JAMHUURIYADDA DIMOQRAADIGA SOMAALIYA
WASAARADDA BEERAHA
SOMALI DEMOCRATIC REPUBLIC
MINISTRY OF AGRICULTURE

GENALE-BULO MARERTA PROJECT

ANNEX V

Livestock

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CONTENTS

CONTENTS (cont.)

LIST OF TABLES

APPENDIX A - COSTS TABLES

LIST OF FIGURES

SUMMARY OF REPORT TITLES

Master Plan Report

Feasibility Study Report

Annex	I	Soils
Annex	II	Water Resources
Annex	III	Human Resources and Institutions
Annex	IV	Existing Agriculture
Annex	V	Livestock
Annex	VI	Potential Agricultural Development
Annex	VII	Engineering
Annex	VIII	Economic and Financial Analysis
Annex	IX	Management and Implementation
Annex	X	Survey Data
Annex	XI	Inception Report

PROJECT AREA AND STUDY AREA

This study contained two elements, a Master Plan covering 67 400 hectares and a feasibility study of 5 000 hectares.

Throughout the reports the term Study Area refers to the area covered by the Master Plan studies and the term Project Area is used for the feasibility study area.

ABBREVIATIONS USED IN THE REPORTS

ADB	African Development Bank
ADC	Agricultural Development Corporation
CARS	Central Agricultural Research Station - Afgooye
DAP	Diammonium phosphate
EDF	European Development Fund
ENB	National Banana Board or Ente Banane
FAO	Food and Agriculture Organisation, United Nations
FAO/PP	FAO Pilot Project (Afgooye - Mordiile Project)
HASA	Hides and Skins Agency
HTS	Hunting Technical Services Limited
HV	High volume (crop sprayer)
IBRD	International Bank for Reconstruction and Development (the World Bank)
ITCZ	Inter-tropical convergence zone
ITDG	Intermediate Technology Development Group (London)
JOSR	Jowhar Offstream Storage Reservoir
LDA	Livestock Development Agency
Libsoma	Libya-Somalia Agricultural Development Company
LSU	Livestock unit
LV	Low volume (crop sprayer)
MLFR	Ministry of Livestock, Forestry and Range
MMP	Sir M. MacDonald & Partners
NCA	Net cultivable area
NCB	National Commercial and Savings Bank (formerly National Commercial Bank)
ONAT	National Farm Machinery and Agricultural Supply Service
PLO	Palestine Liberation Organisation
SDB	Somali Development Bank
SNAI	Jowhar Sugar Estate
TDN	Total digestible nutrients
TDP	Total digestible protein
ULV	Ultra-low volume (crop sprayer)
UNDP	United Nations Development Programme
USBR	United States Bureau of Reclamation
USDA SCS	United States Department of Agriculture, Soil Conservation Service
WHO	World Health Organisation

SPELLINGS OF PLACE NAMES

Throughout the report Somali spellings have been used for place names with the exception of Mogadishu where the English spelling has been used. To avoid misunderstanding, we give below a selected list of Somali, English and Italian spellings where these differ.

Somali	English	Italian
Afgooye	Afgoi	Afgoi
Awdheegle	-	Audegle
Balcad	Balad	Balad
Baraawe	Brava	Brava
Buulo Mareerta	Bulo Marerta	Bulo Mererta
Falkeerow	-	Falcheiro
Gayweerow	-	Gaivero
Golweyn	-	Goluen
Hawaay	Avai	Avai
Hargeysa	Hargeisa	-
Janaale	Genale	Genale
Jelib	Gelib	Gelib
Jowhar	Johar	Giohar
Kismaayo	Kisimaio	Chisimaio
Marka	Merca	Merca
Muqdisho	Mogadishu	Mogadiscio
Qoryooley	-	Coriolei
Shabeelle	Shebelli	Scebeli
Shalambood	Shalambot	Scialambot

GLOSSARY OF SOMALI TERMS

Cambuulo	-	Traditional dish of chopped boiled maize with cowpeas or green grams.
Chiko	-	Chewing tobacco
Der	-	Rainy season from October to December
Dharab	-	Five jibals or approximately 0.31 ha
Gu	-	Rainy season in April and May
Hafir	-	Large reservoir on farms for storing water for use in dry periods
Hagai	-	Climatic season June to September characterised by light scattered showers
Jibal	-	Area of land approximately 25 m by 25 m or 0.0625 ha
Jilal	-	Dry season from January to April
Kawawa	-	Two man implement for forming irrigation ditches
Moos	-	Measurement of land area equal to a quarter of a jibal
Quintal	-	Unit of weight measurement equivalent to 100 kg
Uar	-	See hafir
Yambo	-	Small short-handled hoe
Zareebas	-	Thorn cattle pen

CHAPTER 1

THE NATIONAL LIVESTOCK INDUSTRY

1.1 Introduction

A comprehensive review of the national livestock industry has recently been completed and presented to the Government (Hunting Technical Services Ltd., 1976). In this review the economic, marketing and infrastructural components of the industry were analysed and recommendations made for changes and future development. A certain number of these recommendations is already being implemented, while others await further discussion and funding.

In planning the integration of livestock into the Janaale - Buulo Mareerta project, it was obviously necessary to take into account the overall operation of the national livestock industry as well as local factors.

1.2 Government Policy

The current policy of the Government of Somalia towards livestock is to increase animal production, both quantitatively and qualitatively, with emphasis on more efficient marketing of animal products and improvement of animal health. In order to achieve this the Government intends to:-

(a) take measures to increase offtake from the national herd
(b) develop facilities for fattening cattle
(c) experiment in cross breeding
(d) strengthen the animal health programme
(e) increase training and extension
(f) rationalise the marketing system and increase export returns.

This approach was outlined in the Five Year Development Programme which covered the period from 1974 to 1978. It is not yet known to what extent future policy will be modified in the plans for the next three years, which will be published later on in 1978.

1.3 Livestock Husbandry and Management

It is estimated that the total livestock population of the country is approximately 2.5 million cattle, 15 million sheep and goats, and 2.5 million camels. These figures represent the maximum population during the dry season. During the gu and der rainy seasons, animals migrate into Kenya and Ethiopia, reducing the population to approximately 1.5 million cattle, 10 million sheep and goats, and 2 million camels.

The vast majority of the national herd is run under a nomadic system of management, necessitated by the low rainfall, poor range quality and limited water supplies characteristic of the country. In areas of higher rainfall or irrigation development there is transhumant and settled husbandry where the animals make use of crop residues to supplement natural rangeland grazing.

The basic methods of husbandry for all these systems are similar to those in many other semi-arid and arid rangeland areas in Africa. Growth and productivity are low and vary considerably with environmental conditions. The importance of milk in the stockowners' diet means that there is frequently competition between the stockowners and calves for milk with a consequent reduction in the productivity of the calves.

Recent increases in the livestock population have caused widespread overgrazing and severe range degradation, especially around sources of permanent water. Attempts to redress this situation through the introduction of controlled grazing programmes have mostly been frustrated due to the mobility of pastoral herds, unreliable rainfall and poor communications.

1.4 Marketing and Processing

Approximately 70% of Somalia's export earnings come from livestock, and the export of live animals represents over 80% of livestock derived exports.

The majority of livestock sales and purchases are undertaken by the private sector, though the official government organisation, the Livestock Development Agency, is also active in marketing. Most of the live animals exported from Somalia go to Saudi Arabia and the Gulf States. Only male animals may be exported. Small stock (sheep and goats) are the most important class of stock for export, but cattle and camels are also exported in considerable numbers. Most of the animals sold for live export come from the north of the country.

There is only one beef processing plant in operation in the country, at Kismaayo. There used to be a privately owned processing plant operated by Sopral in Mogadishu, but this is not working at present.

1.5 Infrastructure

The responsibility for livestock related activities is distributed amongst various ministries. The Ministry of Livestock, Forestry and Range is in charge of animal production and health, forestry, range, wildlife and training. The Ministry of Industry is responsible for the Kismaayo Meat Processing Factory and for the leather industry, while the Ministry of Commerce runs the Livestock Development Agency and the Hides and Skins Agency.

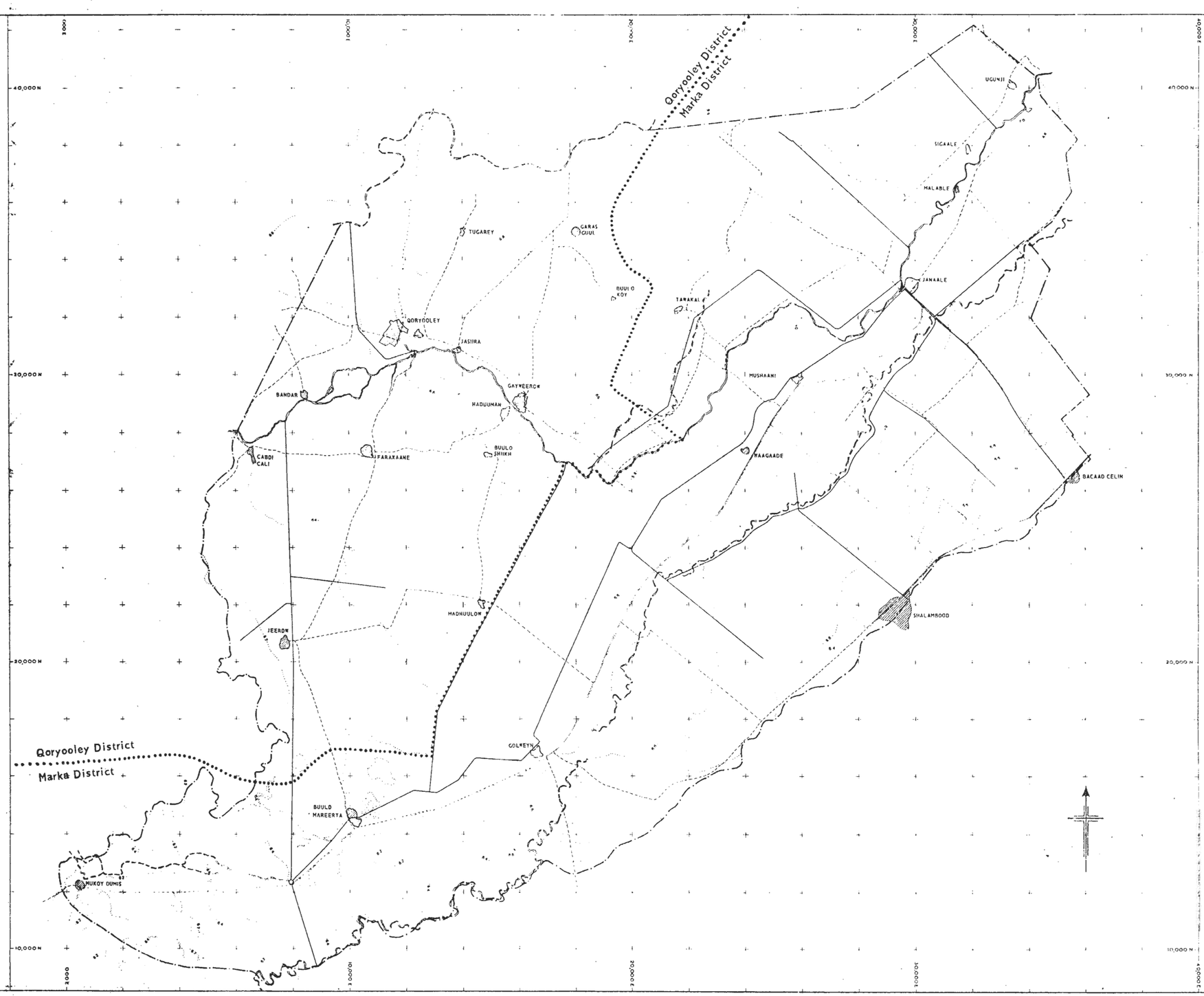
Such a wide spread of responsibilities amongst the various ministries gives rise to a lack of communication and planning between the different parts of the livestock industry. Recommendations for infrastructural changes were made in the Livestock Sector Review and some of these are now being carried out.

1.6 Livestock Development

The recommendations of the Livestock Sector Review outlined extensive proposals for the improvement of export marketing facilities at livestock export harbours, the development of rural roads, market centres and holding grounds, and an up-grading of meat processing and carcass preparation operations.

FIGURE 1.2

STUDY AREA



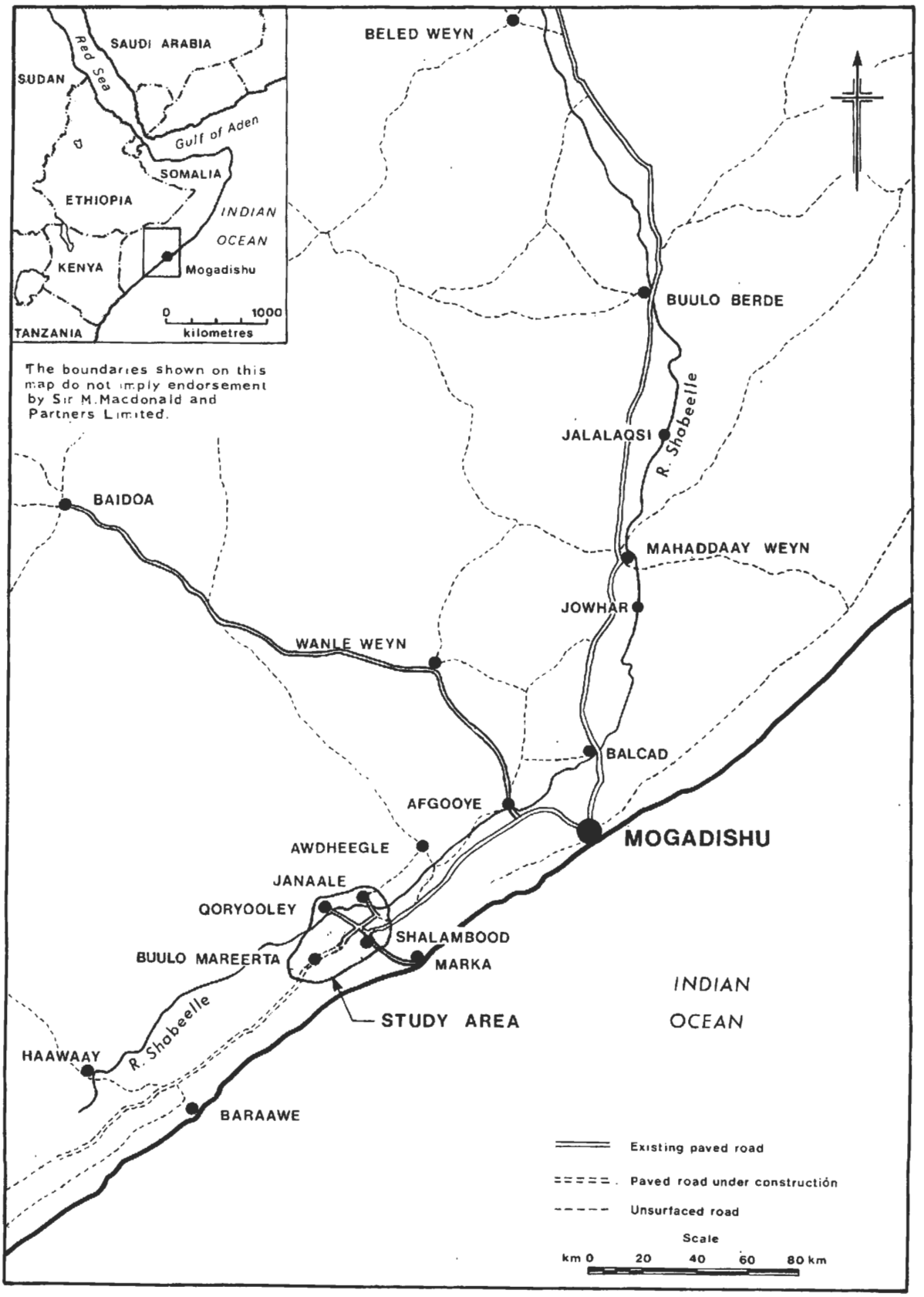
TOPOGRAPHICAL LEGEND

- River
- Major channel remnant
- Main canal existing
- Surfaced road
- Unsurfaced road
- Track
- Contour
- Study area boundary
- Village
- District boundary

SCALE

km. 1 0 1 2 3 4 5 km.

LOCATION OF THE STUDY AREA



Projects concerned with animal health are either planned or being implemented, a particularly important one for the Janaale - Buulo Mareerta area being a tsetse fly control programme along the Shabeelle river, although so far this project has only proceeded as far as a survey of the extent of the problem. In the field of animal production there are ranching and fattening projects which plan to use crop residues and irrigated fodder as well as conventional ranching techniques. There are also projects dealing with dairying, small stock management and poultry production. A number of range management projects are either planned or under way, mainly concentrating on the northern part of the country.

CHAPTER 2

HUSBANDRY AND NUMBERS

2.1 Introduction

Within the Janaale - Buulo Mareerta area, cattle form the most numerous class of livestock. Sheep, goats and camels also occur but their role is secondary to that of cattle. Donkeys are used for transport, especially around the larger villages.

The cattle are predominantly of the East African Shorthorned Zebu type, though the influence of Boran stock from Kenya and Southern Ethiopia can be seen in a large number of animals. Although white, black and dun cattle occur, the most common colours are red and roan.

The sheep are virtually all fat tailed Somali Blackheads, while the goats are mostly of the South Somali Benadir type. There is also a number of the larger, white Galla goats in the area which have crossed with the Benadir stock.

2.2 Husbandry

Although there are different levels of management of livestock in the area, the general methods of husbandry are the same throughout. Animals are usually kept in night enclosures which can be simple thorn zareebas or, in the case of the larger villages, more sophisticated pens until quite late in the morning. In some villages not all the cattle are enclosed at night and these merely lie outside their owner's house. Small stock are virtually always enclosed. It is not unusual to see stock leaving the villages to go out to graze as late as 11 o'clock or even midday. The reason for this is the avoidance of tsetse flies (Glossina sp.), which transmit trypanosomiasis. The flies are most active in the early morning and evening; they spend the hot, middle of the day resting in the shade of thicket. This grazing pattern, which represents a considerable reduction in the total feeding time available to cattle, is probably excessively cautious. The animals could spend the early part of the morning grazing in areas away from the thicket and dense bush, which form the flies' preferred habitat and go into these areas only after the flies have settled to rest. This would extend the daily grazing times by four or five hours.

In areas where other biting flies are a nuisance to stock, at night small fires are lit in the night enclosures. Cattle stand in the smoke from these fires, which are generally fuelled by dung and maize stover.

Castration of young stock is practised to any great extent and there is little attempt to control breeding. Cows are not milked during the first week after parturition though this is more likely to be due to the strange taste of colostrum than through any wish to allow the calf sole access to the milk at this important early stage. Once milking has started, the calf is allowed to suck two quarters while the milker has the other two. Such a system induces milk let down, for Zebu cattle are reluctant to let down milk if not stimulated to do so by their calves. Calves are only allowed to suck at milking; during the rest of the day they are kept away from their dams. As the calves grow, forage, either fresh cut grass or any available crop residue, is brought to them. They

are weaned at about one year at which stage they are allowed to graze with the rest of the herd. When young calves are moved from one place to another with their dams, they have small woven muzzles fitted over their mouths, or have their mouths tied with string, to prevent them from sucking.

For much of the year water is available to livestock from the river and main canals. In some years, during February and March, the river and canals dry up. When this happens stock have to use water from the tube wells and hand-dug wells in the area. The salinity of these wells can be very high, as great as 10 mmho/cm, and stock frequently drink from wells of up to 4 mmho/cm without any apparent side effects; they are obviously acclimatised to the water.

2.3 Management

The majority of cattle in the Janaale - Buulo Mareerta area are kept primarily for milk production. There appears to be a ready market for any milk surplus to home requirements, and also for surplus animals. There are basically three levels of livestock ownership and management: the true nomads, farmers' stock, and large-scale herds, owned by rich farmers and traders.

2.3.1 Nomadic Herds

The herds of nomadic people only come into the area during the main dry season, from January to March. For the rest of the year they utilise the rangelands away from the river.

2.3.2 Farmers' Stock

In January 1978 a livestock survey was undertaken by the Consultants. This survey involved counting farmers' stock and interviewing stock owners, asking them about husbandry techniques and management. The results of the survey show that 52.2% of the farmers in the area own cattle, 17.2% own sheep, 6.2% own camels and 9.4% own goats. A breakdown of household ownership by herd and flock size is given in Table 2.1.

TABLE 2.1

Livestock Ownership by Herd and Flock Size

		Number of animals in herd or flock			
		0	1 - 5	6 - 10	More than 10
Percentage of households	Cattle	47.8	28.3	13.0	10.9
	Sheep	82.8	12.5	1.6	3.1

The survey also showed that, on average, each household owned 3.5 cattle, 0.13 camels, 1.08 sheep and 0.20 goats. As almost 50% of the households had no cattle at all, this comparatively high figure for average cattle ownership is only obtained because a few households had considerably more than 10 cattle;

7.8% of the households surveyed owned 20 or more cattle. The average number of cattle per household would need to be increased further if the 'mobile herds' were considered.

These mobile herds belong to only the richer farmers and traders. Whenever conditions are suitable they are sent away from the irrigated areas to graze in the surrounding rangelands. These animals may be considered surplus to immediate household requirements and are mainly exploited as a supply of saleable milk.

The principle of communal herding is well established and a number of livestock owners in a village will group their animals together for herding. These groups, each of which contains about 50 animals, will all leave the village at the same time, though later on in the day the village herd will tend to split up into its different groups. Professional herdsmen are employed to look after each group. The same system works for the mobile herds. Such herds contain cattle belonging to a number of different households, but are looked after by one employed herdsman.

Of the households surveyed, 32% employed someone to look after their cattle; the remaining 68% used a member of their family to herd their animals.

The use of some form of supplementary feeding is widespread and all farmers feed their animals cut grass and crop residues when available. The livestock survey indicated that 45% of stock owners purchase additional supplementary food for their animals at some stage during the year. This is commonly in the form of cut grass, maize stover or locally purchased sesame cake. Other crop residues used include groundnut, cow pea and green gram hay and occasionally sweet potato leaves.

2.3.3 Large-scale Herds

There is only one large-scale herd in the area, on a farm 5 km outside Golweyn. This herd contains approximately 400 animals, of which only 70 were being milked in January 1978. The animals are unimproved local stock and, apart from the use of some poorly managed irrigated permanent pastures, husbandry is similar to that used for all other cattle in the area. Any excess milk, after the requirements of the farm's labour force have been met, is made into cheese which is sold in Mogadishu.

2.4 Animal Power

Camels, cattle and donkeys are used to supply power and porterage. Donkeys are harnessed to two-wheel carts and used to carry water and forage, especially in the vicinity of larger villages. Although the harnesses tend to be of a fairly crude design, these animals are well looked after, appear to be in good condition and do not suffer from the raw galls frequently seen on animals in similar situations in other parts of Africa. Cattle are also sometimes used to pull carts, though they are not used as often as donkeys. Cattle and camels are used as pack animals and carry fodder, milk or water. Camels are used by the nomads to carry their houses and possessions during migration.

The sesame mills in the villages are powered by camels. Each mill, which is inside a specially built hut, is driven by one camel. The camel is blindfolded, either with a cloth or a specially woven mask, and walks around the mill, driving it by pushing a 2 m long, balanced boom.

Livestock are not used for land cultivation.

2.5 Disease and Veterinary Services

The disease which appears to have the greatest impact on the livestock of the Jariaale - Buulo Mareerta area is trypanosomiasis. The causative agents have been identified as Trypanosoma vivax, T. brucei and T. congolense; the vector is the tsetse fly Glossina pallidipes. The presence of the disease in the area is responsible for the late hour at which livestock go out to graze. The use of drugs as a cure, but not as prophylactic cover, is common.

Other diseases which are a threat to animal health include:

rinderpest
foot and mouth
anthrax
contagious bovine pleuro-pneumonia (CBPP)
contagious caprine pleuro-pneumonia (CCPP).

There is a vaccination programme which covers these diseases and also haemorrhagic septicaemia and black quarter. There is, however, no routine vaccination against foot and mouth and this disease is only treated when an outbreak actually occurs.

There are three vaccination teams working in the Lower Shabeelle region. Animals which have been vaccinated are permanently marked by an ear punch. Monthly figures for the number of animals vaccinated in the whole of Lower Shabeelle region are given in Table 2.2.

TABLE 2.2

Vaccination Data for Lower Shabeelle Region, 1977

Month	CBPP	CCPP	Haemorrhagic septicaemia	Black quarter	Rinderpest	Anthrax
January	-	-	5 900	800	5 000	15 150
February	48 000	69 600	18 100	8 500	9 700	27 700
March	-	-	-	4 000	-	3 000
April	5 000	3 500	8 000	4 500	-	5 000
May	13 500	-	30 300	5 000	5 000	23 600
June	15 400	-	12 000	100	-	1 000
July	-	-	3 000	2 000	250	4 000
August	1 100	-	1 300	1 300	-	1 500
September	7 500	-	10 000	-	11 350	-
October	-	-	4 200	3 500	1 600	-
November	2 000	-	3 000	5 000	1 000	-
December	24 000	-	33 150	2 000	10 000	1 300
TOTAL	116 500	73 100	128 950	36 700	43 900	82 250

Source: Regional Veterinary Office, Shalambood.

Greatest vaccination coverage was achieved for haemorrhagic septicaemia and approximately 31% of the regional cattle herd was vaccinated against this disease; the cover for CBPP was 28%.

There are no standard restrictions or control on stock movements between different areas. However, in the event of an outbreak of a notifiable disease, the area is meant to be closed to livestock movement, but it is not known how effective such a ban would be.

The level of tick infestation on animals is comparatively low. There is a plunge dip at Qoryooley, but this is not used, and neither do livestock owners seem to be aware of the value of tick grease or hand dressing. Despite the relatively low levels of tick infestation, it is likely that a number of tick-borne diseases occur, the most important probably being heart water (Piroplasmosis), red water (Babesiosis) and gall sickness (Anaplasmosis). Without a thorough veterinary survey it is not possible to assess the relative importance of each of these diseases.

No data are available for the rate of occurrence of internal parasites in animals slaughtered within the area. The Livestock Sector Review reported that infection of meat by Cysticercus bovis and Echinoccoccus sp. has regularly been seen in both Mogadishu and Kismaayo, and it is therefore likely that these parasites infect animals within the Study Area.

The headquarters for the Government's veterinary services in Lower Shabeelle region are at Shalambood; district headquarters of relevance to the Janaale - Buulo Mareerta area are at Marka and Qoryooley. Within each district there is a number of sub-stations, each of which is staffed by a veterinary assistant.

Sub-stations within the Study Area are found at:

Marka district:	Janaale
	Golweyn
	Buulo Mareerta
	Uguunji
Qoryooley district:	Cabdi Cali
	Gayweerow
	Faraxaane

Apart from the control and treatment of disease, one of the main functions of the veterinary service is meat inspection at village slaughter houses at Shalambood, Janaale, Golweyn, Buulo Mareerta, Qoryooley, Cabdi Cali, Gayweerow and Faraxaane. The facilities at these slaughter houses are primitive and they are basicaily just a sioping concrete floor, sometimes with a roof overhead. The slaughter houses have no running water and the standard of hygiene is very low.

There are no records on the number of carcasses condemned or the reason for condemnation. It was reported tht condemned carcasses at Janaale are thrown into the river, which constitutes a serious health hazard.

2.6 Livestock Numbers

Without a detailed aerial survey it is difficult to obtain an accurate assessment of the livestock numbers in the area. A further complication is the fact that the Study Area does not comprise one complete grazing unit and there is considerable stock movement in and out of the area, depending on forage availability and season. For the purpose of assessing the livestock population as it will primarily affect, and be affected by, irrigation development, calculations have been based on livestock belonging to resident farmers. Table 2.3 shows the estimated livestock numbers in both the Janaale - Buulo Mareerta Study Area and the Qoryooley Project Area.

TABLE 2.3

Livestock Numbers in the Study and Project Areas

	Estimated no. of families[1]	Study Area[2]	Project Area[3]
		18 940	1 282
	Animals/family		
Cattle	3.5	66 290	4 487
Camels	0.13	2 462	167
Sheep	1.08	20 455	1 385
Goats	0.20	3 788	256

Notes: (1) Average family size 5.93

(2) Population of 112 316

(3) Population of 7 600

Comparisons of the livestock densities in the Study Area with data for Marka and Qoryooley districts are given in Table 2.4; this table also gives the maximum stock densities for any district bordering the Shabeelle river.

TABLE 2.4

Estimated Livestock Densities (animals/km^2)

	This study	HTS (1976)			
		(a)	(b)	(c)	(d)
Cattle	98.3	14.8	25.5	37.7	22.8
Camels	3.6	1.8	17.9	37.9	15.3
Sheep	30.3	4.5	1.6	23.8	9.9
Goats	5.6	10.3	3.2	88.1	30.6

Notes: (a) Marka district
(b) Qoryooley district
(c) Maximum density for any district bordering Shabeelle river
(d) Average density for districts bordering Shabeelle river

It can be seen that cattle densities in the Study Area are very much higher than any of the district densities. Densities for camels and goats were within the range recorded for surrounding districts. The density for sheep was slightly higher than the maximum district density for the Shabeelle river. The results of calculations of livestock densities in terms of livestock units (LSU) are shown in Table 2.5. For the purpose of these calculations a standard livestock unit of a 220 kg cow or steer has been assumed.

TABLE 2.5

Livestock Unit Densities

	LSU conversion factor	LSU density/km^2	%	Total LSU Study Area	Total LSU Project Area
Cattle	0.8	78.6	91.2	52 984	3 733
Camel	1.1	4.0	4.6	2 696	190
Sheep	0.1	3.0	3.5	2 022	142
Goats	0.1	0.6	0.7	404	28
TOTAL		86.2	100.0	58 106	4 093

These figures represent the minimum permanent livestock population. It was not possible to assess the extra numbers of animals brought in by nomads, nor the extent of the mobile herds of people living in the area. Due to the poor quality of the surrounding rangeland it is likely that, at certain times of year, the numbers of extra animals could be considerable.

2.7 Herd Structure

2.7.1 Cattle

Herd structure data were collected for both the farmers' stock and mobile herds; the results are given in Table 2.6.

TABLE 2.6

Age Structure of Cattle Population

Age class (1)	Farmers' stock		Mobile herds		Total	
	No.	%	No.	%	No.	%
Adult male	11	2.4	18	6.0	29	3.8
Adult female	219	48.0	174	58.4	393	52.1
Adult castrate	3	0.7	2	0.7	5	0.7
Sub-total		51.1		65.1		56.6
Immature male	53	11.6	33	11.0	86	11.4
Immature female	70	15.4	52	17.4	122	16.2
Immature castrate	1	0.2	0	0	1	0.1
Sub-total		27.2		28.4		27.7
Calves	99	21.7	19	6.4	118	15.6

Note: (1) Age class categories: Adult over 3 years
Immature 1 - 3 years
Calf less than 1 year

Over 50% of the sample cattle population are adult animals over three years old. There is a high percentage of adult females in both farmers' (48.0%) and mobile (58.4%) herds. Adult castrated males only comprise 0.7% of the population. The bull : adult female ratio is 1 : 20. Only 16% of the cattle population over one year old are male animals. This low figure indicates the effective marketing system of the area.

Although the percentages of immature stock are approximately the same for both types of herds, there are 3.4 times more calves in the farmers' herds than in the mobile herds. The adult female : calf ratio for the farmers' herds is 2.21 : 1, while for the mobile herds it is 9.16 : 1.

2.7.2 Sheep

The age structure of a sample population of 220 sheep is shown in Table 2.7. The number of permanent incisor pairs on the lower jaw has been taken as an indication of age. Animals with only milk teeth have been put into two age classes, determined by size.

TABLE 2.7

Age Structure of Sheep Population

Number of incisor pairs	Estimated age (months)	Percentage Male	Female	Total
0	Less than 6	30.8	5.5	11.6
0	6 - 15	46.1	37.8	39.8
1	16 - 20	9.6	14.0	13.0
2	21 - 25	9.6	20.7	18.1
3	26 - 32	1.9	15.8	12.5
4	Greater than 32	1.9	6.1	5.1

Note: Sample size = 220

Over 50% of the population are less than 15 months old; only 5% are older than 32 months.

As with cattle there is a strong bias towards females; only 24.1% of the population are males. The ratio between rams over 15 months old and ewes of the same age is 1 : 7.1.

2.8 Other Livestock

There are three other sources of animal-derived food which have not yet been discussed; these are poultry, fish and bees.

2.8.1 Poultry

The results of the livestock survey show that 80.4% of the households in the Study Area keep chickens. The average number of chickens per household is 4.98. It is estimated that there are approximately 120 000 chickens in the Study Area, over 8 000 of which occur in the Qoryooley Project Area.

Most of the birds are of poor quality and can be expected to produce only about 40 eggs per year. The average weight of a sample of 60 eggs was 39.1 $\pm$ 2.04 g. Chickens are valued more for egg production than for meat production.

Very little care is given to chickens and for the most part they have to forage for whatever food they can find. Due to the danger of predators, chickens are kept in small elevated pens at night.

2.8.2 Bees and Honey Production

Honey is popular and 93.5% of the people questioned during the livestock survey said that they ate it whenever it was available. Little is done to encourage honey production and the main source is from wild hive robbing. There is, however, one farmer who operates a large number of top-bar hives (estimated to be about 80) and who markets the honey in Mogadishu.

2.8.3 Fish

Although the fishing port of Marka is only 8 km from the edge of the Study Area, very little sea fish finds its way into the rural households. However, fish from the river and canals within the Study Area are caught and eaten in considerable numbers, and even taken to the fish market at Marka. Approximately 35% of the households in the Study Area eat river fish. The main species caught include three species of cat fish, Clarias sp., though Labeo sp. and Tilapia spp. are also taken.

Three fishing methods are used: hand lines, basket traps and 'jump' traps. The hand lines are baited with small fish and left in the water overnight. Fishermen did not consider that they lost many fish to crocodile eating their catch overnight. The basket traps are made out of reeds and secured up to 2 m under water, closed to the river bank. Lines of traps are also placed across the river. Jump traps are approximately 1 m square and made out of sacking attached to a horizontal wooden frame. These traps are lowered over the downstream side of the Janaale barrage and suspended about 0.5 m above the surface, close to where water is pouring through a partially open gate. Fish failing to jump up though the gate and to the upstream side of the barrage, get thrown into the canvas of the trap and caught. Jump traps can only be used when the downstream level of the river is reasonably high.

There are two fish ladders in the Janaale barrage, but neither is working.

Quite a lot of the catch at Janaale is sold at the barrage either fresh or dried, but a certain amount is taken to the Marka fish market. Fish are sold in the markets of villages close to the canals.

CHAPTER 3

ANIMAL NUTRITION

3.1 Introduction

This chapter will discuss the food resources currently available to livestock in the Study Area. In order to express this in quantitative terms it has been necessary to use some basic assumptions on crop residue yields and primary production rates.

Even though the study followed a period of unusually high rainfall it could be seen that the limited natural rangelands were in poor condition and over-utilised. The same is true for the areas of abandoned farm land, which are for the most part dominated by unpalatable herbs and shrubs.

There is often variation in the condition of animals in different herds from the same area. It is not unusual to pass two herds of cattle on the road, one of which is in much better condition than the other. In the time available for the study of livestock in the area it was not possible to identify with any certainty the reason for this. One factor which is likely to contribute to this between-herd difference is the amount of crop residues and cut grass fed by owners to the animals in their herds; another is the movement of cattle from the poorer areas of rangeland away from the river into the Study Area.

3.2 Rangeland and Grass Production

Estimates of forage production from rangeland and canal grass are shown in Table 3.1. Approximately 50 645 t of available dry matter are produced, of which 20 100 t are TDN (total digestible nutrients) and 1 703 t are TDP (total digestible protein).

The acacia woodland and thicket grows as a dense, often impenetrable mass of vegetation and offers only a limited amount of forage to animals. This vegetation type is the main habitat of tsetse fly and is avoided by livestock for much of the time.

Abandoned farm land is more productive than the acacia thicket. A number of the more palatable pioneering species have already been eaten out, leaving aromatic and woody weeds of low food value. In a few areas of abandoned farm land there are swards of perennial grasses which include species of Chloris, Cenchrus, and Cynodon.

Fallow land, which is the most widespread type of rough grazing, is considered to have a relatively good productive potential due to the high soil moisture status. Like abandoned farm land, many of the species are of low nutritional value, but this is an important source of food for the animals.

TABLE 3.1

Estimated Annual Rangeland and Grass Production

Source	Area (ha)	Estimated annual primary production (kg/ha)	Total annual production (t)	Net production after 10% wastage (t)	Estimated dry matter production (%)	Total dry matter production (t)	TDN %	TDN t	TDP %	TDP t
Acacia woodland and thicket	12 950	1 000	12 950	11 655	30	3 496	40	1 398	4.0	140
Abandoned farm land	3 160	800	2 528	2 275	30	682	30	205	3.0	20
Fallow	25 985	4 500(3)	116 932	105 239	30	31 572	35	11 050	3.0	947
Riverine grassland I (1)	810	25 000(4)	20 250	18 225	30	5 467	50	2 733	4.0	219
Riverine grassland II (2)	1 164	30 000(4)	34 920	31 428	30	9 428	50	4 714	4.0	377
TOTAL						50 645		20 100		1 703

Notes: (1) Major areas shown on Land Use Map

(2) Sides of rivers and canal:

River	45 600 x 55 m	=	250 ha
Main canal	118 400 x 55 m	=	651 ha
Secondary canal	33 000 x 55 m	=	99 ha
Distribution canals	164 000 x 10 m	=	164 ha
TOTAL			1 164 ha

(3) These areas will have relatively high production rates due to residual moisture from the previous irrigation and occasional flooding.

(4) Very high production rates due to water available from river and canals.

Two classes of riverine grassland have been identified; the first covers fairly extensive areas close to the river and canals, and the second, limited areas along the banks of the river and canals. Both these grassland types are highly productive and are heavily used by livestock, either through direct grazing or through the provision of cut grass.

In terms of the production of TDN and TDP, fallow land and river and canal banks are the most important.

3.3 Crop Residue Production

The three major sources of crop residues for animal nutrition are maize stover, sesame cake and legume hay. The contribution made by each of these crop residues to TDN and TDP is shown in Table 3.2.

Total dry matter production of residues is 45 788 t of which there are 23 272 t of TDN and 1 655 t of TDP.

It has been estimated that approximately 880 t of rice chaff and bran are produced from the rice mill at Shalambood. Most of this is sold straight to Mogadishu and only a small amount is available for use in the area. This has not been included in the calaculations of crop residue production.

3.4 Overall Forage Production

The combined results of Tables 3.1 and 3.2 show that the Study Area produces approximately 96 433 t of usable dry matter which, in turn, gives rise to 43 372 t of TDN and 3 358 t of TDP.

3.5 The Balance between Forage Production and Consumption

If it is assumed that the annual intake level of each livestock unit is 0.9 t of TDN and 0.08 t of TDP, the total requirement for the 58 000 LSU in the Study Area will be 52 200 t of TDN and 4 640 t of TDP. The demand for nutrients therefore appears to be greater than the supply, the shortfall being 8 828 t of TDN and 1 282 t of TDP. It is difficult to know the degree of accuracy of calculations of this sort, relying on generalised production parameters which may not be particularly applicable to the Study Area. They can, however, be a useful indication.

The physical condition of the animals during the period of study (January/February 1978) did not indicate that the cattle are under-nourished and it is therefore difficult to explain the difference between the theoretical requirements and supply of forage and fodder. There had been unusually good rains immediately before the livestock study began and this could, in part, account for the animals' condition. Another factor is that the calculations were based on a complete year and seasonal deficits, accompanied by loss of condition, could not be identified.

TABLE 3.2

Annual Crop Residue Production

Crop	Residue type	Annual cropped area[1] (ha)	Residue yields (t/ha)	Gross residue production (t)	Dry matter (%)	Wastage (%)	Net dry matter residue production (t)	TDN		TDP	
								%	t	%	t
Maize	Stover	23 226	2.5	58 065	90	20	41 807	50	20 903	2.0	836
Sesame	Cake	9 954	0.2	1 991	N/A	5	1 891	70	1 324	40.0	756
Legume	Hay	5 806	0.5	2 903	90	20	2 090	50	1 045	3.0	63
TOTAL							45 788		23 272		1 655

Note: (1) Includes 16 590 ha of double-cropping

It has been shown in Table 2.4 that the cattle densities in the Study Area were very high and, even allowing for a 30% margin of error in the survey, twice that of other areas bordering the Shabeelle river. It is possible that there has been a recent large-scale increase in the number of animals in the area. Part of this may have been caused by a reduction in the sale of animals to Kenya (Hunting Technical Services Ltd. 1977), but there is no reason why the effect of this should be limited to the Study Area.

These calculations indicate that there is a possibility of problems with livestock nutrition in the Janaale - Buulo Mareerta area, but the same is true for many other parts of the country.

Despite the theoretical imbalance between nutrient demand and production, it is unlikely that these problems are yet severe. However, care must be taken to control the situation and ensure that it does not deteriorate.

CHAPTER 4

PRODUCTION, OFFTAKE AND MARKETING

4.1 Production

There is little information available on production parameters for livestock in Somalia and the collection of extensive production data was not possible during the present study.

4.1.1 Growth

In view of the low and erratic rainfall it is likely that there is considerable variation in the growth of all stock classes in different years. Although the use of crop residues and riverine grass will reduce the impact of low rainfall years, it is likely that during such years a much greater number of animals will come from the interior to utilise these resources.

There is an urgent need for a long term, systematic study of livestock productivity throughout the country covering different classes of stock under different management systems.

4.1.2 Milk Yields

Milk production, like growth, will vary depending on environmental conditions. During the study, farmers in the area reported that they were getting over two litres per cow, but this was after a period of exceptionally good rains. The supplementary fodder given to livestock in the riverine and irrigated areas would suggest that milk yields will be consistently higher than in the surrounding rangelands.

4.1.3 Birth Rates

The herd structure of cattle in the Study Area (Table 2.6) shows that there is an overall effective calving rate of 30.3%, the effective calving rate being defined as the number of animals less than one year old expressed as a percentage of the total number of adult females. This very low figure is probably due to both high calf mortality and a high proportion of barren cows in the herds. The effective calving rate in the farmer's stock (45.2%) is very much higher than in the mobile herds (10.9%). The proportion of adult females in the farmers' herds is lower than in the mobile herds (48.0% as against 58.4%), which might indicate that more barren females are kept with the mobile herds than with the sedentary ones. The level of nutrition in the mobile herds would, for most of the year, also be lower than for the farmers' herds.

Analysis of flock structure data indicates that there is an effective lambing rate of 119%. This rate is high for native sheep under unimproved management and warrants a more detailed investigation than was possible during the study. Little evidence of a high twinning rate was observed and it therefore seems likely that farmers are able to get two lamb crops in three years. If the effective lambing rate is calculated using lambs estimated to be less than six months old, it is reduced to only 26.9%.

4.1.4 Mortality

It was not possible to collect data on the mortality rates of livestock but, like the production parameters, these are likely to vary in different years.

4.2 Offtake

4.2.1 Commercial Slaughter

The only available records of local commercial slaughter are for Marka and Qoryooley districts. Unfortunately it was not possible to obtain data for each separate slaughter house in the Study Area. Data for 1977 are given in Table 4.1.

TABLE 4.1

Official Slaughter Records for Qoryooley (Q) and Marka (M) Districts, 1977

Month	Cattle		Camels		Small stock	
	Q	M	Q	M	Q	M
January	534	600	284	68	114	299
February	198	670	210	102	44	175
March	230	650	193	130	64	67
April	201	304	24	50	44	24
May	148	640	150	309	90	103
June	264	1 220	322	75	74	168
July	183	1 341	96	82	70	172
August	165	370	67	45	62	360
September	130	640	73	30	75	430
October	210	430	86	32	73	320
November	180	413	200	6	40	150
December	310	643	614	8	18	150
TOTAL	2 753	7 921	2 319	937	768	2 418

Source: Regional Veterinary Headquarters, Shalambood.

An analysis of these data, given in Table 4.2, shows that cattle have the highest commercial slaughter offtake rate (7.3% of the estimated population) and that this species accounted for over 63% of the total carcass weight. If the offtake rates for the two districts are assumed to be applicable to the Study Area it means that 4 839 cattle, 103 camels and 78 small stock are killed each year in the eight slaughter houses.

TABLE 4.2

Analysis of Slaughter Data for Qoryooley and Marka Districts

	Cattle	Camels	Small stock
No. of animals slaughtered	10 680	3 256	3 186
Estimated species population[1]	146 500	77 000	66 000
Offtake for commercial slaughter (%)	7.3	4.2	4.8
Assumed average carcass weight (kg)	100	175	15
Total carcass weight for species (tonnes)	1 068	570	48
Species carcass weight as percentage of total carcass weight (%)	63.3	33.8	2.8

Note: (1) Hunting Technical Services Ltd., (1976).

There is considerable variation in the intensity of use of slaughter houses. Those in big villages such as Qoryooley are used every day; in smaller villages they are used only once or twice a week.

The proportion of cattle, camel and small stock total carcass weights for the area is very different from the national average for official slaughter, which is 23.5% cattle, 45.3% camel and 31.2% small stock. It can be seen that cattle are a much more important source of meat in the Study Area than they are in other parts of the country.

Another source of commercial offtake is the Livestock Development Agency (LDA). The agency established an office at Qoryooley in the middle of 1977 and started buying cattle in August. Cattle are purchased on a liveweight basis and are brought over a hydraulic weighbridge. In the first five months of operation the LDA bought 1 243 animals at an average weight of 215 kg (Males = 215.4 $\pm$ 62.82 kg, n = 98; Females = 215.6 $\pm$ 30.93 kg, n = 37). The range in weights for males was 90 to 390 kg and for females 161 to 290 kg.

Cattle purchased by the LDA at Qoryooley are not slaughtered locally, but are either trucked or trekked to Afgooye where they are held for a short time before going on to Mogadishu for slaughter. The average weight loss through trekking the animals to Afgooye is 9 to 10%. Of the cattle bought by the LDA at Qoryooley, 70% were males.

The LDA reports that at the moment people are reluctant to sell their animals on a weight basis for a fixed price, and prefer the traditional auctions of the markets. The LDA have undertaken an extensive campaign to explain the advantages of sale by weight and expect to increase the offtake from the area in the future.

The addition of the LDA purchased cattle to the commercial slaughter figure increases the official offtake rate for the area to 8.1%.

4.2.2 Home Consumption

Cattle are kept primarily for milk rather than meat production. Without adequate storage facilities it is uneconomical for most families to slaughter cattle at home as, in the warm climate, the meat quickly goes bad. There is little or no sun drying of beef in the area, though the technique is widely used for fish.

Estimates given in the Livestock Sector Review (Hunting Technical Services Ltd, 1976) indicate that the national average levels of home slaughter for cattle, camels and small stock are 1.2%, 1.9% and 4.9% respectively. If applied to the Study Area, this represents 795 cattle, 47 camels and 1 188 small stock.

4.2.3 Sale for Export

The most important harbour in Somalia for the export of live animals is Berbera, and the majority of animals exported come from the northern and central parts of the country. Recent improvements to the livestock handling facilities at Mogadishu may change this situation somewhat, as may the proposed expansion of the export carcass preparation process at Kismaayo. At present, however, the export market appears to have little direct impact on the Study Area and the important factors in livestock marketing appear to be the local demand for meat and the requirement for home milk production.

If, in the future, the Government were to lift the current ban on the export of live females there could be a change in strategy. The removal of the ban would create a good market for barren females and would increase the culling of non-productive stock from the local herds.

4.3 Hides and Skins

Hide and skin marketing falls under the control of the Hides and Skins Agency (HASA). The agency has a representative at Marka, but all trading is undertaken by private entrepreneurs who bring the hides and skins to Mogadishu to sell to the HASA. The total numbers of hides and skins sold from Marka and Qoryooley districts are shown in Table 4.3.

TABLE 4.3

Hides and Skin Sales, 1977

	Marka district	Qoryooley district	Total
Cattle hides	7 254	2 546	9 800
Camel hides	363	150	513
Goat skins	6 677	1 399	8 076
Sheep skins	1 339	174	1 513

Source: HASA, Mogadishu

A comparison of these data with the estimated commercial and home slaughter figures for the two districts shows that cattle hides represent 78.8% of the slaughter rate, camel hides only 10.9% and small stock skins 156.5%. The very high figure for small stock skins in relation to slaughter indicates that the area acts as a buying centre for outlying districts.

Hides and skins are either suspension dried or salted; the majority of skins are suspension dried. Most of the larger villages in the area have drying frames.

4.4 Marketing

4.4.1 Live Animals

With the exception of the limited number of cattle bought by the LDA in Qoryooley, the sale of stock is run by the private sector. In each village market there is a section put aside for livestock. Animals are either sold by private agreement or auction. Professional auctioneers receive the verbal bids on behalf of the owner, who has the right to withdraw his animal from the auction if he is not satisfied with the final price offered.

4.4.2 Meat

All the larger villages in the area have a special building in the market which is reserved for butchers. As with the slaughter houses, the standard of hygiene is very low and they merely consist of two concrete platforms under a roof.

There appears to be a considerable demand for meat and the butchers are able to sell all the meat they bring to the market.

The combined figures for commercial and home slaughter indicate that the average daily consumption of meat in the area is approximately 15 g/person/d. This figure is low when compared with the national averages of 100, 80 and 20 g/person/d for people in urban, rural and nomadic populations, given in the Livestock Sector Review.

4.4.3 Milk

Camel and cattle milk is sold in most of the large markets in the area. It is possible to buy both skimmed and whole milk, as well as liquefied butter (ghee).

Milk is brought to the markets from outlying areas in large earthenware pots which are carried by people, donkeys, cattle and even in lorries. It is not known how much milk is brought into the Study Area from the surrounding rangelands, but it must vary considerably with season. During the dry season, cattle are concentrated around the river and milk production will be low. During the rains the animals are spread further afield and production will be high.

It has been shown that approximately 34 500 of the 66 290 cattle in the Study Area are adult females, and that 10 340 of these can be expected to be in milk. If each milking cow yields 2 l/d, the average daily consumption of cows' milk by the human population will be 0.18 l/person/d. Although this will be supplemented by milk from camels, sheep and goats it is very much lower than the national average for cultivators given in the Livestock Sector Review, as 0.5 l/person/d.

4.5 Market Prices

4.5.1 Livestock

Apart from animals bought on a liveweight basis by the LDA, there are no fixed prices for livestock. The LDA pays So. Shs. 2.50/kg liveweight for males and So. Shs. 2.30/kg liveweight for females. The average purchase weight for LDA animals at Qoryooley in 1977 was 215 kg, which means an average purchase price of So. Shs. 537.50 for males and So. Shs. 494.50 for females. The heaviest animal bought was a bull weighing 390 kg, worth So. Shs. 975.

The price of livestock on the free market varies with season and location. The approximate values of six livestock classes are given in Table 4.4. It should be stressed that actual values will vary considerably depending on the age and condition of each animal.

TABLE 4.4

Livestock Prices

Class of stock	Price (So. Shs.)
Cattle	800 to 1 500
Camels	3 000 to 3 500
Sheep	250 to 350
Goats	200 to 300
Donkey	500 to 600
Chicken	8 to 14

The free market price for cattle appears to be higher than LDA prices. A fully grown male in very good condition weighing about 450 kg might fetch up to So. Shs. 1 500 on the free market, So. Shs. 375 more than it would get if sold to the LDA. The liveweight value of such an animal on the free market is approximately So. Shs. 3.33/kg. This, however, is considerably lower than the estimated average liveweight export price of between So. Shs. 5.30 to 5.70/kg, but higher than the LDA local purchase price.

4.5.2 Meat, Milk and Eggs

Beef generally sells for between So. Shs. 10 and 12/kg. The price of the better cuts such as fillet is slightly higher at So. Shs. 13 to 15/kg. Mutton and goat meat is sold for between So. Shs. 12 and 15/kg and camel meat for between So. Shs. 8 and 10/kg.

Liquefied butter (ghee) costs So. Shs. 14 to 20/l. The price of milk varies considerably depending on season and the location of the market. Skimmed cow's milk costs between So. Shs. 0.30 and 0.90/l, while whole milk costs between So. Shs. 1 and 3/l. Camel's milk is generally more expensive and can cost up to So. Shs. 4/l in the dry season.

Eggs cost So. Shs. 0.40 to 0.70 each.

4.5.3 Hides and Skins

Apart from camel hides, the prices paid by traders in the Study Area for hides and skins are considerably lower than the prices paid by HASA to the traders. A comparison of the approximate average prices for hides and skins in Qoryooley and the prices paid by HASA is given in Table 4.5.

TABLE 4.5

Hide and Skin Prices (So. Shs.)

	Price per	Qoryooley		HASA grade			
				I	II	III	IV
Cattle hide	kg	1.00 to 2.00	SD[1]	3.50	3.00	2.50	1.20
			S	4.00	3.25	2.50	1.00
Camel hide	hide	20.00 to 25.00		24.00	18.00	10.00	-
Goat skin	skin	4.50	SD	9.00	6.50	4.00	1.00
			S	8.00	6.50	5.00	1.00
Sheep skin	skin	2.00 to 2.50					

Note: (1) SD = Suspension dried
S = Salted

4.5.4 Fodder

Fodder is sold in bundles weighing approximately 20 kg. The price of a bundle of fresh maize stover is So. Shs. 2.0 to 3.0, and a bundle of freshly cut grass is worth about So. Shs. 3.0.

CHAPTER 5

CURRENT LIVESTOCK PROJECTS

5.1 Introduction

Before making recommendations for the development of livestock in the Study Area and the integration of livestock with the proposed irrigation of the Qoryooley feasibility project, it is necessary to review current developments in the area.

5.2 Central Rangelands Project (CRP)

This project, which is to be funded by IBRD, is still in the planning stage and an appraisal mission from Washington is expected in the early part of 1978. The project will follow the general form of other range development projects of the National Range Agency and proposes improvements in animal husbandry and veterinary services, the development of water supplies through tube wells, the provision of grazing reserves and the establishment of a number of trial ranches.

Although the Central Rangelands project area does not include the Janaale - Buulo Mareerta Study Area, the successful implementation of CRP will be bound to have an effect on its livestock. The provision of reliable grazing reserves, water and animal health facilities away from the riverine areas may reduce the number of stock which at present use the Study Area for dry season grazing. This will result in an increase in the amount of fodder available to resident stock which, if accompanied by control of numbers, would lead to an improvement in the nutritional status of the animals.

5.3 Tsetse Control Project

There are plans to increase considerably the extent of the tsetse fly control operations in the area and preliminary reports have been submitted to the Government concerning the expansion (Ford 1977; Irving and Bourne 1977). The proposed project, which is to be funded by the Arab Fund and IBRD, will be in three phases:-

Phase I - Experimental, survey and pesticide application trials, 1977 - 80

Phase II - Operational, 1980 - 84

Phase III - Mopping up, 1985 - 86

The tsetse control team currently working at Golweyn will be extended to six spray teams and personnel and equipment for research and survey work will be provided.

At the moment the Golweyn team is conducting a pilot project over 100 km^2. They are hand cutting spray lines through acacia thicket and applying Dieldrin (1.8%, at a dilution of 1 : 9) from back-pack sprays.

The operational phase of the project will involve extensive aerial spraying, probably using an ultra low volume endosulfan application. Before the operational phase can be started it will be necessary to collect data on the biology and ecology of the fly, Glossina pallidipes.

The sterile male technique may be used for the 'mopping up' operation of Phase III.

5.4 Cow and Poultry Demonstration Farm

The Ministry of Livestock, Forestry and Range (MLFR) is setting up a Cow and Poultry Demonstration Farm at Buulo Shiikh, near to Qoryooley. The farm, which covers 106 ha, will irrigate fodder crops for dairy cattle and run an egg production unit.

Fifty in-calf cows arrived at the farm in January 1978 from the 21st October Dairy Farm. These cows include pure bred Sahiwal, F_1 Friesians and local cows in calf to Sahiwal and Friesian stock. The farm also intends to use Guernsey stock.

A variety of irrigated fodder crops will be grown, and these include Sudan grass, sorghum, maize, Dolichos lab-lab, alfalfa and other legumes. By the time the cattle had arrived at the farm there had been little development of these fodder crops.

Three thousand chickens were expected to arrive at the farm in February 1978. These birds would probably be White Leghorns and Rhode Island Reds, though there was a possibility of some other breeds, such as Babcocks and Webbfines, being included. The birds will be kept in two deep litter houses and fed a ration prepared by the MLFR at Km 7 in Mogadishu. Eggs and young birds will be sold on the local market.

The main purpose of the farm will be demonstration and training for local people. It is, however, difficult to see how intensive use of irrigated fodder crops can be related to the current husbandry practices in the area, especially in view of the critical shortage of irrigation water that is expected at certain times of the year.

CHAPTER 6

LIVESTOCK DEVELOPMENT PROPOSALS

6.1 Introduction

The future development of livestock must be considered in relation to the fact that virtually all the land in the Study Area is of high agricultural potential. This is in strong contrast with the national situation, where low rainfall, poor soils and limited water supplies indicate that the most suitable land use is extensive livestock production. In view of the overall shortage of land of higher agricultural potential, it is necessary to consider the development of livestock in the area as of secondary importance to the development of irrigated agriculture. Livestock will continue to have an important part to play in the food production systems of the area, but planning will be primarily aimed at increasing agricultural production.

The effect of this strategy is that livestock need to be integrated into agricultural projects. Any increase in the intensity of cropping results in a decrease in the amount of rough grazing available to livestock. There will, however, be an increase in the amount of crop residues available which, if properly managed, could go a long way to compensate for the loss of grazing.

Inevitably, the participants in the projects will retain ownership of their animals and a system of feeding and management which is compatible with more intensive irrigation development will have to be devised.

The implementation of the proposals to develop the irrigation potential of the Janaale-Buulo Mareerta Study Area will take time. No specific proposals are made in this report for the management of livestock in areas which are not developed for irrigation. In some cases these will be developed for irrigation at a later date, but in others, especially around the edge of the Study Area, there will be no irrigation development.

It has been shown in the earlier chapters of this report that the livestock production systems in Qoryooley and Marka districts are complex. There are few basic data on which to plan an extensive livestock development programme and such work is beyond the scope of the present study. There is certainly a need for an integrated livestock development programme, but this should be tackled on a regional, or even catchment, basis rather than by district.

The existing government services dealing with livestock in the area are probably better than in many other parts of the country. However, these services could be improved considerably through better training and organisation, improved funding and equipment and an increase in co-ordination between the different agencies involved.

Proposals for more intensive irrigation throughout the Study Area are included in the Master Plan and a detailed feasibility study is being carried out for the first stage of the development programme in the Qoryooley area. The proposals for livestock development described in this chapter will refer to the Qoryooley area in particular but should provide an appropriate model for development of the other irrigation areas such as Faraxaane and Asayle.

Two livestock development options for the Qoryooley project have been identified. They are, the introduction of a capital intensive and fairly sophisticated system of providing feedlots for villagers' cattle, or alternatively a less capital intensive improvement of the existing system through general upgrading of livestock husbandry and increase in feed availability. These alternatives are discussed and analysed in the following sections. In addition some broad recommendations for poultry improvement are given.

The feedlot alternative entails the establishment of feedlots at village centres which would provide enough feed for villagers' existing holdings of livestock and allow, through the production of irrigated forage, for holdings to be increased on average by two LSU per family.

At present there is little experience in Somalia with this type of production system. Consequently is will be necessary first to develop the system and train staff capable of introducing and operating it at the village level. This development stage would be included in the programme for the pilot farm to be established near Qoryooley town (Annex VI, Part III).

6.2 The Pilot Farm Feedlot

The purpose of the pilot farm feedlot will be to develop suitable techniques for feedlotting animals under local conditions and to train personnel. The cropping pattern proposed for the pilot farm includes 23.5 ha of partially irrigated forage and 47 ha of maize. This would provide adequate feed-stuffs to operate a small experimental feedlot. The total potential forage and maize stover production for the farm in terms of dry matter (DM), total digestible nutrients (TDN) and total digestible protein (TDP) is shown in Table 6.1. The assumptions used to estimate nutrient content are summarised in Table 6.2.

TABLE 6.1

Pilot Farm Nutrient Production (tonnes)

Source	Low production			Medium production			High production		
	DM	TDM	DP	DM	TDN	TDP	DM	TDN	TDP
Maize stover	396	198	7.9	1 386	693	27.7	1 980	990	39.6
Silage	406	203	20.3	406	203	20.3	406	203	20.3
TOTAL	802	401	28.2	1 792	896	48.0	2 386	1 193	59.9

TABLE 6.2

Fodder and Nutrient Production Rates

	Production level	Dry matter (%)	TDN (%)	TDP (%)
Maize stover	* 100% of grain yield	90	50	2.0
	Low: 1 t/ha			
	Medium: 3.5 t/ha			
	High: 5.0 t/ha			
Forage	Average of 65 t/ha fresh weight	25	50	5.0

Note: * Low, medium and high production rates are shown for maize.

The pilot farm will produce enough TDN for over 1 000 livestock units; the level of TDP is slightly lower, and is sufficient for 600 LSU. Not all this fodder could be utilised and some could therefore be offered for sale in the surrounding area.

6.2.1 Development of Husbandry and Techniques

Research into the production of irrigation forage will be undertaken by the agricultural personnel working on the pilot farm. It will also be necessary to investigate efficient and economic methods of storing crop residues and of making and feeding silage.

The correct management of silage will be particularly important, as the village feedlots will depend on silage as the main source of animal nutrition. At present it is envisaged that silage clamps will be constructed with packed coral floors and earth walls, lined with polythene. It will be necessary to test the efficiency of this method, especially from the point of view of air seepage and possible putrefaction.

The pilot farm will be required to test the design of feedlots and establish the intake rates of the basic ration for different classes of stock. It will also need to measure the growth rates and milk yields of livestock on the basic ration and evaluate the advantages of feeding supplementary concentrates.

It should be stressed that the work of the pilot farm feedlot in this respect will need to be directly applicable to the conditions in the village feedlots. The research should take the form of field trials rather than detailed and strictly controlled research. This is not to say that the investigations should not be undertaken with as much care and accuracy as possible, but that the approach and methods should be simple and practical.

6.2.2 Training

The second, though equally important, role of the pilot farm feedlot will be to train personnel in livestock management under local conditions.

The primary training function will be for extension workers for the villages. A short course on poultry husbandry will also be given to the trainees at the poultry improvement unit, which will also be sited on the pilot farm.

The training courses would last one year, thereby giving the trainees experience of a complete agricultural cycle and being sufficiently long to give them exposure to all aspects of livestock husbandry and management.

In order to ensure the practical nature of the training, the trainees will be required to undertake many of the daily tasks in the feedlot. They should also visit other feedlots in the country in order to inspect other methods of production. Throughout their year at the pilot farm the trainee managers will participate in the animal production investigations.

The trainees should be graduates from the Veterinary Training College in Mogadishu, preferably having specialised in animal husbandry.

At the end of their year's training the extension workers should be capable of advising on all aspects of livestock husbandry and forage production and conservation, as well as, with help, being able to set up a village feedlot.

6.2.3 Livestock Numbers

The principal objectives of the pilot farm feedlot cover training, trials and demonstration. It will not be necessary, therefore, to establish a feedlot with a very large capacity and the full production of crop residues and silage from the pilot farm will not be utilised.

A total herd of about 120 cattle and 300 small stock will be sufficient for the purpose. Thirty cattle will be young male stock which will be used for fattening; the remainder will be cows and followers. Initially local cattle will be used, as these will be the type of cattle in the village feedlots but, in time, a proportion will be upgraded to Sahiwal crosses.

Small stock will also be local animals, though experiments in upgrading local goats with imported Swiss Toggenburg should be tried.

6.2.4 Pilot Farm Feedlot Management

The 30 young male cattle, which would be a mixture of steers and bulls, will be fed the basic ration and three different levels of concentrates, each level being fed to 10 animals. This will enable the feedlot to investigate the effects of supplementary concentrates and give the trainees a demonstration of their value. The same system will be used for the cows, their production being measured in terms of milk production. There will be 30 cows and 40 followers.

All animals will be eartagged and weighed once a month.

There will be approximately 120 sheep and 150 goats, 30 of each group being young stock for fattening, 30 being in-lamb and in-kid females and the remainder being followers. Like the cattle each group will be split into three groups of 10 animals, each group being fed a different level of concentrates to supplement the basic ration.

6.2.5 Staffing

The livestock manager at the pilot farm will divide his time between the pilot farm and the village feedlots, or extension work. The rate of development means that the first year of pilot farm activities can be supervised by the manager full time. After one year the village feedlots will start operations at the rate of one every six months if implemented.

The pilot farm will have two trainee managers. These trainees will be required to help with all aspects of the feedlot. The feedlot will also require two labourers and a clerk/typist.

6.2.6 Costs

Detailed estimates of capital and recurrent costs are given in Appendix A. They are summarised in Table 6.3.

TABLE 6.3

Summary of Pilot Farm Livestock
(So.Shs.) 1977 prices (1)

Capital costs:		
Buildings	440 000	
Machinery	171 000	
Livestock	48 100	
TOTAL capital costs:	659 100	
Recurrent costs:		
Salaries	171 000	81 000 (2)
Machinery operation	81 250	
Building maintenance	8 800	
Veterinary, etc.	2 000	
Sub-total	263 050	173 050 (2)
Livestock purchases	114 970	
Feedstuffs	103 500	
Sub-total	218 470	
TOTAL recurrent costs:	481 520	391 520 (2)
Returns:		
Cattle	200 400	
Sheep	33 600	
Goats	32 000	
TOTAL returns:	266 000	
Net costs:	215 520	125 520 (2)

Notes: (1) See Appendix A
(2) Salary levels from year 8.

6.2.7 Returns

The pilot farm feedlot is not intended to be a commercial venture and has been designed for the role of training and investigation. However, the feedlot will produce a certain number of marketable animals each year and the sale of these can be used to defray some of the costs (see Table 6.4).

TABLE 6.4

Estimated Livestock Costs and Values

	Class of stock	So.Shs.
A.	Purchases	
	Heifers	900
	Store cattle	770
	Breeding ewes	350
	Breeding rams	400
	Store sheep	300
	Breeding nannies	300
	Breeding billies	400
	Store goats	250
B.	Sales	
	Cull cows	900
	Fattened cattle	1 500
	Cull ewes	300
	Fattened sheep	350
	Cull nannies	250
	Fattened goats	300

6.3 Village Feedlots

The implementation of irrigation in the Qoryooley project would mean that the opportunities to graze livestock in the area would be limited to those periods between seasons when damage to crops would not be important. The establishment of a feedlot system at villages would facilitate the keeping of livestock and

ensure that adequate forage would be available. The main source of forage would be irrigated fodder crops, crop residues and grass cut from field edges, canals and bunds. In this section, a feedlot system which fits in with the general agricultural plans is described and a comparison of the likely costs and benefits of such a system made. It is emphasised, however, that the proposals at this stage can only be tentative until a system of feedlotting has been developed, tried and tested on the pilot farm.

6.3.1 Forage Availability

The cropping patterns for the Qoryooley project will include maize, upland rice, sesame and forage. The first three crops all produce utilisable residues but, due to the fact that post-harvest processing of rice and sesame will take place off the farm, most of these residues are not immediately available.

The main source of crop residues will be maize stover. Cotton seed cake, sesame cake and rice bran will all be available locally, but at commercial prices. Maize stover and silage made from the irrigated forage will form the basic ration which would be fed to livestock. This can be supplemented as required by locally purchased concentrates.

Using the assumptions on nutrient content given in Table 6.2, the maximum amount of available fodder is estimated to be 20 966 t dry matter (DM) of which there would be 10 482 t TDN and 790 t TDP (Table 6.5).

These nutrients will be produced by 755 ha of forage, which will be partially irrigated in the gu season, and 755 ha of maize in the gu season and 1 510 ha of maize in the der season (Qoryooley cropping pattern Annex VI, Section 3). All calculations include the area served by canal G.2 as part of the Nimcooley farm.

Additional high fibre residues will be available from cotton stalks and rice straw. Both these residues are of low feeding value and would only be used if absolutely necessary. Furthermore, the high potassium levels in these residues make it desirable to burn them in the fields to return potassium to the soil rather than feed them to animals.

If these residues were used they would yield between 5 000 and 7 000 t of TDN and between 240 and 390 t of TDP.

A further source of livestock nutrients will come from the grass growing by the edges of canals. Approximately 4% of the gross area will be covered with high production riverine grassland, yielding up to 20 t of green matter/ha/year. This will provide 3 600 t of grass giving 540 t of TDN and 54 of TDP. The use of this grass is a well established practice in the area and it will be left to the villagers to continue to make use of this valuable source of fodder to supplement the feed available at the feedlot.

TABLE 6.5

Livestock Nutrient Production of Qoryooley Project (tonnes)

Source	Maize stover	Irrigated forage	Total
Low Production:			
DM	1 715	12 389	14 104
TDN	957	6 194	7 051
TDP	34.3	619.4	653.7
Medium Production:			
DM	6 004	12 389	18 393
TDN	3 002	6 194	9 196
TDP	120.1	619.4	739.5
High Production:			
DM	8 577	12 389	20 966
TDN	4 288	6 194	10 482
TDP	171.5	619.4	790.9

The maximum combined production of residues (excluding cotton and rice), irrigated forage and riverine grass would amount to around 11 000 t of TDN and 845 t of TDP. This will be enough to support up to 7 500 LSU. This could be increased to 10 000 LSU if concentrates were used to supplement the digestible protein level.

The composition of each family herd will be left to the family. The high proportion of cattle in the present livestock biomass would indicate, however, that the majority of animals would be cattle. Possible permutations for the composition of the average 5.0 LSU per family are given in Table 6.6.

TABLE 6.6

Permutations for Composition of 5.0 LSU Family Quota

Number of animals		
Camel	Cattle	Small stock
4	-	6
2	3	2
1	4	7
-	6	2
-	5	10
-	4	18
-	3	26
-	2	34

6.3.2 Number of Livestock

The forage available in the Qoryooley area after implementation of the project, would support a total herd of some 10 000 LSU or up to an average of 5.0 LSU per family. This assumes that 20% of the cultivable area would be devoted to partially irrigated forage crops, millet and cowpeas, in the gu season. This is possible if planting is confined to the latter half of April and if the harvest is completed by the first week in July. Should the feedlot alternative prove attractive, the inclusion of irrigation forage crops in the cropping patterns to the limit of 20% should be strongly encouraged.

The distribution of the potential livestock herd of 10 000 LSU between villages is projected in Table 6.7.

TABLE 6.7

Number of Livestock Units (LSU) per Village

Farm unit	No. of families	Projected total LSU(1)	Percentage
Murale	185	925	9.16
Tawakal	267	1 335	13.22
Garas Guul	265	1 325	13.13
Shamaan	208	1 040	10.30
Tugarey	241	1 205	11.94
Nimcooley (2)	235	1 175	11.64
Gayweerow	306	1 530	15.16
Jasiira	312	1 560	15.45
TOTAL	2 019	10 095	100.00

Notes: (1) 5.0 LSU/family
(2) Including area served by distributary canal G.2.

6.3.3 Organisation and Husbandry

The village feedlots will provide a feeding and management service for livestock owners involved in the project. The feed provided would comprise silage and maize residues. The feedlots will vary in size (1 000 - 1 500 LSU) depending on the number of families and their livestock holdings, attached to each village.

It is quite likely that each village co-operative would be able to meet its requirements for irrigated forage (for silage making) and for crop residues. The silage would be made in clamps located around the village and each clamp would have its own crop storage facilities and feeding yards. The whole complex for each village, however, would be organised by one manager. The design of feeding yards would be such that small stock, as well as cattle, could eat and drink. 'Loafing yards' would be constructed to allow owners to leave their livestock there during the day if the owners did not wish to take them back to their homestead until evening. Morning and evening milking of dairy cows would be done in the villages.

It is most likely, however, that the villagers' animals would spend the majority of the day in the villages themselves, going to the feedlot to eat their ration. It will have to be seen whether one feed per day will suffice, or whether two will be necessary. The feedlots would be situated very close to each village and therefore the time required to go to the feedlot would be minimal. It is assumed that the twice-a-day regime would be preferable to once-a-day. Ideally animals should be taken to the feedlots in the morning and again in the evening. There may be some resistance to this from the villagers as, traditionally, they do not take their animals out to feed until well towards midday for fear of tsetse fly. The journey from the village to the feedlot would be as short as possible and the problem of tsetse fly removed by spraying or clearing the area between the village and its feedlot. The system of communal herding currently practised would probably continue with a group of families employing a professional herdsman to take their animals to the feedlot each day.

Each feedlot would have a store of basic concentrate feeds which could be purchased by owners and fed to stock. These purchases could be added to the owners' monthly feedlot account. Mineral licks would also be available at feeding and loafing yards.

It is expected that the majority of stock in the villages would be cows and followers, kept for home milk consumption. The basic ration offered at the feedlot would help increase the level of milk production and calf survival.

Livestock owners would be encouraged to upgrade their cattle through the use of the government artificial insemination (AI) service which is based at Afgooye. The use of Sahiwal semen would increase both milk production and growth from the resulting cross bred animals. As the experience and skill of the villagers in the use of the facilities of the feedlots increased they would be able to continue to upgrade their animals by increasing the proportion of Sahiwal blood in their stock.

There will be compulsory vaccination against all major diseases for all animals and a range of veterinary drugs will be available, at cost price, in each feedlot. The part time services of a veterinarian will be provided. The cost of the veterinarian will be included in the charge to livestock owners for the provision of basic services provided by the feedlot.

The day to day running of the feedlot would be the responsibility of the manager who would have received at least one year training at the pilot farm. His responsibilities would include both the organisation of the feeding at the yards and also the making of silage and collection of crop residues. He would also organise the provision of AI and veterinary services with the appropriate government agency.

These plans for village feedlots contain no long-term production policy, apart from the basic provision of food for livestock. The feedlots are designed only to meet the requirements of individual owners. There is, however, no reason why the strategy of each feedlot should remain at this basic level, for the facilities offer the potential for more developed production systems.

Whether this potential is realised will depend on the villagers themselves, though they should be given every encouragement to expand the scale of their production. One way in which this could be done would be for all the livestock owners in one village to pool their resources. The feedlot would then be able to operate as a single production unit and could be organised for one or two purposes, such as milk production and small stock fattening. This would greatly increase the efficiency and profitability of production, the benefits of which would accrue directly to the villagers themselves.

6.3.4 Charges for Services

Although the average family livestock holding could eventually reach 5.0 LSU, the distribution of holdings is quite likely to remain uneven as it is at present. Thus some families will have relatively large herds of livestock requiring forage at the feedlots whilst others will not have any. It is important, therefore, that the costs of establishing and operating a feedlot component of the project are shared by those using it. It is proposed, therefore, that charges will be levied on users on the basis of the number of LSUs fed per month. The charges would be fixed at a level that would cover all construction and operating costs. An indication as to how stock of different ages could be converted to LSUs is shown in Table 6.8.

TABLE 6.8

Conversion Factors for LSU Charges

Age	LSU Camels	LSU Cattle	LSU Small stock
Full grown	1.5	1.0	0.2
Immature	1.0	0.6	0.1
Milking calf, kid or lamb	0	0	0

Although equal use of the system may not be made by all farmers, all of the farmers in the co-operative would be expected to grow an area of forage crops which would be sold to the co-operative for ensiling and use in the feedlot. The price will be fixed at a level which would adequately compensate and provide incentive to the farmers for growing these crops.

6.3.5 Staffing of Village Feedlots

The staffing of each village feedlot will depend on the size of the village, the larger feedlots requiring more staff than the smaller ones. An indication of the staff complement which would be required is given in Table 6.9. If possible all the junior staff will be recruited from each village.

TABLE 6.9

Staff Requirements of Village Feedlots

Village	Manager	Clerk	Labourers
Murale	1	1	2
Tawakal	1	1	3
Garas Guul	1	1	3
Shamaan	1	1	2
Tugarey	1	1	3
Nimcooley	1	1	3
Gayweerow	1	1	4
Jasiira	1	1	4
TOTAL	8	8	24

6.3.6 Costs

Detailed estimates of capital and recurrent costs of a village feedlot are given in Appendix A and summarised in Table 6.10.

TABLE 6.10

Summary of Village Feedlot Costs
('000 So. Shs.)

Capital Costs:		
	Buildings	6 695.0
	Machinery	1 088.0
	Equipment	78.5
	TOTAL	7 861.5
Recurrent Costs:		
	Salaries	312.0
	Machinery	514.8
	Maintenance and sundry	149.75
	Food	3 622.5
	TOTAL	4 599.5

6.3.7 Benefits

Benefits to the scheme have been calculated on the basis of a family livestock holding of 5.0 LSUs. The herd composition, technical coefficients and output are shown in Table 6.11 and a summary of these returns is given in Table 6.12 with a comparison of the costs and returns.

TABLE 6.11

Estimated Benefits of Village Feedlot: per 100 Families

		Present situation	After development
(1)	Total LSU owned	318	500
(2)	Numbers of animals:		
	Cattle	350	550
	Camels	13	20
	Sheep	108	170
	Goats	20	31
(3)	Milk production:		
	Number of adult females (constant at 48% of herd)	168	264
	Calving rate (%)	45	60
	Number of lactating cows	76	158
	Milk production rate per lactating cow	1.5 l for 180 days = 270 l/year	2.5 l for 200 days = 500 l/year
	Total annual milk production (l)	20 520	79 000
	Total value of milk @ So.Shs 2/l (So.Shs.)	41 040	158 000
(4)	Cattle offtake:		
	Sale of commercial slaughter (%)	7.3	12
	Number of animals sold	25	66
	Average value of sale animals (So.Shs.)	800	950
	Revenue from cattle sales (So.Shs.)	20 000	62 700
(5)	Small stock offtake:		
(a)	Home consumption:		
	Home consumption rate (%)	4.9	6
	Number of animals consumed	6	12
	Value of animals consumed (So.Shs.)	250	275
	Value of home consumption (So.Shs.)	1 500	3 300
(b)	Commercial offtake rate (%)	4.8	15
	Number of animals sold	6	30
	Value of animals sold (So.Shs.)	250	300
	Value of commercial sales (So.Shs.)	1 500	9 000

TABLE 6.12

Village Feedlot: Returns per 100 Family Households (So.Shs.)

	Value	No.	Total
Cattle:			
Milk (l)	2	79 000	158 000
Offtake	950	66	62 700
Small stock:			
Home consumption	275	12	3 300
Sales	300	30	9 000
TOTAL			233 000

Qoryooley project with 2 019 family households:

Gross return	4 704 270
Less recurrent costs (Table 6.10)	4 599 050
Net margin	105 220

6.3.8 Conclusion

Despite the considerable advantages of the feedlot alternative in increasing gross returns four-fold, the running costs of the scheme are far too high leaving a net margin of only So.Shs. 105 000, only 2.5% of the gross return. Over half the recurrent costs are for concentrates and it is possible that these costs could be considerably reduced when more is known of local possibilities of forage production and conservation.

6.4 Improved Existing Systems

6.4.1 Introduction

In this system a mixture of direct and zero grazing is envisaged. Each participant in the scheme would keep his stock in the village and feed them crop residues, grass cut from canal and river banks, and possibly fodder crops grown under partial irrigation in the gu season. This could be supplemented by purchased concentrates. Although zero grazing would be the basis of the system, cattle would also be herded within the irrigated areas to clear up crop residues and grasses after harvest when little damage could be done to growing crops. Similarly cattle could be herded in the non-irrigated areas. This alternative would aim at improving the level of nutrition of existing livestock and allow some flexibility for increasing herd size if desired. It would avoid the high capital and operating costs implicit in the feedlot system.

6.4.2 Source of Livestock Nutrition

Within the communal or co-operative holding the individual's share would amount to the production from 1.875 ha, the other 0.125 ha being the household plot. This area under the proposed cropping pattern has been used to indicate the forage available to maintain a family's livestock herd. A breakdown of the areas of crops per 1.875 ha is given in Table 6.13. It should be noted, however, that the amount of forage crops grown would be voluntary, but that 0.4 ha per 2 ha or 20% of the cultivated area would be the maximum that could be accommodated.

The yields of utilisable crop residues and forage will vary, depending on the skill of the farmers. Table 6.15 shows estimated yields at medium and high levels of production.

TABLE 6.13

Cropped Areas for 1.875 ha (1)

Crop	Area (ha)	
Maize	0.75	Double crop
Cotton	0.66	Single crop
Upland rice	0.75	Double crop
Sesame	0.47	Single crop
Forage	0.38	Single crop
TOTAL	3.01	

Note: (1) Assumes a family would be entitled to forage production and crop residues from about 1.875 ha.

Each 1.875 ha of mixed crop would produce between 5.5 and 6.5 t of TDN and 0.39 and 0.42 t of TDP each year if the maximum area of forage crops was grown. The bulk of these nutrients would come from maize stover and the irrigated forage. These nutrients are sufficient to feed 5 or 6 LSU in TDN, but only 4 LSU in TDP.

A further source of nutrients will come from grass growing along the edges of canals and the river. Within the Qoryooley project area this should yield 3 600 t (fresh weight) of good fodder. This will produce a further 540 t of TDN and 54 t of TDP. Assuming that this resource is spread equally between all participating farmers it would add 0.3 t of TDN and 0.03 of TDP to the annual amount of nutrients available for each farmer's livestock.

6.4.3 Livestock Numbers

The present average livestock ownership rate in the area is 3.14 LSU per family. The estimates of nutrient availability show that, if the maximum area of forage crops were grown, there would be sufficient forage to increase this to 5 LSU per family. A breakdown of potential livestock ownership by village is given in Table 6.14, allowing for ownership rates of both 5 LSU and 4 LSU per family.

The table also shows the number of cattle, using the present population rate of over 90% of the livestock biomass.

TABLE 6.14

Potential Village Livestock Population

Village	No. of families	Total LSU (1)	Total LSU (2)	No. of cattle (3) (2)	No. of cattle (3) (2)
Murale	185	925	740	1 065	852
Tawakal	267	1 335	1 068	1 537	1 229
Garas Guul	265	1 325	1 060	1 525	1 220
Shamaan	208	1 040	832	1 197	958
Tugarey	241	1 205	964	1 387	1 110
Nimcooley (4)	235	1 175	940	1 353	1 082
Gayweerow	306	1 530	1 224	1 761	1 409
Jasiira	312	1 560	1 248	1 796	1 436
TOTAL	2 019	10 095	8 076	11 621	9 296

Notes: (1) 5 LSU per family assuming maximum area of forage produced.
(2) 4 LSU per family.
(3) 92.1% of the total LSU; 0.8 LSU per animal.
(4) Including area served by distributary canal G.2.

6.4.4 Fodder Management

If properly managed, the crops grown by the smallholders will supply sufficient nutrient to support the present number of animals and allow for a small increase.

The more nutritious crop residues, rice bran, cotton seed cake and sesame cake, have not been included in these calculations (Table 6.15) as the crops will be processed away from the farms. These residues will be available to smallholders, but they will need to purchase them on the open market.

Irrigated forage would be the most important source of livestock feed. This crop will be harvested only once a year, during June and July. Part would be zero grazed and part would be conserved as hay. The weather during this period is not ideal for making hay, but because of the small quantities involved this method of fodder conservation would be preferable. Each farmer could produce up to 7 t of hay or 10 families communally produce 70 t. This would be stacked for feeding to stock throughout the year.

TABLE 6.15

Production of Crop Residues and Forage (quintals) for 1.875 ha of Mixed Crops

Crop	Fresh weight yields (quintals/ha)		Area cultivated (ha)	Total dry matter		Total TDN production				Total TDP production			
	Medium	High		Medium	High	Medium	%	High	%	Medium	%	High	%
Maize (stover)	35	50	0.94	29.5	42.2	16.2	29	23.2	35	0.59	15	0.84	20
Cotton (stalks)	10	15	0.66	5.9	8.9	2.3	4	3.6	5	0.12	3	0.18	4
Upland rice (straw)	25	30	0.75	16.9	20.3	7.2	12	8.5	13	0.10	3	0.12	3
Sesame (straw)	5	5	0.28	1.2	1.2	0.5	1	0.5	1	0.03	1	0.03	1
Forage	650	650	0.38	60.9	60.9	30.5	54	30.5	46	3.05	79	3.05	72
TOTAL						56.6		66.2		3.86		4.22	

6.4.5 Livestock Husbandry

(a) Housing

All livestock will be kept in the villages. Most farmers have an area adjoining their house where livestock presently spend the night and the first part of the day. These would require little modification, the main modification being some sub-division to separate the animals and feeding troughs. Those who do not have any special enclosures for the animals would need to construct suitable pens for their stock.

The proximity of livestock pens to houses poses certain possible health hazards due to the build-up of flies. These can be minimised by thorough clearing and the use of insecticide sprayed in the breeding area of the flies. The pens should be cleaned out at regular intervals. The manure could be used to fertilise the houseplots.

(b) Feeding

All animals would be fed in their pens. The wasteful practice of ground feeding would be discouraged and, if concentrates are being used, animals would be fed out of feeding troughs. There is a tradition of feeding crop residues, cut grass and concentrates (mainly sesame cake) and therefore the stall feeding of cattle will not represent too great a change in present husbandry practices.

(c) Water

There will be no water facilities for livestock in the villages. Animals in the southern villages, Murale, Nimcooley, Gayweerow and Jasiira will be able to drink from canals or the river. The three northern villages, Tawakal, Garas Guul and Tugarey, are too far away from the river to be able to walk there each day when the canals dry up. It will therefore be necessary to fill night storage reservoirs near these villages for the dry period and pump water out of the reservoir into troughs.

Livestock will be watered once a day. All animals should be herded from the village straight to the watering point and then herded back again. Care must be taken during this watering period to make sure animals do not stray and damage crops.

6.4.6 Livestock Extension Unit (LEU)

The present level of animal production in the area is not high. This is due to poor nutrition and husbandry and low genetic potential. It has been shown that, if properly managed, irrigated forage and crop residues will give the animals a sound nutritional base. The potential of this nutritional resource can only be fully realised if the animals are properly looked after. It is therefore proposed that a small extension unit, which would provide livestock owners with advice and demonstration in animal husbandry, should be established.

Once sound management and husbandry practices have been established it will be possible to start to upgrade the genetic potential of the stock. There is little value in attempting to upgrade local stock while the level of husbandry is low.

(a) Extension Methods

The Livestock Extension Unit will work with the smallholders and show them methods of improving livestock production. The unit will cover the fields of animal feeding, housing and health as well as culling, AI methods of breeding, and hides and skins. The main approach of the unit will be to select a few stock owners in each village, concentrate efforts on them and use them as models to demonstrate the value of improved animal husbandry. By doing this, all demonstration will be in the villages themselves, which will enable the villagers to have first-hand experience of the effects of the improvements.

(b) Feeding

The extension agents would help the farmers in planning their year's forage supplies. This is especially important in view of the fact that the irrigated forage is only harvested once a year and then has to be conserved and stored for feeding throughout the year. The agents should explain the value of having fewer, more productive animals rather than a large number of unproductive animals. The extra energy demands of pregnancy and lactation should be explained to the smallholders and the importance of adequate nutrition for young stock should be emphasised.

The agents will help in the design and construction of simple feeding troughs which can be made out of local materials. The value of supplementary minerals and concentrates should be demonstrated and, if necessary, the agents should help villagers organise a purchasing scheme for these supplements.

The villagers should be encouraged to grow some perennial fodder crop, such as Napier grass (Pennisetum purpurem) or Sudan grass (Sorghum arundinaceum var. Sudanense) around the edges of their irrigated houseplots. If this was successful it would reduce their dependence on irrigated forage crops. It would also mean that livestock had a regular supply of fresh forage apart from the grass along the canal and river banks.

The extension agents should help farmers establish further stands of Napier or Sudan grass along the edges of canals. The methods used will have to be mainly trial and error, but this could be a further valuable source of animal nutrition.

It will take a while before the success of these perennial fodder grasses can be evaluated. It is possible, however, that they may eventually remove the necessity for the annual irrigated forage.

(c) Livestock Housing

Many farmers already have enclosures which, with minimal modification, would be suitable for stall-fed animals. Enclosures are made out of local materials and the extension agents would give livestock owners advice on the sub-division of these pens to suit the sort of animals they have.

The cattle of the area are tractable and easy to handle. It would, however, be necessary for each village to build a small crush when it starts to use the AI service.

(d) Animal Health

The livestock extension agents would liaise closely with the Government's Department of Animal Health in the Ministry of Livestock, Forestry and Range. The agents would assist in the organisation of vaccination programmes in the villages and would ensure that all stock were covered by vaccination. The livestock owners would be shown methods of hand dressing, worming, the use of tick grease and other basic health practices.

(e) Culling

Owners would be encouraged to sell unproductive animals. It seems likely that there would be a very high proportion of barren cows in the population and the advantages of getting rid of such animals should be explained. Owners would be encouraged to keep simple breeding records of their stock and shown how to use these records in assessing the performance of their animals. Breeding records would also be invaluable if the smallholders start to use AI services.

(f) AI Services

The Government runs a small AI centre at Afgooye. At the moment the centre only has Friesian bulls, but there are plans to enlarge the centre to include the production of Sahiwal semen. Sahiwal crosses would be well suited to the area and should increase both the milk yields and growth of local cattle.

At present the Government provides AI services free of charge, but if the Qoryooley project makes extensive use of AI services it may be necessary to charge a small fee to cover transportation costs.

The semen produced at Afgooye can only be stored for 72 hours. The centre, however, is sufficiently close to the project for this to pose no problem.

Once the standard of husbandry is sufficiently high the LEU could advise on the use of the Government's AI services. They could help to arrange visits by inseminators and co-ordinate them so that a number of villages can be covered in one visit.

(g) Hides and Skins

Extension agents will show livestock owners simple methods of suspension drying hides and skins. If sufficient hides and skins are produced in the villages the agents should organise the construction of drying frames through the Hides and Skins Agency (HASA).

(h) Staffing and Equipment

When the Qoryooley project is fully developed, the LEU would require three extension agents. Two agents will be specialists in animal husbandry and the third in animal health. The extension agents will be graduates from the Veterinary Training College in Mogadishu.

Each agent will be given a motor cycle and they will have a small office at the project headquarters.

6.4.7 Costs

Detailed cost estimates are given in Appendix A, Tables A.6 and A.7. They are summarised in Table 6.16.

TABLE 6.16

Summary of Livestock Improvement Project (So. Shs.)

Capital Costs	42 000
Recurrent Costs:	
A. Extension agents etc.	38 300
B. Increased food costs	680 000
Total	718 300

	per 100 families	Project Area[1]
New output	147 500	2 978 025
Output before project	64 040	1 292 968
Increased revenue	83 460	1 685 057
Net benefit	47 883	966 757

Note: (1) Excludes pilot farm area to families. Requires 2 019 families.

6.4.8 Potential Benefits

The potential benefits are shown in Table 6.17 with the returns from a 100 family unit in Table 6.18. Table 6.16 summarises the project, indicating the net benefit of the improvement. The output shows an increased benefit per family of about So. Shs. 500 before servicing capital.

TABLE 6.17

Estimated Benefits from Livestock Improvement Project: per 100 Families

		Present situation	After development
(1)	Total LSU owned	318	400
(2)	Number of animals:		
	Cattle	350	441
	Camels	13	16
	Sheep	108	136
	Goats	20	25
(3)	Milk production:		
	Number of adult females (constant at 48% of herd)	168	211
	Calving rate (%)	45	55
	Number of lactating cows	76	116
	Milk production rate per lactating cow	1.5 l for 180 days = 270 l/year	2.0 l for 200 days = 400 l/year
	Total annual milk production (l)	20 520	46 400
	Total value of milk @ So. Shs. 2/l	41 040	92 800
(4)	Cattle offtake:		
	Sale of commercial slaughter (%)	7.3	12
	Number of animals sold	25	53
	Average value of sale animals (So. Shs.)	800	900
	Revenue from cattle sales (So. Shs.)	20 000	47 000
(5)	Small stock offtake:		
	(a) Home consumption:		
	Home consumption rate (%)	4.9	6
	Number of animals consumed	6	10
	Value of animals consumed (So. Shs.)	250	260
	Value of home consumption (So. Shs.)	1 500	2 600
	(b) Commercial sales:		
	Commercial offtake rate (%)	4.8	10
	Number of animals sold	6	16
	Value of animals sold (So. Shs.)	250	275
	Value of commercial sales (So. Shs.)	1 500	4 400

TABLE 6.18

Livestock Improvement Project: Returns (1) per 100 Families

	Value	No.	Total (So. Shs.)
A.			
Cattle:			
Milk	2	46 400	92 800
Offtake	900	53	47 700
Small stock:			
Home consumption	260	10	2 600
Sales	275	16	4 400
Return per 100 families			147 500
B. Before project situation			
Cattle:			
Milk	2	20 520	41 040
Offtake	800	25	20 000
Small stock:			
Home consumption	250	6	1 500
Sales	250	6	1 500
Return			64 040
Increased revenue from project/100 families			83 460
Increased revenue from project/2 019 families			1 685 057

Note: (1) Assumes 4 LSU per family after implementation.

6.5 Poultry Improvement

Although poultry are kept in all villages, the birds and their eggs are very small and the level of production is low. The results of the livestock survey (Chapter 2.7.1) showed that 80.4% of households kept chickens and total fowl population in the Study Area was approximately 120 000 birds. There are approximately 8 000 birds in the Qoryooley Project Area. These birds are of poor quality and much could be done to improve the level of production.

The broad objectives of a poultry improvement programme would be to increase egg and meat production by making improved strains of stock available and giving advice on better management and husbandry. Although the present husbandry of poultry is poor, the main constraint on production is likely to be genetic. Unlike many other classes of livestock it is possible to obtain exotic strains of chickens which can increase production, even under poor management.

6.5.1 The Programme

The programme would enable the establishment of a breeding flock of improved but hard poultry. Young birds will be sold to people in the villages and would consequently upgrade indigenous birds. The Black Austrolop would be a suitable breed for this purpose.

The programme would be based on the pilot farm of the Qoryooley Project Area. Apart from administrative advantages, this location would aid the demonstration of improved husbandry techniques to project personnel undergoing training on the farm.

The initial batch of birds would be day-old chicks air freighted from Europe. These would form the nucleus for the breeding stock.

About 200 six week old birds would be produced per week. The high mortality of day-old chicks would make it necessary to keep birds until six weeks old before distributing them to farmers.

This production could be achieved by 100 breeding hens and 10 males. It is estimated that each hen would lay about 200 eggs per year and have an effective productive life of one year, having started to lay at 6 months old. At this level of production the unit will produce 20 000 eggs per year, a much higher figure than the estimated output of young birds. This allows for the replacement of breeding stock, an 80% hatching rate and chick mortality. Any eggs produced in excess of breeding requirements could be sold in the local market.

6.5.2 Buildings and Equipment

The breeding house, which would hold 110 birds, would need to be vermin-proof and well ventilated. If a galvanised roof is used this will need to be covered with thatching to reduce the heat inside. The floor should be made of concrete. The breeding house will be 6 m^2 x 6 m^2.

The rearing houses will hold 400 birds each and will be of the same design as the breeding house. Four rearing houses will be required to allow each house to be thoroughly cleaned and disinfected after use. Each rearing house would have a central partition to allow the birds hatched each week to be separated.

Other buildings would comprise an office, food store and general store, and an incubator room, wash room and egg store.

Eight incubators, each with a capacity of 120 eggs and four 150 W electric light bulbs would be required. Other equipment will include nest boxes, drinking troughs, feeders, veterinary and office equipment.

6.5.3 Staffing

The programme will be run by an Animal Health Assistant who will be required to have specialised in animal production. The animal health assistant will be required to do his own clerical work. Two labourers would also be required.

6.5.4 Poultry Food

Chicken food can be purchased from the Ministry of Livestock, Forestry and Range in Mogadishu. Chick, layer and grower rations are available, though apart from the rearing of a few breeding birds the project will mainly use chick and layers' mash.

The composition of each ration is given in Table 6.19.

TABLE 6.19

Composition of Chicken Rations (Parts)

	Chick	Growers'	Layers'
Pre-mix	45.5	44.5	45.5
Maize	200	150	75
Wheat flour	50	50	50
Wheat bran	50	125	150
Sesame cake	50	25	50
Fish meal	25	-	50
Meat and bone meal	25	25	20
$CaCO_3$	-	2.5	7.5

Source: Livestock Fattening Unit, MLFR, Mogadishu.

6.5.5 Transport

The movement of young birds and surplus eggs to the appropriate market will have to be by public transport.

6.5.6 Location and Scheduling

The programme would be attached to the pilot farm of the Qoryooley project and its activities would start at approximately the same time. The initial batch of chicks will start laying six months after arrival and the first six week old birds for distribution will be available nine months after the start of the project.

6.5.7 Costs

A breakdown of the capital and recurrent costs of the unit is given in Appendix A, Tables A.8 and A.9. A summary of costs is shown in Table 6.20.

TABLE 6.20

Summary of Capital and Recurrent Costs (So. Shs.)

Capital:	
Buildings	280 800
Equipment	18 500
Poultry	910
Total	300 210
Recurrent:	
Salaries	16 000
Food	16 675
Transport	2 500
Maintenance	8 466
Total	43 641

6.5.8 Production and Financial Returns

During the first year the unit will only have three months of active production and will produce 2 400 six week old birds for distribution and approximately 1 800 surplus eggs. Each subsequent year will produce 10 400 six week old birds and 7 800 surplus eggs.

As the project develops, and the demand for young improved birds is assessed more accurately, it will be possible to alter the young bird : surplus egg ratio as required.

Six week old birds from the project could fetch up to So. Shs. 8 each. It is estimated that the average price for surplus eggs will be 60 cents each.

The returns to the programme are shown in Table 6.21. Table 6.22 shows a net returns of So. Shs. 44 239 with an internal rate of return of 12% over 20 years.

TABLE 6.21

Potential Annual Returns to Poultry Improvement Unit (So. Shs.)

	Unit price	Year 1		Year 2 onwards	
		No.	Total value	No.	Total value
6 week old birds	8	2 400	19 200	10 400	83 200
Eggs	0.60	1 800	1 080	7 800	4 680
Total			20 280		87 880

In the first year the total returns will be So. Shs. 20 280; from year 2 onwards they will be So. Shs. 87 880.

TABLE 6.22

Summary of Poultry Improvement Programme Costs (So. Shs.)

Capital	300 210	
Output	87 880	at maturity (2nd year)
Direct costs	43 641	
Net return	44 239	

Internal rate of return 12% over 20 years.

6.5.9 Benefits

The poultry improvement programme would increase the levels of poultry production, both for eggs and meat in the area. Due to the number of birds produced, the effect of the project would extend beyond the Qoryooley project. The unit would also allow a comparison to be made between the Black Australop and the breeds that would be kept at the MLFR farm at Buulo Shiikh.

6.6 Conclusions

Three proposals for livestock improvement for the project have been made; two are alternatives for the village livestock and the third a self-contained poultry improvement scheme. It is proposed that the poultry improvement scheme and the livestock improvement programme should be adopted as being the best methods of improving livestock returns.

The poultry scheme will not only provide upgraded stock for the Project Area and therefore improve each household's output but also, for an investment of So. Shs. 300 000, a net return of So. Shs. 44 000 is respectable and gives an internal rate of return of 12% over 20 years. The present proposals for the village livestock must indicate the lower intensity livestock improvement project as the best choice. Capital costs are minimal at So. Shs. 42 000 compared with the feedlot alternative at So. Shs. 7.9 million and although the output is lower at So. Shs. 3 million instead of So. Shs. 4.6 million, the margin over recurrent costs is So. Shs. 2.2 million compared with only So. Shs. 105 000 for the feedlot. The net benefit of So. Shs. 1.0 million compares with a net loss or cost of So. Shs. 1.0 million for the feedlot. The improvement project requires more from the individual members but once the service and improvements are being made there is no reason why the improvement should not be great, particularly as the carrying livestock capacity can be increased from 4 LSU to 5 LSU. By comparison the feedlot will always be saddled with high capital costs and high administration and food costs.

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APPENDIX A

FEEDLOT COSTS

APPENDIX A

FEEDLOT COSTS

TABLE A.1

Pilot Farm Feedlot: Capital Costs (So.Shs.)
(1977 prices)

	Unit	Unit cost	No. of units	Total cost
A. Buildings:				
Concrete feeding yards	m^2	60	150	9 000
Fencing for loafing yards	km	54 000	0.5	27 000
Silage pit	pit	50 000	1	50 000
Maize store silo	silo	5 000	1	5 000
Concentrate store	m^2	1 800	50	90 000
Mixing shed	m^2	1 500	20	30 000
Crush		3 000		3 000
General store	m^2	1 800	100	180 000
Office	m^2	2 300	20	46 000
Sub-total				440 000
B. Machinery:				
Tractor (65 hp)		85 000	1	85 000
Trailor (4 tonne)		15 000	1	15 000
Feed mixing unit		20 000	1	20 000
Green chop ensiler		30 000	1	30 000
Feed troughs	m	25	100	2 500
Water troughs	m	30	50	1 500
Water piping	m	30	500	15 000
Veterinary equipment	set	2 000	1	2 000
Sub- total				171 000
C. Livestock:				
Cows - heifers		900	30	27 000
Sheep - ewes		350	30	10 500
- rams		400	2	800
Goats - nannies		300	30	9 000
- billies		400	2	800
Sub-total				48 100
TOTAL Capital Costs				659 100

TABLE A.2

Pilot Farm Feedlot and HQ: Recurrent Costs (So.Shs.) (1977 Prices)

		Unit cost	No. of units	Total cost
A. Salaries:				
Livestock adviser[1]		120 000	1	120 000
Livestock trainee extension worker		10 000	3	30 000
Storeman		8 000	1	8 000
Clerk/typist		7 000	1	7 000
Labourer		4 000	2	8 000
Sub-total				171 000
B. Machinery operating cost:				
Tractor (65 hp) (hour)		35	1 750	61 250
Other machinery (year)		2 000	1	20 000
Sub-total				81 250
C. Building maintenance at 2%/year:				8 800
Sub-total				8 800
D. Veterinary etc:				2 000
Sub-total				2 000
E. Livestock purchases				
Cattle stores		770	86	66 220
Sheep stores		300	85	25 500
Goat stores		250	93	23 250
Sub-total				114 970
F. Animal feeds:				
Concentrates[2]	(t)	1 500	55	82 500
Forage for silage[3]	(t)	21.25	800	17 000
Maize stover[4]	(t)	10	400	4 000
Sub-total				103 500
TOTAL Recurrent Costs				481 520

Notes:
(1) This is a non-local but will be replaced in year 8 - new cost So.Shs. 30 000/year i.e. reduction of So.Shs. 90 000/year
(2) 1.5 kg concentrates/LSU/d
(3) Production cost at silage pit
(4) Cost of carting stover from field

TABLE A.3

Pilot Farm Returns (So.Shs.)

		Total
Cattle:		
Milk	30 000 litres @ So.Shs. 2.0	60 000
Culls	6 @ So.Shs. 900	5 400
Fat	90 @ So.Shs. 1 500	135 000
Sheep:		
Fat	90 @ So.Shs. 350	31 500
Culls	7 @ So.Shs. 300	2 100
Goats:		
Fat	90 @ So.Shs. 300	27 000
Culls	20 @ So.Shs. 250	5 000
GRAND TOTAL		266 000

TABLE A.4

Village Feedlots: Capital Costs (1977 prices)

	Unit	Unit cost (So.Shs.)	No. of units	Total ('000 So.Shs.)
A. Buildings:				
Concrete feeding yards	m^2	400	5 000	2 000
Fencing for loafing yards	km	54 000	5	270
Silage pits[1]	pit	50 000	70	3 500
Maize store silo	silo	5 000	8	40
Concentrate stores	m^2	1 750	350	612
Vet. and general stores	m^2	1 800	140	252
Crush	crush	3 000	8	24
Sub-total				6 695
B. Machinery:				
Green chop ensiler	machine	30 000	8	240
Tractor (65 hp)	machine	85 000	8	680
Trailer (4 t)	machine	15 000	8	120
Motor cycle (90 cc)	machine	6 000	8	48
Sub-total				1 088
C. Equipment:				
Feed troughs	m	25	2 500	62.5
Vet. equipment		2 000	8	16
Sub-total				78.7
TOTAL Capital Costs				7 861.5

Note: (1) Each pit to hold 700 tonnes of silage.

Total capacity: 4 900 tonnes.

TABLE A.5

Village Feedlots: Recurrent Costs (1977 prices)

	Unit cost	No. of units	Total cost ('000 So.Shs.)
A. Salaries:			
Manager	20 000	8	160
Clerk	7 000	8	56
Labourer	4 000	24	96
Sub-total			312
B. Machinery:			
Tractor (65 hp)	35	8	490
Motor cycle	1 500	8	12
- service repair	600	8	4.8
Green chop ensiler	1 000	8	8
Sub-total			514.8
C. Sundries:			
Vet. and drugs	1 000	8	8
Building maintenance @ 2%			133.9
Equipment			7.85
Sub-total			149.75
D. Food purchase:			
Grass forage (t)	21.25	50 000	1 062.5
Maize stores (t)	10	10 000	100
Concentrates (t)	1 500	1 640	2 460
Sub-total			3 622.5
TOTAL Recurrent Costs			4 599.05

TABLE A.6

Livestock Improvement Project: Capital Costs (So.Shs.)
(1977 prices)

Item	Unit cost	No. of units	Total cost
Crush	3 000	8	24 000
Motor cycle (90 cc)	6 000	3	18 000
TOTAL Capital Costs			42 000

TABLE A.7

Livestock Improvement Project: Recurrent Costs (So.Shs.)

Item	Unit	Unit cost	No. of units	Total cost
A. General:				
Extension agents		10 000	3	30 000
Motor cycle running		1 500	3	4 500
Service repair		600	3	1 800
Sundries/supplies				2 000
Sub-total				38 300
B. Increased food costs:				
Grass forage	t	15	40 000	600 000
Maize stover		10	10 000	80 000
Sub-total				680 000
TOTAL Recurrent Costs				718 300

TABLE A.8

Poultry Improvement Unit: Capital Costs (So.Shs.) (1977 prices)

Item	Unit	Unit cost	No. of units	Total cost
Buildings:				
Breeding house	m^2	1 800	36	64 800
Rearing houses	m^2	1 800	80	144 000
Incubator room, wash room and egg store	m^2	1 800	40	72 000
Sub-total				280 800
Equipment:				
Incubator	incubator	2 000	8	16 000
Nest boxes	box	10	100	1 000
Veterinary equipment	set	500	1	500
Miscellaneous equipment	set	1 000	1	1 000
Sub-total				18 500
Poultry:				
Day-old chicks(1)	chick	7	130	910
TOTAL Capital Costs				300 210

Note: (1) 20 extra chicks bought to allow for mortality in transit

TABLE A.9

Poultry Improvement Unit: Recurrent Costs (So. Shs.) (1977 prices)

Item	Unit	Unit cost	No. of units	Total cost
Salaries:				
Animal health assistant	man year	12 000	1	12 000
Labourer	man year	4 000	1	4 000
Sub-total				16 000
Poultry food:				
Chick mash	kg	1.30	7 500	9 750
Growers' mash	kg	1.35	500	675
Layers' mash	kg	1.25	5 000	6 250
Sub-total				16 675
Transport:				
Vehicle hire	day	200	10	2 000
Public transport	year	500	1	500
Sub-total				2 500
Maintenance:				
Buildings (2% of capital cost)	year		1	5 616
Equipment (10%)	year	1 000	1	1 850
Veterinary supplies	year	1 000	1	1 000
Sub-total				8 466
TOTAL Recurrent Costs				43 641