retard rather than accelerate the growth of production. This statement is not easy to prove, since large farms have not yet been running

\(^{20}\) Apart from the problems of these particular large farms, there are two rather obvious general reasons why this might be the case. In developing peasant production, the peasants themselves undertake much of the labour at their own cost, rather than wage costs having to be capitalized (to the expense of the state). Secondly, there are so many peasants, that any programme which does arouse enthusiasm can be assured of rapid growth in production. The growth of the peasant dairy herd in Kenya in the 1960s shows this quite clearly, as do several examples of rapid adoption of agricultural innovation in both Kenya and Tanzania. The problem is to define programmes which are attractive to the peasants and though hard, not impossible of solution once it is seen to be the problem rather than forcing the peasants to perform what others think is best. Plainly however, this formulation raises a number of further questions.

\(^{21}\) In Mbulu District in the early 1960s, official reports indicated a reduction in calf mortality after the introduction of free dipping, to under 10\%. While the previous level was not stated, it was evidently considered to have been higher and probably in the range 20–30\%, which is taken to be standard for Tanzania (see 3.5).
long enough to provide data on which to base an accurate evaluation. But the great confidence expressed in feasibility studies which paint a picture of competent management and steady growth in line with targets should not blind one to the real experience so far. Almost all the existing large scale dairy farms were once evaluated in glowing terms, including several which have been taken under the Dairy Development Project, to "put them on their feet" after several years of unproductive, loss-making operation. Apart from this, the estimated parameters upon which the evaluation and estimates of production are based are extremely optimistic. Yields are expected to start at a level about 25% above the average yield for large farms in Kenya, and in some cases, projected to rise to double this level after 9 years. By contrast, data available for large parastatal dairy farms already in operation in Tanzania seem to be about the Kenya level.\textsuperscript{22} This is not a discreditable level of yields, though apparently it is achieved at higher costs than in Kenya. The comparison does throw some doubt on the likelihood of achieving the predicted results on the new DAFCO farms.

But if current large-scale production plans seem unlikely to reach their predicted targets, is there any reason to suppose that concentration on peasant production would prove more effective? Before suggesting whether this might be achieved, it is worth underlining that effectivity cannot be measured by increased deliveries of milk to LIDA controlled large dairies, since little of this milk gets to those who need it most.

Once one redefines the goal as that of increasing production of milk as rapidly as possible from whatever source and whether or not marketed through LIDA, the problems can be posed differently. Given the low genetic potential of local zebu cattle for milk production, one answer would be to introduce sufficient numbers of improved stock to peasants who can pay for them (albeit perhaps at subsidized rates) and who can make the initial investments (largely of labour) to construct adequate facilities for them. Priority for the introduction of exotic semen in A.I. programmes should be given to those areas where soils, rainfall and temperature are better suited to these cattle (mainly highland areas) and to areas where there is already an unfulfilled demand for milk. This would imply a reintroduction of the emphasis on better areas and richer peasants which was formally abolished in 1967. As regards social inequality, expansion of the scope of A.I. (and distribution of goats) could help to offset the existing bias. Dairy cooperatives would also be worth

\textsuperscript{22} NDDP: 41. The calving ratio on the NAFCO farms in question was 66% and the yield per cow (not per cow in milk) was about 1180 litres per year.
considering though they present a number of problems – not least a tendency for officialdom to lavish upon them more than their fair share of irrelevant and cost-increasing advice.

Such a policy need not concentrate solely on the distribution of pure exotic semen or half exotic first-cross heifers. Indeed, there is no reason why a policy should be concerned only with cattle. As outlined above, crossbreds are more productive, cost less to purchase and keep, and produce a nutritionally superior milk. Moreover, given an energetic programme of multiplication, a flock of goats can be expanded much more rapidly than a herd of cattle. This strategy would probably only be suitable in the first instance for those areas where goats are already kept for milk and where there is a demand for improved goats (as there very evidently is in Rombo district and probably in other parts of Kilimanjaro and Aru-Meru Districts). In other areas, upgrading cattle with lower levels of exotic blood or with improved zebu animals (like Boran, Sahiwal, Tanzania's own Mpwapwa breed, or even the better animals from areas like Mara) might be more suitable, given existing problems of controlling tick-borne diseases. This would almost certainly lead to some extremely "untidy" programmes of upgrading and a very heterogeneous herd of improved dairy cattle. But while this would pose major problems for stock breeders who try to work out the results achieved by different crosses, it would not be detrimental to the producers. Peasant farmers are highly expert at assessing the milk production of different animals and can draw their own conclusions about breeding and culling policies.

Such a policy would not be without problems. It does seem to offer better prospects than that presently followed. Among the advantages would be cheapness in terms of both money and labour and thus it would allow the allocation of increased funds and attention to the improvement of veterinary services and animal husbandry advice. These could be more economically provided and be received more enthusiastically if they were defined as the provision of services and advice, rather than control. No doubt control would be needed in particular instances (for example, to prevent disease found on one badly run farm from spreading to the stock of others). But these cases are probably less prevalent than is usually thought. Many of the controls on which agricultural and veterinary officials spend so much time are imposed not for any clearly thought out reason but rather because it is felt that peasants cannot be trusted with their own production process.

The above points to a general direction for dairy development and not a detailed programme, which would hardly be appropriate in a book such as this. Whether such a direction is likely to be acceptable to policy-makers is far from certain.
SECTION 4: MARKETING AND PROCESSING OF LIVESTOCK AND PRODUCTS

Introduction

The following five chapters are about livestock marketing in East Africa, and most specifically about the official marketing systems which deal with beef and dairy products. As stated already, these handle only a relatively small proportion of total beef and dairy products let alone of total livestock produce in East Africa. But there is good reason for this focus (apart from the fact that there is not much information on the unofficial systems). The official systems are, virtually by definition, the means by which government policy is implemented and their interaction with policies for the development of production is thus of obvious interest and relevance.

The four latter chapters deal with beef and dairy marketing in the two countries. What I have tried to do is provide some descriptive material and historical background to indicate how the systems came to be as they are, and then raise some of the more important problems of policy which emerge. As the coverage is somewhat uneven, I have tried to provide a framework which does not conceal gaps and inadequacies but rather makes them evident, so that those interested will be able to see where further work is needed if important questions are to be answered. Similarly, I have tried to point out, rather than conceal, inadequacies in the data.

Far more information and analysis are needed on those areas of marketing and distribution which do not fall directly within the sphere of governmental or officially recognized institutions. It is grossly misleading simply to state, as do so many consultancy and other reports, that 70 or 80 or whatever per cent of total production is "consumed by the producers in the rural areas". This is completely untrue, in that such a formulation disregards forms of exchange and marketing which have been established over long periods and which may involve the movement of livestock for up to hundreds of miles and in large numbers. Furthermore as is currently becoming very plain in Kenya, simply to ignore such transactions or try to stop them through uninformed administrative action, may well prove
counterproductive and nullify the very policies which such action is designed to assist.

The purpose of the first short chapter is to emphasize some aspects of state-controlled marketing systems which are commonly ignored in economic analyses of agricultural marketing yet which are crucial to any proper understanding.

Chapter 4.1: State-controlled Marketing in East Africa

The marketing of major livestock products in East Africa is dominated by state-controlled institutions at almost every level. Prices for most products are set by the state at producer and consumer levels. The supply of produce to the major urban centres and for export is normally under the monopoly control either of a state or parastatal body or (as is the case with KCC in Kenya) of a private body which operates with a state granted monopoly and under some form of state control. In the case of beef and slaughter stock, almost all legal primary markets are owned and operated by the state or parastatal bodies and there is, in addition a large body of legislation controlling how, where and when stock and produce may be moved.

Not only is the degree of state control over marketing and price-formation very extensive; it has been in existence since the beginning of the colonial period. The whole structure of the livestock sector (and of the economy in general) is thus in large part a result of such controls. This indeed was among their purposes, though it is not always the case that the structures emerging were those intended by the policy-makers. Nor is it necessarily the case that either what was intended or what emerged has been beneficial. What is quite clear is that there has never been in East Africa anything remotely resembling a "free market", since even those prices which were not controlled were strongly affected by the large majority which were.

This has a number of implications for the study and evaluation of currently existing marketing institutions and patterns of prices. On the one hand, there is little point in comparing what exists with some hypothetical equilibrium situation since, apart from anything else, there is no way of telling what it would be like. The whole structure of production has been formed and continues to be underpinned by extensive systems of controls and cross-subsidies to say nothing of other forms of state
intervention. Nor can one distinguish sharply between "market" and other controls, for one of the more effective means of maintaining monopoly privilege has been the operation of veterinary controls whose ostensible purpose has been to limit the transmission of disease.

This is not to say that one cannot comment upon or evaluate the various marketing policies. Rather it is to propose that the analysis must be pushed rather further than is common, to consider not just "inefficiency" and "lack of competition", but how these arose, why and on whose behalf they continue to exist. The most constant theme underlying marketing and price policy in the East African livestock sector has been the segregation of the "traditional" and "modern" sectors and the protection of the latter to the cost of the former. This has been achieved through the exclusion of African producers from high-priced markets, as was the case for both beef and dairy produce in Kenya during the colonial period, and by the operation of differential (and preferential) pricing systems. Where outright exclusion was practiced, this was normally justified on the basis of controlling disease-transmission and achieved through quarantine barriers, which also served the purpose (though less effectively) of protecting "modern sector" livestock from the diseases which continued uncontrolled elsewhere.

During the colonial period, the evident purpose of this was to protect white settlers, but the practice has continued into the period since Independence. To some extent this reflects the continued political influence of similar dominant economic groups, though it also reflects the existence of a modern sector, composed of production units, marketing and processing structures and patterns of consumption, which are heavily dependent upon the continuation of the controls.

But protection of the "modern" sector is also required to support current investments in both production and processing. As has been indicated above, many of the state-supported or controlled schemes for production of beef and dairy produce (especially in Tanzania) are grossly uneconomic and require one or other form of protection. On the other hand, investment in surplus capacity of unnecessarily sophisticated and expensive processing equipment also requires protection; this time often by reducing the price at which raw materials are purchased and attempting to prohibit other means of disposal to producers. There is a certain irony in the fact that bodies like the World Bank both tend to criticize the monopolistic pricing structures to be found in East Africa and propose the sorts of investment which make such monopoly protection inevitable.

There is little doubt that monopoly control of marketing does increase
costs quite apart from cases where this is achieved as a deliberate policy. In part this derives from the existence of excess capacity in processing and, in some cases, its inappropriate nature. Apart from this, the possibility of raising prices and the availability of direct government subventions does little to encourage strict accounting procedures and control though, since this also reflected in inadequate reporting, it is not easy to substantiate.

When one turns to consumer prices, the picture is complicated by various contrary pressures. For most of the past decade, prices of meat have been held below what it is thought that the market would bear, while grade price differentials have been kept more narrow than the structure of demand would allow. This has implied a subsidy to urban consumers. In part this has been achieved through the payment of low prices to producers (and especially those within the "traditional sector"), but in some cases, there have also been subsidies and subventions from general government revenue. In both countries it has been deliberate policy to maintain low meat prices in the urban areas, in order to keep the cost of living (and wages) down. But when one comes to look at patterns of consumption, it can be seen that those who benefit most from this are generally the richer urban inhabitants and certainly not those most in need of dietary improvement.

The existence of these various conflicting pressures makes it difficult to predict what would be the effect on the pattern of prices or eliminating various forms of control. Nor is it possible to propose their elimination without further alteration of the structure of production and processing. One can say with some assurance however, that more attention to the economics of "modern" production and processing investments would slow the rate of investment, reduce excess capacity and eliminate the need for certain forms of control (notably that related to control of foot and mouth disease for largely chimerical export prospects) to the great benefit of most livestock producers and consumers.

Chapter 4.2: The Marketing and Processing of Meat in Kenya

The marketing of meat in Kenya has been subject to extensive state control for many years. The two major means for its implementation are the Kenya Meat Commission (KMC) and the Livestock Marketing Division (LMD) of the Ministry of Agriculture. KMC has a legal monopoly of slaughtering for export and for the urban areas. It operates
two meat packing plants at Athi River (near Nairobi) and at Mombasa, with capacities of 155,000 and 60,000 head respectively; and two other large abattoirs at Nakuru and Ngong, the latter serving the Nairobi market. In addition, it licenses some 16 other abattoirs (mostly rather smaller) in Nairobi and other towns, the former being privately run and the latter run by local government agencies.'

The LMD succeeded the African Livestock Marketing Organization soon after Independence. It owns and operates all primary markets for slaughter stock, stock-routes and holding grounds (through which it can control the movement of stock) and operates quarantines and vaccination of slaughter stock. While private traders can use these facilities too, subject to acceptance of the regulations, the LMD itself carries on most of the direct trade in stock from the northern pastoral areas for canning, since the high cost of quarantines and vaccination makes this trade unattractive to the private sector.

Beef prices are controlled at producer, wholesale and retail levels, except for the top two grades which have recently been decontrolled. Prices of meat from sheep and goats are not controlled.

Among the stated purposes of this extensive system of controls are to generate a flow of improved grades of meat, encourage stratified production, limit the spread of disease and "subsidize" the purchase of lowgrade stock from the pastoral areas. In reality, the system has not achieved any of these objectives and the degree of real control is very much less than would appear from the account above. While all exports, except for the movement of slaughter stock across East African borders, are effectively controlled, this is not true of urban meat sales.

In the first place, the slaughtering of cattle and other stock in rural areas is very much less controlled and a number of major towns are ringed by "rural" butcheries, which sell meat to the towns. Apart from this, there has for some time been a substantial illegal urban trade and this is growing steadily. In 1967, it was recorded that the KMC controlled less than 60 % of the Nairobi market. While some of this could be accounted for by licenced private slaughterhouses, a large remainder was being handled by illegal trade. ² By 1978, the extent of this trade was sufficient to cut seriously into the supplies of slaughter cattle available to KMC.

Table 4.1 shows deliveries of slaughter stock to KMC, production of meat and disposition from 1964 to 1978 (see also Figure 2). As can be seen,


Table 4.1. Deliveries to and Production from K.M.C. (Rounded figures)

<table>
<thead>
<tr>
<th>Year</th>
<th>Deliveries of Cattle &amp; Calves ('000 head)</th>
<th>Average C.D.W.* (Kg)</th>
<th>Total production ('000 tons)</th>
<th>Local sales ('000 T)</th>
<th>Exports</th>
<th>Exports as % of total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Chilled/ frozen ('000 T)</td>
<td>Canned ('000 T)</td>
</tr>
<tr>
<td>1960**</td>
<td>155</td>
<td>166</td>
<td>25.7</td>
<td>12.3</td>
<td>2.7</td>
<td>10.3</td>
</tr>
<tr>
<td>1961**</td>
<td>175</td>
<td>158</td>
<td>27.6</td>
<td>12.8</td>
<td>2.0</td>
<td>10.3</td>
</tr>
<tr>
<td>1962**</td>
<td>173</td>
<td>176</td>
<td>30.5</td>
<td>13.3</td>
<td>2.9</td>
<td>11.7</td>
</tr>
<tr>
<td>1963**</td>
<td>182</td>
<td>168</td>
<td>30.6</td>
<td>14.7</td>
<td>3.5</td>
<td>13.3</td>
</tr>
<tr>
<td>1964</td>
<td>156</td>
<td>162</td>
<td>25.3</td>
<td>14.7</td>
<td>3.4</td>
<td>10.5</td>
</tr>
<tr>
<td>1965</td>
<td>185</td>
<td>136</td>
<td>25.1</td>
<td>14.2</td>
<td>2.0</td>
<td>10.0</td>
</tr>
<tr>
<td>1966</td>
<td>188</td>
<td>149</td>
<td>27.9</td>
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<td>2.7</td>
<td>9.7</td>
</tr>
<tr>
<td>1967</td>
<td>216</td>
<td>145</td>
<td>31.4</td>
<td>13.6</td>
<td>2.8</td>
<td>9.7</td>
</tr>
<tr>
<td>1968</td>
<td>184</td>
<td>165</td>
<td>30.4</td>
<td>12.8</td>
<td>4.0</td>
<td>10.1</td>
</tr>
<tr>
<td>1969</td>
<td>185</td>
<td>142</td>
<td>26.3</td>
<td>12.8</td>
<td>3.1</td>
<td>7.8</td>
</tr>
<tr>
<td>1970</td>
<td>196</td>
<td>143</td>
<td>28.0</td>
<td>15.6</td>
<td>2.9</td>
<td>8.5</td>
</tr>
<tr>
<td>1971</td>
<td>210</td>
<td>124</td>
<td>26.1</td>
<td>13.6</td>
<td>3.3</td>
<td>10.0</td>
</tr>
<tr>
<td>1972</td>
<td>199</td>
<td>135</td>
<td>26.9</td>
<td>12.8</td>
<td>4.5</td>
<td>16.5</td>
</tr>
<tr>
<td>1973</td>
<td>155</td>
<td>147</td>
<td>22.7</td>
<td>11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>159</td>
<td>125</td>
<td>19.8</td>
<td>8.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>134</td>
<td>124</td>
<td>16.6</td>
<td>3.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>229</td>
<td>118</td>
<td>26.9</td>
<td>5.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td>158</td>
<td>130</td>
<td>20.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1978</td>
<td>68</td>
<td>131</td>
<td>8.9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Total production delivered by number delivered.

** Figures from KMC in Meyn 1970. Not directly comparable.
from 1965 to 1972 supplies ran at about 200,000 head which was below full capacity of licenced abattoirs though not seriously so. Since then, the capacity of the Athi River plant has been expanded, while total deliveries of cattle to all licensed abattoirs has fallen in most years to below the capacity of this one plant alone. Though 1976 was a record year, this is generally agreed to have been due to the impact of a serious drought on the pastoral areas. Pastoralists sold larger than usual numbers of stock in order to gain some return from them before they died and also to stave off starvation through purchase of grain for their own consumption. The effect of this can clearly be seen in the second column of the table, since the average c.d.w. of cattle delivered fell to the lowest level recorded. Some decline in deliveries could have been expected for the following year (1977) as pastoralists attempted to rebuild their herds, but this does not explain the very marked fall in 1978 – down to the levels recorded for the early 1950s. This has been officially attributed to "competition from the increasing number of private slaughterhouses in the country"; though it is not recorded that several of these are unlicenced, including one large one near to Nairobi.

KMC's canning plant at Athi River produces corned beef, the bulk of which is exported. The plant was opened in 1938 by a private firm, Liebigs. This firm, now a subsidiary of Brooke Bond, still organizes the export sales of this product, most of which goes to the U.K. under the Fray Bentos label. When the canning plant was set up, its major purpose (as indicated in Chapter 3.2) was to find an export outlet for the large numbers of surplus cattle in the Maasai rangelands and the northern and north-eastern pastoral areas. The plant was sited at a point where cattle could be driven to it along segregated stock-routes, without endangering the quarantine regulations which served to form the mainstay of the protective network.

Up to the 1950s, unsuccessful efforts were made to use coercion (in the form of forced de-stocking campaigns) to achieve a sufficient supply of cheap meat for the factory. Then, the African Livestock Marketing Organization (ALMO) was set up, and pursued an alternative strategy by developing stock-routes and holding grounds and operating a floor-price mechanism to prevent dealers' rings from depressing prices. Whether or not the ALMO did increase the price paid to northern livestock producers is open to question, but it did lead to a substantial increase in deliveries of cattle to KMC; from about 80,000 head per annum (to all licenced

abattoirs) in 1954–56, up to 180,000 head in 1962. Most of the deliveries from the north-east were purchased and moved by ALMO itself which indicates that private traders could not compete, or were not interested at the prices offered. To some extent the high level of costs resulted from the strict disease and quarantine regulations imposed by ALMO and the Veterinary Services Division (VSD) of the Ministry of Agriculture.

After Independence, ALMO was replaced by LMD which continued to operate a similar policy, though less emphasis was placed on a previous campaign to purchase old "scrub stock" and culls which were unfit even for corned beef and slaughter them in field abattoirs for pet food and meat extract. By this means the herd composition of the pastoral areas could be improved by getting rid of unproductive stock. At this time, exports of corned beef were taking between 12 and 15,000 tonnes of meat per annum, but government policy was beginning to look for an alternative use for the cattle from the pastoral areas which supplied this meat. While continuing to produce and export corned beef (the lowest grade of canned meat made from the poorest grade of animals), it was planned that an increasing proportion of the offtake from these areas should be in the form of immatures, which would be sold to feeder ranches situated on the periphery of the high-potential and theoretically “disease-free” areas. On the one hand, this would increase the weight and quality of the cattle before slaughter, while on the other, the period of quarantine plus fattening would (so it was hoped) enhance the security of the measures designed to control the spread of disease.

This also had implications for the export trade. It was now hoped to shift exports into the higher-valued chilled and frozen sides and cuts, aimed primarily at the higher income markets in Europe.

But while this was stated formal policy, it can be seen from Table 4.1 that no such increase in exports of chilled and frozen beef has occurred; the bulk is still exported as corned beef. With declining deliveries during the 1970s, KMC has exported an increasing proportion of its total throughput, the local market being increasingly taken over by private traders. Over the period covered by Table 4.1, no decline in meat exports shows up, but Table 4.2, taken from a different and more recent source, does show a marked decline for 1978.

In the two tables, exports are clearly estimated on a different basis. Table 4.1 takes the “c.d.w equivalent" of export production in order to provide comparable figures for local and export production. Table 4.2 is based on the actual net weight of produce exported and since this is composed in part of bone-out cuts and largely of canned meat and meat extract, this involves substantial weight-loss. In addition, the latter figures
Table 4.2. Livestock Exports from Kenya (’000 tonnes and £K mn)

<table>
<thead>
<tr>
<th>Year</th>
<th>Meat &amp; Products</th>
<th>Hides &amp; Skins</th>
<th>Butter &amp; Ghee</th>
<th>Wool</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>('000 tonnes)</td>
<td>('000 tonnes)</td>
<td>('000 tonnes)</td>
<td>('000 tonnes)</td>
<td>('000 tonnes)</td>
</tr>
<tr>
<td>A - By volume</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1969</td>
<td>6.3</td>
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<td>2.1</td>
<td>1.7</td>
<td>1.7</td>
</tr>
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<td>8.3</td>
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<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>1972</td>
<td>10.2</td>
<td>10.6</td>
<td>1.98</td>
<td>1.61</td>
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<td>6.3</td>
<td>8.2</td>
<td>1.86</td>
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<tr>
<td>1974</td>
<td>6.8</td>
<td>9.1</td>
<td>1.15</td>
<td>1.34</td>
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<td>1975</td>
<td>8.2</td>
<td>11.9</td>
<td>0.63</td>
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<tr>
<td>1979</td>
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<td>13.1</td>
<td>1.21</td>
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</tr>
</tbody>
</table>

B - By value (£K mn)

<table>
<thead>
<tr>
<th>Year</th>
<th>Meat &amp; Products</th>
<th>Hides &amp; Skins</th>
<th>Butter &amp; Ghee</th>
<th>Wool</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(£K mn)</td>
<td>(£K mn)</td>
<td>(£K mn)</td>
<td>(£K mn)</td>
<td>(£K mn)</td>
</tr>
<tr>
<td>1969</td>
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<td>0.4</td>
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<tr>
<td>1970</td>
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<td>3.4</td>
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<td>0.3</td>
</tr>
<tr>
<td>1971</td>
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<td>0.4</td>
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<tr>
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<td>0.8</td>
</tr>
<tr>
<td>1973</td>
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<td>4.4</td>
<td>0.5</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>1974</td>
<td>5.2</td>
<td>5.4</td>
<td>0.3</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>1975</td>
<td>8.4</td>
<td>8.6</td>
<td>0.6</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>1976</td>
<td>7.6</td>
<td>8.0</td>
<td>1.3</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>1977</td>
<td>2.8</td>
<td>9.9</td>
<td>1.0</td>
<td>0.7</td>
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</tr>
<tr>
<td>1979</td>
<td>2.7</td>
<td>13.8</td>
<td>0.9</td>
<td>0.7</td>
<td>0.7</td>
</tr>
</tbody>
</table>

*Source: Economic Surveys (1975 and 1979).*

include exports of pig and poultry meat, though these are not large enough to alter the total substantially.

One unexpected point to emerge from the table is that exports of hides and skins have been comparable in value with those of meat (and substantially greater than those of dairy produce) for many years and have, for the past four years, been the major single livestock export.

The trend emerging from these tables is fairly clear. Deliveries of cattle to official markets have not increased since the mid-1960s and have declined considerably in 1978. This has cut into the availability of cattle for export and to a large extent nullified the effects of investment in facilities for export production and processing.

If one refers to Figure 2, it can be seen that deliveries of other stock have also declined, although this began a little earlier. Production of pig-meat
reached a peak in the late 1950s and fell thereafter following the decline in the European farming economy and the chequered career of the Uplands Bacon Factory; the only factory-scale outlet for the processing of bacon and pork. Since then, production has remained more or less stable. For sheep and goats, peak deliveries to KMC occurred in 1962 when some 190,000 were delivered, declining drastically since then to a current level of between 15 and 30,000 per annum. This reflects both a decline in interest in such stock on the part of KMC, and also the fact that with uncontrolled prices, stock have been increasingly bid away by other traders. Even in peak years, official sales represented no more than about 7% of a total offtake of some 2.5 million and at present accounts for only about 1%. The remainder of this chapter will concentrate on beef marketing.

The main reason behind the declining export surplus is that local demand for meat has grown more rapidly than production. However, this statement requires amplification. At the same time, explanation is needed for the related phenomenon of the diversion of supplies away from KMC. The reasons for both trends are connected and reveal some of the contradictory aspects of Kenya's meat production policy.

For some years, officially stated policy has been directed to developing a stratified production structure and generating an increasing surplus of high-grade meat for export. In this way, not only would the total amount of meat exported rise, but its unit value would also increase with the switch from corned beef to chilled and frozen carcasses or cuts. In terms of the local production structure, this implies a change away from the purchase of slaughter stock from the pastoral and range areas to the purchase of immatures from these areas, by fattening ranches and feedlots, to add weight and improve the grade of the animals before slaughter.

But the success of such a policy depends on various prerequisites which have not been met. The first of these is a pricing system which limits local demand for the higher grades of meat sufficiently to generate the export surplus. For many years now, it has been remarked that KMC’s price structure has failed to do this since controls on the price of meat – and especially the higher grades – have increased local consumption of quality beef (which was intended for export) and in doing so, subsidized the beef consumption of a very small wealthy minority. Despite the need to change

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4 Most pigs are still kept on large farms and consumed by high-income urban dwellers, so that production which passes through Uplands is still a large proportion of the total.

5 This is a standard figure to be found in World Bank and other reports and is based on the assumption of an offtake rate in the region of 30%.
Table 4.3. Retail Prices for Beef Compared with Cost-of-Living Indices 1969 = 100

<table>
<thead>
<tr>
<th>Year</th>
<th>High Grade Beef</th>
<th>Middle-Income Beef (Food)</th>
<th>Low Grade Beef</th>
<th>Lower Income Beef (Food)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1970</td>
<td>109</td>
<td>103</td>
<td>101</td>
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<td>1971</td>
<td>101</td>
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<td>111</td>
<td>112</td>
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<tr>
<td>1972</td>
<td>101</td>
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<td>1973</td>
<td>113</td>
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<td>1974</td>
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<td>1975</td>
<td>123</td>
<td>179</td>
<td>140</td>
<td>186</td>
</tr>
<tr>
<td>1976</td>
<td>139</td>
<td>188</td>
<td>140</td>
<td>195</td>
</tr>
</tbody>
</table>

Sources: Statistical Abstracts all adjusted to basis 1969 = 100.

this pattern of domestic consumption if export surplusses are to be generated, Table 4.3 shows that no change has yet occurred (or had not up to 1976). The table shows retail beef prices compared with cost-of-living indices from 1969, in each case comparing a grade of beef with the index for the population most likely to consume it.

In both cases, beef was cheaper in 1976 in comparison with other food items than it had been in 1969; similar disparities show if other years are taken as base.6

The other half of the equation is that beef prices to producers (once again especially those for higher grades) have not been high enough to generate increased production in sufficient quantities. Once again, although it has been recognized for some years that grade differentials are not sufficient to encourage high-quality meat production, relative prices have not changed. Table 4.4 shows official producer prices for "Good Average Quality" Beef from 1969–1976 and the prices of other (lower) grades as a proportion of this. The final columns of the table show the price of 3rd Grade Beef as an index (1969 = 100) and compare it with the cost-of-living data of Table 4.3.

6Taking 1964 as basis, one would have for 1976:–

<table>
<thead>
<tr>
<th></th>
<th>Higher Income</th>
<th>Lower Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef price</td>
<td>207</td>
<td>213</td>
</tr>
<tr>
<td>Cost-of-living</td>
<td>220</td>
<td>228</td>
</tr>
</tbody>
</table>

The smaller size of the differential in comparison with that for Table 4.3 indicates that beef prices rose slightly faster than the cost-of-living up to 1969 and but more slowly thereafter. Interestingly enough, it was in the latter period that large sums began to be spent on trying to develop high-grade export production.
Table 4.4. Beef Producer Prices and Grade Differentials 1969-76

<table>
<thead>
<tr>
<th>Year</th>
<th>As per cent of G.A.Q.</th>
<th></th>
<th>3rd Grade</th>
<th>4th Grade</th>
<th>Indices (1969 = 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G.A.Q.</td>
<td>F.A.Q.</td>
<td>3rd Grade</td>
<td>4th Grade</td>
<td>3rd Grade</td>
</tr>
<tr>
<td>1969</td>
<td>3.41</td>
<td>97</td>
<td>81</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>1970</td>
<td>3.49</td>
<td>95</td>
<td>78</td>
<td>68</td>
<td>99</td>
</tr>
<tr>
<td>1971</td>
<td>4.06</td>
<td>93</td>
<td>70</td>
<td>61</td>
<td>104</td>
</tr>
<tr>
<td>1972</td>
<td>4.43</td>
<td>92</td>
<td>68</td>
<td>59</td>
<td>110</td>
</tr>
<tr>
<td>1973</td>
<td>4.77</td>
<td>93</td>
<td>73</td>
<td>63</td>
<td>126</td>
</tr>
<tr>
<td>1974</td>
<td>5.29</td>
<td>94</td>
<td>78</td>
<td>67</td>
<td>150</td>
</tr>
<tr>
<td>1975</td>
<td>5.98</td>
<td>93</td>
<td>79</td>
<td>69</td>
<td>172</td>
</tr>
<tr>
<td>1976</td>
<td>6.68</td>
<td>97</td>
<td>72</td>
<td>63</td>
<td>174</td>
</tr>
</tbody>
</table>

Sources: Statistical Abstract and Crees n.d.

Note: The situation is slightly complicated by the fact that two different sets of grade labels are in common use. Some sources give "prime" as the top grade, followed by "choice", while others (the Statistical Abstract) use "Good Average Quality", which would appear to be a combination of the two. Again, at the lower end of the scale, the Statistical Abstract, gives prices for "3rd grade" and "4th grade", which seem to cover the same range as "Standard", "Commercial" and "Manufacturing" though the last is a rather small category, composed of those cattle which are unfit for turning even into corned beef and which are thus processed into pet food and meat extract. This however does not affect the argument, since figures from Crees show the differential between "Prime" and "Commercial" narrowing slightly between 1971 and 1976.

The result in terms of deliveries is shown in Table 4.5, which gives the proportion of total intake in various grades for the period 1972–76; these having reportedly not changed significantly during the period.

Since commercial ranches account for some 50% of all official sales of cattle, this table makes clear that over half the sales must be of "standard" or poorer grade cattle. This provides a striking indication of the failure of the policy to generate supplies of high grade stock even from the ranch sector.

The argument over appropriate pricing strategy is made more complex by the claim that KMC's ability to pay high prices for quality animals is limited by its obligation to pay reasonable prices to pastoralists (who provide a large proportion of the lower grades of animal) and by the high costs of this trade. The problem with this argument is that it takes for granted, the bureaucratic structure and plethora of quarantines and other

7 Crees J (n.d. – has no page numbers). These figures cannot be directly compared with those from the Statistical Abstract, since they are presented for end or beginning of year (and only once every two years) rather than for the average of a year period.
controls on the marketing and movement of stock which are responsible for a large proportion of the high marketing costs.

Probably the high costs reduce the prices paid to producers in the pastoralist areas as much as or more than the operation of the "floor price" maintains them. This would tend to be the case in a normal year. In a drought year, like 1976, the floor price system would have operated to maintain prices and since this was literally a matter of life or death to the pastoralists, its value in such situations is beyond doubt. But in any case, it is not the "floor price" whose value is in doubt, but the regulations which raise the costs of marketing.

Perhaps the most contradictory aspect of this is that the high cost results in large part from the attempt to impose health and hygiene standards sufficient to allow Kenya to export beef to England and other western European countries. By 1973, it was already the case that the previous price advantage in exporting to this market had largely evaporated. The present surplusses of meat in the EEC do not make this appear a very promising market, whatever the prices offered. This relates to the other aspect of the problem; it is most unlikely that controls of the requisite stringency can be imposed in Kenya, regardless of the amount of government effort put into attempts to achieve them. Meanwhile the stringency of the requirements imposed by the western European countries is steadily increasing (this being one of the easiest and least politically controversial forms of protection to impose).

Because the costs and delays imposed by vaccination and quarantine requirements are substantial, they constitute a considerable incentive to evasion. The increase in illegal marketing to the urban areas shows quite clearly that producers and traders have been taking this line of action. The

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Table 4.5. Proportion of Deliveries in Different Grade Categories 1972-76

<table>
<thead>
<tr>
<th>Grade</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime</td>
<td>0.02</td>
</tr>
<tr>
<td>Choice</td>
<td>6.7</td>
</tr>
<tr>
<td>F.A.Q. (Pass)*</td>
<td>16.1</td>
</tr>
<tr>
<td>Standard (Pass)*</td>
<td>25.2</td>
</tr>
<tr>
<td>Commercial</td>
<td>47.6</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>3.4</td>
</tr>
</tbody>
</table>

* i.e. found not to be infected with cysticercosis (beef measles).

Source: J. Crees n.d.

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Department of Veterinary Services will not be able to prevent this, especially as its officers report lack of enthusiasm from the police in assisting them in this job. Most citizens of Kenya, as producers, traders or consumers, stand to gain by evasion (or at least see themselves as doing so) and the evasion is becoming increasingly open and recognized.

Once a set of regulations come to be ignored and flouted to the extent that is happening with livestock movement in Kenya, this itself assists in accelerating the process of break-down. Since evasion of quarantine regulations renders those regulations largely worthless for the purpose of disease control, even those who previously obeyed the law, feel themselves unjustly penalized for no good purpose. Unless the trend of 1978 turns out to be exceptional, it is likely that the existing regulations cannot be re-imposed and that the only way to achieve some form of control will be to redefine the system with more modest objectives.

A redefinition of the system is necessary for a number of reasons, apart from the over-riding one that the present system may actually be reducing the effectiveness with which transmission of disease can be controlled. If serious efforts are to be made to generate an export surplus of beef, this will require substantial increases in the prices of the top grades of animals and meat. Greater success may also result if exports are aimed at those importing countries where the health and hygiene regulations are less stringent than in western Europe. This will require reductions in the cost of marketing, but so long as KMC has a monopoly of all exports and remains (together with the LMD) the buyer of last resort for the pastoral areas, it will necessitate a reduction in marketing costs from these areas.

However, there is good reason to predict that this will not happen, that local demand will continue to outstrip the growth of production and that export surplus will continue to stagnate or decline. In this situation a radical overhaul of both the grade-price system and the system of controls is made all the more necessary. The question should be asked whether such a sophisticated grading system is necessary or operational, given the narrow differentials likely to exist. Although a local market for high-grade beef certainly exists, it is confined to a small wealthy urban minority. While it may be a great convenience for expatriates working in Kenya and for rich Kenyans to have high grade beef available at very moderate prices, it can hardly be claimed to be a major development priority. It is

It would be extremely naive to suppose that the failure to change the price structure hitherto has been merely the result of failure to notice the problem, especially in view of the number of reports which have recommended such a change. It may be rather crude to attribute this to the interests of those who make the decisions and benefit from the low price of high-grade meat, but it seems not too far from the truth.

---

9 It would be extremely naive to suppose that the failure to change the price structure hitherto has been merely the result of failure to notice the problem, especially in view of the number of reports which have recommended such a change. It may be rather crude to attribute this to the interests of those who make the decisions and benefit from the low price of high-grade meat, but it seems not too far from the truth.
Table 4.6. Household/Annual Consumption of Meat Products (Sh and kg)

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Households with:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Under 0.5 ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Over 8 ha</td>
</tr>
<tr>
<td>(Sh, per annum/family)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own Produced Beef</td>
<td>25</td>
<td>18</td>
</tr>
<tr>
<td>Own Produced Other Meat</td>
<td>95</td>
<td>76</td>
</tr>
<tr>
<td>Purchased Meat &amp; Fish</td>
<td>236</td>
<td>219</td>
</tr>
<tr>
<td>Total</td>
<td>356</td>
<td>313</td>
</tr>
<tr>
<td>Converted to kg</td>
<td>71</td>
<td>63</td>
</tr>
<tr>
<td>Per capita consumption</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

| Source: See note 11. |  

possible that if grade prices did reflect the costs of producing different grades, then the demand for top-grade beef might fall substantially.

Unfortunately, this is largely speculation at present since prices are structured in accordance with official controls. But following the freeing from control of the top two grades in 1976/77, this proposition may now be tested. In addition, a study of the "informal" beef sector would also yield very valuable information on this score.\(^{10}\)

This chapter has concentrated almost entirely on the official marketing of cattle through KMC and within this, the upper end of the trade. Yet this hardly affects the vast majority of the population who consume relatively small amounts of meat from zebu cattle marketed outside KMC or meat from sheep and goats. The reason for the bias in the discussion is because so little usable information is available on the latter type of trade. The standard figure for non-rural consumption of meat in Kenya is about 13 kg per capita per annum, but this is meaningless in view of the large disparities existing between income groups and areas. Poorer urban residents probably consume only a few kilograms of meat, most of this being from small-stock.

For small-farm rural areas, the Rural Survey of 1974\(^{11}\) provides some information on estimated consumption levels.". Table 4.6 shows mean

\(^{10}\) I know of no such study as yet.

\(^{11}\) Statistical Abstract 1977, Table 111–124. This contains no figure for average family size, but a World Bank study which cites these figures, gives a mean figure of 6.97. Unfortunately, no figure for the proportion of families in different income groups is given, though other tables make clear that there is a positive relation between holding size and family size. It would thus appear that (from these figures) there is not likely to be much difference in per capita consumption between different holding sizes (within the groups of small farms, less than 20 ha, to which these data apply), but see text. The table from which most of the data in Table 4.6 are taken is No. 117.
annual expenditure per family and the imputed value of home-produced beef and other meat. It also shows consumption by families at the low end of the farm size range (less than 0.5 ha) and at the upper end (8 to 20 ha). This is transformed into crude estimates of the total volume consumed per family by assuming a price of Sh 5 per kilo; this being an approximate figure somewhat below urban prices for the years in question. The mean consumption figure is then divided by family size for an average per capita consumption in the region of 10 kg per annum.

While the figures for purchased meat include fish and do not differentiate between types of meat, it is reasonable to assume that beef would account for no more than half of the total, thus giving an average per capita consumption of some 5 kg per annum of beef and roughly the same amount of other meats. But this approximate average figure conceals a very great variation between households and areas. Moreover, some doubt is thrown on the apparent conclusion that per capita consumption does not vary significantly with holding size (and thus family income) by the fact that a number of households appear to have incomes substantially below consumption. Since the figures are not presented on a comparable basis in the Statistical Abstract, it is not possible to estimate the size of this shortfall (which would seem to indicate over-reporting of expenditure on smaller farms).

Apart from this, it is virtually certain that the "per capita" figure is grossly misleading in that adult males probably eat several times as much meat as other family members. While this implies that meat is not a very important source of protein in the small-farming areas (excluding pastoral areas which are not included in the Rural Survey) this does not translate easily into direct conclusions for the operation of the marketing system. It is probably fair to say, however, that given the bureaucratic operations and high costs of KMC, its intervention in this area of beef marketing would be neither feasible nor productive.12

12 A number of commentators (Aldington and Wilson 1968, Heyer 1976 op. cit.) have pointed to the high costs of KMC and related them to heavy administrative overheads. One could also point to the development of sophisticated plant and equipment for the processing of meat for export, much of which seems unlikely to be used to capacity. However, lack of detailed and up to date information has prevented the presentation of any more adequate description and analysis here.
Chapter 4.3: The Marketing and Processing of Meat in Tanzania

In the period from 1954 to 1971, for which reasonably reliable data are available, the number of cattle in Tanzania grew at an average annual rate of about 2.25%. Over the same period, sales of cattle on official primary markets grew at about 1% per annum. Sales of hides indicate an increase in total offtake of only 0.2% per annum, though accepting a reasonable adjustment to this figure by Mackenzie brings the rate up to 1.3%. Even allowing for the poor quality of the data upon which these rates are based, one can say with some confidence that they indicate the absence of any rapid or dynamic growth, especially since growth rates were generally lower during the 1960’s than previously. No comparable figures have been published since 1972, but such fragmentary data as there are indicate no improvement.

Most observers are agreed that deficiencies in the marketing system are, at least in part, responsible for this slow growth in marketed production. Some, like Mackenzie, place major emphasis on herd production coefficients, especially high rates of calf mortality, and this is undoubtedly important. But Mackenzie also stresses marketing problems. In very simple terms, what these amount to is that low and controlled retail prices, combined with an expensive and inefficient system of primary marketing, have led to very low producer prices and other obstructions to the flow of cattle. Since the late 1960’s, this has been intensified by the imposition of a variety of bureaucratic controls which have driven an increasing proportion of total offtake outside the official marketing system – and to some extent outside the country. One major problem has been the variety of different governmental and other bodies in control of different parts of the marketing process, though hopefully this will improve now that all livestock and meat marketing is controlled by subsidiaries of LIDA.

Until 1948, beef was produced in Tanganyika almost entirely for domestic consumption, though there were some exports of live cattle in the early 1920’s and an abortive plan in 1936 to export 50,000 head to Italian Somaliland (presumably for use in the invasion of Ethiopia). Hides and skins were the major livestock export, composing some 6–7% of total exports, though small amounts of ghee were also exported.

1 Taking the average for 1970–72 since sales for 1971 were abnormally low: in fact, below the 1954 level.
2 See above Figure 3.6.
3 Reference found in Tanzania National Archive papers for the period.
Stock routes and markets were established in some of the major cattle areas for the purpose of supplying the towns and plantations, for which small market the supply forthcoming seems to have been adequate. Indeed, the number of cattle passing through official markets in the mid-1920's was about the same as in the mid-1960's. Sales declined during the 1930's with the drastic reductions in price which accompanied the depression. Sisal estates attempted to maintain profits by cutting both wages and rations so reducing demand for beef and thus its price, to less than one-third of the level of the mid-1920's. One cannot deduce any price response (or lack thereof) from this, since there is no information on prices outside the official markets.⁴

In 1948, Liebig's (now Brooke Bond Liebig) set up a canning plant at Kawe, north of Dar es Salaam, with a capacity of up to 100,000 cattle per annum, and a smaller plant at Arusha (20,000 capacity) to slaughter and chill beef for coastal and plantation consumption. At the same time, the colonial government instituted a series of de-stocking campaigns involving compulsory sales of stock. Africans considered this as a means to obtain cheap cattle for the factories, while colonial civil servants insisted that the existence of the factories allowed destocking campaigns without drastic price reductions. Both were probably right. The de-stocking campaigns were generally considered to have been a failure, and it is not clear whether the expansion in official marketing in the early 1950's was connected with them, though it was observed that when compulsion ceased, there was no reduction in sales. The establishment of the Tanganyika Packers canning plant increased prices, but not enough to generate large supply increases. For most of the decade, the canning plant ran well below capacity, while the Arusha plant was closed around 1960 for lack of supplies.

Table 4.7 shows how prices and deliveries to primary markets changed during this period.

From this table, it appears that total offtake and official sales both shifted upwards at the beginning of the 1950's, around the time when the Tanganyika Packers Ltd. (TPL) plant was set up, though by less than the capacity for canning. Official sales remained at about the same level until the mid-1960's, though total offtake increased significantly after 1959. The initial upward shift in price presumably contributed to increased sales, but subsequent price increases seem to have generated no further growth in

⁴ It seems reasonable to suppose that with cattle prices at 14–20/- per head, herders would have lost interest, especially as taxes were often collected at cattle markets in pastoral areas.
Table 4.7: Average Sales, Prices and Hide Exports for Five-Year-Periods

<table>
<thead>
<tr>
<th>Period</th>
<th>Primary Market Sales '000 head'</th>
<th>Hide Exports '000</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1945–49</td>
<td>212</td>
<td>62/68</td>
<td>3.0</td>
</tr>
<tr>
<td>1950–54</td>
<td>240</td>
<td>122/55</td>
<td>9474</td>
</tr>
<tr>
<td>1955–59</td>
<td>244</td>
<td>159/15</td>
<td>937</td>
</tr>
<tr>
<td>1960–64</td>
<td>233</td>
<td>180/70</td>
<td>1278</td>
</tr>
<tr>
<td>1965–67</td>
<td>245</td>
<td>191/89</td>
<td>1233</td>
</tr>
</tbody>
</table>

Sources: 1. Up to 1949, Egom (1972:21). Rest from Statistical Abstracts, Table G.8
2. Stat. Abstracts Table G.10
3. Rounded export tonage. IBRD 1961, p. 20
4. 1954 only.

supply. However, this conceals a response in terms of liveweight. During the period, TPL paid higher prices for cattle than local butchers, since the local retail price was below export parity. Up to 1959, TPL paid a flat rate per kg of liveweight to its buyers, after which a graduated rate was introduced, favouring heavier stock. From 1959 to 1962, the average liveweight of cattle purchased by TPL rose from around 200 kg to 252 kg, at which level it remained until 1967.5

During this latter period, average liveweight for all commercial sales is given as 230 kg,6 from which one can deduce that non-TPL stock would have been some 30–40 kg lighter than TPL stock and that overall liveweight of cattle sold was increasing, probably as a result of greater selectivity on the part of buyers.

The operation of primary markets was already coming under criticism at this time. During the period of compulsory sales, the Veterinary Department had exercised some supervision of the markets, and while this failed to curb malpractices,7 it did serve to maintain the physical condition

6 Meyn 1970:161. A table on page 163 shows that weights of stock for canning were higher in Tanzania than in Kenya (124.4 kg as opposed to 113.5 kg both c.d.w.), while data on page 161 shows overall average slaughter weights to have been higher in Kenya. This is entirely consistent with other information which indicates that while canning for export was the price-leading market in Tanzania, local butcheries paid higher prices in Kenya, with its more highly developed urban domestic market.
7 During the de-stocking campaigns, market-masters and/or auctioneers had to sign forms certifying that herders had sold their allotted quotas. A brisk trade in these papers developed from which some of the officials emerged as rich men by the standards of rural Tanganyika. In one area, where I did field work, a substantial proportion of the rich peasants owning tractors were ex-primary market officials, who had purchased their tractors soon after resigning.
of the markets. When this lapsed, responsibility for the markets devolved onto District Councils, although the Veterinary Department still controlled stock-routes and holding grounds. The District Councils saw cattle markets largely as a source of revenue, especially in areas where cattle sales were a large proportion of marketed produce, and this did little to encourage attendance. At the same time, they were unwilling to spend money to maintain the markets, and many fell into disrepair. A growing proportion of sales were carried on outside the markets, though "within their orbit". In spite of vehement protests from the Veterinary Department about how this led to price rings and restrictive practices, it is not clear that they had this effect. A more harmful repercussion was the closure of markets as a result of low sales and the loss of a focus for marketing. This is a factor of some importance in places so sparsely populated as the major cattle raising areas of Tanzania.

During the period up to 1967, livestock production and marketing were not major priority areas for the Tanzania government. The major priority was seen as developing export production which, in effect, meant leaving TPL to define its own purchasing policy. In 1967 and 1968, however, a number of major policy changes were made, related to the Arusha Declaration, which had significant effects on livestock marketing. In 1967, 51% of TPL was nationalized. In the same year, Dar es Salaam's ageing abattoir at Vingunguti was finally condemned and since TPL's Kawe plant had slaughtering capacity in excess of canning line needs, responsibility for providing Dar es Salaam was transferred to TPL in 1968. This was not simply a physical transfer since it also meant that TPL now had the responsibility of buying cattle for the Dar es Salaam market.

In 1968, price control was imposed on meat at the retail level, as was

8The reason for this was that in such areas, cattle markets formed the major, if temporary, concentration of population and one in which it was harder to claim that one had no money. Apart from District Council Cesses (flat-rate sales tax), cattle markets also came to be the venue for collection of TANU, NUTA, UWT and various other dues, which did nothing to endear the Party to the people of such areas who had little idea for what they were being forced to pay. In Masai, where such practices were especially prominent, and where the District Council livestock sales tax was also higher than elsewhere, this led to a noticeable decline in sales through District markets, offset by increased sales in surrounding districts and over the border in Kenya. Officials complained bitterly of the "traditionalism" which kept the Maasai from selling their cattle, seemingly unaware that it was an entirely "economically rational" response to their own excessive rapaciousness.

9That is, sales were carried on outside the markets but affected by them. Thus, it can be noted that cattle markets performed an important function even where not heavily used, simply by virtue of the advertisement of a time and place where traders and some herders could meet and do business.
done for a number of other basic food products. If data from the Statistical Abstract are to be believed, meat prices had been remarkably stable during the previous decade, increasing by only 5% over the period as a whole, in comparison with 50% for maize and 24% for the urban workers' cost of living index?" There were also some questions how useful it was to control the price of "meat-with-bone", in which form the largest proportion of meat was sold, since this could lead to a reduction in the proportion of meat in the mixture. Livestock experts agreed that producer prices were already too low to encourage improvements in productive practices and felt that price control, to the extent that it was effective, would simply accentuate already emerging problems of supplying the towns with meat."

This did happen, though not in quite the way expected. Official price data indicate that retail prices increased by 1.25% per annum, though they were supposed to be controlled at a fixed level and my recollection is that they were.¹² Producer prices, from the same source, are said to have increased more rapidly than during the previous five years, though the poor quality of the data make it impossible to specify further. The reason for this was that TPL had to bid up prices in order to keep up with expanding demand in Dar es Salaam, occasioned in part by fixed retail prices. This combined with increased activity by butchers in neighbouring countries where cattle and meat prices were higher and rising more rapidly.

With low and stable prices, the demand for meat in Dar es Salaam rose rapidly. It had probably risen before 1968, but had been unfulfilled because of the break-down of the old abattoir. Between 1968 and 1971, meat purchases in Dar es Salaam increased by 77% from 47,000 to 83,000 and would probably have risen even more rapidly had meat been continuously available.¹³ TPL bid prices up in the effort to meet this demand, subsidizing the local market out of its rapidly declining proceeds from canning. District councils, which were designated as the sole suppliers to TPL in 1969, also lost money on this.¹⁴

¹⁰ Tanzania Statistical Abstracts, Tables R.2, R.3. These price data are generally accepted as being of dubious value, but are the only data available which cover the period.
¹¹ Discussions with officials concerned with price control at the time when I was asked to write a brief memorandum on the pricing of meat.
¹² See Mackenzie 1974:147, where the price of meat is said to have been controlled and unchanging from 1963–72. The Statistical Abstract (Tables R.2, R.3) shows the retail price of "meat-with-bone" as rising by 6.5% over the period 1968–71, as compared with 8% for maize and 21% for the urban workers cost-of-living index.
¹³ Mackenzie 1973b:44. Evidence on supply problems from personal experience.
¹⁴ Previously TPL had relied on licensed private buyers.
Although some cattle crossed the borders to Uganda or Zambia, the major source of foreign demand was Kenya. Along the extensive and unpolicered border between the two countries, there are a number of production areas in Tanzania that are not far distant from urban or canning markets in Kenya. During the 1950's there had been quite substantial imports of live cattle into Tanganyika from Kenya, since European protective practices excluded Africans from the more lucrative markets and depressed prices. Now the situation was reversed. KMC at Athi River paid higher prices on a more differentiated scale; while the lowest price was 25% above the Tanzania equivalent, the highest was 50% above the top price paid in Tanzania.\textsuperscript{15} Not unnaturally this diverted the largest and best qualified animals across the border. But in addition to this, urban markets were expanding rapidly in Kenya and barriers to unofficial entry becoming less effective. Apart from the direct price effect, a differential in the rate of exchange between the Kenya and Tanzania shillings began to emerge. In part this arose because the general price level was lower in Kenya, especially for imports and manufactured goods more easily available. But it was also easier to move funds abroad from Kenya than from Tanzania which stimulated a further demand from businessmen trying to shift their wealth out of the country. An unofficial exchange developed at Nairobi long-distance bus station, at which Maasai herdsmen embarked for home after selling their stock.

More significant than changes in the producer price during this period were changes in the weight of cattle delivered to TPL for canning. This declined from about 250 kg in 1967 to 210 kg in 1973.\textsuperscript{16} Price leadership passed to the butchers and illegal export markets and with it, the pick of the stock.

In 1971, a further change in the system of beef marketing took place. District Development Corporations had been formed in many Districts between 1970 and 1972. They were initially charged with carrying on "essential" and "productive" activities, but those in charge of them had little experience in running such activities. They tended to choose trading activities for their first ventures assuming that the simplicity of operating as "middleman", together with the advantages of a designated monopoly, would allow relatively easy accumulation of surplus. This could then be used, together with continuing profits from trade, to underwrite more risky and imaginative ventures. The initial assumption was further

\textsuperscript{15} Meyn 1970:169.
\textsuperscript{16} Marketing Development Bureau 1976:71. Annual figures are not shown but the decline is referred to as "steady".
underwritten by one of the more popular items of Tanzanian political ideology; that Asian traders were making vast profits through their (much less secure) monopoly of wholesale trade and some branches of retail."

Having taken over petrol supply in a number of areas with a reasonable measure of success, a number of DDCs were encouraged to take the plunge into the murky waters of meat trading in 1972. It is worth noting at the outset the enormous difference in the two trades. Petrol was purchased from large companies, whose salesman took the initiative to visit and take orders. Delivery of the petrol was the responsibility of the company, while selling it was not a complicated business, given fixed prices and the prior existence of petrol stations or their construction by the companies. Cash changed hands only at this point, where the pump provided an automatic check on sales and receipts. In the case of meat, the DDCs had to send their inexperienced buyers (or previously independent traders) into rural markets with cash in hand to purchase from herders and other traders. They had then to arrange for transport of the stock, hold them, arrange the flow into abattoirs and butchers shops and control the cutting and sale of the meat, often performed by the former private butchers or their ex-employees.

Although meat-cutting is not particularly sophisticated in most Tanzania butcheries, it does require skill and offers opportunities for the cutter to work on his own account. The two main grades of meat sold are "meat-without-bone", also known as "steak"\(^{18}\) and "meat-with-bone". This obviously provided scope for altering the proportion of bone in the latter and thus the amount of steak which could be cut from the carcase, and also for selling a proportion of the carcase "through the back door" by mis-stating the proportions.

In the event, the results of the take-over were disastrous. Buyers disappeared with the cash or the cattle and meat cutters misappropriated considerable quantities of meat. With an already existing squeeze between retail and producer prices, the DDCs lost large amounts of money, in some cases, losing their total initial capital more than once.\(^{19}\) At the same time, meat became obtainable only with difficulty in a number of the main

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\(^{17}\) To combat this simplistic notion is not to deny that some Asian businessmen did make large profits. But it assumes away a considerable fund of skill, experience and market knowledge and in many cases, the employment of family members at low wages. The DDCs, with their rigid procedures and employment structures, better adapted to government administration than to trading, had much higher wage and other costs in addition to their lesser experience and skill at buying.

\(^{18}\) Normally "steak kawaida" (ordinary) to distinguish it from the more prestigious cuts sold in some shops and from the even more expensive "ranch beef" sold in fewer.

\(^{19}\) Mackenzie 1973b:48.
towns in the country. Data from the 1973 Statistical Abstract indicate that commercial sales for 1972 were 40% above those for 1971, but few people resident in the country at the time will find this credible. One suspects that these data reflect the overstatement of purchases by buyers which was one form by which misappropriation was concealed. This applies with still greater force to the data on prices in primary markets, which are stated to have risen by 24% in this one year.

In 1973, most of the butchers shops were handed back to private butchers, though in some cases, the DDC continued to operate the wholesale trade or at least charge a wholesale margin. The supply position in the towns improved a little, though shortages and queues continued to be quite common (as they had been in some cases before the take-over)."

In 1973, retail prices were raised by about 33%, though they still remained low in relation to staple foods. No data on official trade in meat have been publicly available since 1972, and the absence of such data from a document produced for the 1977178 price review implies that they are probably hard to find. There is no evidence that the price increase reduced demand. It may have reduced unfulfilled demand, but not to the extent that it could all be met from deliveries. Mackenzie, writing in 1973, assumed that the price elasticity of demand for meat was 0.5 and thus by implication, a 33% price increase would reduce demand by 15%. Figures for Dar es Salaam do not support any such contention.

My own opinion is that price elasticity is not a very useful concept in such a situation since, apart from ignoring unfulfilled demand, it requires that other prices and income levels be reasonably stable if it is to mean very much. Neither condition was fulfilled in Tanzania at the time. Add to that the existence and growth of a peri-urban butchery trade just outside the perimeter of the areas reserved for DDC operations, and one can see that the response of demand to fluctuations in official prices for meat means little.

20 It may be that the purchases took place, but still represent double-counting because the cattle were then re-sold by the buyers on their own account.
21 To some extent this is inevitable in markets served by small butchers without facilities for refrigerated storage. Such butchers will almost invariably try to provide too little meat each day since an unsatisfied customer is much preferred to excess meat which may rot overnight.
22 Marketing Development Bureau 1976. The only figures shown are for Dar es Salaam, where supplies continued to increase slowly to about 90,000 head until 1975, when they fell to 77,000 with an apparently similar level in 1976. From this source it also appears that another abattoir has been licensed for Dar es Salaam and that private butchers in or just outside the town, have captured more of the total trade. It is unclear from the data however, whether the reduction in supplies was the result of falling demand or, as seems more likely, disruptions in the supply chain.
Since there are no figures available to me for either hide exports or official market sales since (effectively) 1971, there is no possibility of estimating producer response to prices. Even if the data were available, one would have to take into account the effects of drought which were serious in 1971, even more acute in 1974, and affected some areas in 1975.

With the formation of the Livestock Development Authority in 1974, a subsidiary company, Tanzania Livestock Marketing Corporation (TLMC) was set up to take over all aspects of primary marketing including the purchase of immatures for ranch fattening.

As TLMC controls stock routes, holding grounds and markets, the possibility exists for a more integrated approach than hitherto. At the same time, TLMC may act as a buyer in these markets on behalf of TPL, some urban abattoirs and ranches requiring immatures. A charge of 20/- per bovine and 4/- per head of small stock is made which, although perhaps necessary for maintenance, does not seem a very good way of encouraging the use of the markets. However, if it results in their improved physical operation, the net effect may be positive.

In 1975/6, TLMC introduced a new scale of prices with differentials per kg for four weight classes (as opposed to the previous system which had operated with only two classes). But at the same time the price differential for weight was reduced.

In both 1965 and 1971, the differential between top and bottom weights was about 67%, which should be reduced by about 10% to take into account flat-rate payments for transport to Dar es Salaam. This was reduced to 15% in 1975/6 with prices for the top weight increasing by only 9% in a period when the urban workers cost-of-living index rose by over 100%. Since TLMC is the buyer for TPL, this provides another reason why the weight of cattle for canning fell during the period.

More recently, a new scale has been proposed which contains many more weight classes and a price for top weight some 2.5 times that paid for the bottom weight. It also introduces quality classes for purchases of local cattle for the first time. Prior to this, quality classes have been applied solely to ranch-bred cattle. It is not known whether this scale was accepted nor whether such wide differentials for weight are even economic for meat, much of which will be used for canning or as “meat-with-bone”. But if it leads to some more differentiated scale of prices, this would be a positive step. Complaints about low quality and weight do not make much sense when, as in the past, they are unaccompanied by any incentives to improvement.

Table 4.8: TLMC Producers Prices for Top & Bottom Weight Cattle, Shillings per kg Liveweight

<table>
<thead>
<tr>
<th>Class</th>
<th>1965</th>
<th>1971</th>
<th>197516</th>
<th>Increase (%) 1971–1975/6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top class</td>
<td>1.35</td>
<td>1.42</td>
<td>1.55</td>
<td>9</td>
</tr>
<tr>
<td>Bottom class</td>
<td>0.81</td>
<td>0.86</td>
<td>1.35</td>
<td>67</td>
</tr>
<tr>
<td>Bottom as % of Top</td>
<td>60</td>
<td>61</td>
<td>87</td>
<td>.</td>
</tr>
</tbody>
</table>

Source: Marketing Development Bureau 1976: 72–3. The weight differential also narrowed, but not to the same extent.

The question of producer price responsiveness still remains unanswered and cannot be answered with the data available. Even if one could find comparable series of prices per kg for different rural markets and relate these to deliveries, this would not tell one very much, given the major disruptions in the marketing system which have occurred during the past five years. There is strong evidence that producers seek out the markets where they get the best prices, whether or not these are legal. There is also strong evidence that the weight of stock delivered is responsive to price differentials. This does not necessarily mean that producers make any effort to produce large cattle. What it does mean is that dealers are careful to select the best stock for those markets in which the prices and differentials are most favourable. This is predictable enough, since no-one has ever doubted the price responsiveness of dealers. But since producers are often not even present at markets, having sold to dealers previously, one cannot be sure what prices they receive, let alone how they respond.

At a guess, I would say that a large proportion of the herders in Tanzania have been too busy coping with problems posed by successive droughts and villagization to be able to embark on any systematic programmes to upgrade their stock. In addition to this, it is only very recently that a system with significant differentials has been imposed (if it has).

Processing
After the closure of the Arusha plant, TPL Kawe was for many years the only abattoir in the country slaughtering for more than local requirements.

By 1972, when the Phase II Livestock Project was being discussed, it was already clear that unless the Kawe plant was overhauled substantially or replaced, its hygiene certificate for canned meat exports to the U.K. would soon be withdrawn. Provisions for this overhaul were included in the Tanzanian Phase II proposals. These included shifting the canning line to Shinyanga, retaining the slaughtering facilities at Dar es Salaam for the domestic market and for 40,000 head to be exported as chilled sides.
Also proposed were smaller chilling plants, at Mbeya (mainly for the Zambia market) and at Arusha (where the old TPL plant was to be renovated) for the tourist market in that area.

The major item in this proposal was the transfer of canning to Shinyanga, and this made a lot of sense. Up to 70% of the cattle for TPL's canning operations in Dar es Salaam come from Shinyanga and surrounding areas, which form the largest concentration of livestock in the country. The journey from producer to canning line can take up to four weeks, including trekking to the railway holding ground, waiting at either end, rail travel and trekking from Ruvu to Kawe. In the course of this, it is estimated that from 7–10% of the cattle die and that the weight loss is in the region of 20% of liveweight (that is 50 kg on a liveweight of 250 kg, and at least 20 kg c.d.w.). Apart from this, railway rates were 32/- on average in 1973, had risen to 1301- by 1976 and with further increases in the offing. Mackenzie estimated the total cost of losses and rail transport at 100/- per head representing 58% of total marketing costs in 1973 (something in the region of 25–30% of producer price). By 1976, the total cost would have been almost double this and have represented an even higher proportion of the producer price.

Apart from the very considerable direct economic advantages which would be gained from siting canning in Shinyanga, this would also make far better use of the livestock available from the area. Even in recent years, when encouragement has been given for the purchase of females, they constitute only a small proportion of stock marketed, because railing mixed mobs of cattle leads to bruising in transit. Apart from this, large numbers of cattle which are perfectly adequate for the production of corned beef, have to be rejected at present since they are judged unfit to withstand the journey. Since up to 10% of those selected die in transit, there is no reason to suppose the criteria are too stiff.

Another factor of major importance is that although the railway capacity is said to be 5,000 head per week, problems tend to emerge when throughput exceeds 4,000 per week. In 1972, the average shipment level was only slightly over 3,000 but varied seasonally with a maximum of nearly 4,200. With the planned expanded throughput, the average might be expected to exceed 4,000 but with similar seasonal peaks which, unfortunately coincide with those for major shipments of crops (especially cotton). Canned meat, by contrast, is not only storable and can be shipped during the slack season, but it is also a very much more compact product.

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than live cattle. In summary, all these arguments point to the well-known theorem from regional and transport economics, that where processing reduces the bulk of a product and makes it more easily storable and transportable, the processing should be sited (other things being equal) near to producing areas rather than markets.

Unfortunately, other things were not equal in this case. The World Bank turned down this proposal in favour of renovating the existing plant at Kawe. The reasons for this decision had to do with maintaining a steady flow of canned meat in order not to lose the market (since broken in any case), but was mainly based on the implications for the other proposed plants and the likelihood of excess capacity in slaughtering at Dar es Salaam. The proposal to renovate the Arusha plant was rejected, (reasonably enough in my opinion) on the grounds that the market probably did not justify a plant of such size while the prospects of getting supplies of high-quality ranch beef were not good. Again reasonably enough, it was judged that prospects for exports of chilled beef from Mbeya and Dar es Salaam were less good than had been supposed and the conclusion drawn from this was that Mbeya and a smaller plant at Shinyanga should slaughter and chill sides for transport to Dar es Salaam for canning. To my mind, it would have been more sensible to drop or reduce the scale of the Mbeya plant, shift the canning line to Shinyanga and accept the existence of excess capacity in Dar es Salaam unless chilled or frozen meat could be exported to the Middle East. Alternatively, some of this meat could have been railed or trucked to Arusha to provide for the tourist trade. Admittedly, this would involve some risk of spoilage from rail or truck break-down, but this would be substantially less than the present risk in shipment from Shinyanga since the Dar es Salaam/Shinyanga road is mostly unsurfaced while the road to Arusha is tarred.

Although it is impossible to know what went on in the negotiations with the World Bank, possibly the Shinyanga canning line could have been saved if the Tanzanian Government had been willing to drop its plans for the Mbeya plant and the (largely chimerical) prospects of high-priced markets for fresh or frozen meat exports. From the World Bank point of view, this seems to be an example of the triumph of short-term economic calculations over common sense. As Mackenzie has pointed out, the shift to Shinyanga (or somewhere in that area) is inevitable in the long-run and

26 See Chapter 3.2. The argument is that most such markets are rather small and unstable. In addition, with the increasing stringency of hygiene regulations, Tanzania would become heavily dependent upon the ability to maintain completely segregated "disease-free zones". There is good reason to doubt either the desirability or the feasibility of this.
there seems little point in building in further obstacles to a rational spatial organization.\textsuperscript{27}

This battle has been lost; the extensive repairs at Kawe have now been completed and the canning line is in operation again. During the process, Tanzania has ended the management and marketing agreement with Brook Bond Liebig and is now undertaking its own marketing. This was the immediate cause of the withdrawal of the hygiene certificate in early 1976, and it does seem likely that Tanzania will have to meet more stringent hygiene conditions operating independently. As of late 1976, the Tanzanians had adopted a new can design (they had lost the right to BBL trademarks) in a rather bilious shade of green. Marketing experts are agreed that, for European markets, this reduces sales significantly when compared with a predominantly red design.

\textit{The Marketing of Ranch Beef}

The markets for ranch and local beef have always been fairly strictly segregated in Tanzania, the former being automatically assumed to be of much higher quality and priced accordingly. The first state ranch at Kongwa had its own small abattoir, from which meat was sold to selected butchers in Dar es Salaam. In spite of strict limitations to "reputable" firms, the amount of "Kongwa" meat sold generally exceeded that delivered, the remainder being presumably "upgraded" selected other meat.\textsuperscript{28} In northern Tanzania, a large private ranch supplied a few town butchers and the tourist trade, and the same was probably true on a smaller scale in certain other towns. When the National Cold Chain Organization was set up, it took over the marketing of ranch beef for a time, but was then replaced by the Tanzania Livestock Marketing Cooperation (TLMC) which now coordinates all marketing in Tanzania. In reality, the situation is probably less tidy, since the ranches are dispersed around the country and some of them are far from the main urban markets. In 1974, the West Lake ranches experienced considerable difficulties in disposing of their slaughter stock, which had been developed for the Uganda urban market. Political problems and the collapse of the Uganda shilling made the prospect for regular export sales poor, but the ranches were further hampered by the necessity to refer all decisions to the head office (then of NACO) in Dar es Salaam. This resulted in lengthy delays during which time, the purchasers lost interest.\textsuperscript{29} There was no

\textsuperscript{27} Mackenzie 1974:156–7.
\textsuperscript{28} Discussion with veterinary officers concerned with meat marketing in 1968.
\textsuperscript{29} Discussions with the then manager of Missenye Ranch.
market for ranch beef in Bukoba, since the price was much higher than that of local beef. Nor was the quality evidently superior for, due to lack of markets, the ranches had had to increase stocks with a population of steadily increasing age. To my untrained eye, the stock did not look markedly different from any other cattle to be seen grazing in the area.

The market for ranch beef is largely restricted to the tourist trade and some of the richer expatriates in Tanzania, for although prices are low in comparison with European (or even Kenya) levels, they are about twice as high as those for local beef.30

The Marketing of Other Meat
So far as can be told from data on sales of skins, the total offtake of goats has declined since the 1950’s and the population appears to have remained more or less static for many years. Though the data on skins are likely to be even less reliable as an indicator of total production than for hides, there is no reason to doubt this finding. Much the same is true of sheep. Sales through official markets represent a very small proportion of the total; in 1961, this was 4 % for both sheep and goats and by 1971, the apparent figure had risen to 5 % and 6 % respectively (though it seems likely that the skin count is underestimated to a greater extent in the latter year). By comparison, cattle sales through official primary markets were 19 % of total hide exports in 1960 and 37 % in 1971, though in this case also the hide count is probably underestimated in the latter year.

Little attention has been paid to sheep and goat production or marketing. There is no important export production to focus attention and, for the most part, small stock are sold close to the areas from which they come.

Relatively little poultry meat is transported chilled or frozen. Most major towns are surrounded by a number of commercial and small scale production units, some kept by the wives of civil servants and professionals, others by fulltime commercial producers. Much the same is true of eggs. In both cases, some producers use intensive and semi-intensive methods of rearing, and rely to a large extent on purchased feedstuffs. This had led to problems since the composition of Tanzania feeds not only varies widely but sometimes includes toxic substances. There have been a number of occasions when death of poultry has resulted from this and others where it has been caused by failure to deliver feed.

30 I have not been able to find very much data on the marketing of ranch beef, perhaps because much of it is sold direct to the hotel trade. I have no experience as a consumer since local beef always seemed better value.
The problem of feeds together with problems of hygiene and the control of infectious diseases have obstructed the growth of what is otherwise by far the most dynamic of the livestock sectors.

The marketing of poultry and eggs is for the most part in private hands, though some DDCs have controlled or taken it over. Marketing channels range from delivery by truck and retail sale through large shops, to sale by producers or itinerant traders travelling on foot or bicycle.

Pig production in Tanzania is small and dispersed and the products cannot be slaughtered or processed in normal abattoirs since this would run counter to Moslem hygiene regulations and the meat trade is largely dominated by Muslims. Pig products are thus available irregularly and informally.

Postscript
Since this draft was written, the price of beef in Tanzania has been raised rather substantially (1979). I do not have precise information on the size of the price rises or whether they were in fact sufficient to raise the price of meat relative to that of other foodstuffs above the level of the 1960s. It is reported to have reduced meat consumption in Dar es Salaam substantially, though again, this awaits confirmation. The effect on production and sales has yet to be determined and will be of some interest. On the one hand, as indicated above, price response in this case is rather complex. On the other hand, it remains unclear in what proportions the increase in consumer prices will be divided between TLMC, traders and herders.

Chapter 4.4: The Marketing and Processing of Dairy Products in Kenya

The processing and urban sale of milk is controlled by one monopoly body, as in the case of beef. But while KMC is a parastatal body Kenya Cooperative Creameries (KCC) is a private cooperative, dominated by milk producers, especially large ones, which has successfully survived two attempts to nationalize it. Unlike KMC, the effectiveness of its monopoly

'See Judith Heyer, "The Marketing System" in Heyer, Maitha and Senga (eds) 1976. As was the case for beef marketing, I have found Heyer's account very useful in preparing the present chapter.
of urban sales has increased over the years. Given this fact, and the domination of KCC by producers, one would expect a rather different price structure for milk than for beef. Most accounts stress the high level of producer and consumer prices for dairy products and the negative impact of these on consumers of the products. This statement was less true of the period 1973 to 1975, when falling real producer prices combined with increased cost of production inputs contributed to a decline in production. Since then, however, milk prices have increased substantially and the previous conclusion seems justified.  

Although most of this chapter will be concerned with milk marketing through KCC, due to lack of adequate information about other sales, it must be remembered that this is only a minor proportion of total milk production. The standard estimate for the proportion of total production passing through KCC is about 25%, but as was shown in Chapter 3.3, if one accepts Rural Survey statistics for the numbers of grade cows kept on small farms and the total production from them, this proportion would have to be reduced to between 12 and 20%. The same Rural Survey statistics indicate that on average, about 38% of the milk produced by small farms (except in pastoral areas) is sold: ranging from 62% in Coast Province and 46% in Central Province, down to 29–30% in Eastern and Western Provinces. Clearly, an amount at least equivalent to that passing through KCC is sold locally by the producers.

Where a few cattle owners produce an excess above their own requirements but, in total, less than the amount demanded in the immediate locality, sales tend to be organized privately by producers or petty traders, who deliver the produce on foot or by bicycle. When the surplus over domestic requirements increases beyond what can be sold in the locality, cooperatives are set up to sell the product in small towns, where sales are not covered by KCC. When production and surplus increase beyond this point, then arrangements are made to sell the surplus to KCC factories as either fresh milk or butter fat. In neither case is the price received as high as that for local sales, thus only the surplus over local requirements is sold to KCC. Within sales to KCC, there is a marked differential between the prices paid for fresh milk and for butter fat, and this differential has increased over time. During the mid-1960’s the producer price paid for butter fat (raw milk equivalent) was about half

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2 See Heyer loc. cit. See also below. Note that this requires revision of some of the conclusions drawn in Chapter 3.3, which was written before the most recent figures were available to me.

3 Statistical Abstract 1977; Table 116.
that paid for fresh milk. By 1974 it had fallen to one-third.⁴ Not surprisingly, most producers prefer to deliver fresh milk. Normally butter fat is sold only where distance from the cooperative is great, or where there is no collection system, so that the producer finds it cheaper to process and store milk for several days between making deliveries.

KCC was started as a marketing cooperative before the Second World War, by and for large European farmers. Like all similar bodies at the time, it strictly excluded all produce from African cattle-owners; this being entirely in line with the various efforts made by European producers to prevent the ownership of grade dairy cattle by Africans.⁵ In the post-war period, purchases of butter fat from African producers were started, but it was not until the end of the decade, with Independence clearly approaching and milk production from Africans rapidly increasing, that fresh milk began to be accepted.

By the 1950's, KCC was supplying fresh milk to the major towns, and processing a seasonal surplus into butter (for export), cheese and ghee, in addition to which, some of the large farmers processed their own milk into these products.

Although Africans were allowed to send fresh milk to KCC through cooperatives from the late 1950's, and sales to KCC increased steadily, the price paid was still less than that to the large farms. This distinction was not based specifically on farm size, but KCC operated a three-price structure in which the cooperatives could only receive the lowest price. The highest price paid was for "quota" milk. The holder of a quota agreed to provide a given amount of milk throughout the year, in return for a considerably higher price to compensate for the cost of the dry-season feeding required to maintain stable production. The second grade, "contract milk", allowed a certain amount of variation in deliveries between seasons. There were no restrictions imposed on the lowest grade and so the price paid was much lower. In addition there were some areas and producers from whom KCC refused to purchase milk except in the form of butter fat.

Given the great seasonal fluctuations in milk supply between seasons in most parts of Kenya because of rainfall variation, there is a logic behind a form of pricing which aims at evening out deliveries and recompensing

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⁴ Statistical Abstract 1975, Table 82. In 1965, the price for butter fat was 7.17 shillings/kg as against 0.55 sh/litre for milk. By 1974, the butter fat price had increased only to 7.2 sh/kg, while the milk price was 0.77/litre. The conversion ratio normally given for milk to butter fat is 26 litres: 1 kg.

⁵ See Chapter 3.3 and references therein.
those producers who feed their stock with purchased feed during the dry season. This is one way to deal with seasonal variations in milk supply. An alternative strategy is to set up processing plant to utilize the seasonal surplus and develop production to the extent that the dry season or minimum production is sufficient to cover fresh milk consumption requirements. Alternatively the producer price can be seasonally adjusted to reflect variations in production costs. In the case of Kenya, however, because prices for local sales are almost always higher than for deliveries to KCC, and because local prices rise during the off-season, it is unlikely that KCC could realistically increase its prices for off-season milk to the extent that it could compete milk away from these other outlets.

KCC has built various plants to process its surplus peak season milk into evaporated milk and powder milk, both full-cream and skimmed. These were built during the mid-1960’s and in 1971 KCC was forced by Kenya Government to drop the quota system and pay a standard price for all milk delivered, regardless of the time of year. Since all prices were levelled up to the previous quota level, this substantially increased the average, especially as this was followed by another large price increase in the following year. One might have expected that milk production would expand substantially as a result but after some increase in the next two years, there followed three years of declining production, during which time the money price paid to producers remained unchanged, while the price of inputs increased considerably. It has been claimed that this reduction in output was the result of unfavourable climatic conditions, but the evidence on prices does not bear this out. As shown in Figure 4, production fell for three years after 1973, when price increases were less than the rate of increase in the prices of inputs and consumer goods. When the price increased substantially, as in 1976, this generated a rise in deliveries.

To relate changes in deliveries solely to the producer price of milk would be simplistic. As can be seen by comparing deliveries of cattle with milk deliveries, there is a clear if not consistent negative relation, indicating the influence of rainfall. In bad years, there is some tendency for deliveries of cattle to increase, because of pressures operating in the pastoral areas, while milk deliveries drop for obvious reasons. It might be thought that this relationship could more easily be deduced directly from rainfall records but this is not the case. Even if records for meteorological stations in Kenya were more complete than they are, it is extremely hard to relate weather experienced to annual rainfall figures, because of the crucial importance of timing. Crees has collected annual rainfall data for the period 1971–76 with a view to explaining the variation in milk production.
He was forced to conclude that "the acknowledged patterns of rainfall are not recognizable from the table, most particularly the 1976 drought in the south-eastern part of the country, and the table is therefore not useful in comparison with livestock production figures".6

It seems clear, however, that rainfall did affect milk deliveries in 1975 and 1976. But one would not expect a simple relation between the producer price for milk and milk deliveries, for apart from the price of inputs, the prices of alternative products and milk prices for non-KCC sales have to be considered.

There seems general agreement that prices of production inputs in the dairy sector did increase more rapidly than producer prices during this period. Oil prices rose dramatically with repercussions on the prices of oil-based inputs such as chemical fertilizers and insecticides. Although this is said to have affected small-scale producers in Central Province badly it could be expected to have had a more severe impact on large-scale producers more dependent in general upon purchased inputs.

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6 Crees n.d., no page numbers.
This view is borne out by deliveries to different KCC dairies, as shown in Figure 5. The most rapid decline in production during the period was registered in Nakuru and Eldoret, both large farm areas, where the reduction in deliveries seems to be part of a longer-term decline. The three dairies serving Central Province (Nairobi, Naivasha and Kiganjo) had a similar experience: production only declined slightly over the period. Production from the smaller dairies at Nyahururu (serving both large farms and settlement schemes) and Kericho/Sotik (small farms) continued to increase during the period as did deliveries to Kitale, serving both large farms and settlement schemes. It must be noted, however, that the figures on which this Figure is based are different from those found in the Statistical Abstract.

Table 4.9 does appear to explain part of the reason why milk production declined, for maize and coffee are alternative products for many of the smallholders who produce milk from grade cattle. High maize prices may have encouraged the replacement of fodder grass with maize, especially since non-official prices were often higher than those shown here. While it is most unlikely that any farmers planted coffee on land previously devoted to fodder crops, possibly some labour was diverted from tending cattle to weeding and harvesting coffee. But this is not a sufficient explanation for...
Table 4.9: Index of Producer Prices of Certain Crops and Milk (base 1969 = 100)

<table>
<thead>
<tr>
<th>Year</th>
<th>Coffee</th>
<th>Maize</th>
<th>Milk</th>
<th>Milk: Maize</th>
<th>Milk: Coffee</th>
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<td>100</td>
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<td>1977</td>
<td>631</td>
<td>322</td>
<td>254</td>
<td>79</td>
<td>40</td>
</tr>
<tr>
<td>1978</td>
<td>435</td>
<td>322</td>
<td>254</td>
<td>79</td>
<td>58</td>
</tr>
</tbody>
</table>

Source: Economic Surveys.

Note: It should be remembered that all of these columns are indices so that no undue significance should be attached in the final two columns to the figure 100, which is merely the price relation existing in 1969.

the change in the level of milk deliveries; if it had been, there would be no reason to expect a recovery in production in 1977–78.

Increased coffee prices would have had an impact not only through the diversion of labour but, far more importantly, through its effect on rural incomes and thus on rural non-official purchases of milk. One can guess (no more than that) that an immediate effect of the rising incomes from coffee would have been to divert sales of milk away from KCC, but in this case, the high incomes obtained from dairying would subsequently have led to increased investment and thus to increased production.

Clearly the recorded changes in milk deliveries since 1960 permit no single explanation. Rural and non-KCC consumption have undoubtedly grown rapidly, since the grade herd kept by smallholders has expanded greatly and the milk produced is not for household consumption requirements alone. Many have had to borrow money to acquire grade cattle or pay for various complementary inputs needed and must thus have increased sales at least sufficiently to cover loan repayments. All the evidence suggests that grade cattle are overwhelmingly seen as an investment in production for sale. Since producer prices are considerably higher outside KCC, the KCC receives only production surplus to local demand and, as is always the case with residual buyers, experiences considerable fluctuations in deliveries. Probably the fluctuations in deliveries which stand out plainly in Figure 5, will continue for as long as the present price relations remain unchanged.
Table 4.10 shows deliveries of raw milk to KCC and production by KCC of different dairy products from 1966, the first year in which production of skim milk is recorded (though production may have started earlier). Perhaps the most salient feature of the table is the 7.5% per annum average increase in milk drunk fresh or made into fresh cream (only a small proportion). This compares with a growth of about 2.6% per annum for deliveries. This has meant that milk available for manufacturing has declined in absolute terms over the period, while the proportion consumed fresh has grown from 40% in 1966 to around 70% for the past few years.\footnote{If anything, this computation understates the change since alternative sources give different and higher figures for raw milk deliveries in 1966–68.}

The composition of processed dairy produce has also changed over the period. Skimmed and whole milk powder, produced for the first time in 1966, are now by far the major products. Production of butter and ghee have scarcely changed since 1960 and neither has that of cheese, while production of evaporated milk seems to have risen and subsequently declined. If one looks closely at the table, it can be seen that there is some discrepancy between the assumed availability of milk for manufacturing and the volume of products actually produced. At a reasonable rate of conversion between fresh and skimmed milk and other products, the products manufactured from milk seem excessive in relation to the milk from which they were manufactured! The reason for this rather unusual finding is presumably that "recorded" milk deliveries are less than total milk deliveries by some (unrecorded) amount. This does not, however, alter the conclusion given above since, at least from 1972, consumption of fresh milk has increased while the quantum of manufactured products has not done so significantly.

In this connection, it is interesting to compare consumer prices of fresh milk with those of other common items of urban consumption. Table 4.11 attempts this comparison from 1972 to 1977, in the form of an index with 1972 as base.

Only beef increased in price less than milk, so that the general feeling that milk prices have been set too high is comparatively less true than in (say) 1970. While there does not seem to be any good reason to expect urban consumers to substitute milk for other commodities, the lower than normal price increase is probably responsible for increasing demand.

To summarize, undoubtedly there are problems connected with the marketing system for milk in Kenya, but the policy seems less misguided than policies for the marketing of beef or the dairy marketing policies of
<table>
<thead>
<tr>
<th>Year</th>
<th>Recorded Milk Deliveries (mill. l)</th>
<th>Milk &amp; cream (mill. l)</th>
<th>Butter &amp; ghee (mill. kg)</th>
<th>Cheese (mill. kg)</th>
<th>Evaporated milk (mill. kg)</th>
<th>Whole &amp; Skim milk powder (mill. kg)</th>
<th>Other (mill. kg)</th>
<th>Milk Equivalent(^1) for manufacturing (mill. l)</th>
<th>Proportion of total consumed as fresh milk &amp; cream (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966</td>
<td>196.3</td>
<td>79.1</td>
<td>4.2</td>
<td>0.4</td>
<td>–</td>
<td>0.8</td>
<td>1.2</td>
<td>107.3</td>
<td>40</td>
</tr>
<tr>
<td>1967</td>
<td>200.0</td>
<td>85.0</td>
<td>4.8</td>
<td>0.4</td>
<td>–</td>
<td>1.2</td>
<td>0.9</td>
<td>115.0</td>
<td>43</td>
</tr>
<tr>
<td>1968</td>
<td>213.6</td>
<td>87.3</td>
<td>4.5</td>
<td>0.5</td>
<td>–</td>
<td>2.3</td>
<td>0.9</td>
<td>126.4</td>
<td>41</td>
</tr>
<tr>
<td>1969</td>
<td>210.9</td>
<td>92.3</td>
<td>4.8</td>
<td>0.5</td>
<td>0.1</td>
<td>2.6</td>
<td>0.6</td>
<td>118.6</td>
<td>44</td>
</tr>
<tr>
<td>1970</td>
<td>232.0</td>
<td>103.1</td>
<td>5.5</td>
<td>0.5</td>
<td>2.7</td>
<td>4.7</td>
<td>0.3</td>
<td>128.9</td>
<td>44</td>
</tr>
<tr>
<td>1971</td>
<td>220.4</td>
<td>108.4</td>
<td>4.1</td>
<td>0.5</td>
<td>2.7</td>
<td>5.5</td>
<td>0.4</td>
<td>112.0</td>
<td>49</td>
</tr>
<tr>
<td>1972</td>
<td>268.4</td>
<td>124.6</td>
<td>4.7</td>
<td>0.7</td>
<td>4.8</td>
<td>7.0</td>
<td>0.2</td>
<td>143.8</td>
<td>46</td>
</tr>
<tr>
<td>1973</td>
<td>279.7</td>
<td>148.8</td>
<td>5.5</td>
<td>1.0</td>
<td>5.1</td>
<td>7.5</td>
<td>0.2</td>
<td>130.9</td>
<td>53</td>
</tr>
<tr>
<td>1974</td>
<td>249.8</td>
<td>160.0</td>
<td>4.4</td>
<td>0.5</td>
<td>3.2</td>
<td>5.6</td>
<td>0.1</td>
<td>89.8</td>
<td>64</td>
</tr>
<tr>
<td>1975</td>
<td>230.6</td>
<td>158.0</td>
<td>4.2</td>
<td>0.5</td>
<td>1.6</td>
<td>5.1</td>
<td>–</td>
<td>72.6</td>
<td>69</td>
</tr>
<tr>
<td>1976</td>
<td>208.7</td>
<td>150.4</td>
<td>3.1</td>
<td>0.2</td>
<td>2.1</td>
<td>4.5</td>
<td>–</td>
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<td>0.4</td>
<td>1.3</td>
<td>8.7</td>
<td>–</td>
<td>101.5</td>
<td>61</td>
</tr>
<tr>
<td>1978</td>
<td>269.8</td>
<td>185.6</td>
<td>3.9</td>
<td>0.3</td>
<td>0.5</td>
<td>7.2</td>
<td>–</td>
<td>83.8</td>
<td>69</td>
</tr>
<tr>
<td>1979</td>
<td>240.6</td>
<td>212.3</td>
<td>3.1</td>
<td>0.3</td>
<td>0.2</td>
<td>2.6</td>
<td>–</td>
<td>25.2</td>
<td>88</td>
</tr>
</tbody>
</table>

Source: Economic Surveys.

\(^1\) Computed by subtracting fresh milk and deliveries. (i.e. availability for manufacturing).
Table 4.1: Index of Consumer Prices of \textit{Milk} and Other Items (1970 = 100)

<table>
<thead>
<tr>
<th>Year</th>
<th>Milk</th>
<th>Maize Meal</th>
<th>Wheat Flour</th>
<th>Low Grade Beef</th>
<th>Sugar</th>
<th>Rice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1973</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>110</td>
<td>130</td>
<td>100</td>
</tr>
<tr>
<td>1974 (Aug.)</td>
<td>100</td>
<td>129</td>
<td>148</td>
<td>110</td>
<td>130</td>
<td>133</td>
</tr>
<tr>
<td>1975 (Feb.)</td>
<td>100</td>
<td>165</td>
<td>189</td>
<td>110</td>
<td>189</td>
<td>139</td>
</tr>
<tr>
<td>1976 (Feb.)</td>
<td>119</td>
<td>165</td>
<td>189</td>
<td>127 (July)</td>
<td>243</td>
<td>182</td>
</tr>
<tr>
<td>1977 (Feb.)</td>
<td>163</td>
<td>217*</td>
<td>199</td>
<td>142 (Apr.)</td>
<td>243</td>
<td>182</td>
</tr>
</tbody>
</table>

\textit{Source:} IBRD Economic Memorandum. Table 6.2.

* Reduced to 194 at the end of the year.

Tanzania. KCC has probably overinvested in processing plant and equipment, given the rapid increase in the demand for fresh milk and the higher returns from its production than from other dairy products. There is also no doubt that KCC has faced problems in covering costs, and has been bailed out by the government with large loans on a number of occasions. A number of cooperatives handling milk for delivery to KCC confront the sorts of problems which are common to all East African cooperatives (high fixed costs, low levels of efficiency and corruption). These are probably exacerbated by the fact that a perishable commodity like milk is harder to handle than one which is storable without refrigeration and careful attention to hygiene. On certain occasions in recent years, problems have arisen in supplying the needs of urban consumers, and there have also been complaints about the quality of the milk.

While the quantity of milk handled by KCC has not risen much during the past decade, this results primarily from the increased rural consumption and growth of trade outlets other than KCC, for the population of grade cattle has increased considerably over the same period. Since urban requirements have, by and large, been met, this seems all to the good.

Data from the Rural Survey of 1974 indicate that in the small farm areas (excluding holdings over 20 ha and the pastoral areas), about 55% of holdings had cows in milk producing about 1000 litres per annum on average per household of cow-owners; of this some 640 litres were consumed by the farm household. But recorded purchases of dairy produce and eggs (an average 46/- per annum) were much lower than for

\footnote{Statistical Abstract 1977, Table 116.}
meat, indicating (if the information is accurate) that those without their own cattle (45% of those with holdings together with almost all the landless) consumed little milk.\(^9\) This suggests that most milk is drunk by richer rural inhabitants with their own cattle and the surplus is sold to the inhabitants of smaller rural towns and villages.

Finally, mention should be made of one new policy with very important implications for dairy production, though the scheme has not yet been implemented and it is uncertain how it will be. This is the announcement, made in 1979, that the government will provide free milk in all primary schools. While this would undoubtedly benefit those children attending school, it is not at all clear how the goal can be achieved given present levels of milk consumption, nor how it can be financed.

Chapter 4.5: The Marketing and Processing of Dairy Products in Tanzania

This chapter will start with a brief outline of the current production and utilization of dairy produce in Tanzania and will explore how imports together with local produce form the consumption patterns of different groups in the society. After this, the growth of commercial marketing and processing are described, to examine why consumer demand has persistently outrun production. Two points can be made at the outset. Exports of dairy produce are negligible, and will not be considered further. Commercialization as defined here (sales through officially recognized markets and institutions) is coextensive with processing, since all this milk is at least pasteurized.

As noted in Chapter 3.4, total milk production in Tanzania is in the range of 330–500 mn litres per annum.\(^1\) About 93% of this comes from the "traditional herd" that is, from unimproved zebu cows. Of this, it is generally assumed that about 50% is needed for calves, with most of the

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\(^9\) Loc.cit., Table 117.

\(^1\) See 3.4. For clarification, kg and litres will be used throughout this chapter as if they were interchangeable. In fact one kg of liquid milk is not precisely the same as one litre; one litre of reconstituted milk weighs 1.03 kg. However, given that most of the data presented here are unlikely to be accurate with a less than 10% margin of error, this is hardly significant in most cases. Similarly kg (litres) per day can be converted to or from an annual basis at rates which vary between 365:1 and 300:1. I have used the former for production (on the assumption that cows do not work a six-day week) but 300 for dairies, since this seems to be normal practice.
rest being consumed by the herding family or traded locally. Milk is most often consumed fermented (mtindi). This yoghurt-like ferment is preferred for drinking straight or mixing with grains in most parts of the country. Given the lack of refrigeration or facilities for clean (let alone sterile) processing of raw milk, souring after a few hours is inevitable and a controlled ferment has much to recommend it. Apart from improving the digestible nutrient content, the increase in acidity has some anti-bacterial effect. In particular, it is said to reduce the incidence of TB.2

Only in a few areas does the zebu herd produce any substantial surplus over local requirements, though this could be increased if there was any possibility of cheap and regular marketing. For example, a small group of herders in Karagwe District used to produce a surplus of some few hundred litres at least up to 1975. This was transported to Bukoba over 100 miles away as one of the farmers had other transport business with the town. It was always fermented on arrival and sold as such, often also producing small amounts of butter because of the poor state of the roads. There can be little doubt that many times this amount could have been produced had there existed regular markets at the going price.3

The main surplus producing area is Mara Region, where a herd estimated at between 750 and 830,000 head produces a surplus over calf needs of about 60,000 kg/day.4 It is further estimated that some 40,000 kg of this are consumed locally, leaving 20,000 kg for commercial deliveries. The area currently has processing plant with the capacity to handle 85,000 kg/day, and, not surprisingly, there has been some trouble in getting enough milk to process. Deliveries in 1977 amounted to some 26,000 kg/day; the weather that year was more than usually favourable, but there is also reason to believe that high producer prices drew off some milk previously consumed domestically.5 Yet this allowed no more than 30 % utilization of processing capacity. During the 1950’s, it is said that the equivalent of 30,000 kg/day were delivered to the cooperative, in the form

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2 Zalla n.d. (but 1972) p. 7. See also quotation below.
3 Markets did exist but were not regular because of the lack of any reliable collection and transport system. See also reference below to a proposed NCCO pasteurization plant.
4 Study performed by a team from Texas A & M University, cited at second hand since original not seen.
5 Marketing Development Bureau 1976:87, where the argument is mentioned as having been used to press for lower producer prices in Mara, and rejected on the grounds that it undervalued peasant labour. My argument is rather that one must doubt the worth of such plant (see also below). A more recent draft government report makes the point about deliveries cutting into domestic use rather more strongly on the basis of the Texas A & M study which was not available to MDB.
of ghee or soured cream; if accurate, this would imply a considerable decline in deliveries since production for the processing plant never exceeded some 16,000 kg/day before 1977.

There are a number of possible reasons for this decline. Probably the most important factor is that, in the past, the separators used to return the skim milk to the producers. This was probably not thrown away, as many have assumed, for it is hard to believe that 30,000 kg/day was wasted, especially because when converted into mtindi, the difference in taste and texture between full and skim milk is much reduced. Another factor may be that the human population has grown faster than the herds or milk production. Finally, as the processing plants have faced problems in setting up collection systems (far more difficult for fresh milk than for sour cream), they have not extended their network to all producing areas, in addition to which, prices were not attractive until 1975/6.

The implication that any further diversion of milk to processing plants is likely to be at the expense of local consumption is cause for concern. When the plants were set up there was much talk about improving nutrition. But none of the sources consulted even mention increased productivity and it is only very recently that a small A.I. programme has been set up in the area.

Apart from Mara, Tabora is the only other area where unimproved zebu cattle produce a surplus for official collection and processing. A small factory has been producing ghee and cheese for many years.

The grade herd in Tanzania is currently estimated at between 30 and 45,000 head and its milk production at between 23 and 25,000 litres. Well over half the herd is owned by small holders in Kilimanjaro and Arusha (Mount Meru slopes). Apart from a very small amount of milk sold for pasteurization in Arusha, the overwhelming bulk of the output is home-consumed or sold locally for direct consumption. Demand for milk on the two mountains is considerably greater than the supply in spite of local prices which are almost always higher than the producer price for pasteurization and which rises in the dry season to over twice its level. Thus there appears to be no immediate prospect of increasing supplies for processing plants from this source.' In addition, the terrain makes

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6 See 3.4. The precise amount produced is not of great importance to the present argument, since very little of the peasant production comes onto official markets; or is likely to in the near future.

7 Zalla, in 1974, reported prices between Sh 1.00 and 4.00 per litre, the latter applying to the dry-season. These have been restated in more recent sources, although it seems highly likely that with inflation, the whole range would have moved upward. It is most unlikely that prices would ever be found below the producer price at the Arusha Dairy (currently 1.80–2.00 per litre).
extremely difficult the setting-up of an effective and regular collection system. This is true of most areas where grade cattle are kept by smallholders, although this has not prevented the National Cold Chain Organization from planning to set up small-scale pasteurization plants.

Large farms supply most of the raw milk delivered to pasteurization plants in Dar es Salaam and Arusha (and Tanga when open), but this represents a small and declining proportion of total throughput. Many, if not the most, of the state and parastatal dairy farms are still in an early phase of development and their levels of yield and production are commonly below expectation. Apart from this, many existing parastatal dairy farms are attached to institutions like prisons or national service camps with production geared largely, if not solely, to institutional demand.

Thus the largest proportion of milk delivered to official outlets for pasteurization and further processing, comes from the unimproved zebu herd of Mara and to a small extent from Tabora. This is shown for the past four years in Table 4.12.

1974 was the first full year when milk was collected for the Mara processing plants (I do not have data on previous collections of sour cream and ghee). The pattern of deliveries shows a fairly normal, though not very rapid, growth in deliveries with the expansion of the collection system and increased producer prices. The large farms have clearly declined. The up-turn in 1977 may indicate a new trend but seems more likely to derive from good weather conditions.

Thus, while deliveries to processing factories have increased from 14% to 30% of (one shift) capacity, deliveries to pasteurization plants have declined from about 29% to a low of 10% in 1976, though increasing marginally to 14% in 1977. In view of this it is surprising, at first sight, to find plans in hand, or already under way, with the aim of increasing pasteurization capacity to almost double the present level. The reason for

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8 See above 3.4.
9 Others, like research stations and certain locally operated state farms, supply milk, (usually at heavily subsidized prices) to civil servants (and a few others) who are fortunate enough to get on the delivery list. In the only area of which I have first hand experience, these were all senior civil servants. Similarly Mission and Cooperative farms tend to favour their own members, while in Bukoba, the one European producer/trader tended to favour those whose incomes were sufficient to make regular orders. Those who could not afford to make daily orders for milk found it very much more difficult to get supplies.

**Figures for 1970-73 from ISCDD 1975:42. For subsequent years from a draft Government of Tanzania Report of 1978. From overlap in 1974, the figures appear to be on the same basis.**
Table 4.12: Raw Milk Deliveries to Processing Plants in Tanzania 1974-7 (million kg per annum)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Large Farms, for Pasteurization</th>
<th>Zebu cattle for processing</th>
<th>Total</th>
<th>Zebu as % of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>7.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>6.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>6.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>5.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>4.6</td>
<td>5.1</td>
<td>9.7</td>
<td>53</td>
</tr>
<tr>
<td>1975</td>
<td>3.1</td>
<td>5.6</td>
<td>8.8</td>
<td>64</td>
</tr>
<tr>
<td>1976</td>
<td>2.9</td>
<td>6.3</td>
<td>9.2</td>
<td>68</td>
</tr>
<tr>
<td>1977</td>
<td>4.0</td>
<td>9.8</td>
<td>13.9</td>
<td>71</td>
</tr>
</tbody>
</table>

Source: See note 10.
Totals do not add due to severe rounding.

* Converted from kg/day at 365:1. This may exaggerate the total, which may have been derived in the first place by conversion from annual data at a lower rate. This does not affect the proportions.

This is that, while throughput of local milk for pasteurization has declined steadily, the deficit has been made up by the increased reconstitution of imported skim milk powder (SMP) and butter oil (BO). In Dar es Salaam the capacity for mixing and packaging is now almost fully utilized.

This leads on to the topic of import policy. Tanzania has been a net importer of dairy produce since before Independence and these imports have grown steadily in money terms, by about 10% per annum. Indeed the rate of growth would have been more rapid in recent years, but for the importation of SMP and BO under food aid agreements, under grant or heavily subsidized terms. According to plans, imports of these two commodities from the World Food Programme (WFP) and EEC, would have cost over Sh 35 mn at current market prices, instead of which those from WFP were free and those from EEC cost only the transport from Europe. While the value of imports has steadily increased, the composition has changed considerably. At Independence, and until the early 1970’s, the main imported commodities were items for direct consumption; the most important by volume being tinned milk, baby food and some powder milk for home mixing. With the advent of the pasteurization plants, these have been replaced by SMP and BO for reconstitution. In recent years, there have been controls placed on total imports of dairy produce, which

11 Marketing Development Bureau 1976: p. 88. At current prices, total imports were worth Sh 18.7 mn in 1961 and 70.8 mn in 1975.
have operated largely by allowing a certain amount over and above “requirements” for reconstitution.

To summarize, total milk production in Tanzania is about 330–500 mn litres per annum, of which about half is consumed by humans. Of this 165–250 mn litres, some 14 mn litres (or between 6 and 8 %) are delivered to pasteurization and processing factories. About 70 % of this amount goes to processing plants in Mara Region, where it is processed into skim milk powder and ghee. "Fresh" milk for predominantly urban consumption is overwhelmingly (85 %) composed of reconstituted imported SMP and BO which contribute some 27–28 mn litres fresh milk equivalent out of a total of 33.3 mn litres (1977). In addition to this, other dairy imports come to about 23 mn litres fresh milk equivalent. This "commercialized" dairy production, both local and imported, accounts for about 15–20 % of total domestic production or 30–40 % of the half consumed by humans.

In spite of the steady increase in imports, available data indicate that consumption per capita is declining and that it will probably continue to decline until 1981, even though current plans are to increase production. A large number of different estimates exist for per capita milk consumption, few of which are mutually consistent. Among the more generally agreed orders of magnitude is that rural consumption amounts to the equivalent of some 22 litres per capita per annum, while urban consumption is in the region of 50–60 litres p.c.p.a. This, it may be noted, means that the proportion of rural milk fed to calves must be substantially less than the 50 % assumed elsewhere, since if that figure was true, then rural consumption would be reduced to 10–15 kg p.c.p.a.. A recent estimate indicates that even if current plans are implemented and reach their targets, then rural consumption in 1981 will fall from 22.5 to 21.5 kg p.c.p.a., while urban consumption will also fall from 60 to 57.6 kg p.c.p.a. One can disagree about the absolute levels, but the arguments for the reduction seem sound, at least so far as the rural areas are concerned. Local production is not expected to rise as rapidly as demand and while reconstitution will increase in line with large-scale dairy expansion, other

12 One may note the factors likely to have biassed these two estimates in opposite directions. The first tends to support the generally held opinion that productivity in the "traditional herd" is low and that it does not provide a worthwhile basis for development, even though it produces over 90 % of all milk in the country. But acceptance of this when assessing rural milk consumption would lead to the appearance of levels much lower than have been accepted for many years. This is by no means the only example of inconsistencies in the data. Another, noted previously, concerns the different rates of calf mortality used for assessing beef and dairy production, although both refer to the same herd.
dairy imports will be controlled. Since they are already controlled to the extent that unfulfilled demand exists, and since the system of allocation strongly favours the urban areas (which will undoubtedly continue), a fall in rural consumption can be expected. Whether efforts to control imports will succeed to the extent that urban consumption demand remains unfulfilled is another matter.

But the urban-rural division is not the only important one. In the first place, the range of per capita consumption between different rural areas is considerable; according to one estimate from over 80 kg p.c.p.a. in Arusha down to less than 1 kg p.c.p.a. in Mtwara. In general, those regions in the north and west of the country where the major proportion of the national herd is kept, consume upwards of 30 kg p.c.p.a. Coastal and southern regions consume less than 10 kg p.c.p.a. Variation between urban areas is also substantial with Moshi and Arusha consuming over 100 litres p.c.p.a. and most other major towns, in the region of 25–30 kg p.c.p.a.

Even more important is the variation with respect to income, though this is harder to estimate. Data from the 1969 Household Budget Survey provide no data on the quantities of dairy products consumed, because of the difficulties involved in reducing different products to any reasonable estimate of fresh milk equivalent. Data on the consumption of meat and dairy products, excluding butter, showed that for the mainland as a whole, 50% of the population with family incomes below 1000/- per annum consumed only 9% of all livestock products by value; whereas the 7.6% of households with highest household incomes consumed fully 63% of all livestock products. While this does not distinguish between meat and dairy produce, the distributions do not seem to be significantly different. As will be shown below, there seems little doubt that present policies with regard to production and imports are likely to accentuate this tendency.

Before proceeding to this discussion, it is worth considering briefly how the present pattern emerged and how the development of marketing and processing have influenced production.

As indicated in Chapter 3.4, dairy production was not an area of major emphasis during the colonial period and the keeping of grade cattle by peasant farmers was actively discouraged. The bulk of milk sold even in the urban areas came from surrounding herds of unimproved zebu cattle. But little if any of this trade ever entered the statistical compilations, as the milk was sold by producers and small traders on foot or bicycle and usually in the form of fermented milk for African consumption. Some of

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the larger towns had dairies producing for European and Asian consumption, which relied on production from settler farms in the vicinity. Express Dairies in Dar es Salaam was larger than the others. This plant strained, boiled and bottled milk from commercial producers in the area. Dairies in Moshi, Arusha and Iringa operated on a smaller scale.

With the completion of a link railway in 1961, pasteurized milk was imported from Kenya in tetrapaks, but the supply was subject to delays and breakdowns and the milk often arrived sour.\(^14\) In 1968, Kenya started exporting UHT milk to Tanzania, but by then, the decision had been made to start local pasteurization. This decision was taken on grounds of "hygiene". Many African civil servants and the expatriates who advised them considered milk from Express Dairies in Dar es Salaam to be "dirty", though whether this was based on any evidence more firm than the standard East African racialism which assumes that any food processed by Asians will be less hygienic than one which derives from Europe or North America, I do not know. Perhaps more significantly, the product was less convenient for use in tea or for drinking fresh since the boiling left a skin. At the same time supplies of pasteurized milk would get rid of the various milk vendors who sold small amounts of fermented milk from door to door. These were considered to be a major health hazard, though a number of local veterinary experts doubted this. Since the point is important, it is worth quoting some comments by Zalla in full.

He says:

It is widely recognized that unpasteurized milk can be a carrier of tuberculosis, brucellosis and other milk-borne diseases. Other pathogenic bacteria introduced after the milk has been drawn, find fresh milk an excellent medium. It is less widely recognized that cattle in Tanzania are generally infected with the avian and bovine strains of T.B. rather than the human type (reference). It is also seldom recognized that very few cases of bovine T.B. in humans are found in Tanzania. Again, it is seldom recognized that a large part of milk consumed in rural areas in Tanzania (and here one can add milk sold by small vendors in urban areas – PR) is consumed as fermented rather than as fresh milk.

There is a large body of evidence that the process of fermentation in milk, not only restricts the growth of pathogenic organisms, but actually destroys them as the lactic acid content of the milk increases. Although pathogenic organisms can still exist in fermented milk, their numbers and dangers are severely restricted by the process of fermentation. A crucial variable in this respect is the length of time milk is allowed to ferment before it is consumed.\(^15\)

\(^{14}\) I am not sure when this trade started. It was certainly in operation by 1967 when I arrived in Tanzania.

\(^{15}\) Zalla n.d. (1972) p. 7. In support of this contention, Zalla (himself an economist) cites various expert sources in the fields of milk processing and nutrition.
This point must be emphasized since it is commonly assumed in Tanzania that fermented milk is "sour" and thus unhygienic. In fact, it would appear that the population most at risk are those who purchase pasteurized milk and allow it to sour slightly out of a preference for fermented milk. They are doubly unfortunate in that pasteurized tetrapak milk produces a ferment of significantly inferior taste.\(^{16}\)

Dairy production from large-scale farms was already stagnating during the first half of the 1960's in both Dar es Salaam and the northern area, but declined more rapidly after the setting-up of pasteurization plants. The reason for this is not hard to find. Pasteurization (and packing in tetrapaks or plastic bags) is a far more expensive process than straining and boiling (or simply straining on the assumption that consumers would boil it for themselves). With the opening of Coastal Dairies Ltd. (C.D.L.) in Dar es Salaam, the producer price was reduced to less than half the previous level in order not to increase the price to the consumer. The effect was entirely predictable. It had been assumed that by making deliveries to CDL compulsory, milk currently traded unofficially would be added to deliveries to Express Dairies so that some 50% of throughput would come from local production. Since most of the dairy farmers were Asians, it was also assumed that they were making enormous profits. Apparently it was not foreseen that squeezing prices would merely drive most of the farms out of business, though this likelihood was certainly mentioned at the time. Table 4.13 indicates the position.

There is no reason to suppose that having got back to the pre-1969 producer price, production is likely to increase. Costs of production have risen by well over 100% in the intervening period. By 1977, the dairy sector was 95% dependent on reconstituted milk and the position seems unlikely to change much. New state and parastatal farms are to be developed, but this will be offset by elimination of the few remaining private producers. Unless the parastatal producers receive direct subsidies, it is not clear how they will be able to produce at this price level economically. When the 1976 price was set, a proposal suggested that it should be reviewed within six months because of inflation. However, it was still in force as of early 1978. Of course the question must be asked whether there is much point in even trying to generate local production in an area like Dar es Salaam where costs are so high. These prices are, after all, substantially higher (at least for the past few years) than those paid to producers in Kenya. Given that the hygiene factor does not seem to be

\(^{16}\) My own opinion, but corroborated by all of the (admittedly non-random sample of) Tanzanians with whom I have discussed the matter.
Table 4.13: *Producer Prices* and *Deliveries of Fresh Milk to CDL*

<table>
<thead>
<tr>
<th>Year</th>
<th>Producer Price (Shillings/lkg)</th>
<th>Raw Milk Deliveries ('000 kg/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967/8</td>
<td>1.84–2.19*</td>
<td>..</td>
</tr>
<tr>
<td>1969</td>
<td>0.94</td>
<td>..</td>
</tr>
<tr>
<td>1970</td>
<td>0.94</td>
<td>11.9**</td>
</tr>
<tr>
<td>1971</td>
<td>0.94</td>
<td>10.7**</td>
</tr>
<tr>
<td>1972</td>
<td>0.94</td>
<td>9.1**</td>
</tr>
<tr>
<td>1973</td>
<td>0.94</td>
<td>7.3**</td>
</tr>
<tr>
<td>1974</td>
<td>0.94–1.14***</td>
<td>5.4</td>
</tr>
<tr>
<td>1975</td>
<td>1.14–1.70***</td>
<td>3.0</td>
</tr>
<tr>
<td>1976</td>
<td>1.80–2.00***</td>
<td>2.3</td>
</tr>
<tr>
<td>1977</td>
<td>2.00</td>
<td>2.6</td>
</tr>
</tbody>
</table>


* Range of free-market prices
** Converted from annual data at 300 days/year
*** Prices increased during course of year.

either important or positive, the best policy would probably be to run CDIL entirely as a reconstitution plant, setting the price on the basis of costs of importing SMP and BO from the cheapest source possible. Then it would be possible to allow local producers to sell their milk as and where they liked. Supposing CDIL was capable of meeting the demand for reconstituted milk, this would limit the consumer price to within the general region of that price and allow the local dairy farmers to produce economically because of much lower processing costs. One probable source of fresh milk in future would be the substantial number of agricultural holdings opened up in recent years in the vicinity of Dar es Salaam by civil servants and their families. Given some improvement in the supply of veterinary services, a modest A.I. programme and some improvement in the supply of feedstuffs," one could predict the development of a modest but significant production from this source as well as from local herders.

The first pasteurization plant set up in Tanzania was the Northern Dairies plant in Arusha. This had previously been the most important area of production by large farms and it was hoped to tap both this source and smallholder production on Kilimanjaro and Meru Mountains. In the event, the prices offered were insufficient to attract the smallholders and no extensive collection system was set up, so the dairy has relied on large

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17 See Chapter 3.6 on Inputs and Feedstuffs.
farms. Increasingly these have been parastatals as the private farms have been taken over or gone out of business. Deliveries have declined over the past few years from about 11,500 kg/day in 1970–4 to about 6,000 in 1974–6, and to 8,400 in 1977. The prospects for an increase in production are rather better here as prices are now set equally all over the country and costs of production are lower in this area, due to the more favourable climate and soil fertility. This is also the area in which a number of parastatal farms will be set up and/or developed under the IDA Phase I Dairy Programme and other programmes. The investment programmes of these farms are largely unrelated to prices and markets, though one can predict that if they find difficulties in producing economically, this will lead to more effective pressure than hitherto for increasing the producer and retail prices of milk.18

In 1975, these two pasteurization plants, were taken over by Tanzania Dairies Ltd., itself a subsidiary of LIDA. There were plans for a new large dairy in Tanga, which should be in operation by now and for the expansion of a smaller pasteurization plant, previously operated by the National Cold Chain Operation (NCCO) in Mbeya.

I have no information on the operation of the plant in Mbeya, but it seems to have been the only project implemented out of a "rash" of "small-scale" pasteurization plants planned by NCCO. The word "rash" as indicating a symptom of disease, is used advisedly. There can be little doubt that these would have had the same negative effects on production at a smaller scale, as the larger plants in Dar es Salaam and Arusha. One plant was planned for Bukoba, in West Lake Region. This town was previously supplied by two small-scale dairies which strained and boiled the produce of a few rich peasants in the vicinity of the town and imported, on a somewhat irregular basis, fermented milk from Karagwe located some 100 miles away. The latter was only economic because the farmer who brought the milk to town, stored it until he had sufficient other produce to justify bringing a 5-ton truck to Bukoba. In addition to this small supply, the local research station, a Catholic Seminary, a Farmers Training Centre, one rundown state farm and ujamaa villages, between them produced a few hundred litres per day. The total was estimated to be at most, 1300 litres. Assuming that the plant could draw in milk from peasant producers to the south of Bukoba and from Karagwe (daily by

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18 Since both dairies and dairy farms are subsidiaries of the same overall organization (the Livestock Development Authority of Tanzania – LIDA), one can assume at least some level of coordination, once the dairy farms emerged from the "development" stage, to prevent the payment of too great subsidies.
landrover), the plant planned to pasteurize 1500 litres per day. This would have cost some Sh. 1.7 mn in capital investment and employed personnel at a cost of almost 100,000/- per annum. The price offered to producers would have been about half the existing rate, and conversations with local private producers elicited the information that they would sell or slaughter their grade cattle if the scheme was implemented. In the end, the decision was taken not to invest in this ridiculous machinery salesman's pipe-dream, though not before several months' work had been done and at least one lengthy report written.

By far the largest milk-processing complex in Tanzania is in Mara Region. An old ghee factory at Musoma has been expanded and sophisticated equipment has been installed for pasteurization, and the production of UHT "long-life" milk, butter, cream and cheese. The plant, built under Danish aid (as were both the Dar es Salaam and Arusha pasteurization plants) has a capacity of 40,000 litres per day of raw milk. At the same time, another plant was built at Utegi in the northern part of Mara Region, to produce skim milk powder and ghee. The capacity of this plant is 45–50,000 litres/day. As noted already, studies of production in the area have estimated the surplus over calf and local human requirements to be no more than 20,000 litres/day and one may well wonder why plants with a total capacity of 85–90,000 litres/day have been built. During the time when the feasibility of the two plants was being assessed, an economist from the University of Dar es Salaam made a similar prediction, based on the findings of a preliminary field survey. The only effect of this report was that the author's clearance to perform research in the area was withdrawn, and the investment proceeded.

Currently the Musoma plant runs at about 30 % of (one-shift) capacity; its major products being UHT milk and butter, and a small output of cheese. Butter represents slightly under half the total production; a commodity whose market is perhaps the most restricted to higher income groups of all dairy products, except fresh cream. Another 30 % of the output is UHT milk, which also supplies the higher income groups as it is considerably more expensive than fresh or tinned milk. In short, the production of this factory is almost solely aimed at the highest income markets, and if this is achieved at the expense of local consumption, as has been proposed, then the nutritional effects are quite unambiguously negative. The foreign exchange costs of operating a plant well below capacity are also probably higher than those of importing parts of the

19 A misprint in one of the tables refers to staffing as "Manpowder". Perhaps by reconstituting some of this it would be possible to achieve capacity throughput!
various "butter mountains" around the world at concessionary terms. The plant at Utegi currently runs at about 22% of capacity and separates the intake into ghee and dried skim milk powder. Had the Musoma plant not been built, then it might have made sense to install an outlet for a seasonal surplus of milk. This might even have justified installing 45,000 litres/day capacity since it would be used only during the surplus season. But to argue this point requires consideration of a number of other factors including the opportunity costs (in economic and nutritional terms) of the skim milk previously returned to the producers by the ghee factory and now made into SMP. Apart from this, SMP production is usually a final option for seasonal surpluses which cannot be disposed of otherwise and is normally only economic with very low production costs or if a proportion can be borne by fresh milk sales (as in Kenya). In any case, there is no possible economic justification for two plants in this one area.

In summary, it can be said that large-scale milk processing has had a generally negative effect in Tanzania both in financial terms and also due to its impact on levels of local production. The Tanzania Government seems to have listened with an excessively sympathetic ear to the proposals of foreign machinery salesmen. For the future, there does not seem much likelihood of further investment in processing for butter, ghee or skim milk powder, though Tanzania is stuck with the present plants.20 For Mara Region, the clear priority is a carefully worked out programme for upgrading and raising productivity of the existing herd, based on studies of the herding system, rather than some "turnkey" form of production imported from abroad.21

Further investment in plant for pasteurization can unfortunately be predicted. It is worth repeating the main points of my argument in this respect. The main effect of pasteurization has been to reduce the local supply of fresh milk to urban areas. The impact on hygiene is probably only marginally positive, given the fact that most people drink milk fermented. Thus pasteurization is not any great convenience to the mass of the population, especially when many use for their "maziwa ya chai" (tea milk) evaporated or condensed tinned milk. It is true that a large number of urban workers purchase and drink pasteurized milk from kiosks in Dar es Salaam, showing a preference for the high-fat "maziwa halisi", made

20 It would be unduly optimistic to expect that either might be closed down.
21 Although this term is usually applied to industrial plant (such as most of the dairy processing plants discussed above), its application to large-scale dairy farming does not seem too fanciful when many projects are based on imported methods which have never been tried in Tanzania and do not relate very clearly to its needs.
from local raw milk. But the siting of these kiosks (mostly where adult males can purchase milk for lunch or snacks) indicates how little of this goes to the women and children who should be given priority were there any serious commitment to improved nutrition.

The policy of substituting local production of reconstituted milk (from imported ingredients) and UHT milk, for previous imports of canned milk seems to have negative distributional effects both as between urban and rural areas and between income groups. UHT and pasteurized milk are more expensive than canned milk, less storable, and a smaller quantity (than the canned milk imported formerly) gets to the rural area. As indicated above, pasteurized milk tastes worse than raw milk when soured, while UHT becomes virtually undrinkable due to a bitter metallic taste.

It should be mentioned that the major cost incurred in pasteurization is not the process itself but the packaging, especially in tetrapaks. In very broad outline, a preferable policy for milk collection and processing for smaller urban centres can be proposed. This alternative strategy would be based primarily on production by peasants and villages within a reasonable radius of the town in question.

The two main aspects of the development would be a low-cost collection system, based on a circular route with milk collection points along it. Where possible, the need for refrigeration should be avoided. Instead, some form of evaporation cooling, combined with regular collection early enough in the morning to prevent spoilage could be established. The processing would consist of either simple straining and boiling or straining plus batch pasteurization, after which the milk would be dispensed to buyers in their own containers. This process could be simplified if prospective buyers bought standardized cans of a design which facilitated easy washing (and a sink was provided in the dairy at which this could be done). Since many consumers would probably prefer to buy fermented milk, it would be possible to test the milk on arrival for bacterial count, boil that which failed the test and then ferment it in controlled conditions to produce the required taste and hygienic standards. Even more simply, it could just be fermented for a period sufficient to ensure a high enough lactic acid content to reduce the bacterial count to an acceptable level. This could provide milk at reasonable cost to urban dwellers of a broader income range than at present, while offering high enough prices to producers to stimulate increased production. Such a programme would be a logical accompaniment to a change of emphasis in the productive sphere from large farms to an expanded provision of A.I. for peasant producers and villages.
SECTION 5: SUMMARY AND CONCLUSIONS

Introduction
Since a number of specific conclusions are already implicit in material presented in the book and since I have not hesitated to express my personal opinions throughout, the present summary will be brief. I shall be concerned primarily to raise questions relating to what I think are some of the more important policy issues.

The Purpose of Livestock Development
The claim that the purpose of developing a livestock sector is simply to increase economic production where a potential exists evades most of the important questions. This would imply basing priorities on relative rates of return. Apart from the virtual impossibility of deriving true social rates of return, given the plethora of cross-subsidies and opportunity costs to be considered, any result achieved would still be largely arbitrary since the relative prices on which it would be based already reflect governmental choices about the allocation of resources. There is unfortunately no reason to assume that they reflect consistent or well-worked-out priorities.

It is therefore necessary to consider the various purposes for which the livestock sectors might be developed in themselves, rather than as reflected in market price relations.

The major aims generally presented are: export production, improvement of the nutritional standards of the population and improvement of incomes and material living standards of the livestock keepers of East Africa.

Export Production
It is frequently stated that the prospects for exporting beef from East Africa are good. In my opinion, this view needs severe qualification. The most favourable markets for beef exports, in price terms, are those for chilled or frozen sides and cuts exported either by sea or air to the rich countries (mainly Western Europe) or the high-income urban markets of other developing countries. The rich countries impose increasingly stringent controls on health and hygiene. Freedom from contact with Foot and Mouth Disease is probably the most important control, though
regulations also exist relating to pesticide residues, diseases transmissible to man or livestock in the importing country, and diseases which produce toxins in the meat."

Given the current policies of protection in the EEC and the surplusses generated as a result, European producers will probably continue to press for a limitation of meat imports. Increasingly stringent health and hygiene regulations are one effective means of achieving this limitation. Outside Western Europe, the controls are less stringent (though they seem to be becoming more so) and there is probably still scope, at least in the short run, for some expansion of demand. Even so, the standards imposed by these markets are usually high enough to require the imposition of internal veterinary controls and quarantines in the producer country. To the extent that these exceed what would be necessary for supplying meat to the domestic market, they represent costs and not simply costs paid by governments which impose them. Quarantines involve costs to producers from delays and thus loss of weight and condition of the stock. Efforts to evade the quarantines then impose further costs on other herders through disease transmission.

The export of chilled or frozen beef to Western Europe requires the setting-up of disease-free zones, completely segregated from areas where the remaining livestock are kept by an effective system of quarantines. These zones must either be situated away from normal paths of stock movement or impose complete barriers to movement. The former is only possible where the produce can be moved outside the country without affecting the movement pattern of the other stock. This degree of segregation seems unlikely to be achieved, though the border ranches between Tanzania and Zambia might be an exception in this respect.

The other side of the coin is that the supply of beef for export is not expanding in either country. In Kenya, local demand has far outstripped the increase in local deliveries of cattle for slaughter and this has led to a substantial reduction in the amount of meat available for exports (chilled and frozen) and low-priced canning beef, indicating that the growth in domestic demand is not confined to any one part of the market. In Tanzania, the situation is not so easy to assess because of the lack of up-to-

\[1\] There may be some benefits to locals from this. For example Kenyans now consume less harmful acaricide residues in their milk because export regulations forced the government to replace chlorinated hydrocarbon acaricides with organo-phosphorus compounds. The latter degrade more rapidly and so find their way into the milk in smaller and less harmful quantities. How serious the problem was prior to this, I do not know; but I do know that one expatriate toxicologist used to advise friends to drink as little milk as possible.
date figures on livestock marketing. But from what data there are, and from secondary sources (such as Rigby’s paper cited in Chapter 2.6.), it appears that local urban markets are able to sell all the meat which can be supplied from the rural areas. Though as Rigby makes clear, the marketing system limits the number of cattle sold to well below the number on offer. As noted in the postscript to Chapter 4.3, meat prices were increased substantially in 1979, with a corresponding reduction in urban demand for meat. The effect on production will depend (among other things) on the proportions in which the increase is divided between TLMC, traders and producers. There is no evidence of any dramatic improvement in meat exports, which have continued to be bedevilled by problems at the canning plant.

For dairy products, it is highly unlikely that there will be any sizeable export surplus in the near future. Tanzania has been steadily increasing its imports and though Kenya continues to be a net exporter, these exports are small in comparison with meat or hides and skins. In future, even less milk will be available for export, and indeed for processing, if present plans to introduce free milk in schools are even partly implemented.

All things considered, investment in sophisticated processing and handling facilities combined with the development of a segregated and protected ranch sector, is not the most useful way to spend national investment funds, nor to incur foreign debts. This conclusion is strengthened when one looks at some of the processing investments which have been made.

Improvement of Nutrition
The problem of nutrition can be considered at a number of levels. It is bounded by the fact that livestock generally convert vegetable energy and protein into their animal products at rates not much better than 9:1. In some cases with extremely intensive systems (and especially with pigs and poultry), the rates can be brought down to half that or less, but these are currently not undertaken in East Africa. Nor are they likely to be (from an economic perspective) given current relative prices of purchased feedstuffs, equipment, veterinary medicine, land and final end-products. From the viewpoint of the amount of energy and protein that can be produced from a given area, it would thus seem that crop production is superior except in those areas where climate prevents this, or where land has no opportunity cost.

This may happen in three types of situation; where the climate prohibits land uses apart from livestock production; where land and the necessary means of production are so abundant as to have no opportunity cost; and
where crop and livestock production are sufficiently complementary (as when oxen plough and provide manure) that the inclusion of livestock production within the system leads to no reduction in crop output. These may also be combined in different ways as for example when land is so abundant or of such low potential for crops that given amounts of labour and means of production are able to produce more from livestock.

These criteria would be worth pursuing in more detail with respect to productive and social systems where improvement of the diet of the majority was seen as a primary emphasis of policy. But this does not appear to be the case in East Africa, despite policy statements to the contrary. Figures on differences in consumption levels of animal products between income groups make plain that these are primarily foods for the richer members of the population – and correspondingly those least in need of dietary improvement. The level of consumption is generally lower in the rural areas than in the towns and varies considerably between regions. This is particularly marked in the case of milk, because of its perishable nature and high transport costs, but it seems also true for meat from such figures as are available.

The above is still more the case with respect to products from the schemes upon which both governments are concentrating much of their energy and funds. This is obviously the case with production of high quality, expensive beef produced on private ranches in Kenya and parastatal ranches in Tanzania. It is also true of dairy production policies in Tanzania, which concentrate on milk production for urban pasteurization plants, at high cost. Production of milk from grade dairy cows by peasants in Kenya may be an exception to this rule, since it appears that this has contributed to an improvement in rural consumption patterns, although probably this has not affected the poorest families. The plan to provide free milk to primary schools should spread consumption further, though children attending primary school tend not to come from the poorest families.

Under present circumstances, if improved nutrition for the mass of the population is to be seriously attempted, the development of peasant production of milk should be given every encouragement and in addition, ways sought to assist the spread of dairy consumption to lower-income families. Among the measures necessary for the achievement of this goal, a major priority would be to improve the control of ticks through dipping. This would help make the adoption of grade cattle a less risky proposition for those without their own private grazing areas. In Tanzania, such a policy would also require that attention be switched from large-scale dairy farms towards the provision of improved bulls and A.I. for upgrading peasant cows.
In addition, a more energetic policy for the dissemination of improved dairy goats would seem to offer even better possibilities for improved nutrition.

Although the actual consumption of milk and dairy products tends to be highly unequal between income groups and areas, there is some evidence (from Kenya) that it is considered an important food for children. This implies that a reasonable proportion of any extra milk produced is likely to be consumed by them. In the case of meat, the reverse is true; a large proportion is consumed by adult males, and perhaps especially so in the lower income groups. This indicates that expenditure on increasing the production of beef and other meat can scarcely be justified on nutritional grounds.

Incomes of Producers and Development of Production

Once one abandons rates of return and seeks instead independent material criteria by which to judge whether an activity contributes to "development" or not, it is exceedingly difficult to find any clear-cut basis for answers. In part this simply reflects the fact that there can be no such thing as a "neutral" optimal path, since any decision will affect the relative access to and control over means of production by different groups in society (even if this simply means leaving the present structure unchanged).

Most of the following comments will focus on the improvement of productivity. It is generally accepted that developing peasant and pastoralist production is likely to prove more equitable than a concentration of attention on ranches and large dairy farms. Large scale developments of this nature lead to the alienation of land. Although claimed to be uninhabited these lands often turn out to have been supporting larger populations before ranch development than afterwards. The general effect of these policies is to widen inequality. But although this is widely recognized, it is generally ignored. The reason behind this is the claim (made not only by those on the right politically), that more "modern" forms of production are more productive and a necessary step forward if the overall level of productivity is to be raised. Once again, the full argument is more complex than presented here, but on the question of the level of direct productivity, evidence has been presented throughout the book that its relation to "modernity" is by no means so close as is usually assumed.

Two criteria can be suggested by which policies can be evaluated (somewhat crudely). One of these is the degree to which a given direction of development or policy contributes to the expansion of current income or
material welfare (and whose incomes and welfare it expands). The other is the degree to which it increases productivity or "expands the forces of production". On closer inspection, these criteria are complex and their interaction still more so. But they do, however, provide the basis for a few comments on some existing policies.

It may seem self evident that the development of ranching increases productivity to the extent that the beef produced from a given area is increased as is the output per man employed (though even this is not always the case for some parastatal ranches in Tanzania). But if one considers social productivity, it could well be that investment funds spent on increasing productivity in the "traditional sector" not only increased output to a greater degree, but contributed more to the development of skills and productivity in the long run.

More significantly, the protective barriers erected around the ranch sector at present obstruct the development of peasant and pastoralist production. In Kenya, the barriers take the form of quarantines and other disease-control measures, whose primary aim is to allow access to markets for a largely mythical export surplus. Given the current break-down in regulations imposed to control movements of cattle (since a large proportion of the increased supplies going to Nairobi and other towns are moved illegally), one could expect official recognition of this fact in the near future. This would lead to a redefinition of the aims of the various control measures and a reduction in their incidence to what could feasibly be achieved without disrupting supplies. One major gain from such a review, would be that a larger proportion of cattle driven to town for slaughter, would use the gazetted stock-routes and so reduce the spread of ticks and tick-borne diseases. Whether any such development is likely, depends partly on the way in which the government and Department of Veterinary Services define the problem.

In Tanzania, the situation is rather different, although similar problems may exist connected with disease control. The major single difference is that a single body, LIDA, runs the large-scale ranches and large dairy farms, and also controls the primary markets for cattle throughout the country. So long as LIDA defines its major goal as being the development of the "modern" sector, the operation of these primary markets is unlikely to improve. Such information as is available indicates that at present the ranches and large dairy farms are not well run. Furthermore, the results to date suggest that they cannot be run at a profit and this poses the problem of how the losses will be subsidized. It seems unlikely that LIDA will be able to rely on continued subventions from central government, so the other obvious alternative is to make use of its own "revenue generating
capacity", i.e. the fees from the primary livestock markets which it operates. As happened in the 1960's when District Councils saw primary markets mainly as a source of revenue, this would almost certainly lead to deterioration and a reduction in the number of cattle passing through them. The danger would then be that LIDA would try to use legal enforcement to increase the flow of livestock through the markets. The legal powers to do this already exist since the LIDA-controlled markets have a monopoly of legal primary marketing in cattle. Were this to be enforced with heavily punitive fines imposed on the large numbers of stock-owners and traders who ignore the regulations, the result could be a very dramatic disruption of supplies. In addition to this, it would certainly put back the implementation of government schemes for the development of peasant and pastoralist herding for herders on these schemes would be likely to suffer most from legal enforcement.

This argument is largely speculative, but it is based on the ways in which other parastatal agencies in Tanzania have tried to recoup the losses of their "directly productive" activities. Given that livestock are more easily movable than crops, it seems highly unlikely that any such policy would succeed in generating large revenues. But it could more easily reduce the meat supply to the urban areas.

Production of Beef from Range Herders

One feature of the range herders' production system not often mentioned is that there is a quite strong complementarity between subsistence requirements and the production of slaughter cattle. Current herd composition figures reveal that for most herders, the major subsistence product is milk, though the obvious "by-product" of this production in the form of more calves is also plainly desired. This inevitably produces "excess" number of males which die, are culled or sold for slaughter. Mackenzie has indicated that the rate of calf mortality is so high that it effectively precludes the sale of more cattle for slaughter than at present. Whether or not this is strictly true, the level of calf mortality limits the possibility of increased sales.

The implication of this finding is that major efforts should be made to

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2 In this context, it may or may not be significant that recent Economic Surveys (Hali ya Uchimi), which do not report the number of cattle passing through official markets, do report the amounts collected as fees.

3 The same would be true of enforced de-stocking campaigns, which would certainly be seen by herders (and perhaps not without justification) as a means to get cattle to the official markets and get them cheap. There was certainly a widespread reaction to the enforced de-stocking campaigns of the 1950's.
improve tick-control. But since there are many other causes of calf mortality, none of which is well documented, there is a clear need for field research into this topic.

Many claim that herders are not interested in increasing the cash value of their sales and that their response to improved rates of calf survival (and improved calving ratios, if this could be achieved) would be to increase the build-up of herds and therefore overgrazing. While the discussion in Chapter 2.6 was far from complete or conclusive, it did point to some conclusions on this score. Herd growth is far from indiscriminate; it varies considerably between years and is often based on sound and even "economic" reasoning. Perhaps even more importantly, de-stocking has so often been associated with policies directed against the interest of the herders that it is only too comprehensible that herders tend to view any such proposal with the deepest distrust. Current or future policies which reproduce and justify this distrust (as, for example, forced de-stocking campaigns aimed at making-good deficiencies in the supply of slaughter cattle to the towns or to clear the way for ranch development) can only retard the possibility of assisting herders to develop improved production systems.

Some direct policy implications are fairly clear, but the precise form which such improved production systems should take is far less obvious. Far greater attention should be paid to a detailed study of herding systems, whether among cultivators or pastoralists, and be specifically concerned with looking at processes and coefficients of production. As pointed out on a number of occasions through the book, present knowledge is rudimentary. This is evidenced by the number of rough "guesstimates" passed on from one report to the next, without serious scrutiny as to their accuracy. When one looks, for example, at Meyn's survey, one is immediately struck by the disparity between the large amount of data for ranches and research stations and the rough estimates which have to suffice as guides to production in the ranges. This problem is by no means confined to the livestock sector; the same can be said of the quality of data available on most peasant cropping systems in East Africa.

The majority of detailed studies have been made by anthropologists rather than agronomists, vets or animal husbandry experts. Excellent though many of these studies are, their relevance to the problems facing technical personnel would be increased if they included more information on patterns of disease and productivity, if they considered herding as a system of production. Detailed studies along these lines would probably have a greater impact on the thinking of policy-makers than has been the case hitherto.
It has been all too easy for the technicians to ignore the contents of anthropological studies and to continue to use misleading stereotypes of the "irrational" herder. Much of this literature is devoted to debating problems which appear irrelevant to technicians while the language in which many studies are written can be dauntingly complex to outsiders. Apart from this, there is a sense in which overdetailed reporting of those symbolic aspects of daily life and social transactions which strike the observer as "exotic", can actually detract from a coherent or convincing presentation of the system of production. For example, detailed descriptions of who offers milk to whom first upon which ritual occasions may interest specialists but they can give the impression of a society totally bound up in tradition.\footnote{A brief passage taken (perhaps rather unfairly) from Rigby (1978) may make the point. He says "one of the most dishonourable acts which a (Ilparakuyo) husband can perform is to enter his wife's bedroom, where the milk calabashes are stored, in order to determine how much milk she has; for this not only involves an infringement of her domestic right to distribute milk as she sees fit, but it strikes at the very heart of the mutual respect (enkanyit) and service on which their economic unity as a household group must depend. . . ." One gets the impression of a relationship very much characterized by rather formalized expressions of respect, dignity etc., part of which derive from the very language used. Whether or not this is always the case with Ilparakuyo marriage, I do not know, but that it could possibly not, can be seen by comparison with the following. "One of the most dishonourable acts which a (British) husband can perform is to enter his wife's bag where the housekeeping money is stored, in order to determine how much she has (and spend it on drink or gambling), for this not only etc. etc. . . ."} In reality, while the actions of herders, pastoralists and peasants are undoubtedly "bound" by custom and social rules, they are no more "bound hand and foot" than anyone else.

The lack of detailed research means that it is premature to propose any detailed solutions to the problem of developing peasant and pastoralist livestock production. In any case since each system has its own particular characteristics, no one set of proposals could be expected to apply to all.

In my opinion a priority should be placed on research, in order that more appropriate policies could be worked out and implemented.

There can be no doubt that the incorporation of these societies into basically capitalist national economies will continue. It seems to me that the most productive (or least destructive) way of helping this process is through appropriately designed policies for developing the production and productivity of existing herding systems rather than through their replacement by "modern" systems. This is quite distinct from a policy of "preservation"; instead it aims at a radical transformation of these societies.

Given the nature of the national system into which herders and
pastoralists are incorporated, there can be no doubt that they will be affected by contradictions, inequalities and other negative characteristics. But the other course of action, the marginalization of peasant producers in the interest of a large-scale sector, seems generally the worse of the two options, in terms of social productivity as well as equity. But which of the two is chosen will depend not on any notion of what is "optimal" in a neutral sense, but on the balance of class power and the logic of the processes of class consolidation in process.
Livestock Development and Policy in East Africa

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Livestock production is an important economic activity in East Africa, especially for people living in areas where climate makes crop production risky or unviable. The vast majority of all livestock production comes from the herds and flocks of peasants and pastoralists and while only a small proportion of this reaches officially recognized markets, that part which does considerably outweighs the production of large-scale ranches and farms.

Government policy, both before and since Independence has had as its primary focus the development of large production units, producing for high-income markets and for industrial processing plant. The single partial exception to this has been the emphasis in post-Independence Kenya on modernized peasant dairy production.

This has implied both the concentration of state expenditure upon this "modern" sector and a variety of means for its protection from competition by "traditional" producers. The policy has been justified by reference to the presumed superior efficiency of large-scale producers and the economic irrationality which prevents "traditional" livestock-keepers from responding to government-induced innovations.

This book starts with an analysis of different aspects of livestock production in Kenya and Tanzania and continues with an historical account of the development of important sub-sectors and the relation to state policy. Its purpose, apart from collecting and presenting information about livestock production, is to question some very dubious assumptions which form part of the basis of official thinking. Beyond that, its purpose is justified to broaden discussion about the whole area of livestock policy by introducing problems and processes not commonly considered by policy-makers.