JAMHUURIYADDA DIMOQRAADIGA SOMAALIYA
WASAARADDA BEERAHA
SOMALI DEMOCRATIC REPUBLIC
MINISTRY OF AGRICULTURE

DARA SALAAM BUSLEY AGRICULTURAL DEVELOPMENT PROJECT

ANNEX 3
Socio Economics

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ABBREVIATIONS FREQUENTLY USED IN THE REPORTS

AFMET	Agriculture, Farm Management Extension and Training Project
API	Aerial photographic interpretation
CARS	Central Agricultural Research Station - Afgoi
CIF	Carriage, insurance and freight
CSB	Commercial and Savings Bank
DLF	Development Loan Fund
EAA	Euro Action Acord
EC	Electrical conductivity
ECU	European Currency Unit
EDF	European Development Fund
ENB	National Banana Board or Ente Banane
FAO	Food and Agriculture Organization, United Nations
FOB	Free on board
HASA	Hides and Skins Agency
HTS	Hunting Technical Services Limited
GOS	Government of Somalia
GTZ	German Technical Aid
id	Internal diameter
IRAS	Inter-Riverine Agricultural Study
IRR	Internal rate of return
JSP	Juba Sugar Project
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association (of the IBRD)
ILCA	International Livestock Centre for Africa
IMF	International Monetary Fund
ITCS	Inter-Tropical Convergence Zone
MLFR	Ministry of Livestock, Forestry and Range
MMP	Sir M. MacDonald & Partners
MOA	Ministry of Agriculture
NCA	Net cultivated area
NFMAS	National Farm Machinery and Agricultural Service
NTTCP	National Tsetse and Trypanosomiasis Control Project
ODA	Overseas Development Administration, British Government
ONAT	Former name of NFMAS
SACA	Societa Azionari Concessionari Agricoli de Genale
SAR	Sodium adsorption ratio
SC	Specific capacity
SDB	Somali Development Bank
SoSh	Somali Shilling
SY	Specific yield
TOR	Terms of Reference
UNCDF	United Nations Capital Development Fund
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture

SPELLINGS OF PLACE NAMES

Throughout the report Somali spellings have been used for place names with the exception of Mogadishu and Afgoi 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
Aw Dheegle	-	Audegle
Balcad	Balad	Balad
Baraawe	Brava	Brava
Buulo Mareerta	Bulo Marerta	Bulo Mererta
Falkeerow	-	Falcheiro
Gayweerow	-	Gaivero
Golweyn	-	Goluen
Hawaay	Avai	Avai
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
Haagai	-	Climatic season June to September characterised by light scattered showers
Jibal	-	Area of land approximately 25 m by 25 m or 0.0625 ha
Jilaal	-	Dry season from January to April
Kawawa	-	Two-man implement for forming irrigation borders
Quintal		Unit of weight measurement equivalent to 100 kg
Uar	-	A stock watering pond
Yambo	-	Small short-handled hoe
Zareebas	-	Thorn stock pen

ANNEX 3 - SOCIO-ECONOMICS

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SECTION A

SOCIAL AND FARMING SYSTEMS ANALYSIS

CHAPTER A1

INTRODUCTION

A1.1 General

This section provides data and background on the human resources and institutional framework for development. It also discusses aspects related to the social services and highlights certain issues deemed relevant to project planning.

A1.2 Population Data

The database for assessing the current levels and structure of the project population is poor, with many gaps. The main source should have been the results of the 1975 national population census. However, the detailed village lists were never released. Another national population census has been completed in 1986/87, but the detailed results had not been released by May 1987. The Consultant therefore had to fall back on a set of village population lists used for the Marka District Survey. They appear to date from 1983 and contain information supplied by village leaders. Checks by the Marka District survey team and the Consultant have shown them to be unreliable.

Determining a project population is further complicated by the boundaries chosen. While there are a number of permanently resident villagers in the project area there are also a number of semi-nomadic families who move in and out over the years. There are also families living in the coastal towns and villages who travel across the sand dunes to farm or graze stock in the project area. Far more significant are the families living in villages on the west bank of the Shabeelle who farm in the project area. The Consultant had to make certain assumptions concerning these groups. These are given in Table A1.1 with village data in Table A1.2.

Data on population structure and fertility has been inferred from national characteristics. The most recent sample census was conducted in 1980/81. The results indicate that 45% of the population is under 15 years of age. Crude birth rates are around 44 to 48 per thousand and crude death rates at around 13 to 17 per thousand. The infant mortality rate before reaching one year of age is between 146 and 180 per thousand live births; life expectancy is 45 to 49 years. The national population growth rate is now estimated at 3.1% per annum. Urban growth rates, including migration statistics, are currently estimated at 5.4% per annum.

Surveys in the Lower Shabeelle indicate that some 30% of people now resident there were born outside the region indicative of recent immigration into this riverine region. The most significant population movement remains that of migrants into towns, mainly Mogadishu. Some 25% of the national population is now based in urban areas, almost 30% is rural and just over 45% nomadic. A survey of Mogadishu migrants published in 1983 (A. Awal, ILO/SIDAM) identified 11% of the sample coming from the Lower Shabeelle region. The clear trend in this survey was of permanent migration to seek work and business opportunities. Home visits and remittances passing back to the rural-based families appear few.

The current literacy rate is estimated at around 60% for men and 48% for women while the participation rate in the labour force in the rural areas is 45% for women and 80% for men.

TABLE A1.1

Population Assumptions

			Household total gross	Household total resident
1.	Coastal villages - outside project area		na	-
	Estimated number of households farming in project		500	-
2.	West bank main village - outside project area		(2 740)	-
	Estimated number of households farming in project at 40%		1 096	-
	Sub-total		1 596	-
3.	Dune villages - resident		337	337
4.	Plains villages - resident		1 428	1 428
5.	East bank river villages - resident		150	150
	Sub-total		1 915	1 915
	Total		3 511	1 915
6.	Dry season pastoralists - variable, say,		100+	-
A.	People using area, say,	3 511 at 4.5/household =	15 800	16 000
		3 511 at 5.0/household =	17 500	17 000
B.	People resident in area	1 915 at 4.5/household =	8 600	9 000
		1 915 at 5.0/household =	9 600	10 000

TABLE A1.2

Village Population Data
(B. is short for Buulo meaning village of)

A. Villages from Coast and Dunes Using the Area

- Gandashe	- Yaaqbine	- Bansaley
- Jilib Marka	- Timirtey	- Xinka Omane
- Ceel Madow	- Gubyar	- Marka
- Gub	- Bulo Sheikh	- Xaaji Hussein
- Cadcaddey		

Number of villages = 13 Estimated 500 households using area.

B. Dune Village in Project Area (Number of Households)

- Fidlabey	(50)	- B. Macabe	(20)
- B. Shaqadle	(60)	- Day Suufi	(25)
- B. Shaafa	(20)	- B. Garrun	(30)
- Ceel Wareegow	(40)	- Cusmaan Xasan	(14)
- Fed Guduud	(na)	- Ceel Modobe	(18)
- Garas Moqor	(20)	- km 60	(40)

Total	(357)
Number of villages	12

C. Plain Levee Village and Recent Settlements

- Aybuuteey	(385)	- B. Mude	(50)
- Busley-Dawd	(350)	- Nagaadweyne	(70)
- B. Jinni	(70)	- Diinle Maxaad	(na)
- B. Ismaaciil	(3)	- Garas Weyne	(20)
- Sagaaroole	(100)	- Fiiley	(na)
- B. Barrow	(100)	- Cambanaani	(180)
- B. Siidow	(30)	- B. Geelle	(15)
- B. Yarrow	(50)		

Total	(1 423)
Number of villages	15

D. River Bank Villages

In project area on east bank		Outside project area on west bank	
- Bardiid	(30)	- Jawhar/Aw Dheegle	(825)
- Tugaarey	(100)	- Dara Salaam	(213)
- Sadiiq	(25)	- Mubaarak	(935)
		- Cali Dahir	(10)
Total	(155)	- Khalif/Abliko	(100)
		- Moxamed Cumar	(25)
Number of villages	3	- Mareer	(632)
		Total	(2 740)
		Number of villages	9

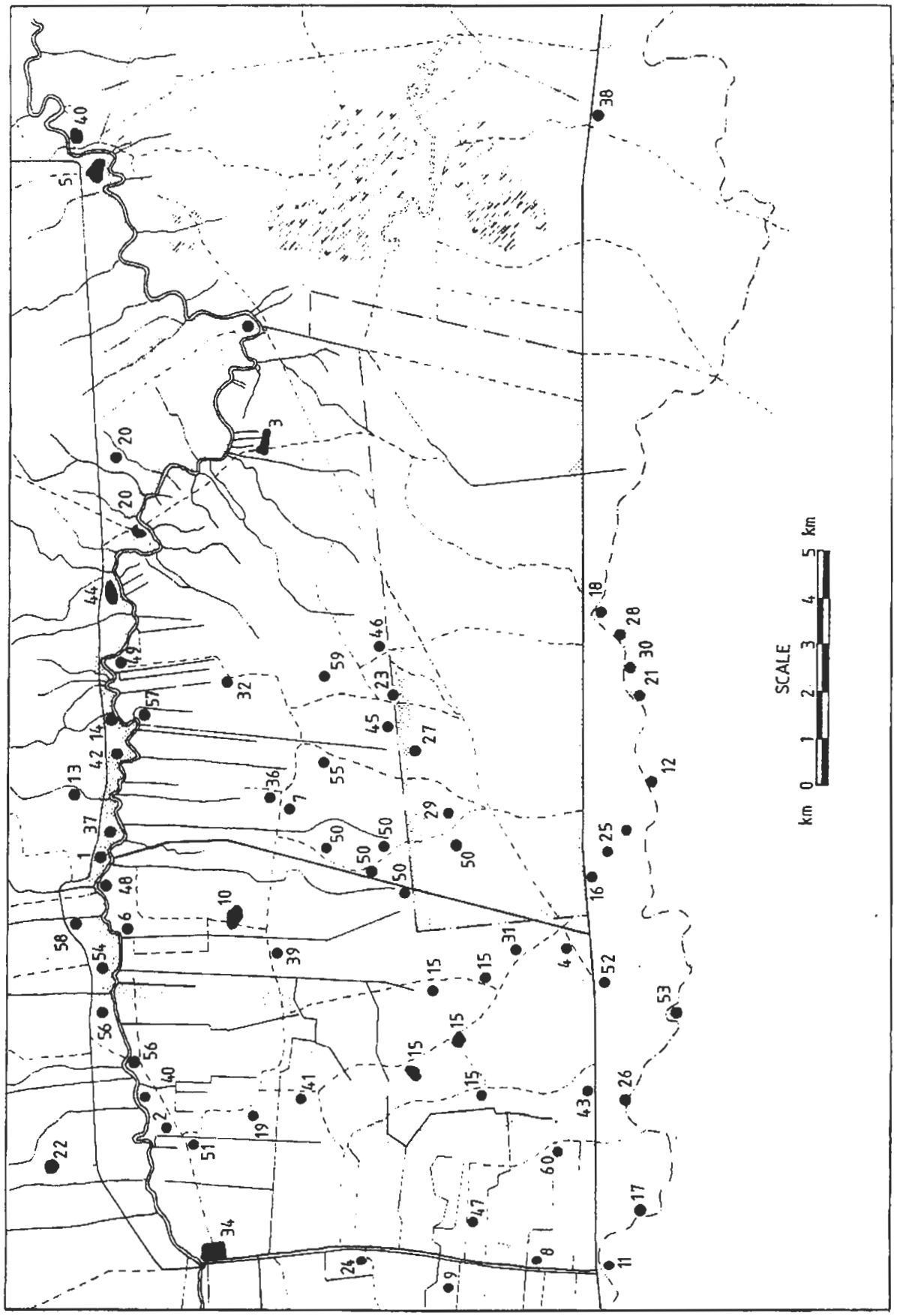
	Resident	Non-resident	Total
Number of villages	31	22	53
Number of households	1 935	1 870	3 805

Key to Figure 1.1 - Village Location

Nr			
1	Abliko	31	Geelle
2	Alundi	32	Ismaaciil
3	Aybuutey	33	Jadiid
4	Ali usman	34	Janaale
5	Aw Dheegle	35	Jawhar
6	Bardiid	36	Jinni
7	Barrow	37	Khaliif
8	Barsame	38	Kilomitirka Lixdamaad
9	Bhuroow	39	Laabaas
10	Busley-Dawd	40	Malable
11	Buufow	41	Marsaan
12	Caaramadow	42	Moxamed Cumar
13	Cabdalle	43	Moxamed Nurow
14	Cali Caahir	44	Mubaarak
15	Cambanaani	45	Mude
16	Ceel Wareegow	46	Naqaadweyne
17	Cusmaan Ouilq	47	Raxmo
18	Cusmaan Xasan	48	Saalixiya
19	Dalooya	49	Sadiiq
20	Dara Salaam	50	Sagaaroole
21	Day Suufi	51	Sarcade
22	Deg Wariirow	52	Shaqadle
23	Diinle Maxaad	53	Sheik Xussain Shofac
24	Doon Dhere	54	Shuffeeri
25	Fed Guduud	55	Siidow
26	Fidlabey	56	Siiqaale
27	Fiilley	57	Tugaarrey
28	Garas Moqor	58	Ugunji
29	Garas Weyne	59	Yarrow
30	Garrun	60	Xamaali

Figure 1.1

Village Location



A1.3 Institutional Framework

Somalia is administratively divided into regions, districts, sub-districts and villages. Administratively, control is exercised by the Ministry of the Interior, the sectoral Ministries, such as the Ministry of Agriculture (MOA) and the party structure.

The Ministry of the Interior is primarily responsible for the administrative control and maintenance of peace and security within the country. It is also responsible and increasingly involved in the promotion of rural development. So far as the project is concerned, the most important sectoral ministries are the MOA, the Ministry of Livestock, Forest and Range (MLFR) and the Ministry of Finance. The MOA and MLFR both have implementing and coordinating functions at every administrative level. The semi-autonomous agencies, such as ONAT (the national machinery hire service), also represented at regional and district levels, come under the sectoral ministries.

The central government is represented by the Governor who resides at Shalambood. He is responsible for executing the instructions of the Ministry of the Interior as well as supervising and coordinating all government activities in their respective regions. The MOA is represented by the Regional Co-ordinator at Janaale.

The Governor is assisted at district level by District Commissioners. The MOA also has District Coordinators at Janaale and Afgoi. The functions of the agricultural coordinators include land registration, crop protection, input supply and flood protection. Their extension function has been taken over by AFMET which is discussed in Annex 4.

The north-west part of the project including the villages of Jawhar, Aw Dheegle, Aybuuteey, Dara Salaam and Mubaarak are in Afgoi district of the Lower Shabeelle region; the rest of the project area lies in Marka district.

The main villages are designated as sub-districts called beels. Beels have some authority over an area which includes several smaller villages.

The arrangement of the beels in the project is still undergoing re-arrangements as certain villages opt to be affiliated with different administrative centres. Thus the villages of Busley Dawd, the east bank river villages, Buulo Siidow, Buulo Yarrow, Buulo Jinni, Sagaaroole, Diinle Maxaad, Garas Weyne, Nagaadweyne and the Cambanaani satellite villages come under Janaale with Busley Dawd as the main village. The Afgoi district villages come under Afgoi while the remaining dune fringe and plain villages come under Marka with Ceel Wareegow as the lead village.

The Somali Revolutionary Socialist Party now maintains a party representative group in every village or beel. The group is headed by a chairperson appointed by the district authorities, who is assisted by a Deputy and several members often selected by the chairperson after consulting the authorities. Their job is to represent the district local government in the village and transmit instructions from the district to the village. Likewise the village as a body or as individuals may pass requests to the district authority. The position may be held by a man or woman.

The ability of each village leader to lead depends on a number of factors, chief of which are their educational standard, honesty, exposure to the outside world and their ability to represent their constituencies interests.

It is the duty of the village committee to keep a close watch on uncropped land and bring it to the attention of the local government, which then passes the information to the Ministry of Agriculture.

Decisions to undertake development tasks are moved by the chairperson who gives the villagers the opportunity to deliberate. This is followed by a motion to collect money if it is necessary to pay in advance. The collection is usually undertaken by more than one man and all receipts are recorded. Several persons often supervise the spending of funds to ensure that no underhand dealings take place and that a receipt is obtained.

A1.4 Local Organisations

In addition to the administrative and political structures of government, certain local organisations exist that will form an important base on which the project management can draw to achieve local participation. These organisations include the canal committees set up by water users on each of the smallholder canals, the associations of traders represented by committees in some of the larger villages, such as Mubaarak, and farming and women's groups which can include operational cooperatives and companies. In addition, the strength of the self-help and community development capacities indigenous to the area should be recognised. These are administered through the village committees and local government. These activities have flourished in the Lower Shabeelle region in general. A particularly dynamic example of this can be found in Dara Salaam where roads, water supplies and electricity facilities have all been installed independently by the village, drawing on strong village leadership and self-help capacities. Self-help labour is often organised through the activities of the Youth League or women's organisations.

A1.5 Education

The rural areas, especially the riverain areas, have the lowest per capita literacy rate. This is due to the following factors:

(a) The type of education imparted is not always relevant to the area.

(b) Teaching staff, usually originating from urban areas, do not willingly go to rural, malarial areas where housing is poor and social amenities are lacking.

(c) In the past all secondary school leavers were assured employment by the Government. Recently this service has reached saturation point, cannot absorb further intakes and is coming under strong pressure to cut back on staff.

(d) No technical education relevant to the area (such as masonry, carpentry, mechanics, blacksmiths, farming) is offered.

(e) School leavers perceive that there are more attractive opportunities in the urban areas either in employment or by better economic support services.

For these reasons farmers do not willingly send their children to school. At a very early age, children begin assisting the family by working during peak weeding periods, often for other farmers. They are also engaged in tending animals. With the more recent loss of employment opportunities which school leavers previously had, school attendance has dropped markedly.

There are two types of schools in the area:

(a) the elementary/intermediate school - lasting up to 8 years and

(b) the secondary school - lasting another 4 years.

These are general stream schools, in which Somali language, Somali culture, sciences, arithmetic/mathematics, Arabic and English are taught. Formal education begins at the age of 4 to 5 years with two optional years of pre-school (kindergarten).

There are only two secondary schools in the Lower Shabeelle, one at Marka and one at Qoryooley. There are elementary/intermediate schools in Janaale, Mubaarak, Marka and Qoryooley. There are also one- or two-room schools in a number of villages which may open whenever a teacher is available. In addition, there are the Koranic schools which are run by religious teachers. There are a number of them in some villages, often taking boys from neighbouring villages for instruction.

The Ministry of Education is also responsible for non-formal education such as adult education literacy classes, women's education for improved housekeeping, child care, sanitation and sports.

A1.6 Health and Nutrition

The main health hazards of the area include schistosomiasis, seasonal malaria, intestinal parasites, venereal diseases, eye diseases and pneumonia. Measles, pertussis, poliomyelitis, tuberculosis, diphtheria and tetanus typically contribute to the high rate of infant mortality. In 1983, UNICEF and WHO agreed to assist in the establishment of an intensified primary health care programme (PHC) in the Middle and Lower Shabeelle regions and in Galbeed. This programme is now beginning in the project area and is expected to become fully operational by 1988.

In line with Government policy of decentralisation, special attention is being given to the strengthening of existing regional and district medical structures. Integrated planning and coordination of activities are being promoted at regional, district and village level.

To educate the community in the basic principles of primary health and to stimulate the involvement of the community, seminars and workshops are held for village elders, village committee chairmen and members of local councils.

The National Health Plan (1980-1985) indicates that 25% of the Somali children are malnourished; 7% are classified as 'severely malnourished'.

In the Lower Shabeelle region, because of irrigation facilities, famines are not as frequent and severe as in some other regions. Nevertheless, local children also suffer severe malnutrition. Maize is the staple food with frequent additions of beans, onions, fruits and vegetables. Eggs and milk, although produced by many farm households, are frequently sold to raise cash. The remaining surplus are often insufficient to satisfy the basic requirements of the household. Meat and chicken are eaten only on special occasions. Freshwater or saltwater fish, although abundant in the river and on the coast are eaten only by a small percentage of the riverine population.

Malnutrition, combined with other diseases (especially diarrhoea and measles) accounts for much of the child mortality in the first years of life. To combat this, UNICEF is launching a 'Joint Nutrition Support Programme'. The main components of the programme are primary health care (through the Ministry of Health), water supply and sanitation (through the Water Development Agency), family life education (through the Ministry of Education) and the stimulation of village activities.

A1.7 Project Planning Issues

Services which cannot be managed by the community would be managed and co-ordinated by project management. The project should have the authority to administer its own budget, subject to ex-post approval and full accountability to MOA. It should establish formal co-operation with local government and the sector ministries and their agencies. The Governors, Regional and District Coordinators, LPAs and village committees should be involved in planning and be kept informed about the progress of project implementation. This would be achieved by inviting representatives from these different institutions to participate in various project advisory committees.

The MOA will be the parent ministry. However, coordination with sectoral ministries will be required since it is proposed to second staff from the MLFR and NRA to the project. The school refurbishment component would involve the Ministry of Education at a central and regional level. The Ministry of Health was concerned that the project should raise food production capacities and, if possible, devise a project strategy that could direct the nutritional benefits to selected target groups currently at risk.

CHAPTER A2

SOCIO-ECONOMIC ORGANISATION

A2.1 Introduction

It is believed that the long-term success of the project depends on the extent to which the intended beneficiaries participate in the planning, implementation and evaluation of the project. Experience in Somalia and elsewhere shows that externally imposed systems, which concentrate almost entirely on the technological aspects of agricultural development, nearly always fail when external support is withdrawn; whereas systems which emphasise the human factor and which take into account existing practices are more likely to be taken up by the beneficiaries and be sustained by them.

A2.2 Historical Setting and Settlement

Archaeological research in Somalia confirms a long human presence dating back at least 100 000 years. These early populations were probably hunters and gatherers of Bushmen stock whose descendants are possibly traceable to small groups in Kenya, Tanzania and southern Africa. In Somalia the small group of Eyle families may have ancestral links with these prehistoric settlers.

Settled agriculture was probably introduced into Somalia during the periods of Bantu expansion and riverine settlement prior to and early in modern times. Immigration of Oromo and later Somali clans began during the 8th and 9th centuries. This led to both displacement of, and affiliation with, existing groups.

The alliance between the original cultivators and the immigrant pastoralists developed essentially into a patron-client relationship. This ensured important social and economic links which guaranteed cultivators' protection and access to livestock products, particularly milk and butter, and gave the pastoralists access to grain supplies, watering points on the river and crop residues.

About 50 to 60% of the total population lead a nomadic or semi-nomadic life. The transition from nomadism to semi-nomadism and sedentary farming has been going on for centuries but has increased rapidly due to drought, war and the influences of the modern state and international relations. From the 8th to the 19th century and during the early colonial period waves of nomads from the northern Somali peninsula migrated into southern Somalia in search of more fertile pastures. Around the Juba and Shabeelle rivers and the inter-riverine areas they found conditions sufficiently attractive to settle and start farming. However, they tended to settle away from the tsetse infested areas which were close to the rivers so that they could continue to keep their livestock and maintain linkages with their nomadic cousins.

Much closer to the rivers one finds sedentary farmers of Bantu origin. They keep few livestock and provide most of the labour for the medium- to large-scale irrigated farms along the river banks.

In the 19th century the coastal pastoral clans on the Benadir coastline, linked with Arab and Swahili traders operating from the coastal towns, imported labour from East Africa. This labour was put to work on small- to medium-scale rainfed

holdings and to develop small canal systems for flood irrigation, based on short canals along the riverine strip. This led to more pastoralists adapting cultivation and the recent arrivals being adopted into Somali clans.

In the Consultant's canal survey the dates of establishment were recorded which show many to have been built between 1830 and 1880 (see Annex 6). A commercial export agricultural system soon developed in response to the demands from foreign markets in East Africa, Zanzibar, the Gulf and Europe. The main products were sorghum, sesame, cotton and orchella. Sorghum in the riverine areas has now all but disappeared, having been replaced by maize. Sesame, introduced in the 1840s, forms an important part of local cropping patterns. The local hand-woven cloth had at that time depended on imports of Indian cotton. In the face of the flood of modern textiles from Europe and America, the local industry had to find a cheaper source of raw material. Local production of a wild variety began to flourish, keeping the craft trade alive. This still maintains itself today at a much reduced level, in the face of competition from imported textiles, out of a small craft centre in Jelib Marka.

The increasing foreign control over coastal trade, foreign commodities and competition all contributed towards the ending of this period of expansion of commercial agriculture; a situation of relative prosperity to which the region has not returned even to this day.

Early in the 20th century the river flood irrigation system was further developed into plantation estates under Italian settlers who relied on local farmers for their labour. This labour was extracted under force and the project area itself is a typical example of where this took place. It was only after 1941 that these labourers returned to concentrate on their traditional holdings in their own villages. The history of labour use on the old Italian holdings has important ramifications for development within the project area today.

During the 20th century there has been a continuing drift of northern Somali groups in the region drawn by the attraction of irrigable lands in the Afgoi, Janaale and Golweyn areas as Italian settlers left, and also due to the expanding commercial and capital base at Mogadishu. A further influx came when the northern nomadic victims of the 1973 to 1974 drought were resettled along the Shabeelle at Sablaale and Kurten Waarey.

The Consultant's field surveys identified a number of different historical settings and dates of establishment of the present villages. Four main zones are identifiable: the river bank villages, settlements established on old levees in the main coastal plain, settlements on the interface between the plains and sand dunes and the coastal villages.

The river bank villages on the east bank appear mainly to comprise people who worked as labourers on the old Italian estates. Some have regained a certain degree of independence and are now farming as smallholders in their own right at Tugaarrey and Aybuuteey.

Some of the main existing villages have a known history going back several hundreds of years, similar to the coastal sea-trading towns of Marka and Baraawe. The people of Aw Dheegle have oral records dating back 800 years. Jawhar has inscriptions on its mosque confirming 670 years of settlement. These villages, like Afgoi upstream and Hawaay downstream, were major trade route river crossing points. At these points Persian and Arab traders have been long established settlers and founding fathers of villages. Many families of direct Arab descent can still be found in these villages today.

Dara Salaam itself began with a settler from Jowhar 150 years ago. It has had a chequered history, having suffered from the early Italian policy of forced labour. At that time most of the villagers fled into Bay Region, only returning to re-establish the village in 1969 after road construction and draining of swampland made settlement a more attractive proposition.

The Mubaarak settlement was founded as a religious community in 1818 by Sheikh Abdi Dayow and an interesting description of the organisation of irrigation and agriculture here is provided by Norbert Segar in 'Agriculture in the Winds of Change'.

The other river bank villages of Baadid, Saadiq, Tugaarrey, Khaliif and Abliko all date from around 1830. The exception to this is the village of Aybuuteey which is an amalgamation of smaller hamlets once scatterd around the current village location. This occurred as a result of the Government villagisation campaign in 1974.

The other long-standing settlements are to be found on the fringes and within the sand dunes. It is here that sweet water shallow wells can be found which allowed the Bimaal clan pastoralists to establish their home wells. It was from these villages and the coastal towns that the development of commercial and agricultural development in the last century took place.

Virtually all the villages which today dominate the population of the project lie on the higher ground of old levees in the floodplain. Some sites, like Cambanaani and Busley-Dawd, date back to 1930 to 1935 when pastoralists and agropastoralists from Bay Region came down to the Janaale area seeking work in the wake of severe drought and settled down permanently. The remaining settlement sites on the floodplain were affected by serious flooding until flood control measures have made these fit for permanent habitation. The map provided in Annex 7, of historical flood areas, indicates the problems once faced.

The combination of the decline in labour strategies, flood control and a release of smallholder potential to extend the canal network beyond the boundaries of the old Italian farms gave rise to a new generation of floodplain villages. The first, Nagaadweyne, was established in 1955 and was followed in the 1960s by the remaining settlements of Sagaaroole, Buulo Barrow, Diinle Maxad, Fiilley and Garas Weyne. All the settlers originated from Bimaal villages that were on the fringes of the canal dunes. Most of these villages are thus agropastoral in nature. This can be deduced from the traditional type of semi-permanent huts or the transportable round huts that are used, compared with the permanent mud structures used in the river bank villages. The bush clearance associated with this settlement and land development has also contributed to the pushing back of the tsetse areas.

The arrangement of these levees means that many of these villages are strung out in a ribbon fashion or perch on isolated islands of higher ground. In the long-established river bank villages and those occupied by the river people who keep no livestock, residences are concentrated. Amongst the agropastoral villages there are wider paths through the settlement areas serving as stock routes. These act both as access routes from village to watering points and as access to the kraal spaces within the settlements where stock are kept overnight.

Dara Salaam and Mubaarak on the west bank stand out as evolving rural growth centres. Both are linked by coral roads to Janaale and Afgoi and have numerous stone and brick buildings with corrugated iron roofs, market places and a thriving trader and shopkeeper community. These small towns function as supply centres for their localities as well as for some of the project area villages. A

similar growth centre might develop at Ceel Wareegow if the proposed project headquarters are located there with its central position and siting on the main Mogadishu to Kismaayo tarmac road.

A2.3 Social and Economic Differentiation

For statistical simplicity the Somali population is often separated into three groups: nomadic pastoralists, settled agriculturalists and urban dwellers. More recent studies have differentiated the rural communities into four basic groups: nomadic pastoralists, semi-nomadic agropastoralists, sedentary farmers of pastoral origin and traditionally sedentary farmers of Bantu origin. Others recognise an additional group of sedentary trading or craft families which might also farm land and/or own livestock.

In the project area all these groups are represented, as are groups of immigrant farmers, government workers and large land holders and absentee landlords. The present poor database makes numerical classification difficult. However, for development purposes it is the clarification, qualifications and understanding of these different groups, and particularly the links and inter-relationships between them, that are most crucial.

There are in Somalia degrees of nomadism ranging from movement that is geographically widespread to highly localised transhumance or shifting residence sites. Each is determined by the demands of the biological, economic and ecological environment that different households or groups face. The riverine and higher rainfall characteristics of southern Somalia have favoured the development of river people, agropastoralism and the strategic seasonal use of the riverine strips by nomadic pastoralists.

The successful evolution of resource use, involving all three groups, has demanded reciprocal agreements, integrated activity, co-operation and a series of complementary links which bestows advantages on each in a situation which might otherwise be competitive. One main factor which binds this system together is drought.

Drought is the destabiliser which guarantees no permanent favoured position, whether as sedentary farmers or nomadic pastoralists. The uncertainties of its occurrence and recurrence create only one sure lesson of experience - that water shortages, poor rains, lack of grazing, crop failures and stock loss will happen again. When drought occurs (and when it doesn't) the pastoralist can supply meat, milk and dairy products or the farmers fruit, grain and fodder. Mutual links have thus evolved between rangeland, riverine areas and urban centres to ensure a better means of survival for all. These systems have developed over centuries. Recently a new factor in drought survival strategies has emerged as an alternative for some: the provision of international aid, food aid, disaster relief agencies, feeding centres and settlement schemes. There has also been rapid commercialisation of rural life as exchange and trade mechanisms have become fully monetarised. Economic differentiation is being determined increasingly by these influences as well as from the traditional values and status bestowed by livestock ownership. The recently introduced notions that land has an intrinsic economic value when in individual ownership also has created a new opportunity for attaining wealth. All these have created the climate for more widespread economic differentiation in the society.

The socio-economic groups specified above mask the fact that the categories might simply distinguish between the necessary functions and management roles which individual members of the same household or family have to play. In fact,

the most rational and effective survival strategy any family could adopt would be to ensure full diversification of economic and production activities by having a family member in each group. This would reduce the impact of recurring drought to a minimum by guaranteeing access to food and income from a variety of sources.

It is not only social, economic or ethnic background which determine lifestyle but deliberate management decisions in the selection of farming systems and economic strategies as the opportunities arise. An important factor is the influence of the situations families face at different stages in their family cycle. As marital status, family structure and age distribution change so too do the family labour, food and cash flow demands. Early in marriage close ties with parental families and kinship groups or access to a viable independent economic situation are required. With limited labour capacity and limited productive assets the situation of a young family is very different from that which they will face later with a pool of adolescent labour to call on if children are successfully reared. The fruits of better years provide means of investing in livestock or in insuring against the poor years to come. The choices, constraints and potential disasters facing each family are thus constantly in ebb and flow. This dynamic system and its historical setting provide some of the main reasons why the development of irrigation, agropastoralism, settlement of pastoralists, the current farming systems, the production practices used and management techniques employed have evolved and are structured as they now are.

The higher social status which is often attributed to those who keep livestock can be viewed from a variety of angles. This has arisen not only as a result of social and political history and differences in cultural background: it also comes from a rational desire to achieve a viable economic and strategic survival. Livestock provide a buffer against drought either as a tradeable commodity or as an asset which can be walked out of a drought-affected area. Thus this aspect adds to their value stemming from a recognition of their success in survival. Livestock also act as a symbol of respect for those gaining age and experience in the community since there are natural correlations between herd sizes, structures and species composition and the age of the family individuals involved.

Collectively livestock can also contribute to corporate wealth amongst the larger family groupings which again can act to provide difference in socio-economic status.

A2.4 Family Structure

The project communities while not uniform ethnically all follow religious laws of a Muslim society which has a strong influence on everday life. More farm labour to tend crops, to look after and process crop and dairy products and livestock, is encouraged by marrying more than one wife. This is in the hope that more children can be raised to assist with crop production and tending livestock.

Marriage connections amongst powerful clan groups also provided an insurance for access to good grazing lands controlled by other clans.

The head of the family is always the father. Decision-making rests with him and his sons; his eldest son being his second in command. Women play an indirect role in decision-making but nevertheless they can and do influence their menfolk, depending upon their status. The female influence often derives from the mother of the eldest son who plays a major role in the moulding of the

decisions of her son. The heads of the families select elders to represent them in matters relating to the clan and other clans. They also mediate in disputes between clan members. Usually persons elected to these positions are recognised as being gifted with courage, eloquence, patience, common sense and human understanding.

A2.5 Leadership and Decision-making

Traditional Somali society is characteristically egalitarian and clan leaders are little more than ritual or symbolic figureheads. Organised leadership, whether symbolic or real, follows patri-linear descent. Each clan is divided into sub-clans, each electing its own leader. Although their political power has been greatly curtailed since the 1969 revolution, the chiefs are still highly regarded within their groups and wield considerable influence. The reorganisation of villages in the 1970s and the long history of mixed religious communities both provide examples of successful communities where village organisation need not follow the kinship patterns.

Decisions of any importance have traditionally been made under the auspices of a council of elders and by an assembly of all the adult men in any particular family or community grouping. In the agricultural areas the clan or village leaders have had more authority than amongst the nomadic groups.

Religious leaders played a consultative role in issues other than those involving Islamic law. An important exception to this is to be found amongst the special village communities that have built up around the leadership of charismatic religious sheikhs. Such communities are to be found in the project area and differ from other villages by their utopian approach to collective and communal living. The degree to which cooperative spirit succeeds differs considerably from community to community but it is significant that their unifying impact has been achieved often across boundaries of kinship ties and social and economic class.

A rural nuclear family typically comprises 4 to 5 members while the extended family includes a number of units headed by a patriarch.

Traditionally the family or village elders decided on communal policy matters, mediated in disputes and advised on family problems. This has been modified since the Government has introduced village councils which are composed not only of elders, but also of capable young people who, in most cases, are members of the Somali Revolutionary Socialist Party. The traditional structure nevertheless remains respected and operational in village affairs.

Self-help activities and mutual assistance operates in certain tasks like communal livestock herding, harvesting, and threshing, roof construction for new houses, canal maintenance and repair and flood control. This mutual help will also be called on whether disaster affects a single villager or the whole community.

A2.6 Division of Labour

In general men are responsible for clearing land and maintaining the irrigation system but most other agricultural operations are shared by men and women. Amongst the settled nomads young men are often occupied exclusively in looking after the family herds. A number of methods are used to overcome labour bottlenecks at land preparation, planting, weeding and harvesting. For example, the

sharing of labour between friends and neighbours is common. An example of a more institutionalised association for the sharing of agricultural labour is the barbaar. The barbaar is composed of young men and women under a leader called an aaw. These young people will help the older members of the community cultivate their farms. A more temporary arrangement for reciprocal labour sharing is the goob. A farmer will invite a large number of other farmers to work on his farm for one day in exchange for food and a promise of further assistance. These reciprocal arrangements are now far less employed than in the past and farmers increasingly hire labour and tractors if available.

The wife's main duties, apart from household and children, are fetching water, fuelwood gathering and assisting with weeding the fields. When a house is built, husband and wife share the work according to physical capabilities. If the few milking animals kept permanently in the village are not tended by a village herdsman (gausar), this job falls mainly to the children; the older ones being responsible for the cows and the younger ones for the sheep and goats.

The task of women would be lightened by:

(a) the provision of drinking water at or nearer the village;

(b) planting trees suitable for firewood near the village.

The task of men would be improved by:

(a) animal traction especially for weeding;

(b) animal carts for the carrying of goods and persons.

2.7 Land Tenure Arrangements

The field studies of this and other recent projects in Somalia have highlighted the problems of land tenure in relation to achieving progress in rural development. The implications of the land tenure and land use systems determine the attitudes to agricultural investment and security of both small, medium and large farmers. This affects not only investment capacities but also the attitudes towards residence, food supplies and farm incomes. They also influence the social, economic and political standing of rural households and development groups such as co-operatives, village and farmer associations and companies and determine technical efficiency, economic viability, adoption of new technologies and the size and distribution of income.

The project area, in common with other areas in Somalia, is going through a period of rapid change with respect to land tenure and access to land. The current competition for resources has focussed on access to water, via the registration and enclosure of land bordering the river. Increasingly the focus is shifting to land per se as it accumulates economic value in the hands of others than genuine farmers. This is inevitably leading to conflict and requires more sophisticated means of mediation and administration than is currently available via traditional mechanisms and current MOA practices.

The traditional land use systems were devised primarily for a transhumant pastoral society. This provided access to pasture, browse and naturally occurring water. Access to man-made resources, including cleared land, wells and artificial ponds was restricted to the individual family or larger community group (whether religious or kinship based) that contributed to the efforts of

creating and maintaining them. Therefore, the use of scarce resources was based on the guarantees resulting from being a member of a community capable of defending rights and use against competitive communities. These rights were identifiable by membership in a community. Thus territories could be used by more than one group without disturbing the traditional values of rights of use. This system is fundamentally different from one of territorial ownership where a clear geographic boundary establishes where the rights of one group start and those of another end.

This distinction applied less clearly in the inter-riverine zone where cultivation and agropastoralism, by nature, confined the production systems within more closely defined areas and which, over time, established more rigid boundaries of resource use. This is particularly so along the coastal strip where direct economic and trade ties to the coastal export towns increased the speed with which permanently resident socio-political institutions became developed. In the project area permanent administrative and village structures developed as the noble kinship groups did.

The traditional arrangements of the last century allowed strangers to obtain rights to arable land and water through formal ceremony with local elders where, by renouncing all previous birthrights, they would be adopted within the local clan group. New members of the group could not dispose of land, except to members of their adopted group. Nor could they dig wells without permission, which limited their ability to increase or even attain livestock wealth. This led to the growth of the small-scale plantation commercial export farming system using rudimentary canal flood irrigation on farms up to 40 ha. Today these underlying patterns are still visible but much altered by contemporary political changes. The communities that developed in the last century have independent cultivation rights, as those at Tugaarrey. Some are still visible as large private company or co-operative farms. Other land use includes institutional farms, such as Militia Farm near Buulo Jinni.

Associated with this diverse and composite social and production pattern were religious communities (tariiqas) ranging in size from a few hundred to many thousand. They have provided a viable alternative to the difficulties of the clan based systems and also an opportunity for the displaced who otherwise could not easily obtain resources. The effectiveness of these insitutions remains evident today in villages like Mubaarak.

Contemporary changes have all attempted to alleviate the traditional injustices and constraints of the clan-based and patron-client systems. In 1956 it was made illegal for political parties to have clan names. In 1960 client status was abolished and individual rights of settlement and access to resources equalised for all. In 1969 and since the Revolution, the use of clan names has been banned and persistent attempts have been made to restructure administrations and ideology. In addition commercialism and international monetarism by the 1970s had penetrated the pastoral system producing a significant shift to export trading to the Gulf states and private commercial development of water resources.

The most significant legislative land reforms took place in 1911, 1929, 1960, 1965 and 1973. In 1975 women were given equal status and inheritance of land and the Land Tenure Laws that apply today were passed. This declared all land to be

state-owned and administered by the MOA. The law recognised that individuals may register only one piece of land on a 50-year (renewable) lease. Holdings were limited to 30 ha of irrigated or 60 ha of non-irrigated land unless it was a banana plantation which may be up to 100 ha.

Leases given to co-operatives, state farms, independent agencies, companies and local government were allowed for an indefinite period in areas that are at the discretion of the MOA. All leaseholders are required to develop land within two years and pay taxes or else the land reverts to the State. Similarly, sales, rentals or subdivision of land would risk the penalty of losing the land. The inheritance of land by close relatives was provided for as long as the registry was notified and the land remained cultivated.

The law gives no recognition to customary rules or procedures or to the indigenous institutions that, in practice, still govern access to land and pasture. Pastoralists in particular are given no rights, in spite of their numerical importance in the population and their dominant contribution to export earnings. The law also favours, in content and in practice, institutional and state control of land and co-operative or company applications.

The procedures of registration channel applications through the District Agricultural Coordinator who, with the police, inspect, measure and assess the land for its production potential and for competing claims. The claim is then posted for a 30-day period, for receiving objections. If none is lodged, then the mapped claim is forwarded to the Regional Agricultural Coordinator who registers the file and checks the records for competing claims before sending the application to the MOA in Mogadishu where the process is repeated. The Director of Lands checks the papers and forwards them for approval to the Minister.

These procedures at present do not lead to any map or way of knowing how much of the arable or cultivated land is leased. In practice, the time-consuming and complex procedures are often by-passed or 'desk' surveyed. Thus community leaders, merchants and (ex) government workers are at an advantage in the operation of the system, often leaving the individual applicant at a disadvantage in the appropriation of land. Given the recent liberalisation of economic policies a land rush has accelerated the process. This is apparent in the project area as the field survey suggests a significant concentration of private ownership into absentee landlords who may not have land development and agricultural productivity as their main objectives.

In practice very few smallholders have registered all the land they cultivate. This is to avoid paying land taxes or declaring that they farm more than one parcel or is due to their ignorance of the current legislation as a result of the complex, time-consuming and expensive registration procedures.

The Consultant has analysed the land registration records at Janaale which indicate the general trends of registration since 1975 when the new legislation was enacted. The results are shown in Table A2.1. This shows the early rush in 1977/78, most probably amongst those who could foresee the advantages of legal title. What is most striking is the lag period until 1983 after which year the rush for land registration began in earnest. The records are also striking since out of a total of 209 registrations only four were for less than 10 ha. It seems likely that villages or family communities have bonded together under a nominal co-operative or company umbrella to enter the registration process.

TABLE A2.1

Land Registration Records in Janaale (1977 to 1987)

Year	Total area registered (ha)	Average farm size registered (ha)	Number of registrations that year	Main villages involved
1977	680	97	7	Sagaaroole (S) Busley (B) Cambanaane (C)
1978	280	28	10	B, C, Siidow (Sid)
1979	58	28	2	C, Baadid (Bar)
1980	586	117	5	S, B, C
1981	-	-	-	-
1982	542	77	7	S, B, C
1983	1 150	88	13	B, Sid, Bar, Jawhar (J) Aybuuteey (Ab), Km 60
1984	2 117	50	42	S, B, C, Sid, Ab, Mude Barrow, Garas Weyne, Ceel Wareego (W), Khaliif (K)
1985	1 558	52	30	S, Sid, C, Bar, Ab, Mude, W, K, Km 60
1986	4 482	71	63	Most villages
1987(1)	2 186	73	30	B, Ab, Mude, Nagaadweyne, Km 60
Total	13 639	65	209	

Note: (1) 1987 records to April only.

The field studies and the aerial photo interpretation confirmed that certain disputes over land, canal and water rights were causing land to be fallowed. The studies also revealed the difficulties of smallholders to involve themselves in formal credit programmes due to a lack of a legal title. Therefore it will be necessary for the project to assist in smallholder land registration which would have three objectives:

- to increase the capacity of the district and regional agricultural coordinators to register smallholders in the area and comply with registration procedures;

- to promote the dissemination of information to smallholders about their rights to land use and the procedures required to secure them;

- to increase the capacities of these groups to register their land and defend their traditional rights of use.

The recently approved USAID-supported Shabeelle Water Management Project has a key component addressing this issue and is planning considerable financial and institutional support to speed it up. It is proposed to support identical activities in the Dara Salaam-Busley project area, preferably under the same organisation that would work as part of the Shabeelle Water Management Project.

CHAPTER A3

FARMING SYSTEMS

A3.1 Introduction

While the major project components comprise technical and engineering works the coordination and management of the proposed programme can only be effective if improvements to the whole farming, livestock and economic system are achieved. A major constraint to enable intensification of production in irrigated and, particularly, rainfed areas is the lack of locally proven, adequately demonstrated technologies which can be adopted within the present farming system. Part of this problem is caused by the lack of knowledge on the inter-relationships between the main factors of production (land, labour and capital), and most particularly the necessary linkages between different sub-components of the overall farming system (food production, fodder production, natural grazing and browse crop farming, agropastoralism and range management, etc.).

Clearly a major part of the solution lies in the hands of agricultural research and the training given to the extension services. But it will also be a major requirement for the orientation of the project management and their technical advisers.

The main technical aspects of farm production are discussed in Annex 4 (Agriculture) and Annex 5 (Livestock). The main socio-economic influences have been described in Chapter 2 of this section. The following paragraphs look at other key factors which affect the productivity of the overall farming system.

A3.2 Farming Systems

The use of the term farming system is here taken to mean the entire range of private and societal goals and activities which relate to the productivity and welfare of rural people. The methods of management employed by individual production or consumption units in any sector are thus viewed as sub-systems which are connected and have relevant inter-dependencies and inter-relationships. These links may be conflicting, competitive or complementary in nature. When adequately understood at a holistic level the farming system seen reflects the resolution of goals with the conflicts, constraints and contradictions faced within and between the people and households involved. Figure A3.1 expresses this view diagrammatically.

To assist in visualising the project, Figure A3.2 gives some summary information on residence and land use patterns.

The general pattern of farming includes:

- the medium to large scale farming sector based on the old Italian farms and includes government farms with flood and controlled (pumped) irrigation and an increasing number of private investors (individuals and companies), who have registered land rights during recent years. This area also supports tenant labourers, tenant farmers and sharecroppers;

- smallholder cultivators from old villages in the vicinity of the river with crop production under rainfed conditions supplemented often by uncontrolled flood irrigation; livestock rearing is, in this system, of limited importance due to tsetse fly infestation and cultural backgrounds;

- mixed smallholder farming and agropastoralism to the south-east of the old Italian farms area, where crop production under rainfed and flood irrigation conditions is undertaken. Livestock rearing is practised as a sedentary or semi-nomadic production system;

- nomadic livestock rearing, including the seasonal movement of large nomadic livestock herds into the riverine area during the dry season for water and pasture or crop residues against payment to crop cultivators.

Figures on the number of farmers and farm types in the project area are not available, nor are there any reliable production figures. The 1983 aerial photography provides some data on land use in the two districts. These figures are summarised in Section B, Table B7.2 of this Annex.

About 4 500 ha and 1 550 ha of land are estimated to be in the irrigated and rainfed cultivation cycles, respectively. During the gu season it is estimated that about 4 900 ha are cropped (19% fallow) and during the der season about 3 800 ha (36% fallow) resulting in an overall cropping intensity of 145%. The cropping intensity can be higher in areas with supplementary irrigation where double-cropping is more extensively practised. Maize, with about 65% of the total cropped area, is the most important crop in the region, followed by sesame, tomatoes, watermelons and legumes. Other crops include bananas and citrus, which are mainly grown in controlled irrigation schemes and small areas of cotton are now being reviewed.

In the rainfed areas agriculture concentrates on the more reliable gu season. Most farmers plant their entire farm area during this season but possibly only a part during the der season. Over recent history sorghum has been progressively replaced by maize due to bird problems and changing consumer tastes. Maize and sesame are grown in both seasons, with pulses mainly interplanted in the maize.

The risk of crop failure due to drought is ever present and the main objective of the cropping system is to ensure family survival under all but the most extreme conditions. The strategy includes planting in desheks, intercropping, planting at wide spacing to reduce competition for moisture, and the use of drought-resistant and short duration varieties if available.

Whenever possible farmers prefer to use tractors for land preparation which they hire from ONAT or private owners. The use of tractor hire services varies between villages. The Marka survey recorded 83% of farmers using tractors. Most farmers believe that limited access to tractors is a major constraint on production. No farmers use animal traction; during the CRASH programme the use of animal traction was demonstrated but it did not become popular.

Inputs such as improved seed, pesticides and fertiliser are available in limited amounts. The Marka survey recorded 8% of farmers using fertiliser and 5% pesticides. AFMET surveys, conducted more recently, record a similar use of fertilisers but up to 75% of farmers using insecticides. Farmers do not apply farmyard manure to their fields.

Figure . 3.1

Diagramatic Farming System

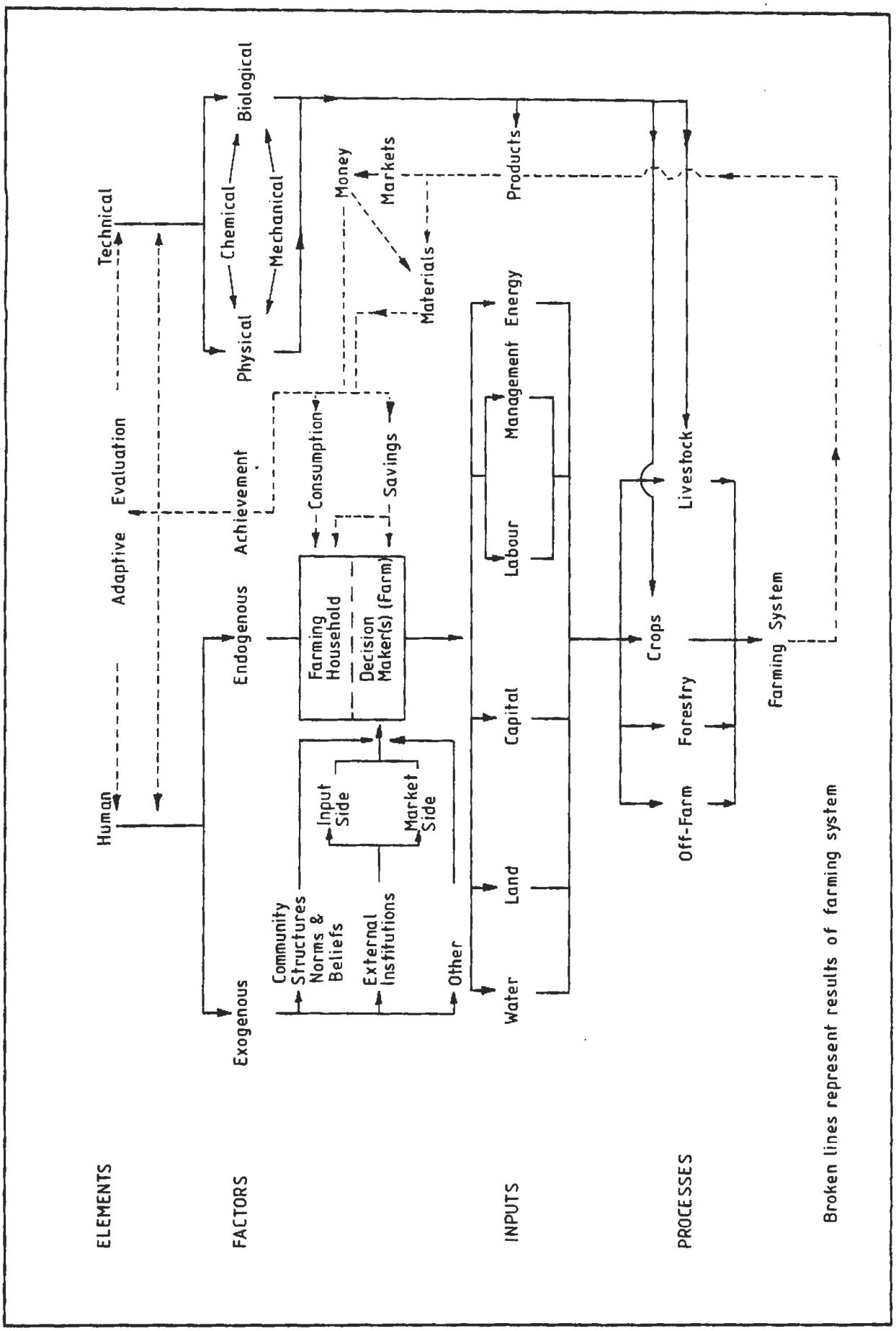
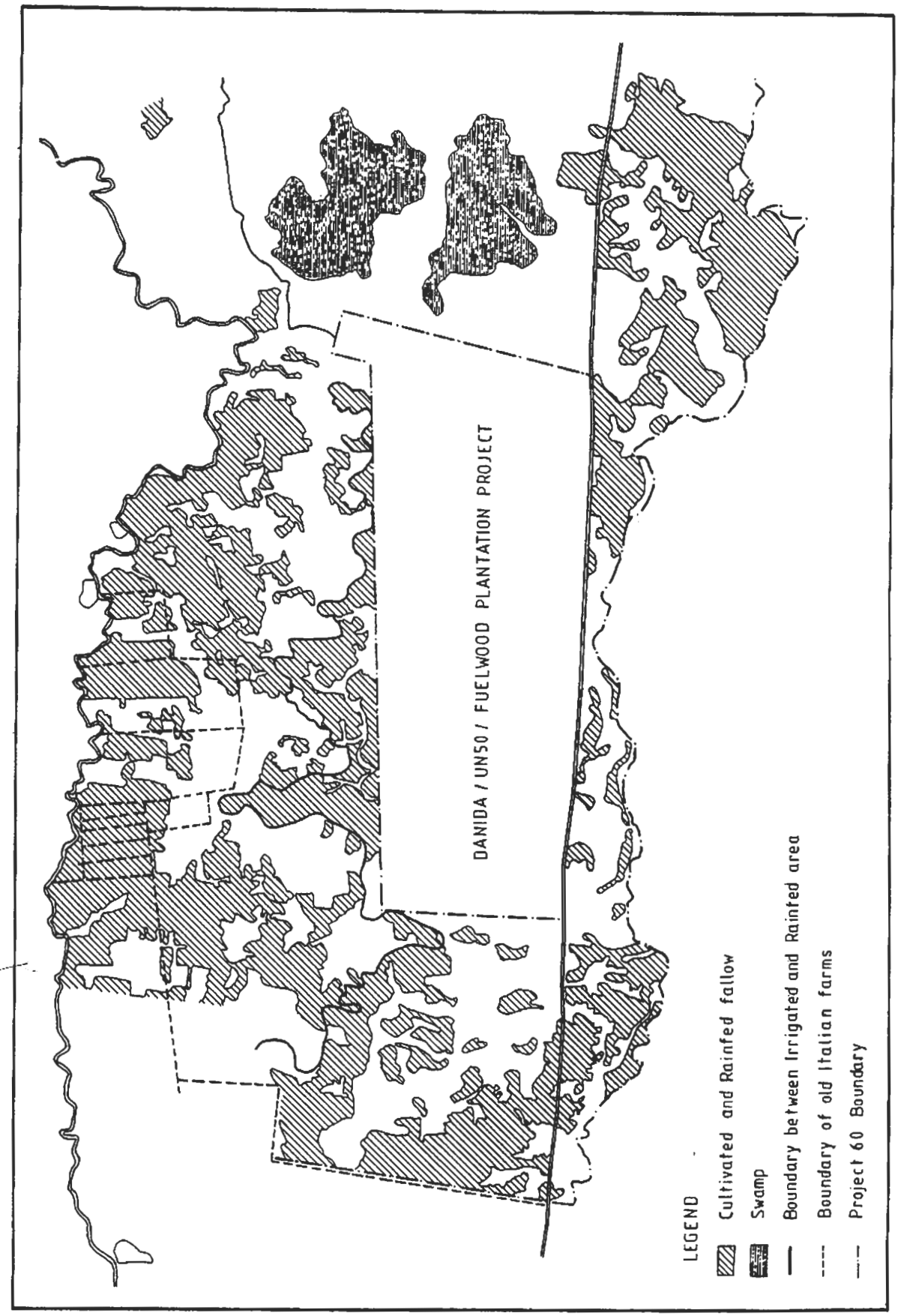


Figure 3.2

Farmland Characteristics (1983)



Most farmers plant and store their own seeds. Crops are intentionally planted at wide spacing to reduce moisture stress. While the low plant population reduces yields in a good year, it minimises the risk of crop failure in dry years. Re-sowing and gapping are common practice.

Weeding of maize in the gu season is a major labour bottleneck. Farmers who can afford it, employ hired labour but demand for labour at this time causes wage rates to rise substantially.

Farmers complained that their crops were often damaged by rats, baboons and monkeys. No mention was made of damage inflicted by livestock although damage to canals was reported.

Crops are commonly stored in pits covered with a layer of maize stalks and earth. Storage losses are estimated to be as low as 5% to 10%. It is also common practice to store grain in sealed 200 litre cooking oil drums.

Livestock provide additional security against crop failure and add considerably to family income. Most villagers keep some poultry; other stock kept are cattle, goats and sheep. Some of the smaller village herds and flocks graze in the surrounding common land. Lactating cattle are herded together and brought into the villages at night. Larger herds of cattle and camels are looked after by farmers' relatives often on the seasonal migrations to the Gil-Gil ecological area across the river. In the dry seasons the herders and nomads bring their livestock into the villages to water at the village wells or to river water-points.

Farmers using carts near the riverine area use oxen rather than donkeys because of problems with tsetse and ticks. Away from areas of high tsetse fly risk donkeys are more common. There are very few owners of motor vehicles.

Motor transport comes into the villages during the maize and cotton harvests and to collect reeds and firewood. Otherwise people take products like milk, butter and ghee for sale in Mogadishu or the local towns on buses plying on the main road.

Access to crop residues by pastoralists are either free, by reciprocal agreements or for cash, depending on the relationships involved.

Grain is often sold soon after harvest to obtain cash or repay debts. Surplus grain is sold to private traders, shopkeepers or to neighbours. Higher prices are obtained in the main villages which have more formal markets and the semi-urban centres of Janaale, Marka, Qoryooley and Shalambood.

Cotton is sold to Somaltex. The price is agreed before planting and Somaltex collects the crop from the villages. Sesame is sold to local mills (both machine and animal operated) or to private traders who come mainly from Mogadishu. ADC buyers also come into the villages but their prices are generally lower than those of private traders except when a 'sheil' credit system operates.

A3.3 Farm Sizes

The issue of farm size is crucial to the economic viability of a crop farmer as is shown in the farm financial analysis in Section B, Chapter B7. The Consultant undertook two small surveys in the project area. The first was an uncontrolled sampling of villagers for the agricultural survey. The nature of the sampling means that it is unreliable on farm size distribution. Another source is the tax

records from 1983 which most probably underestimate smallholders who were tenant farmers. The Marka survey covered two specific villages in the project area. The Consultant carried out detailed surveys of farm sizes on a complete canal command area at the Barwaaqo canal. Further comparison is provided by the land registration records given in Chapter A2 which are also suspect because of the use of companies and co-operatives as a guise under which to register land. This also would not show land farmed by tenants. Table A3.1 compares the results.

TABLE A3.1

Farm Size Distribution

Farm size (ha)	1983 tax records	Marka survey		Consultant's survey	
		Busley	Fidlabey	General	Barwaaqo
		(percentage of those farming land)			
1	7	90	77	-	70
1-1.9	12	7	23	6	22
2.0-4.9	21	2	-	26	2
5.0-9.9	26	1	-	18	2
10.0-19.9	44	-	-	29	3
20.0-49.9	23	-	-	9	-
50.0-99.9	58	-	-	3	-
100-299	10	-	-	6	1
300 +	4	-	-	3	-
Area	Mixed	Irrigated	Rainfed	Irrigated	Irrigated

A pattern of extensive subsistence-scale smallholders emerges that probably dominates the actual land use systems. There are also a significant number of medium-scale farms. The area of land operated as registered large-scale farms is substantial and perhaps some 10% of farmers control between 20% to 30% of the land area.

No account is taken in these figures of landless families which are reported to be increasing.

The suggestion of these three levels of farming scale immediately identifies potential target groups for development planning and implementation purposes. These scales are also perceived by villagers as relevant criteria by which to assess poverty or wealth, in addition to the number and species of stock owned. In most interviews a small farmer was regarded as having a gross area of between 0.5 ha and 5.0 ha, a medium-scale farmer between 5 ha and 20 ha and a large farmer more than 20 ha. A further category of 'agenda' farms corresponding to the old Italian plantation farms was also recognised.

A3.4 Livestock Issues

One major problem is how to quantify a model of livestock activities. The flows of inputs and outputs from the local livestock system are determined by biological, economic, family cycle and reproductive variables which cannot be reduced easily to an annual overview as with seasonal crops. Also, the standard farm management and budgeting techniques available have been designed to accommodate well-defined livestock management systems that do not correspond to those employed locally.

The lack of any basic survey data and management analysis creates a significant gap. At this stage analyses from the limited field surveys are still based on impressions. The discussions attempt to show how livestock enterprises might interlink with cropping systems to provide a more diverse farming system and one that can reduce risks for those families who cannot sustain a commercial livestock capacity.

Annex 5 describes how the main problems facing livestock development in the area are caused by a basic shortage of adequate nutrition, a constant threat from trypanosomiasis and a poor spatial distribution of seasonal water supplies. It also highlights the potentially serious effect which the proposed Mogadishu Fuelwood Project might play by reducing further the fodder supplies of the area and providing a suitable environment for the tsetse flies. Should the project materialise a net decline in livestock numbers within the project boundaries is likely to occur.

A3.5 Key Variables in Livestock Management

To understand the mechanisms behind agropastoralism involves appreciating the dynamic interactions over a number of years. The key variables are:

(i) The influence of recurring seasonal or longer-term drought on herd size, reproductive potential and resource availability including both the location of the family members and the distance and access to feed and water.

(ii) The access to and productivity of alternative income generating opportunities, whether this be in producing crops (an agro-pastoralist), labouring, controlling land (as an absentee landlord or large farm) or being involved in trade, commerce or migrant work (locally, nationally or overseas).

(iii) The size of breeding herd (which determines commercial capability) which a family can maintain over a period of years under the influence of drought, social transactions of stock, economic cash flow problems and their stage in the family cycle (which determines labour availability for both herding and dairy product processing).

(iv) The relative merits which various species of stock and types of management systems have for families in their development cycle and the ways in which shifts are made in and out of different species and management systems.

These are a few factors which produce a constantly changing pattern of livestock ownership over the years within villages and amongst families.

A recognised succession, to which most with a pastoral background would aspire, was stated in interviews. Families would first acquire small stock (sheep or goats) from which short-term cash needs could be generated through sales of surplus stock. These animals are more easily managed by younger families. There are also those who desire lactating stock for feeding milk to young children. These stock would also provide dairy products for sale and a breeding base for future growth in reproductive capacity.

Sheep and goats would thus be readily traded in or exchanged for breeding heifers or cows. The desire with either stock is to build a breeding herd whose size and reproductive potential can guarantee sufficient surplus animals to counter drought losses and to produce adequate cash income from sales to cover subsistence food demand and consumer needs. Once this level is achieved it helps reduce the dependence on farmland.

While the Lower Shabeelle cultures have given particular emphasis to cattle there nonetheless remains a strong cultural desire to own camels. Thus, once established with cattle, sheep or goats, further trade or exchange for camels may take place. These are both intrinsically, and by virtue of their size of greater value and the milk they produce, much desired.

The economic system that livestock breeding, sale and exchange produces and the impact of recurrent drought means that many families cannot create sufficient investment resources to move up to a higher level of production and commercial capability. Some are able to achieve this from in their farm land and others by breeding successfully. A few jump a level by receiving stock in social transactions. The pattern of settlement shows that there are those who, in times of climatic, biological or economic adversity, lose their stock, and have to settle and farm or take up migrant labouring, these being the only means of regaining an earning capacity to feed and clothe themselves and to create a surplus for re-investment in livestock. These processes can occur at any stage in a family's development cycle.

Economic decisions are further influenced by the age and type of species immediately available on liquid assets. The relative values of young, mature and elderly stock, the products they can produce and the difference in values between shoats, (the collective term for sheep and goats), cattle and camels significantly affect the seasonal cash flows of any family. Thus, those without milking stock cannot produce a regular income. Those without cattle or camels cannot produce a large injection of capital quickly. Those with small stock can sell to cover a short-term cash need without generating cash for investment.

The key factors which determine where when and why herds and flocks move are ecological. A number of recent studies has now started to map out these ecological and livestock management zones as perceived by the experience of local people. These are summarised in Figure 3.3 for southern Somalia. More detailed descriptions are given in Annex 5 and in the reference sources. The key parameters involved in this classifcation are the seasonal availability of water, grazing/browse, insect problems, species advantages, soil types and topography.

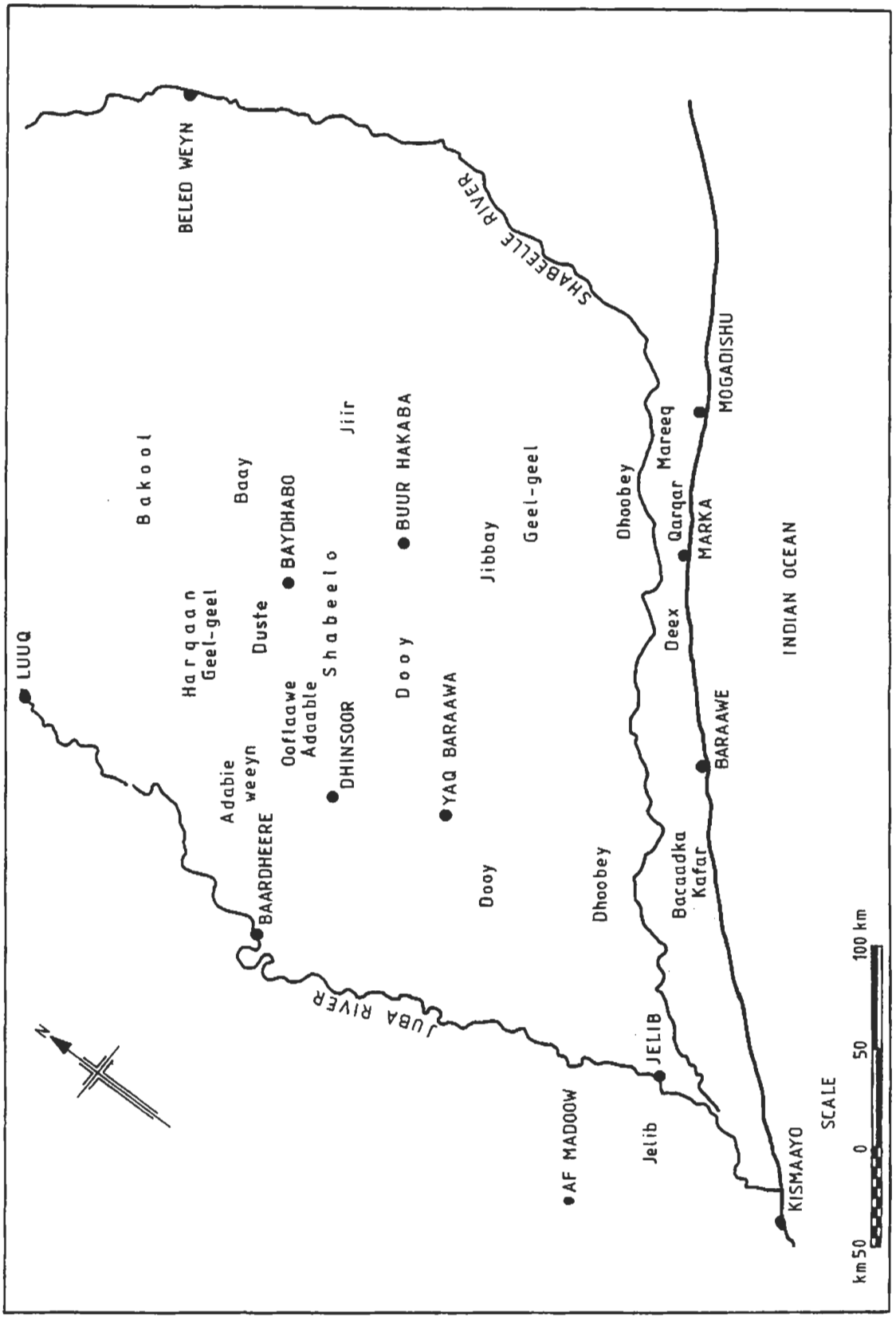
A3.6 Herd Sizes and Management

Survey data results on herd and flock size are discussed in Annex 5. These figures mask the operational realities which particular types of families or farming systems face. The financial analysis in Section B Chapter B7 tries to resolve deficits in family budgets by looking at the equivalent number of surplus sale stock which would be required. This section analyses the breeding requirements and factors affecting it to ensure that this surplus could be maintained and also the impact of drought.

Available data show that to produce one cull and one mature steer on a regular annual basis would require a minimum breeding herd of 12 females with access to a bull. This is based on an assumption of a 35% calf mortality. The effects of drought can be devastating as has been witnessed in 1986/87. Interviews with

Figure. 3.3

Local Ecological Zones of Southern Somalia



families from the Middle Shabeelle who were grazing herds in Jilaal Moogi recorded many families suffering between 60% and 90% losses in their herds. In this situation people will be forced to rely on crop income, wage labouring or social transactions to restock their herds. The alternative would be to wait for the natural breeding potential of any remaining females to rebuild the herd to a viable level. This in turn would mean that sales would have to be foregone in the intervening period.

Options are also constrained by labour capacity which in itself can determine herd size. A young married couple is unlikely to be able to afford hired herders. Stock are thus either herded out on the range with relatives or around the village with communal herders. Alternatively a backyard dairy unit is established where one or two lactating animals are kept which can be stall fed. The amount of time available from the wife for milking and processing the milk products thus determines the number kept. In this system it will be income from dairy sales which become important. The seasonality of milk production now affects the cash flow decision making process.

Ghee (clarified butter or 'subug') is an important component of Somali diets. Since it can be stored for several years it is highly valued as a non-perishable and portable food supplement, especially during the dry season when milk is in short supply. Most ghee produced is sold for cash. The amount available varies considerably depending on the season and the calf and milk management strategy and demands. As less milk is required for children an option of raising better calves for meat marketing arises. The buttermilk by-product is given to children, given away or sometimes sold in the Mogadishu market. Goat's milk is also made into ghee and is sometimes mixed with cow's milk for processing. The advantage of the goat as a milk producer is that milk can be produced more or less all the year round.

The variations in reproductive cycles between the different species means different herd growth rates for each type of animal. Goats and sheep are thus more attractive for families wishing to build numbers rapidly.

The watering and labour requirements of each species are also different and taken together with their relative financial and marketing values produce a plethora of consideration in livestock investment and management decisions. Table A3.2 summarises some of these characteristics which influence both species choice and herd sizes. The aim of most families is to take advantage of the characteristics of each species by building up diversified herds and trying to avoid the problem of holding too many of any one species.

Following on from research into herd management strategies in the Bay Region, families in the project area were questioned on the main types of economic transactions in which stock and dairy products were involved. In this respect livestock transactions are common phenomena, not just sales into the livestock markets at Qoryooley or Afgoi or to visiting traders. Exchanges of stock for stock, stock for grain and milk for grain are also made. In many instances these are transactions which attempt to restore house and herd viability and not to make a direct 'profit'. The patterns are seasonal, drought-influenced and affected by the evolution of families in the development cycles. These trading patterns allow the species or age composition of livestock holdings to be altered. They can also shift the proportion of breeding to marketable stock, increase the lactating capacity, off-load animals not needed or build up numbers.

Herd sizes affect the commercial options available. Small producers may be forced, through a lack of choice from numbers, to sell either female breeding stock, prime slaughter or export quality animals. Large producers tend to buy breeding stock and only sell culls and prime slaughter animals. Purchases of these breeding stocks often occur from the smaller producers when they run into periods of difficulty, either as cash transactions or by the trading of grain for stock. The problem for the small operator is always how to break the threshold barrier and achieve and sustain a commercial level of offtake. In this respect agropastoralism is important to use cropland to minimise the cash needs for food consumption, or to generate the capital surpluses for livestock re-investment or to establish a local base from which wage labouring can be carried out. In the commercialised economy that now exists where commodity prices are fluctuating widely the crop farming strategy also allows a partial or opportunistic withdrawal from the commercial sector. Livestock form the long-term assests and those which can be cashed in to cover small (shoats), medium (cattle) or large (camels) cash or food deficiencies.

A3.7 The Labour Issue

There is a long history of labour problems which have plagued the Janaale area. Recent surveys by AFMET in the Janaale area indicate that credit, availability of tractors for land preparation, shortages of irrigation water, and a lack of seasonal inputs were ranked as more of a problem than labour in this sample area. However, in the Consultant's field surveys farmers reported that in the Dara Salaam Busley area the labour issue is an important constraint.

The way the present situation has developed is in Appendix I to this Chapter.

Most farmers, whatever their wealth or social status, prefer to have their own plot even when they live and work most of the year on estates. A 1954 survey showed that 100% of the farm workers held and cultivated their own plots to which they devoted from 45% to 90% of their own or their family's labour time; 64% of the better paid had their own farms, and 79% of these cultivated them with family labour alone. This pattern continues to hold for contemporary labourers on most of the agricultural projects, and suggests that paid labour is regarded as a supplement to, and not a substitute for, their own agricultural enterprises.

The financial analysis in Section B of this Annex shows that to move family resources into livestock is a far better economic option than having to cover cash flow or food deficits by wage labouring even though the local wage rates appear to be high. In practice, it is likely that the rural wage rates are too low to allow relief to the labour market needs.

Since Independence smallholder proliferation on irrigated land has expanded, as witnessed by the settlement patterns (Section A2.2) and the extensions made to the canals once used solely for the Italian estates (see Figure A3.2). Even the post-Independence collapse of banana production immediately in and adjacent to the project area had little effect on the stability of the labour market. In fact, with the recent revival of banana farms and the presence of more medium and large-scale farmers the pressure on wage rates has intensified.

The implications for the future are that labour saving technologies for the medium and large-scale farms will be an urgent consideration.

TABLE A3.2

Management Characteristics of Different Livestock Species

	Biological characteristics			Productive characteristics			
	Reproductive rate	Food requirements	Water requirements	Dairy products	Meat	Sales/ exchange	Other uses
Camels	12.5 month gestation 6-7 calves	Shrubs and trees Fodder occasionally	Every 4-9 days in dry season Every 2 weeks in wet season; not at all if frequent rain	Milk	Rare, only ceremonial occasions	Highest market value	Burden. Rarely for draft (carts or plough)
Cattle	9 month gestation 3-5 calves	Grass Fallen leaves Grain stover Hand fed chaff	Every 2 days in dry season Every 4-5 days in wet season	Milk Ghee Buttermilk	Infrequent, only important occasions	Often to obtain grain	Hides
Goats	5 month gestation 6-7 kids	Shrubs	Every 3 days in dry season Less frequently in wet season	Milk Ghee	Frequently, on religious festivals and for guests	Frequently, to obtain cash for household expenses	Skins
Sheep	5 month gestation 5-6 lambs	Herbage and shrubs	Every 2-3 days dry season Less frequently in wet season	Milk ghee	As goats	As goats	Skins

Labour Requirement

	Herding	Watering	Milking
Camels	High	Medium (dry season)	Medium
Cattle	Medium	High	Low (dry season) High (wet season)
Goats	Low	Medium	None (dry season)
Sheep	Low	Medium	Medium (wet season)

A3.8 Overview and Target Groups

The Consultant's field studies, literature reviews and data analysis indicate a particularly heterogeneous make-up to the project area, its people, the farming systems, its commercial structure and the mechanism driving the economy. This diversity stems from cultural influences, economic history and strategies and the effects of the ecology and drought on agricultural and livestock practices.

The society has gone through many years of dynamic change and cannot be regarded as traditional in either structure, method or outlook. The irrigated area has expanded steadily. So too, recently, has the use of modern inputs, particularly mechanised land preparation. Commercialism has removed all but a few vital non-cash transactions which serve to maintain an important survival mechanism in agropastoralism and the accummulation of wealth or alleviation of poverty. The indigenous methods of organisation and management of the irrigation systems show a sophisticated variety of means to minimise disputes, spread the benefits of irrigation and entice users to maintain the water delivery system.

Economic development is constrained significantly by the current changing values attached to land, the land tenure policies and practices and by the nature of land distribution and the labour markets. The lack of a true farming system and drought-oriented approach and the availability of credible recommendations, particularly for the rainfed and livestock is also significant.

Target groups can nevertheless be readily catalogued but not as easily identified on the ground at this point in project planning. While each group has problems specific to its situation which could all be addressed by aid investments, there is a clear need to direct assistance to the smallholder sector. Table A3.3 outlines the target groups identified, with the main constraints given in summary form.

The results of the financial analysis of the present situation indicate that the low levels of reliably applied irrigation and poor production techniques lead to productivity and production being insufficient. Net farm incomes on average are only sufficient to cover the basic food needs of the family, with a small cash surplus available for other requirements of daily life. However, the capacity for savings and investment can in no way be guaranteed, particularly when the effects of recurrent droughts and shortages in river flows are taken into account. Development strategy has, therefore, to be designed accordingly and, necessarily, parts of any assistance will have to be on soft terms in order not to overburden the smallholder and to keep risks within limits.

Through an intensification of the existing production system by improving irrigation and husbandry techniques it should be possible to increase productivity, production and incomes substantially. However, these improvements also have the effect of raising the capital stakes and risk in the smallholder system. Whether smallholders can or will be prepared to accept this increased risk must be carefully monitored. The works proposed should enable utilising family labour more efficiently. The effect of any area extension will also increase the demand for hired labour, the availability of which is not at all clear. If net farm income increases expected for the smallholders would enable the family to adopt improved living conditions and if minimum farm sizes of an adequate scale could be guaranteed this would considerably strengthen the capacity for savings, investment and a future repayment of development charges.

To realise the existing potential farmers will have to intensify production through the adoption of improved technology and invest more labour and capital. To assist this process the agricultural support services have to be

strengthened. Effective service and extension packages which can reduce a large variety of farmers' constraints simultaneously and in an integrated way will not be easy to achieve in the short term.

The rainfed areas are virtually all under a mixed farming system. Rainfed crop production remains based on simple technologies with low levels of physical inputs, low levels of productivity and, due to environmental factors, suffers frequent crop failures or very low levels of production. The absence of a sufficiently profitable rainfed crop production system and the apparent risks of crop failures necessitates families to supplement incomes from other sources.

The income levels of mixed farmers in rainfed areas are lower than those achieved in flood irrigation schemes. For this reason most families attempt to gain access to irrigated plots as well as farm rainfed plots. In the average or good farming years the major part of the basic food can be obtained from rainfed production. In drought years families have to fall back on grain stored from previous harvests in underground pits or else have to buy additional food with livestock assets cashed in. Good farming years are generally used to increase the herd sizes as risk insurance capital for bad years. Thus the need to develop a more productive rainfed crop production system is now becoming urgent since an increasing number of families are becoming more dependent on rainfed crop production as the prospects for expansion of irrigation, livestock rearing and alternative employment opportunities diminish.

A3.9 Farmers' Attitudes and Planning Issues

Throughout the field surveys and from the results of other studies farmers show themselves wary of government intervention. This derives from the power government has to appropriate land, levy taxes and to force them to take actions which they would not otherwise willingly perform. It would be necessary for the project to win farmers' confidence from the outset.

All the farmers are by now aware that the area had been designated for a major scheme. They were enthusiastic towards the scheme although they were also somewhat apprehensive.

It is evident that production has increased considerably since 1982 when the enforced sale of produce to ADC was abolished. Just as these farmers have responded to price incentives, it is expected that they will be prepared to adopt appropriate technical inputs provided the output can be easily marketed.

The implementation of the project will involve major changes to the villagers' way of life including significant new employment possibilities while construction contracts are being carried out. In the interests of the villagers, to implement current government policy and to guarantee long-term project success, it would be necessary to involve participants in planning and preparation of the project. It has been noted that both canal and village committees already exist. The implications of the scheme would have to be explained to the committees and villagers at an early date. Representatives of the committees should then be invited to participate in project planning and implementation committees.

To ensure effective farmer participation in water management, maintenance of infrastructure and other services, the basic unit of project organisation and management at the watercourse unit level should be the existing canal organisations. While various voluntary labour groups already exist, the project's farmer organisations would require a higher degree of co-operation

than is presently practised. The project can provide some guidance in the formation and modus operandi of these organisations. Because little is known at present how different socio-economic groups work together it is recommended that participants should be left to form their own groups.

Clearly the most contentious issue remains registration and title to land. The present rush for land by outsiders and absentee farmers could endanger the rights of existing residents. Therefore, farmers should be encouraged to register their land.

The large numbers of livestock owned by farmers and nomads in the project area can cause considerable damage to irrigation infrastructure and crops. It is proposed that the project provide watering and feeding points for livestock outside the irrigated area as well as walkways through the project to allow access to river watering points. In addition, farmer organisations would be encouraged to accept responsibility for providing security against livestock vandalism and for operating and maintaining many of the project works proposed.

TABLE A3.3

Target Group Activities

Farm type/Target group	Action required
Larger Farms/Plantations	
(a) Absentee speculators	Incentives to redistribute land and to invest in agriculture.
(b) Absentee landlords with on-site minders	Assistance with farm management skills, investment and insurance strategies. Credit and technical assistance programme for improvement of irrigation and development works. Marketing coordination.
(c) Resident owners	As for (b).
(d) Company and institutional farms	As for (b).
(e) Agropastoralists	As for (b) and training for stockmen. Improvements to veterinary and dairy marketing systems.
Smallholders	
(a) Tenant labourers/farmers	Extension and credit schemes, banking and insurance facilities, land distribution, weeding options, nutritional monitoring, potable water and fuelwood provisions, subsidised improvements to irrigation facilities. Provide banking services.
(b) Agropastoralists	As for (a) and (e) above.
(c) Commercial scale agro-pastoralists	As for (a) and (e) above.
(d) Crop farmers	As for (a).
Landless in Area	
(a) Commerce and artisans	Coordination with contractors for employment possibilities and to assist in improvement of services to farmers and pastoralists.
(b) Labourers	As for smallholder (a) above.
(c) Seasonally immigrant agropastoralists	Access to veterinary and stock water improvements. Contingency provisions for future major droughts.

APPENDIX I

HISTORY OF LABOUR RELATIONS AND AVAILABILITY IN THE PROJECT AREA

After the developments described in Section A2.2, agricultural development first ran into problems as a result of Italian labour policy. The Consultant's studies have been combined with the research efforts and personal communications of Lee Cassanelli to compile the following summary of labour policy in colonial times, which is still relevant today.

Italian methods for obtaining farm labour included carefully planned and managed systems of worker incentives at Societa Agricola Italo-Somalia (SAIS) Jawhar estates and the use of armed coercion at Janaale and in the project area. SAIS was started in 1920, by the Duca degli Abruzzi; 25 000 ha of land near Jawhar were leased by SAIS through direct negotiations with elders of the local clans in the area. One major farm was established close to Busley-Dawd and is fed by the Gure and Minnow canals today. Over the next decade, more than 680 km of primary and secondary irrigation canals were dug. The major commercial crops that were tried were cotton, sugar cane, maize, coconut palms, and bananas.

The SAIS farm's approach to labour recruitment and management encouraged labour to settle directly on the estate. Each family signed a contract and received 1 ha of land, half of which was allocated to a designated commercial crop and the remainder to crops the farmer chose. The commercial crops were sold to SAIS at a price fixed annually by a board made up of local headmen and community leaders, while the produce of the remaining 0.5 ha was at the farmer's disposal. SAIS also provided its workers with housing, tools, access to wells, seeds and medical care. It was a paternalistic system where the work and life styles of participating families were carefully controlled and even the time allowed for marriages and funerals was written into contracts. Local advisory councils ensured that the rights and obligations of both workers and supervisors were recognised.

However, other Italian concessions set up during this period suffered from a scarcity of unskilled labour, particularly at Janaale and in the Juba valley where Somali farmers already farmed their own plots and where the benefits of plantation life were not as well subsidised as they were at SAIS.

To meet the continued labour shortages the SAIS farm at Janaale in the project area and other concessions offered other incentives. By recognising that many estate workers divided their time between SAIS and their own off-scheme farms, the Society offered additional daily wages for labour performed on other parts of the estate during the farmers' free time. Bonuses were also offered to farmers to marry, to take second wives, to have more than three children living on the estate, and for children marrying the children of other estate residents.

Other recruitment techniques were tried after 1925 to develop the concessions at Janaale, where there were more Italian owners competing for labour and where labour practices were not as uniform. One practice involved paying hired workers a week's or a month's advance as an incentive for recruiting workers and was the only way that some labourers were engaged. However it made them liable for breach of contract if they abandoned the plantations and established legal powers to compel their return.

As the Italian development gathered pace in the late 1920s two forms of contract dominated labour relations in the agricultural concessions. The first was a rotating system, where each village near the European plantations had to provide workers for a 6-month period. As it became apparent that the riverine areas were unable to supply the necessary manpower, recruiting of labour chiefly in the Buur Hakaba/Baydhaabo region started. Labourers were expected to sign contracts on renewable 4-year terms. These contracts stipulated obligations for excavating and repairing canals and constructing dikes and dams.

This was a period when families were divided, coercion was regularly employed to ensure that contracts were not broken and considerable deaths and injuries resulted. The main canal on the Janaale system nearest to the project area is named after the traditional scarf of mourning in remembrance of those who died constructing it. That experience has remained strong in the collective memory of local people until modern times.

Throughout the 1930s and 1940s, the Italian farms continued to experience critical manpower shortages, exacerbated by the military build-up for the war with Ethiopia. Farm labour was most scarce during the planting seasons, when workers were preparing their own fields or helping with those of relatives. Only in exceptionally dry years did the plantations attract sufficient numbers. During the severe drought of 1933, agropastoralists from the Bay Region migrated in large numbers to the Shabeelle valley. The following year the colonial government transferred 150 orphaned children from drought relief camps to the agricultural concessions at Janaale. The project village of Busley-Dawd comprises migrants of this drought year who never returned home.

Labour policies during the British Military Administration (1941 to 1949) reflected the economic uncertainties of the time. All previous Italian legislation and the system of contracts was abolished. Although the Italians complained of a deliberate attempt to undermine the planters' rapport with their workers by declaring the previous contract system a form of slavery, nevertheless many workers abandoned their concessions when British forces occupied Somalia. However, the British did reinstitute a form of rotating contract labour for public works and essential agricultural activities, and the Proclamation of 1947 established prison sentences for breach of contract.

The 1951 ILO Mission to Somalia recognised that the chronic scarcity of labour on the large estates, especially during the rainy seasons, was exacerbated by the fact that Somali landholders were themselves hiring labour during the planting season, paying (in 1951) SoSh 2.50 per day plus food, in comparison with a minimum wage of SoSh 1.30 on European farms. During the dry season, in contrast the daily wage for hired labour on Somali farms was SoSh 0.30 to 0.40. Although only better-off farmers could afford to pay these rates, it seems clear that Somali farmers were then beginning to compete with European farmers in recruiting seasonal workers.

Another trend was the influx of rural labour into the coastal towns in spite of high levels of urban unemployment and a shortage of manual labour in rural areas. The wages paid to agricultural workers were not high enough to attract the urban unemployed, who prefered to remain in towns in the hope of obtaining work. This was the labour situation in Somalia up to the present.

The foregoing shows that the present difficulties of rural labour are not new. Most of the sedentary rural population became small independent farmers which, combined with the relative abundance of unoccupied cultivable land, stemmed the emergence of a wage labour force in colonial Somalia. It was not until mobilisation for the Italian war against Ethiopia and the growth of towns during and after World War II that a substantial free labour market appeared.

There are also sound economic reasons for the rural Somalis' reluctance to sell their labour. It was calculated in 1925 that an independent farm family had to invest 344 work days to produce 2 100 kg of maize, an amount sufficient for the family's annual needs plus a small surplus to exchange for other necessities. Today the labour requirements are estimated at about half this rate. Moreover, because the critical planting and harvesting seasons overlapped for most plantation and staple crops, Somali farmers simply could not maintain their own farms while working for a concessionaire. Even in times of drought, as soon as the rains returned with the promise of good planting, migrants from the Bay Region quickly abandoned the plantations and returned to their own plots. Throughout the colonial period, the concessions draw most of their voluntary labour from populations living in the marginal agriculture zones, not from the stable farming communities of the riverine zones.

SECTION B

FINANCIAL AND ECONOMIC ANALYSIS

CHAPTER B1

INTRODUCTION

B1.1 Introduction

This section presents the results of the financial and economic studies. The information and analysis of this Annex has to be cross-referenced to the other technical annexes and, in some instances, to other research texts. The key texts used for this study themselves contain more complete sets of bibliographies and are listed in Appendix A.

The section begins by giving some general economic background on Somalia. Market prospects for the major livestock species and crops dealt with in the project analysis are then appraised and the major price assumptions discussed. These data are then fed into an analysis of the farming systems found to be typical of the area. The final chapters deal with the assessment of the project costs and the expected level of economic benefits for the proposed development programme.

B1.2 Project Assumptions

The project characteristics taken into account in the analysis are:

- The project is to be mainly funded from external sources.
- Funds are to be grant aid.
- Project implementation period will be about five years.
- Project objectives are multi-purpose and thus demand a multi-component project approach. These will necessarily involve investments addressing economic, technical as well as social constraints.
- The main orientation of the project is for the assistance of smallholders and the more disadvantaged groups but not to the exclusion of important economic producers or private sector support services, nor is it implied that investments are to be channelled in uneconomic or unproductive ways without justification.
- The Terms of Reference and project discussions gave special emphasis to an investment plan laid within clearly defined project boundaries. This investment strategy limits the effectiveness with which planning can address the integrated nature of economic, social and commercial links, relations and constraints which cross the boundaries fixed for the project. The project concept is thus area-specific, as well as multi-component and multi-purpose.
- The short-term initial commitments from the donor limited the degree to which the Consultant could develop longer-term plans. The main problem is the impact which a short, sharp and substantial injection of foreign exchange will have on the local economy and government budgets. The levels of short-term donor investment envisaged will inevitably create a ripple effect and generate additional capital requirements in the local economy and for GOS recurrent budgets which they must be prepared

to maintain. Stimulating local skills together with the use of revolving funds has been given special consideration to enable the project to generate a self-sustaining capacity once the investment and donor phase is completed.

- The multi-component nature of the project implies that responsibilities within the project will go beyond those normally shouldered by the MOA. It will be essential to co-ordinate with the responsible bodies and to integrate into the existing local government and self-help procedures if the project is to be successful.

- It is important that the project should rehabilitate and improve, but not replace existing systems.

- The project strategy would identify where existing institutions and government services need to be assisted and supported and not duplicated or diverted.

- Participation of local people in the planning, design and implementation to the maximum possible extent is a major management aim.

- Project strategy would aim to make the project self-sustaining. Funds required for project operation should be substantially recoverable from the beneficiaries.

- Irrigation development would be based on present levels of water abstraction at peak periods. No increase in the irrigated area can be assumed except out of savings due to improved irrigation efficiencies.

B1.3 The Database and Analytical Procedures

The initial studies indicated that the existing survey data and project analysis from the neighbouring irrigation areas on the Janaale system would be adequate for detailed planning to a feasibility study level. This was to be supported by reconnaissance level surveys and rapid rural appraisal techniques during the fieldwork. However, the field studies soon indicated basic differences and data deficiencies. The main reasons why this uncertainty has been identified are that most previous studies have dealt with large and formal existing irrigation schemes having a substantial institutional involvement or with similar schemes being planned as such. This context is very different from schemes found in the project area where there is a long history of locally developed irrigation without significant institutional involvement and which is to be rehabilitated with minimum disruption to the existing system.

The primary focus of previous studies has been on the development of irrigated farming separate or isolated from the local pastoral or rainfed economies. The main planning critiera which follow from this approach are substantially different from those which should apply in the Dara Salaam Busley project area where the development involves supporting an economy where there is an integrated and symbiotic set of inter-relationships between the irrigated, rainfed, pastoral and agropastoral sectors and where allocation of funds and resources between these sectors is an important factor in how the economy as a whole can develop. Therefore a baseline survey should be carried out as soon as possible (Annex 8).

In particular, it was not possible to identify all major parameters on the operations of the local economy to develop a reliable database for analysing which rural feeder roads would produce the most significant local benefits. A simplified impact analysis has therefore been used. This tries to determine population densities (for which a reliable population database is also not available) and densities of cultivation in particular zones surrounding selected stretches of potential feeder roads. The road locations were determined from linkages believed to be necessary either to join villages to the existing road network or to upgrade routes, which obviously cater for the major marketing and travel needs, or to link with the location of proposed village stores. Details are in Annex 6.

No data are available on the levels of feeder road vehicle use, or the seasonality of road use and traffic densities. Neither are there any local data on how the the rains delay marketing services or impede the movement of labour and farmers during the cropping season. Thus the extent to which improved roads would assist in marketing, fieldwork, labour availability or its efficiency is not clear. However, undoubtedly both social and administrative benefits would result.

Another example of data deficiency concerns the appraisal of the location and impact of improved water supplies. The field interviews show that lack of potable water sources in the cover and marine plains means that women have to walk considerable distances to collect water, except during the irrigation season, when water is drawn from irrigation canals. Thus, time available for fieldwork when the irrigation canals are dry is severely restricted. Provision of wells near the villages would undoubtedly enable more time to be spent on fieldwork. Moreover, a clean and safe watersource may or may not be an advantage when the canals are running: health hazards of canal water are not clearly identified. Neither is it known which villages are located above suitable potable water sources. Therefore, provisions have been made for investigations and test drilling.

The issues attendant to land registration and tenure are also not fully understood. For instance, a recent analysis of the adjoining Shalambood scheme noted a certain percentage of large farms, but did not recognise that large areas within these farms are in fact farmed by smallholders, either as the tenant farms of farm labourers, or as farms rented to smallholders from other areas. Such information, which must be based on direct field studies, is vital to produce a balanced understanding of the true nature of farming problems in any particular area. A related aspect concerns the extent of share cropping, who is involved, and how this farm management system impinges on farm profitability or family capabilities to produce their subsistence needs.

The land registration records indicate that by setting up companies and co-operatives, small and medium-scale farmers can come together to register land and protect their rights of land use without disclosing illegalities, e.g. by farmers farming more than one plot in different locations. There are strong indications that these modern management institutions are mostly a response to land tenure problems. Their existence uncovers little about how these institutional forms assist in the efficiency of resource use, farm productivity, rationalising the organisation of market links to many small farmers, or how they help develop management or marketing skills. Preliminary impressions are that few if any such benefits are being derived through these institutions. These sectors would need much closer study before a coherent development strategy can be formulated (Section A, Chapter 2).

The rapid field studies identified a range of different farming systems and socio-economic groups operating in the project area. However, the time and resources available to study the conditions of each was severely limited. This limits the current capacity to direct the project's investment strategy reliably towards particular target groups and base it on sound reasoning. Though intuitively the target groups would seem obvious, they may be difficult to identify in practice. An example would be to elucidate how poor nutrition affects different groups or to identify which farm groups suffer from insufficient production or economic capacity to maintain their nutritional intakes at adequate levels. At present hypotheses can be made but little confirmation or quantification of specific target groups can occur. Nutritional studies as part of the baseline survey would greatly assist this planning.

The recommendations for the proposed baseline study (see Annex 8) incorporate all the vital data required to develop a proper agricultural programme. The implications are that the project management will still have a certain amount of research and strategy analysis to complete before detailed plans on sub-components can be drawn up. This can proceed as other more certain aspects of the project are being implemented. Forcing this more interactive and on-the-spot planning contains certain distinct advantages, as it leaves flexibility in the hands of management to respond to conditions as they find them and not to implement plans based on a limited amount of fieldwork and local contact.

These deficiencies have created the need for a simplified methodology for project analysis. While it has been possible to derive scenarios which indicate basic differences between a few of the farming systems and scales of farms, it has not been possible to translate this into a distribution of such farms across the whole project area. The approach aimed to cover a range of probable outcomes. Thus, in deriving the benefit flows for the project, the analysis has extrapolated first the best farming circumstances across the whole area, and then the worst, thus providing the upper and lower limits of likely project returns. This contrasts with the normal method of analysis which tries to provide a definite structure of the project to derive a main rate of return which is then tested by various alterations to key variables in the sensitivity test procedures. The selected method has been taken one stage further by introducing two price scenarios as described in Chapter B5. The farming systems analysed are described in Chapter B6.

The selected methodology redefines the analytical approach set out in the Consultant's original proposal. It essentially completes the same task, but gives a more realistic setting to the economic models of the project's future operations and structure considering the quality of data available.

In Somalia at the present time there is no standard or centrally controlled application of economic appraisal criteria or assumptions. The Consultant has reviewed recent economic reports and has tried to keep to the main assumptions common to these studies. The main purpose of this is to make the results of this project appraisal comparable with others.

The analytical procedure is a standard cost-benefit analysis common to the majority of projects presented for international financing. The project cost and benefit flows have been extended over the complete life of the project which, in this case, relates to the useful life of the main irrigation structures. For purposes of analysis the project life is taken as 50 years. This is to be clearly distinguished from the initial financing period now under consideration by the CEC, which would be for 5 years. Once the annual cash flow of the project has been calculated, annual values are discounted back to the start of the project to calculate their present values and the internal rate of return. It

should be noted that this assumption is not accepted in some Islamic banking practices. It must also be realised that the analytical method tends to favour projects giving good short-term returns and can thus mask certain fundamental long-term needs of development, such as conservation of resources or a slow and steady approach to a project when data and technical solutions are still unclear.

A further use of the internal rates of return is to compare those generated by the project with the opportunity cost of capital in the economy as a whole. It must however be borne in mind that in areas of marginal climate, land use and low productivity there may, in practical terms of regional agricultural development, be little alternative choice for investment; and that agricultural projects in marginal areas may all have low rates of economic return. For a more meaningful assessment, criteria for social returns, i.e. the notional value of non-quantifiable benefits, like improvements in the quality of life, need to be identified.

CHAPTER B2

ECONOMIC BACKGROUND

B2.1 The Development Context

Somalia is poorly endowed with natural resources. Erratic climatic conditions create a hostile environment for either sedentary or pastoral rural production systems. The country's two main rivers, the Shabeelle and the Juba, provide the major part of the usable surface waters but even their flows are irregular. The result of these uncertainties is to create a framework for agricultural development which faces considerable risk. Moderate droughts can be expected once every 3 to 4 years and major droughts every 8 to 10 years.

Somalia's land area is 63.8 million hectares (ha) of which 45% is rangeland, 42% marginal grazing and 13% potentially cultivable, as shown in Table B2.1. The country is divided into 16 regions, as shown in Figure B2.1. The major cultivation takes place along the two rivers and in the inter-riverine area but, at present, only uses about 9% of the potentially cultivable land. About 77% of this cropping is rainfed, 16% uncontrolled irrigation and 7% controlled irrigation.

TABLE B2.1

Potential and Actual Land Use in Somalia 1983

Land category	Potential Area ('000 ha)	(%)	Cultivated (1983) ('000 ha)	(% of potential)
Non-agricultural	26 765	42	-	-
Range land	28 850	45	-	-
Crop land:				
Irrigation				
Shabeelle river	86		35	41
Juba river	160		14	9
North West Region	4		1	25
Total irrigation land	250	0.4	50	20
Flood irrigation	-	-	110	-
Rainfed	7 900	12.4	540	7
Total arable land	8 150	12.8	700	9
Total land	63 765			

Source: The Crop Production of Somalia - Agriculture in the Winds of Change, 1986

The rangelands are believed to be reaching the limits of their potential in the face of the transhumant pastoral and agro-pastoral regimes. Livestock forms the backbone of the economy and export potential. Since 1982/83 export marketing has been severely disrupted by a ban imposed by the major export market outlet of Saudi Arabia. This ban still holds for cattle exports, but some recovery of other exports has occurred as new markets in Egypt and North Yemen have been developed. The effects of this are shown in Table B2.2.

TABLE B2.2

Number and Value of Livestock Exports, 1976 to 1986

	Sheep ('000)	Goats ('000)	Cattle ('000)	Camels ('000)	Total livestock ('000)	Total value, FOB[1] (SoSh million)
1976	385	381	58	34	858	301.9
1977	465	462	55	33	1 015	299.5
1978	739	715	77	22	1 553	570.6
1979	717	705	68	13	1 503	474.1
1980	745	736	143	17	1 641	639.5
1981	685	680	116	15	1 496	1 001.9
1982	730	719	157	15	1 621	1 511.9
1983	569	557	54	8	1 188	1 129.3
1984	389	362	8	4	763	670.8
1985	709	749	42	7	1 507	5 247.6
1985	34	34	-	-	68	-
1986[2]	81	82	3	1	177	-

Notes: (1) Exchange transaction records.
(2) Through February.

Source: Ministry of Livestock, Central Bank of Somalia and IMF.

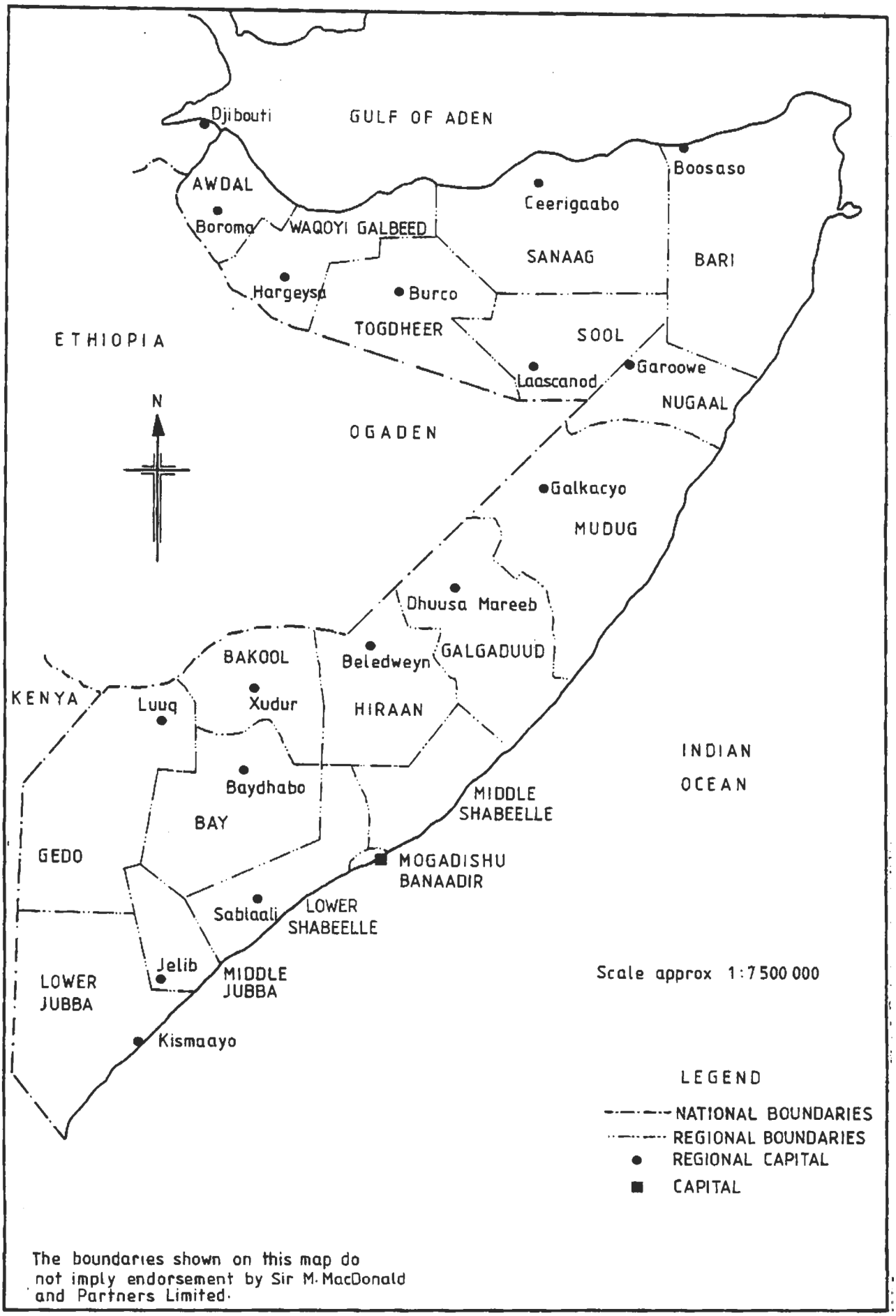
Somalia's population is currently estimated at around 5.8 million people (excluding refugees estimated between 0.5 and 0.7 million) and is growing at some 3% per annum, which is high in relation to food production capacities. Although population density is 11 per square kilometre, given its fragile environment it is unlikely that Somalia can face with confidence a significant increase in numbers. The nation's capital, Mogadishu, has faced a massive influx of people from rural areas and now comprises some 20% of the country's population. The total urban population is only 25%; another 25% of the population are sedentary cultivators, with the remaining 50% either transhumant pastoralists or agropastoralists.

Somalia is classified as a low income country, with current estimates placing Gross National Product (GNP) per capita at around US$ 260. Gross Domestic Product (GDP) has grown at around the rate of population growth during the 1970s and early 1980s, but the growth of the productive sectors has declined relative to population increases while the service sector has expanded.

The major contributor to GDP (see Table B2.3) is livestock, contributing around 40% in 1985. Crops produced 12%, industry 9%, and the service sector 34%; forestry and fisheries providing the small remaining balance. Livestock dominates the export trade providing about 75% of export value while bananas contributed 15% in 1985.

Figure 2.1

Regional Map of Somalia



The last century has seen dramatic transformations in the state and structure of Somalia's economy from a net exporter of food and commercial products to an economy in crisis, with a severe balance of payments deficit and a recent history of significant food imports. Severe droughts in 1973 to 1975 and 1979 to 1980, moderate droughts in 1983 and 1986, heavy floods in 1981 and a major border conflict with Ethiopia in 1978 followed by continuing skirmishes, have all contributed to undermine the economy. These circumstances have also led to thousands of displaced people and refugees having to be resettled, or accommodated in camps. Growth has also been hindered by pervasive Government policies and controls in the 1970s which created massive inefficiencies in resource use and a large, poorly motivated public sector. Nevertheless, significant progress was made in the fields of literacy, education and health.

The resurgence of the Western influence and donor aid from the late 1970s has led to political and economic reforms. These have included the decline of state-run enterprises, promotion of the private sector and smallholders on the state farms, trade liberalisation, exchange rate reforms, and the dismantling of agricultural pricing and marketing controls. Helped by favourable weather conditions since 1983, these reforms have led to a partial recovery in GDP growth and food production in 1984 to 1986. This led to food surpluses while World Food Programme Aid still arrived. The resurgence of drought and flooding in 1986/87 and a state of emergency in some regions highlight the short-term nature of such upturns.

TABLE B2.3

Gross Domestic Product 1980, 1983 and 1984

	1980		1983		1984	
	Million SoSh	%	Million SoSh	%	Million SoSh	%
Agriculture:						
Livestock	1 813	34	1 403	27	1 996	34
Crops	580	11	595	11	578	10
Forestry	269	5	283	5	283	5
Fishing	25	0.5	32	0.6	42	0.7
Sub-total	2 687	50	2 313	44	2 899	49
Other:						
Mailing	20	0.4	21	0.4	21	0.4
Manufacturing	429	8	483	9	483	8
Electricity and water	58	1	64	1	74	1
Construction	212	4	247	5	225	4
Trade and tourism	474	9	521	10	537	9
Transport	356	7	341	6	397	6
Finance and insurance	360	7	406	8	423	7
Government services	646	12	787	15	787	13
Other services	166	3	185	4	192	5
Adjustments	(76)	(1)	(86)	(2)	(90)	(2)
GDP at factor cost	5 332		5 282		5 948	
Indirect taxes	623		664		664	
GDP at market prices	5 955		5 946		6 612	

Source: Ministry of National Planning.

Inflation levels have also been reduced to around 37% in 1985 compared to 92% in 1984. Nevertheless, local interest rates remain below the level of inflation and thus negate domestic savings. Also, export earnings still cover only about 25% of the value of imports and the accumulated value of debts to be serviced (US$ 170 million at the end of 1985) annually is over 100% of the value of exports. This will last at least through to the 1990s even if recent policy reforms are sustained and current growth trends continue, and if adverse weather conditions do not hit again. It is therefore reasonable to project that Somalia will have difficulty meeting its debt servicing obligations in the medium-term future and will remain heavily dependent on external aid if basic consumption levels are to be maintained.

The basic packages of reforms which are being sought include the following:

(a) unification of the exchange rate at a realistic level to improve resources allocation and promote exports, import-substitution, and remittances;

(b) removal of price and marketing controls of petroleum and related products to improve allocation of resources;

(c) liberalisation of exports of hides and skins, frankincense and myrrh through private sector participation in production and export;

(d) simplification of import tariffs;

(e) better control and monitoring of food aid to sustain incentives for domestic crop production;

(f) improvement in tax administration, public sector domestic resource mobilisation, and control of government expenditure to eliminate current budget deficits;

(g) increased recurrent expenditure for economic and social services and restraint on financing general services;

(h) further improvement of incentives and opportunities to encourage private sector savings and investment; interest rate adjustment; improved credit allocation; and the introduction of private bank(s) to help improve private sector services;

(i) better selection of projects for the Public Investment Programme (PIP) to generate growth and to improve productivity of public investment;

(j) civil service reform with a reduction of staff and a restructuring of salaries; and

(k) public enterprise reform to phase out unprofitable enterprises and restructure others to improve resource use efficiency.

B2.2 Government Development Policies

Government planning and budgeting takes place within the framework of Five Year Development Plans (FYDP). The most recent covered the period 1982 to 1986. The publication of the current FYDP, 1987 to 1991, is believed to be forthcoming

later in 1987. Concurrent with these national plans has been the development of strategy recommendations for rural development that have resulted from national conferences organised by the Ministry of the Interior. The first conference was held in 1979 and led to the adoption of a National Rural Development Strategy (NRDS) for the period 1981 to 1990. The ensuing years have created significant change necessitating feedback to revise the strategy. Thus, in 1985, another national conference was held. Discussions have been published and the revised strategy is awaited with the current round of policy reassessments taking place at cabinet level.

After two years of operation, the 1982 to 1986 FYDP was informally superseded by the publication of the PIP in December 1983. This focused on new efforts to stimulate the economy in the short term and reflected the understandings being reached between the Government of Somalia and the main donor agencies.

The FYDP and the PIP are dependent upon projects and programmes that create a top-down strategy of developing local resources, productive capacity and people. The NRDS looks to strategies that will mobilise local resources by a participatory process and are based on self-help, self-reliance and eventual self-sufficiency. Even though the participatory strategy is clearly the stated GOS intention, the unforeseen result of the sectorial bias in Government administration has diverted the actual strategy and use of donor funds into the trickle-down approach. There has also been little co-ordination or interchange of ideas between the entities responsible for the production of the FYDP and the NRDS; the former being based on a traditional sectoral planning approach and the latter on promoting linkages across and between sectors. The former has always presented projects and programmes for financing to donors without having to justify how they will integrate and complement each other. The latter has not presented projects nor defined the guidelines for implementation while, nevertheless, establishing an excellent policy framework for strategies. It is likely that neither alternative alone can succeed but that a blend and compromise of the two must be found.

The basic objectives of the FYDP and the PIP are to raise the standard of living, to provide employment opportunities and to create a society based on social justice with individual freedom. This is being pursued through a programme that seeks to restore the economy's productive capacity and develop the basis for self-sustaining growth. Additional objectives covered from within the NRDS include the accelerated growth of production, improvement in nutrition, reductions in the disparities between rural and urban incomes and access to social services, the protection of the environment and the reversal of deterioration in the crop and range lands, and the fostering of self-reliance and encouragement of popular participation in development efforts.

B2.3 Balance of Payments

Table B2.4 provides details of Somalia's balance of payments from 1982 to 1984. Livestock exports dominated external trade up to 1983 when Saudi Arabia banned, for health reasons, the import of live animals from East Africa. The value of livestock exports fell 66% between 1982 and 1984. Fortunately this was offset by increases of 150% in banana exports and 45% in other export sales, but there was still an overall decline of 40% in the total value of exports. During the same period, imports rose in value by 84%; as shown below, the balance of trade deteriorated significantly.

TABLE B2.4

Balance of Payments
(1982 to 1984 SoSh million)

	1982	1983	1984
Goods and Services (net)	-3 807.1	-4 876.6	-9 787.4
Exports FOB	1 836.3	1 554.1	1 096.2
Banana	113.7	234.4	284.4
Live animals	1 516.9	1 122.1	514.4
Others	205.7	197.6	297.4
Imports C&F	-5 824.4	-6 570.6	-10 714.9
Foreign exchange	-2 424.0	-2 844.4	- 2 217.1
Franco valuta	-69.5		-3 000.0
Grants in kind	-1 743.7	-2 322.6	-3 320.2
Loans (commodity)	-1 587.2	-1 403.6	-2 177.6
Trade balance	-3 988.1	-5 016.5	-9 618.7
Services	181.0	139.9	-168.7
Transportation and insurance	-47.9	-146.7	38.6
Travel	-1.7	6.7	51.9
Investment income	-64.7	-73.3	-104.7
Government	281.5	149.1	239.8
Others	76.8	204.1	-394.3
Transfers (net)	1 899.6	2 641.1	7 145.9
Government	1 751.7	2 339.3	3 885.2
Private: Cash	86.7	302.0	261.6
Franco valuta	69.5	-	3 000.0
Others	-8.3	-0.2	-0.9
Current Account Balance	-1 907.5	-2 235.5	-2 641.5
Capital Movement (net)	1 486.2	1 077.9	1 952.5
Private	-8.2	-130.0	-299.1
Official	1 494.4	1 207.9	2 251.6
of which: Loans	(1 505.8)	(1 226.0)	(2 265.1)
Disbursement	(1 716.0)	(1 226.0)	(2 265.1)
Amortisation	(-210.2)	(-335.3)	(-57.1)
Other assets	-11.4	-18.1	-13.5
Errors and Omissions	-	120.9	-515.3
OVERALL BALANCE	-421.3	-1 036.7	-1 204.3

Source: Central Bank of Somalia

Balance of trade	1982	1983	1984
SoSh (million)	(3 988)	(5 017)	(9 619)
US$ (million)	(371)	(318)	(481)

These factors contributed significantly to the balance of payments deficit rise from SoSh 421 million in 1982, to SoSh 1 204 million in 1984; in US$ terms from US$ 39 to US$ 60 million.

B2.4 Government Budgets and the Problems of Recurrent Finance

As shown in Table B2.5, Government revenue rose 70% to SoSh 4 343 million between 1982 and 1984 with a corresponding increase in expenditure to SoSh 6 214 million. The overall deficit rose to SoSh 1 871 million from the 1982 level of SoSh 1 078 million. Under the category 'general services', the major increases in expenditure included outlays to the Ministries of Planning and Juba Valley Development. Expenditure on economic services rose from 7% to almost 15% of total expenditure between 1982 and 1983. By 1984 development budgets gave priority to agriculture (31% of development expenditure), livestock and forestry (15%), mineral and water resources (14%) and education (12%). These priorities have been continued in subsequent Government budgets.

The CEC is already aware of the problem being faced in many Associated Country Programme (ACP) countries in financing the recurrent costs of agricultural projects after physical completion. This problem will have to be faced also in the context of this project. The Terms of Reference expected physical completion to take five years. However, while all planning and implementation management efforts should be brought to bear to achieve this objective, the implementation period may have to be extended. Full project benefits are expected to take 5 to 7 years from the time physical works are completed in any one area. Therefore, for the project area as a whole, full benefits will not be achieved in less than ten years. This fact has been allowed for in the economic and financial analysis and must be accepted by GOS in budgeting for operating costs until these can, after 10 years or possibly more, be fully recovered from the beneficiaries.

At present, the GOS is not giving full consideration to the future recurrent cost implications of its PIP and of projects financed and designed through donor efforts. Recent calculations indicate that budgeting for recurrent finance is providing less than 15% of annual requirements. For livestock projects, this rate falls to 7%; for agricultural projects to only an alarming 2%. The major part of available recurrent finance is being diverted into other activities. This has been to the detriment of human development, the capacity to operate and maintain the productive sectors and to rehabilitate ageing capital infra-structure such as irrigation structures and roads. Table B2.6 indicates something of this problem.

B2.5 Agricultural Production

By 1985 a total estimated area of 1.06 million hectares was under cultivation compared with 0.73 million hectares in 1980. Area and output estimates for the major crop categories are shown in Table B2.7.

TABLE B2.5

Government Revenue and Expenditure 1982 to 1984

	SoSh Million		
	1982	1983	1984
Tax Revenue	2 222.4	3 384.7	2 979.0
Income and profits	85.5	269.1	302.8
Production, consumption and domestic transactions	824.2	901.2	822.8
International transactions	1 312.7	2 213.7	1 853.4
- of which: import duties	(1 039.1)	(1 553.6)	(1 333.0)
Non-tax Revenue	336.0	503.5	1 364.1
Fees and service charges	22.4	114.1	107.4
Income from Government property	256.0	102.9	383.8
Other revenue	57.6	286.5	872.9
- of which: transfers from abroad	na	(155.1)	(759.4)
Total Revenue	2 558.4	3 888.2	4 343.1
Expenditure by Functional Classification			
General services	2 918.3	4 295.7	4 634.8
Economic services	967.7	813.9	916.8
Social services	450.0	577.4	662.2
Total expenditure	3 636.0	5 687.0	6 213.9
Overall Deficit	(1 077.6)	(1 798.8)	(1 870.8)

Source: Central Bank of Somalia

TABLE B2.6

Development and Recurrent Budget Allocations (as percentages)

Expenditure item	1984	1985	1986	Average for Sub-Saharan Africa (1981-85)
Development	28	44	48	25
Recurrent	72	55	52	75
of which:				
General Services (including Defence)	83	88	89	63
Social and Economic Services	17	12	11	37

Source: GOS and IBRD statistics.

TABLE B2.7

Crop Areas and Production 1980 to 1985

	1980		1985		Change	
	Area ('000 ha)	Output (' 000 t)	Area ('000 ha)	Output (' 000 t)	Area + %	Output + %
Grains	575	263	879	551	53	110
Oilseeds	98	44	107	68	9	55
Legumes	19	9	27	15	42	67
Other	39	317	48	399	23	26
	731	633	1 061	1 033	45	63

Livestock is a major element in the Somali economy with an estimated population of almost 40.6 million head in 1984 (Table B2.8) of which 11% were cattle, 15% camels and the balance sheep and goats. Growth in the livestock population is affected by drought in particular, and growth in terms of livestock units is moderate at almost 1.5% a year. By species this figure would be rather less for cattle and higher for small stock.

TABLE B2.8

Livestock Population 1975 and 1980 to 1985

	'000 head				Livestock
	Cattle	Camels	Sheep	Goats	Units(1)
1975(2)	3 951	5 428	9 452	14 997	11 900
1980	4 351	5 800	10 300	17 000	13 176
1981	4 473	6 014	10 800	18 000	13 675
1982	4 578	6 239	11 580	19 000	14 207
1983	4 201	6 131	11 200	18 000	13 638
1984	4 296	6 162	11 800	18 300	13 841

Notes: (1) Livestock Unit - LU = 250 kg live weight.
(2) 1975 Livestock census.

Source: Ministry of Livestock and Forestry Research.

B2.6 Imports and Exports

Tables B2.9 and B2.10 set out Somalia's imports and exports by category. Food imports, including food aid, have been substantial for some years. They have adversely affected the marketing of local grains and sugar. Livestock and bananas are the major export crops, although, as noted in Section B2.1, the former has been seriously affected by Saudi Arabia's 1983 ban on live animal imports from East Africa.

B2.7 Summary

The severe drought of 1974/75 diverted Somalia's resources to resettle large numbers of displaced families. By the early 1980s, GNP per head had not risen above the levels of the early 1960s. Since 1982, development assistance has risen substantially and the Government's marketing policies have been liberalised. However, international political and economic events, and drought in 1984 and 1986, have combined to hamper progress - the budget deficit grew rapidly and inflation rose, in 1984, to 90% per year. Difficulties include a much devalued currency, problems in financing, substantial under-utilisation of the industrial and processing sector, and power, fuel and raw materials shortages. Nevertheless, crop production, especially grains, has increased rapidly as a result of two good seasons and market liberalisation, and inflation has fallen to about 30% per year.

TABLE B2.9

Imports 1982 to 1984 (SoSh million)

Items	1982	1983	1984
Foodstuff	391.2	453.7	267.5
Beverages and tobacco	107.9	112.1	79.4
Textiles and household	35.7	36.2	37.3
Medicines and chemicals	120.8	126.1	64.4
Manufacture raw material	121.9	127.4	66.4
Agricultural	19.9	20.0	0.2
Petroleum	672.9	881.5	902.7
Construction materials	301.3	336.8	193.0
Machinery	195.1	209.5	293.1
Transport	196.7	211.3	145.6
Farm machinery	6.9	6.9	12.1
Others	289.9	322.9	155.3
Total	2 460.2	2 844.4	2 217.0

Source: Central Bank of Somalia

TABLE B2.10

Exports 1980 to 1984 (SoSh million)

	1980	1981	1982	1983	1984	1985
Bananas	68.8	56.8	25.8	234.4	284.4	533.2
Livestock	639.2	858.6	2 011.8	1 122.1	514.4	2 604.4
Meat	10.4	0.2	1.2	2.7	-	-
Fish	2.8	15.9	22.8	33.0	7.6	7.5
Skins and hides(1)	41.8	7.2	23.9	20.9	74.8	169.2
Myrrh(2)	-	-	-	89.9	49.3	172.8
Others	72.0	21.3	57.0	51.1	165.7	89.5
Total	835.0	960.0	2 142.6	1 554.1	1 096.2	3 516.5

Notes: (1) 1983 includes leathers
(2) 1980 to 1982 included under other exports

Source: Central Bank of Somalia

CHAPTER B3

LIVESTOCK MARKETING

B3.1 Introduction

The past decade has produced a series of key studies on the state and operations of livestock marketing(1). There is thus an extensive base of analysis of the marketing systems, the major constraints and the policy issues which face this dominant sector of the Somali economy and source of welfare and employment for many of Somalia's people. Details have been reproduced in a much summarised form.

Local commercial offtake from the project area is primarily cattle which are trekked out to be shipped from either Kismaayo or Mogadishu ports. Recently the emphasis has been on moving south to exploit border trade with Kenya and to sell to the Kismaayo meat factory. A revitalising of this processing facility is being attempted since its decline after the cutting of support by Russia for both the factory and an export market for the processed products.

The following sections summarise the main characteristics of the livestock markets.

B3.2 Export Marketing

The recent studies have identified the following main issues:

(a) Abandonment or lack of effective links to a number of alternative foreign market outlets.

(b) Historical dependence and concentration on Saudi Arabian markets and particular dominance of the short-term seasonal Hadj market with its preference for Somali shoats (sheep and goats) for sacrifice.

(c) Stagnation of ruminant exports and decline in camel export demand since early 1970.

(d) Sudan, Syria, Jordan, Egypt, Turkey and Australia have all increased their share of the Saudi Arabian shoat market. Premium payments for Somali shoats have been undermined by price cutting of other suppliers. Concurrently, producer prices in Somalia have also increased.

(e) Lack of market intelligence, research and development; some exporters appear reluctant to pool resources.

(1) Hunting Technical Services - Livestock Review (mid-1970s)
Livestock in Northern Somalia - J. Swift
USAID Consultant Studies; leading to the Livestock Marketing and Health Project
MASDAR 1984/85
MASCOTT 1986

(f) Lack of marketing drive and exporter interest in developing regular monthly shoat market outlets. On the other hand, cattle export agreements with Egypt have made progress.

(g) Continuing deficiencies in quarantine, watering and holding ground facilities, particularly on the northern trade route.

(h) Non-recognition of the role of small ports; export advice and banking services in export and regional development.

(i) Lack of support services, technical advice and cost-effective management to promote the production livestock feeds and processed meat.

(j) Lack of adequate trading capital and capacity to fulfil Letter of Credit (L/C) agreements amongst certain trading companies, particularly new inexperienced entrants.

(k) Lack of co-ordination between trading companies who do not recognise the benefits of a national livestock marketing umbrella institution that could assist in export intelligence gathering, co-ordination of export arrangements and developing new markets.

(l) Problems of trader pressure groups trying to set up monopoly powers in export institutions.

(m) Inadequate livestock port handling facilities and carriers both in major and minor ports.

(n) Lack of fully finished stock for export and resultant high freight costs per kg of live weight when charged for on a per-head basis.

(o) High mortality in livestock trucking on poor roads and in small port dhow exports from exposed Indian Ocean ports.

B3.3 Domestic Marketing

The main issues relevant to domestic marketing are:

(a) Fluctuating supply levels due to seasonal, religious and export demand influence.

(b) Declining per-capita consumption of meat and increasing dependence on imported grain.

(c) Poor development of regional and inter-regional rural to urban milk product marketing networks to exploit wet season milk surpluses.

(d) Insufficient meat processing facilities to market certain surplus stock, i.e. young male culls for emergency slaughter in drought conditions.

(e) Lack of holding grounds and fattening units for the Mogadishu market.

(f) Slow progress of tsetse eradication and tick controls in the Middle and Lower Shabeelle limiting new trade routes for trekking of small ruminants and development of modern dairy units.

(g) Lack of bank credit and support facilities to small producers to assist them to cross the threshold from subsistence to commercial production.

(h) Lack of dissemination of market price and demand information.

(i) Lack of rural craft extension and market promotion work to promote alternative marketing possibilities for producers and better utilisation of local hides and skins.

B3.4 Demand Prospects

B3.4.1 Export Markets

A series of sources have examined the international demand prospects for livestock and livestock products. Future potential markets would seem to exist for live animals in Iraq, Jordan, Oman, South Yemen and Kuwait, in addition to continuing potential in the existing outlets of Saudi Arabia, Yemen, United Arab Emirates, Egypt and Kenya.

Potential markets for quality cuts of beef and lamb exist in Egypt, Saudi Arabia, Kuwait and UAE, while markets for lower-grade tinned meat exist in Western and Eastern Europe and further afield in Hong Kong, Singapore and Thailand. Recommendations to research, develop and harness this market potential have been detailed in the recent Agricultural Sector Survey Task Force papers (Jaffee and Weli, 1985) and are being reassessed and planned for by RONCO for the LMHP. The historical pattern of livestock and livestock product exports and its changing structure during this century are shown in Tables B3.1 and B3.2. These show the shift from a subsistence-based milk surplus system to a commercial live animal export system, as well as the recent collapse in exporting to levels which prevailed in the 1950s.

B3.4.2 Domestic Markets

Previous attempts to detail the changes of specific levels of consumption have been hampered by lack of reliable statistics for either human or livestock population and their relative growth rates. Both issues are affected by the cross-border flows of refugees, nomads and the impact of drought. Nevertheless, it is believed that there is a general picture of declining per-capita meat consumption and rising grain consumption. As camel exports have declined, supplies have been diverted into the domestic market where camel meat is now cheaper than other meats. In approximate order of magnitude, based on the available statistics, national consumption appears to have risen as follows:

	1971	1986
	(thousand head)	
Camels	50	85
Cattle	240	360
Sheep	1 600	2 000
Goats	2 800	3 500

TABLE B3.1

Somalia's Changing Export Structure

Year	Shoats (head)	Cattle (head)	Camels (head)	Ghee (tonne)	Hides/ skins (Nr'000)
1919	(61 483)	(1 657)	-	(23)	(1 239)
1927	(127 544)	(2 274)	(18)	(251)	(1 755)
1936	(118 462)	(2 172)	(650)	(150)	(1 301)
1950	120 875	2 651	174	385	na
1963	828 726	39 951	15 302	na	na
1972	1 635 799	81 328	21 954	26	4 912*
1980	1 481 190	85 000	21 000	-	5 804*
1984	676 000	7 700	4 000	-	na
1986	163 000	3 000	1 000	-	na

Notes: Bracketed figures are records from Northern Somaliland only.

* These figures are in tonnes.

Source: MASCOTT, 1986

TABLE B3.2

Livestock Export Contributions

	Percentage of total exports by value			
	1950		1973	1980
	North	South	All	All
Live animals	27	0.9	58.0	76
Hides and skins	67	27.0	3.8	5
Ghee	0.04	5.7	0.2	-

Source: Swift, J (1979)

Future growth in population is forecast at about 3% per annum in the medium-term, but will also remain affected by drought effects and refugee movements. The growth in income, and thus demand potential, is also uncertain in the current state of economic transformation. Given the difficulties being faced in increasing total offtake and improving range management the future capacity to maintain local meat supplies might depend more upon the effectiveness of the veterinary services and the livestock feed industries, together with a capacity to improve the capacities of production from the irrigated areas.

B3.5 Supply Responses

The capacity of the existing production systems to respond favourably to increased meat demand appears to be constrained more by technical, biological, infrastructural, economic and institutional constraints than by the commercial attitudes of producers or traders. The preliminary herd statistics collected by the GTZ veterinary studies show that all male stock of marketable age is being sold already. The female age structures indicate a strategy of managing breeding potential to minimise the impact of drought losses and to provide stock for emergency or short-term cash income needs.

However, improvement could be made through:

(a) Providing access to adequate feed or concentrates to fatten and finish animals prior to marketing or final sale, thereby utilising more fully their true meat potential and making transport cost savings.

(b) Improving disease, parasite and stress control, particularly in young stock, to reduce mortality and to reduce mortality in trucking.

(c) Opening up new export channels through which to increase offtake of female stock. Since no live female animals may be exported, this requires chilled or frozen meat capacity.

(d) Privatising hides and skins marketing and pricing systems to allow increased use of hides and skins, and developing a better capacity to sell finished leather craft products to identified markets.

(e) Developing rural market, road and banking services to create easier, cheaper and quicker access to the transhumant systems.

(f) Developing the country's small ports to increase the offtake from the coastal regions. This potential is currently constrained by high marketing costs if exported through Mogadishu, Kismaayo or Berbera. This strategy would also help reduce stock pressure on the northern rangelands and the holding grounds/fodder resources available to the export triangle (Hargeisa - Burao - Berbera).

(g) Co-ordinating the inter-regional and seasonal holding grounds, shade and water facilities for the trading routes for livestock, to allow a more regular and efficient network to develop to maintain quality through to final sale and allow a more regular monthly offtake to occur.

(h) Providing special livestock credit systems to marginal commercial producers to reduce their risk level and to encourage an increase in herd sizes to commercial levels.

(i) Identifying ways of creating alternative and more attractive rural income-generating opportunities to induce the least efficient commercial producers to take on alternative occupations.

B3.6 Commercial Marketing Systems

The historical evolution of producer management systems under the influence of commercialism has been described in a number of recent studies based on interviews with local producers. Further work will be required fully to elucidate how far or how differently management patterns and production systems have changed in the project area. The pattern of development described and the preliminary results of the livestock and market surveys indicates four possible major groupings of livestock systems.

- Small scale herds/flocks held for subsistence, with poor families selling stock as their short-term cash/food needs demand and when herd size, age and restocking capacity allow. The limited household surveys carried out indicate small-scale producers might comprise perhaps 40% to 60% of the total family units.

- Medium- to large-scale producer or producer-trader herds/flocks, with sufficient stock and reproduction potential to allow herds to be managed with commercial objectives and for some to employ herders.

- Livestock traders' herds/flocks, primarily owned by absentee landlords, merchants and large farmers who may employ or who have representatives to herd stock under a seasonal holding strategy to maximise trading gains. These would not necessarily be operated as breeding herds and would comprise stock purchased from the primary producers.

- Traders' and exporters' herds/flocks moving directly on route to market by truck or trekking, but utilising feed and water resources along the way.

The importance of each group in each district and the pattern of herd management and marketing show variations. There are clearly seasonal variations influenced by the Hadj marketing and also by the rhythm of the changing availability of feed and water. There are also probably differences according to the production system and the regional locations. However, there are currently no field survey data available which can help build a basic understanding of the interactions, competitions, bottlenecks or support areas needed. The proposed baseline surveys in the project area should start this research.

It was noted that the small- and medium-scale producers deliberately hold back some male stock of marketable age. The purpose is to reduce their economic risks by ensuring that there is always some saleable stock available to generate income. This is a poor person's insurance strategy. The holding of saleable stock amongst larger owners to accumulate wealth is not believed to be a significant management strategy; large breeding herds are, however, common. This may be found less applicable for camel herds than other stock. The need for data on these issues is important to identify where, with whom, and how offtake potential may be more efficiently exploited.

The age at sale is a function of the synchronised outcomes of fluctuating demand, the biological breeding patterns of different stock, the breeding and weaning management strategies and their season timings. The ages at which stock are currently being marketed on the coast are as shown in Table B3.3.

TABLE B3.3

Local and Legal Age Limits for Marketing Livestock

	Sheep (years)	Goats (years)	Cattle (years)	Camels (years)
Local markets	0.5 - 10	weaning - 15	2 - 15	3 - 25
Export markets	1 - 10	3 - 7	4 - 10	10 - 20
Legal minimum export age	2.5	4	4	4

The total trade loss and transfer of stock includes:

(a) social transactions, i.e. marriage, hospitality, religious;

(b) gifts or disaster support systems, such as restocking after disease or drought;

(c) political and legal transfers such as the traditional 'dia' literally 'blood money': compensation for injuries or their communal actions demanding compensation arrangements;

(d) emergency slaughter/culling - destocking during drought;

(e) culling for economic, subsistence consumption or biological reasons;

(f) local sales and exchanges, for breeding, growing on or fattening;

(g) local market sales - surplus stock for slaughter/export or generating income; and

(h) sales off the range - surplus stock into municipal or export market assembly chains.

B3.7 Trade Organisation

Trade organisation shows two main characteristics:

- The export trade networks show a pattern that is vertically and horizontally integrated, demand-driven and increasingly controlled by a relatively small competitive class of influential merchants, industrialists and commodity import traders.

- The local marketing and export assembly organisation shows a complex network of functional and strategic relationships involving supply profiteering, exchange of information, financial links and credit mechanisms, social and commercial liaisons and very often bonds of kin and friendship.

The main types of traders and middlemen generally involved in stock marketing in Somalia are:

- Market place brokers or dilaals. These are local men (one is located in Busley-Dawd) who facilitate the transactions of livestock and conduct price negotiations between buyers and sellers, help locate stock sources and sales outlets and usually function in the major towns and village markets. They obtain a modest commission for the services, usually around SoSh 5 per head for goats, about SoSh 50 for cattle and SoSh 100 for camels.

- Independent livestock traders (jeeble or bayac mushtar). These are men who either buy stock on order from exporters, or more usually are distinguished by their independent and specialist use of their own capital to purchase their own stock or speculate with stock price increases over time and between different markets. A smaller trader will operate mainly in a small area on his own, or if he has accumulated sufficient financial reserves will recruit herders (sawaaqi or qowsar). Some are taken on with credit finance to act more in the capacity of a local agent for an exporter. Increasingly these trader types are developing into two groups; those who have adequate finance, own trucks and employ agents, and those who remain small local limited-finance livestock traders and continue to operate on foot.

- Merchant traders or ganascato. They also deal in the purchase and sales of other commodities. The jeeble may progress into becoming ganascato. The merchants are usually urban-based, use their own capital and often employ an agent and herders to assemble and move livestock. Some wealthier merchants own or hire trucks. They also undertake more speculative holding and growing-on enterprise by gaining access to feed and water resources, sometimes buying fodder to supplement grazing and later selling on to exporters on demand and usually from the main export collection centres. This group is predominant amongst the traders found in the regional urban centres and in the main coastal towns.

- Buying agents or wakil. These are commonly employed by the exporters to organise their independent assembly operations which may reach town, village or range markets or pick up trade stock trekked or trucked in by ganascato or jeeble. Such operators are to be found at Sagaaroole and Cambanaane.

- Export traders (ganascato war weyn) are mostly merchants located in the three main port towns of Mogadishu, Berbera and Kismaayo, and in the larger commercial and assembly centres such as Burao and Hargeisa. They arrange the final transport, shipping, feeding and stock care on the sea voyages and the financial transactions involving letters of credit, tax payments and export charges. Since the letters of credit have a short expiry period (50 to 90 days), these traders rely on their agents and merchant traders to supply wholesale lots that will quickly fill a ship after its arrival in the port.

- Overseas agents/traders. These people are often ethnically Somali but may possess a foreign nationality. They usually supply capital to open letters of credit, pay freight costs and purchase consumer commodities that are to be imported into Somalia using the profits generated by the foreign exchange deals. Also involved in the arrangements between importer and exporter can be another broker taking commission from

both. By using a transferable creditor's name, and using 'buying short and selling long' techniques, this dilaal sets the transaction arrangement and then transfers the letter of credit, thus omitting the appearance of a commission on the bank transaction.

The marketing transactions throughout the chain are usually conducted by price negotiations and bargaining. Auctions are used in the inter-riverine and trans-Juba region where auctioneers (falisaad) are regularly employed. However, under conditions of high competitive demand in the range of local town/village market place, price bargaining may become so intense that the dilaal resort to opening up an auction system. The main local livestock markets at Qoryooley and Afgoi both use auction sale systems.

The project area is close to the major livestock markets of Qoryooley and Afgoi, which therefore play a significant role. They are used more for local sales/slaughter, to generate short-term income, and for the exchange/sales of breeding stock.

All types of marketeers buy direct from the producers off the range: the animals will be aggregated into trade herds/flocks ready for trekking or trucking.

Both the regional traders and exporter's agents may pre-finance or order stock to be collected by local traders (jeeble), or else they can buy from jeeble who have assembled trade stock independently with their own finances. The exporters and their agents may also send pre-finances and orders through the network of local or regional commodity/stock trader (gedisley). There are, therefore, a number of variations on the theme, involving different financing and assembly mechanisms and utilising different types of traders and trading relationships.

B3.8 Market Intelligence

Although the Ministry of Commerce has commercial offices in Embassies and Consulates, their capability and effectiveness to respond to commercial needs has proved limited in the highly competitive international live-animal trade in the Middle East. The paucity and irregularity of intelligence reports, and the lack of co-ordination between export traders, are resulting in Somalia losing a substantial share of overseas markets in which it was once dominant. Proposals are already in various stages of implementation or considered by the MLFR, the Ministry of Commerce, the Chamber of Commerce and trader organisations.

B3.9 Marketing Costs

Table B3.4 provides data on local market taxes, marketing commissions and trekking/trucking costs and Table B3.5 on the costs of trekking. Table B3.6 gives some recent comparisons of the costs of watering stock. Table B3.7 provides the current freight rates from various Somali ports to export destinations in the Middle East. Table B3.8 gives the prevailing minimum livestock export prices set by the GOS that are used in the determination of the exporter's letters of credit. These do not represent the real export market prices received by Somali traders. Tables B3.9 to B3.12 show the prices for livestock and their products from various markets in recent years. The price range indicates the variations due to quality differences within a particular stock type.

TABLE B3.4

Marketing Cost Information: 1985

	Camels	Cattle	Sheep	Goats
Local Market Taxes (SoSh per head)				
Seller	5% of sales value on all classes			
Buyer - Tax levy	40	30	5	5
- Self help	25	15	10	10
or				
Exporter - Tax levy	30	30	5	5
Marketing Commissions (SoSh per head)				
Dilaals (if used)	100	50	5	5
Wakils (if used)	150	100	50	50
Trekking Costs	Mainly in wet season for small ruminants. All times for others.			
Mortality Loss (%)	Insignificant. Greater losses in quality if feed/ water limited.			
Herders	Known as Harris in the North, Sawaaqi in the Central Regions and Qowsers in the Southern Regions. Wages paid regionally are very variable and range from SoSh 50 to 300 per day with camels and food also provided.			

Trucking Costs (SoSh/head shoats)	Distance (km)	Road type	Cost	Losses (%)
Hobyo-Galkayo	200	Rough	100-200	10-15
Galkayo-Burao	600	Tarmac	200-300	1-2
Burao-Berbera	200	Tarmac	100	1
Hardehere-Mogadishu	500	Rough/ Tarmac	150	10-15

The type of truck used takes 80 to 90 head of shoats; a trailer holds 120 head: say a total of 200 head per truck .

Source: MASCOTT, 1986.

TABLE B3.5

Typical Trekking Cost Schedule

		Total cost (SoSh)	Cost/ head (SoSh)
Trade flock size	1 000 head shoats or 800 cattle/ camels		
Number of herders	8		
Cost of herders	SoSh 200 per day (1985) cv. SoSh 100 per day (1980)	96 000	96.00
Trekking time	1.5 to 2.5 months		
Camels provided	3 at SoSh 10 000 One for water, two for food given as gifts	30 000	30.00
Food provided (1985 prices)	50 kg flour at SoSh 1 500/quintal	750	0.75
	50 kg sugar at SoSh 1 600/quintal	800	0.80
	50 kg rice at SoSh 1 900/quintal	950	0.95
	50 kg beans at SoSh 1 600/quintal	800	0.80
	5 tins oil at SoSh 3 750/tin	18 750	18.75
	34 kg tea at SoSh 960/kg	2 880	2.88
	500 kg salt at SoSh 600/quintal	3 000	3.00
	Total Food	27 930	27.93
Herders return trip	Lump sum per herder	1 000	1.00
	Approximate overall cost	155 000	155.00

Source: MASCOTT, 1986.

TABLE B3.6

Water Prices 1986/87 (SoSh)

District source	Camel (head)	Cattle (head)	Shoat (head)	Drum (200 l)	Can (20 l)
Caynabo					
Public well - at official rate	1	0.4	0.2	3	0.4
- at unofficial rate	2 - 5	-	-	-	-
Private barkad	-	-	-	100 - 250	15 - 20
Water lorry	-	-	-	300	-
Afmadow					
Public borehole	1 - 2	0.5 - 1.0	0.2 - 0.5	-	5
Public uar	-	5	-	-	-
Marka					
Public borehole	-	2	-	10	-
Private uar	5	5	5	-	-

Source: Enro-Action ACORD and Consultant surveys.

TABLE B3.7

Shipping Freight Rates (US$/Head)

Port	Destination	Shoats	Cattle	Camels
Mogadishu/Kismayo	Jeddah	13	78	130
	Abu Dhabi	15-18	90-108	150-180
	Suez	-	90	-
Berbera	Jeddah	6	36	60
	Abu Dhabi	8	48	80
	Yemen	5	30	50
Hobyo	Abu Dhabi	6		

Source: Somali Shipping Line

TABLE B3.8

Minimum Export Prices and Taxation (US$/Head): from 8.6.85

Port		Shoats	Cattle	Camels
Berbera	- FOB	36	213	360
	- CIF Middle East	42	252	420
Mogadishu	- FOB	34	201	248
	- CIF Middle East	42	252	420
Mudug/Bari/Sanaag (Small Ports) - FOB		36	213	360
Customs valuation from 14.7.85 (SoSh/head)		175	1 050	1 750
Tax Rate: (%)		25	25	25

Note: These prices form the basis of the letter of credit. 65% of this value can be maintained after sale in US$ in an external account and 35% remitted to SoSh at the Government exchange rate.

Source: Ministry of Commerce and Customs Department

TABLE B3.9

Local Market Prices - Cattle (SoSh '000/head)

Year	Location	Season	Export quality	Young stores	Breeding males	Breeding females	Slaughter sales	Slaughter culls
Estimated weight (kg)			250-300	80-150	250-300	200-300	220-250	150-220
1977	Qoryooley Auction	Annual Average	1.50	0.9-1.3	1.0-1.5	0.9	-	0.9
1982	Bay region	Jilaal	2.0-3.0	1.0-1.7	3.0-3.5	3.5-4.2	-	1.8-2.5
1983	Qoryooley	Jilaal	4.0-5.0	1.9-4.0	7.0-8.0	2.8-3.8	-	-
	Auction	Gu	5.0-6.0	1.5-3.6	5.0-6.0	4.0-5.0	-	-
1984	Qoryooley	Jilaal	3.5-3.7	0.8-2.0	3.0-3.5	2.0-3.5	-	-
	Sablaalle	Gu	8.0-10.0	4.0-8.0	-	-	4.0-8.0	2.8-5.0
1985		Jilaal	4.0-5.0	2.0-4.0	-	-	1.5-3.5	1.0-2.5
	Buulo Burti	Der	4.0-5.0	1.5-2.7	1.4-2.4	3.5-4.0	2.0-3.0	2.0-3.0
	Galkayo	Der	4.0-5.0	-	-	1.0-1.5	1.5-2.5	-
1986	Afmadow	Gu	-	-	-	16.0	11.0	7.0-8.0
	Kismaayo	Gu	17.5	-	-	9.0-10.0	8.5	6.5-7.0
	Marka	Gu	20-30.0	15.0	12.0-30.0	10.0-20.0	10.0-20.0	7.0-8.5
	Caynabo	Jilaal	-	-	-	8.0	6.0	4.0
	Afmadow	Jilaal	12-15.5	-	-	14.0	7.5	3.0-4.0
	Kismaayo	Jilaal	17.5	-	-	-	-	-
	M. Shabeelle	Jilaal	-	-	6.0	-	4.0	-
	Homboy	Der	-	-	15.0	10-20.0	6.0-7.0	4.0-6.0
1987	Marka	Jilaal	8.0-20.0	10.0	12.0-20.0	7.0-15.0	4.0-7.0	0.7-2.0

Sources:
- MMP: Genale Bulo Marerta Study, 1978.
- HTS: Bay Region Agricultural Development Project, 1983.
- MASCOTT: Central Rangelands Development Project, 1986.
- EAA: Programme Identification Surveys, 1986.
- MMP: Homboy Study, 1986.
- MMP: Dara Salaam Busley Study, 1987.

TABLE B3.10

Local Market Price - Camels (SoSh '000/head)

Year	Location	Season	Export quality	Breeding stock	Slaughter sales	Slaughter culls
1983	Qoryooley	Jilaal	9.0 - 12.0	8.0 - 9.0	-	-
		Gu	7.0 - 8.0	12.0 - 14.0	-	-
1984	Qoryooley	Jilaal	5.0 - 10.0	9.0 - 15.0	-	-
	Sablaalle	Gu	20.0 - 25.0	-	7.0 - 20.0	5.0 -15.0
		Jilaal	10.0 - 12.0	-	4.0 - 10.0	3.0 - 9.0
1985	Hobyo	Gu	15.0	-	-	-
		Der	10.0 - 12.0	-	-	-
1986	Burao	Jilaal	25.0 - 30.0	20.0	15.0	10.0
	Caynabo		14.0 - 18.0	8.0	6.0	4.0
	Afmadow		18.0 - 30.0	14.0	7.5	3.0 - 4.0
	Kismaayo		31.0	24.0	17.0	10.0
	M. Shabeelle		-	-	10.0	-
	Burao	Gu	25.0 - 30.0	20.0	15.0	10.0
	Caynabo		18.0 - 25.0	25.0	18.0	14.0
	Afmadow		-	16.0	11.0	7.0 - 8.0
	Kismaayo		17.5	9.0 - 10.0	8.5	6.5 - 7.0

Source: Ibid.

TABLE B3.11

Local Market Price - Shoats (SoSh '000/head)

Year	Location	Season	Export quality	Breeding stock	Slaughter sales	Slaughter culls
1984	Sablaalle	Gu	1.3 - 1.7	-	0.6 - 1.2	0.4 - 1.0
1985		Jilaal	0.5 - 1.0	-	0.3 - 0.9	0.2 - 0.8
	Galkayo	Gu	1.6 - 1.7	-	-	-
		Der	1.2 - 1.7	0.5 - 0.7	0.9 - 1.0	0.2 - 1.0
	B. Burti		1.0 - 2.0	0.9 - 1.2	1.0 - 1.6	0.4 - 1.0
1986	Burao	Jilaal	4.0 - 5.0	1.4 - 1.7	1.2 - 1.5	1.0 - 1.2
	Caynabo		2.5 - 4.5	2.0	1.7 - 1.8	1.4
	Afmadow		1.3 - 3.4	2.3 - 2.6	1.8 - 2.0	1.1 - 1.5
	Kismaayo		4.0	3.0	1.8	0.7
	M. Shabeelle		-	-	0.6 - 0.8	-
	Burao	Gu	5.0 - 6.0	2.0 - 3.0	1.7 - 1.9	1.5 - 1.6
	Caynabo		3.5 - 6.0	3.0	2.0	-
	Afmadow		-	3.0 - 3.4	2.0 - 3.0	1.5 - 2.6
	Kismaayo		4.0	6.0	4.5	3.0
	Marka		3.8 - 4.0	2.0 - 4.0	2.0 - 3.0	-
	Homboy	Der	-	-	2.0 - 3.0	1.0 - 1.5
1987	Marka	Jilaal	-	2.0 - 4.0	-	-

TABLE B3.12

Local Market Prices - Livestock Products (SoSh/unit)

Year	Location	Season	Camel meat (kg)	Cattle meat (kg)	Shoats meat (kg)	Camel milk (litre)	Cattle milk (litre)	Goat milk (litre)	Ghee (litre)	Cattle hide (each)	Shoats skin (each)
1984	Dara Salaam	Jilaal	-	-	-	20	4	-	-	-	-
	Qoryooley	Gu	-	-	-	6-8	4	-	-	-	-
1985	Sablaalle	Jilaal	-	-	-	16-30	10-16	8-15	2-300		
	Hobyo		-	-	-	30	30	30	(3-400)	-	8-20
	Sablaalle	Gu	-	-	-	10-14	4-8	5-7	1-200	-	-
	Hobyo		-	-	-	5	15	8	100	-	8-20
	Galkayo	Der	0	50	70	20-60	-	100	-	-	-
	Buulo Burti		-	-	-	25	25	-	260	-	-
1986	M. Shabeelle	Gu	-	-	-	25	20	-	250	12	6-7
	Marka			-	-	20-30	10-20	-	250	500	-
	Kismaayo		-	-	-	25	20	-	-	-	-
	Afmadow		-	-	-	80	80	-	-	-	-
	Caynabo		-	-	-	20-40	20-40	-	-	-	-
	Burao		-	-	-	40	50	-	-	-	-
1987	Marka	Jilaal	160-200	160-200	120-150	40-50	20-30	-	400	-	-
	Kismaayo		80	80	200	30	30-35	-	-	-	-
	Afmadow		80	80	150	80	80	-	-	550	-
	Caynabo		150-200	150-200	260	60	60	-	-	900	-
	Burao		120	120	120	75-80	70-80	-	-	-	-

Source: Ibid.

B3.10 Hides and Skins

A strong local demand exists for finished leather goods and animal hide shoes. International demand for high quality hides and skins from Somalia has always been strong.

The Hides and Skins Association (HASA) was created in 1973 with the sole responsibility for collection of raw hides and skins and sale to public and private tanneries for processing. Only HASA is permitted to export hides and skins.

The hides and skins industry operates far below its potential because the quality of raw hides and skins and export products is of low standard due to careless preservation and poor flaying. Second, the collection and market system is costly and inefficient; and third, HASA's export monopoly has prevented private investment and created a disincentive for the products of local tanneries.

Two practices which reduce the value of individual hides and skins are the cuts made in the skins during slaughter and the brand marking of animals in central body parts rather than on legs. HASA has insufficient resources to instruct slaughterers on proper skinning and drying procedures. There are also insufficient supplies of insecticides at HASA's town buying stations to treat the skins, and insufficient extension and treatment facilities to control pests and diseases affecting skins while the animal is still alive.

HASA experiences great difficulty in obtaining hides and skins from remote areas. Therefore, purchases are concentrated in a few regions (i.e. Benadir, the North-West Region, Lower Juba and Hiran). The panterritorial pricing system provides no incentive for commercial traders to service remote areas.

Price increases for hides and skins have remained below the overall inflation level. HASA's purchase prices were changed only once between 1976 and 1983, and again in 1984 and 1985. HASA's purchase and local sales prices are shown in Table B3.13.

The limited price incentives and marketing services have induced a substantial parallel market for both local and export sales. 'Unrecorded' hides and skins exports to Kenya, South Yemen and Italy have been estimated to be equal to official exports.

HASA seems to have a successful market presence only in drought years (i.e. 1974, 1975, 1979, 1980) when its purchases have averaged 41% more than the average for non-drought years. Camel hide purchases increased in line with the increased local slaughter of camels while cattle purchases are now well below those of the mid-1970s (Table B3.14).

Export of leather and hides and skins has also shown great variations. In real terms these have been lower in recent years than in the early 1970s, as seen in Table B3.15.

TABLE B3.13

Purchase and Sale Prices of Hides and Skins 1976 to 1985

Quality Levels

Year		1		2		3		4		5	
Price		Pur-chase	Sale	Pur-chase	Sale	Pur-chase	Sale	Pur-chase	Sale	Pur-chase	Sale
Camel	1976-79	24	24-30	18	-	10	-	-	-	-	-
(SoSh	1980-83	32	40	26	33	20	28	16	20	-	-
per kg)	1985	38	50	28	38	20	30	16	20	-	-
Cattle	1976-79	4	5	3.25	4.25	2.5	3.5	1	2	-	-
(SoSh per	1980-83	5	6.3	4	5.5	3	4.5	2	3	-	-
kg)	1985	6	8	5	7	4	6	3	4	-	-
Shoats	1976-81	9	12.75	6.5	9	4.5	7.6	1	2.3	-	-
(SoSh per	1982-83	12	17	10	14	7	11	2	5	.5	200
skin)	1985	20		18		17		15			

Notes: P = Purchase price.
S = Sales price.

Source: Jaffee, S and Weli, A. The marketing of livestock and livestock products. Somalia Agricultural Sector Survey 1985.

TABLE B3.14

HASA Hides and Skins Production 1974 to 1984

Year	Sheep and goat skins (pieces)	Cattle hides[2] (estimated number)	Camel hides (pieces)	Total	Index
1974	3 729 942	106 526	-	3 836 468	100
1975	3 844 787	132 107	11 533	3 988 427	104
1976	1 542 119	133 405	21 462	1 696 986	44
1977	1 790 536	117 497	20 114	1 928 147	50
1978	2 304 059	78 923	16 430	2 399 412	63
1979	2 766 476	68 824	18 710	2 854 010	74
1980	3 351 000	87 176	23 602	3 461 778	90
1981	2 221 000	115 412	34 973	2 371 385	62
1982	1 704 083	59 603	38 455	1 802 141	47
1983	1 965 651	46 460	53 107	2 065 218	54
1984	2 176 897	64 471	72 609	2 313 977	60

Notes: (1) First purchases by the Hides and Skins Agency.

(2) Estimated by dividing total weight by 8.5 kg.

Source: Annual Reports, Hides and Skins/Somali Leather Agency.

TABLE B3.15

Leather, Hides and Skins Exports 1971 to 1982
(million SoSh)

1971	18.1
1972	17.1
1973	13.1
1974	14.1
1975	26.3
1976	51.3
1977	9.5
1978	11.9
1979	53.1
1980	42.1
1981	7.5
1982	24.1

Source: Central Bank of Somalia, Bulletin Nr 55, March 1985.

B3.11 Dairy Products

Dairy products, particularly milk, are important in the nutrition of the population. In the Mogadishu Household Budget Survey carried out in the late 1970s, cow's milk had the third highest expenditure level, behind only sugar and vegetable oil and exceeded all grain and grain products and fruit and vegetables. Milk is the dominant source of calories, protein and fats amongst meat and fish products.

Per-capita consumption of milk and other dairy products is not known exactly. When available, milk is consumed fresh in homes owning milk cattle; surplus is sold or processed into yoghurt, butter, ghee and different types of cheese. Urban residents will obtain their milk via rural women or co-operatives who bring cow's or camel's milk to an urban market, small urban-based dairies. Alternatively they use imported dry skim/full cream milk.

Milk prices display a strong seasonal pattern as milk is plentiful during the rainy season and short in dry periods. They are lower in the late gu, rising during haagai, falling during the der and then rising again over the jilaal.

In Mogadishu there are numerous scattered small dairies, each with about 2 to 10 cows. The cows are stall-fed. Fodder supplements of grass and straw are carted into the capital from outlying farmland. The small dairies are constrained by water shortages and unhygienic conditions: refrigeration equipment is poor and unreliable and cream separators are also inferior. Only a few units produce cheese, butter and yoghurt.

There are two large-scale dairies in the country: a publicly-owned unit in Mogadishu and a private operation in Hargeisa. The Mogadishu factory began operation in 1966 but its history has been one of under-utilisation of capacity, shortages of local milk supplies and equipment breakdowns. The factory's performance can be seen in Table B3.16.

TABLE B3.16

Mogadishu Factory Milk Production (million litres)

1977	3.8
1978	3.3
1979	2.7
1980	1.2
1981	1.3
1982	1.1
1983	0.4
1984	0.0

Source: Central Bank of Somalia 1983 Annual Report.

The European Investment Bank is financing a project to renovate the factory and increase its capacity from 5 000 l/d to 22 000 l per shift. The problems of obtaining raw milk supplies relate to the nature of city milk production and the city authorities' inability effectively to implement milk marketing and quality legislation. As a result, producers can always avoid selling to a processing plant and can undercut their prices.

The poor performance of the public sector dairy and the production difficulties faced by smaller dairies have prevented Somalia from becoming self-sufficient in dairy products. Despite Somalia's vast livestock resources, the country has had to import increasing quantities of dairy products, to the point where in 1980 Somali imports of dairy products exceeded in value its exports of bananas, the country's second largest export item. Figures are given in Table B3.17.

TABLE B3.17

Dairy Product Imports (SoSh million)

1975	1976	1977	1978	1979	1980	1981
7.4	12.5	23.9	66.3	54.8	57.5	36.1

Within the project area a number of small-medium scale private and co-operative ventures were identified. The supply system is highly seasonal, due to the feed and water shortages in the dry season. However, the marketing system is well developed, with daily deliveries being made to collection centres in Mogadishu. Current prices vary between SoSh 10 and 30 per litre. Many producers market their production, enabling them, while in Mogadishu, to purchase other needed commodities. Since this system appears to work satisfactorily, the project has not considered a milk marketing component.

There is significant home processing capacity for ghee (clarified butter) and buttermilk in the project area, again suffering from seasonality problems of supply and surplus. The systems are labour-intensive and depend on the availability of women to undertake the work and marketing. It has been suggested that interest would be shown and a market potential created if small-scale dairy processing units could be introduced.

CHAPTER B4

CROP MARKETING

B4.1 Crop Selection

The crops selected as suitable for the project area are discussed in Annex 4. Criteria used to select these crops included: soils and environmental suitability, general market conditions, processing and handling requirements, available varieties and yields expectations. Consideration was also given to local consumer acceptance and farmers' present knowledge of specific crops. As a result, although a number of oilseed and legume crops could be grown sesame was chosen to illustrate returns from such crops. Sesame is already widely grown and its oil is preferred to others. Legumes such as cowpeas and mungbeans are widely grown, but on a small scale. While these legume crops produce a relatively low gross margin they will, together with maize, undoubtedly continue to be produced since they are staple elements of the population's diet. Although legumes are both agronomically and nutritionally important their minor contribution to family income has meant that they have not been included in the crop and farm budgeting analysis in Chapter B7. Tomatoes were chosen as representative of vegetable crops. An existing cash crop is water melon, which is also considered in the cropping patterns. Other local crops that are, and will continue to be grown on a small scale, are chillies, peppers, marrows, gourds and other field vegetables.

While small areas of bananas, grapefruit and papaya are grown within the area these are not considered as smallholder crops and have thus not been included in the analysis.

This chapter considers the market conditions and future prospects of these specific crops. First, consideration is given to the general marketing background in Somalia.

B4.2 Background

B4.2.1 Project Access

The proposed project area is close to the main, tarred, Mogadishu-Kismaayo road. The location of project villages ensures good access for inputs and crop marketing. The Shalambood and Janaale area are major market centres, with both Agricultural Development Corporation (ADC) and Somalfruit depots. Local merchants operating from Kismaayo and Mogadishu have easy access to the project area. Somaltex operations are from Balcad which has good access along the main tarmac road.

To give some indication of how the access and location of the project affects prices, some regional comparisons of prices of selected goods are provided in Table B4.1.

B4.2.2 Marketing Policy

Law Nr 51 of July 1971 designated the Ministry of Agriculture as the sole agency for storing and marketing cereals in Somalia. Producers were then prohibited from storing more than limited and specified quantities of maize and sorghum for

TABLE B4.1

Prices of Selected Goods in Various Districts 1986/87

Item	Quantity	District				
		Kismaayo	Afmadow	Caynabo	Burco	Marka
Sugar	1 kg	60	65	80	70	60
Cooking oil	1 l	90	120	120-140	80-100	100-150
Pasta - imported	1 kg	90-100	120	100	100	100
Rice	1 kg	40	45	50-60	45-50	45-50
Tea	4 oz	26	26	40	35	30
Kerosene	1 l	25	30	60-80	60	50
Soap	1 bar	40	na	na	35	40
Soap powder	200 g	na	30	70	na	35
Wheat flour	1 kg	40	60	60	50	50
Tomato	1 kg (pc)	50	(1)	(3)	30-140	20-150
Sweet pepper	1 pc	2	3	3	2	2
Papaya	1 pc	10-20	na	30-60	30-70	30-50
Guava	1 pc	2-3	na	10	5	n.a.
Sorghum	1 quintal	4 000	1 500-2 400	na	2 000	800-2 400
Maize	1 quintal	1 650	1 000-3 200	na	1 500	1 000-3 000
Sesame	1 quintal	7 000	3 500-6 400	na	na	7 000-8 000
Cowpea	1 quintal	na	1 500-2 500	na	na	2 000-4 000
Cotton	1 quintal	na	4 400	na	na	4 500
Charcoal	Small sack	200	na	na	200	na

Source: EAA District Survey December 1986 and January 1987 and Consultants Field Survey.

their own consumption. The Ministry of Agriculture was responsible for fixing producer, wholesale and retail prices for these and other crops. Marketing and importation of certain crops was undertaken by the Agricultural Development Corporation (ADC). The Ente Nazionale Commercia (ENC) was also involved in commercial imports of various commodities including wheat and vegetable oils.

All private trading was prohibited under Law Nr 51, 1971. In 1982 the Presidential Circular Nr 9 concerning the harvesting and storage of crops was widely considered to allow farmers to store greater quantities of maize and sorghum and, although Law Nr 51, 1971, has not been changed, some liberalisation of the marketing system occurred. Eventually in 1984 ADC's monopoly was formally removed. Private commercial trading is now encouraged.

Since ADC's monopoly power over maize and sorghum marketing has been withdrawn it was assigned the following tasks:

- to act as grain buyer of last resort;
- to build up a national grain reserve;
- to collect detailed market information; and
- to ensure efficient operation of its own storage capacity.

This agency's role has declined drastically during the last 15 years, as shown in Table B4.2.

TABLE B4.2

ADC Grain Purchases as Percentage of Total Production ('000 t)

Period	Maize	Sorghum	Total	Total production	ADC share (%)
71 - 76	41.0	22.4	63.4	236.2	26.8
76 - 80	19.4	40.2	59.6	250.4	23.8
81 - 84	2.7	11.8	14.5	405.8	3.6

Source: Lahmeyer 1986.

With marketing significantly liberalised and ADC in competition with private traders, ADC buying prices have risen substantially. Prices actually received by growers have generally been higher than the official ADC prices but excess production in 1985, after a good season and stimulation of production through higher prices, resulted in lower maize and sorghum producer prices in 1986, as shown in Table B4.3 and illustrated in Figure B4.1

B4.3 Cereals

B4.3.1 General Prospects

Table B4.4 summarises Somalia's cereal production and imports from 1979 to 1984, with estimates for 1985, 1986 and 1990. The latter data are based on two population projections - A with a total population of 7.45 million, B with 6.5 million.

TABLE B4.3

Domestic Purchases of Grain by the ADC and Official Producer Prices, 1979/80 to 1986/87
(in thousands of metric tons and Somali shillings per 100 kg)

	Maize			Sorghum (white)			Sesame		
Period[1]	Amount purchased	Official price	Producer prices	Amount purchased	Official price	Producer prices	Amount purchased	Official price	Producer prices
1979/80	8.6	75	na	52.3	75	na	na	240	na
1980/81	4.0	120	na	12.2	120	na	0.46	300	na
1981/82	8.0	180	na	33.9	160	300 - 550	0.09	450	na
1982/83	2.2	220	200 - 400	8.0	180	200 - 420	0.08	450	1 000 - 2 000
1983/84	0.4	360	400 - 1 500	9.9	220	300 - 1 100	0.07	700	1 300 - 2 500
1984/85	0.7	650	1 300 - 3 000	0.3	450	1 000 - 2 400	na	850	3 500 - 6 000
1985/86	0.4	1 500	1 000 - 3 000	0.3	1 300	800 - 2 400	0.04	5 200	8 000 - 9 000
1986/87	na	1 500	1 000 - 3 000	na	1 300	800 - 2 400	na	6 100	7 000 - 8 000

Note: (1) February to January.

na not available

Source: ADC and Consultant farmer interviews.

Figure 4.1

Index of Real Producer Prices Maize and Sesame 1978-1986

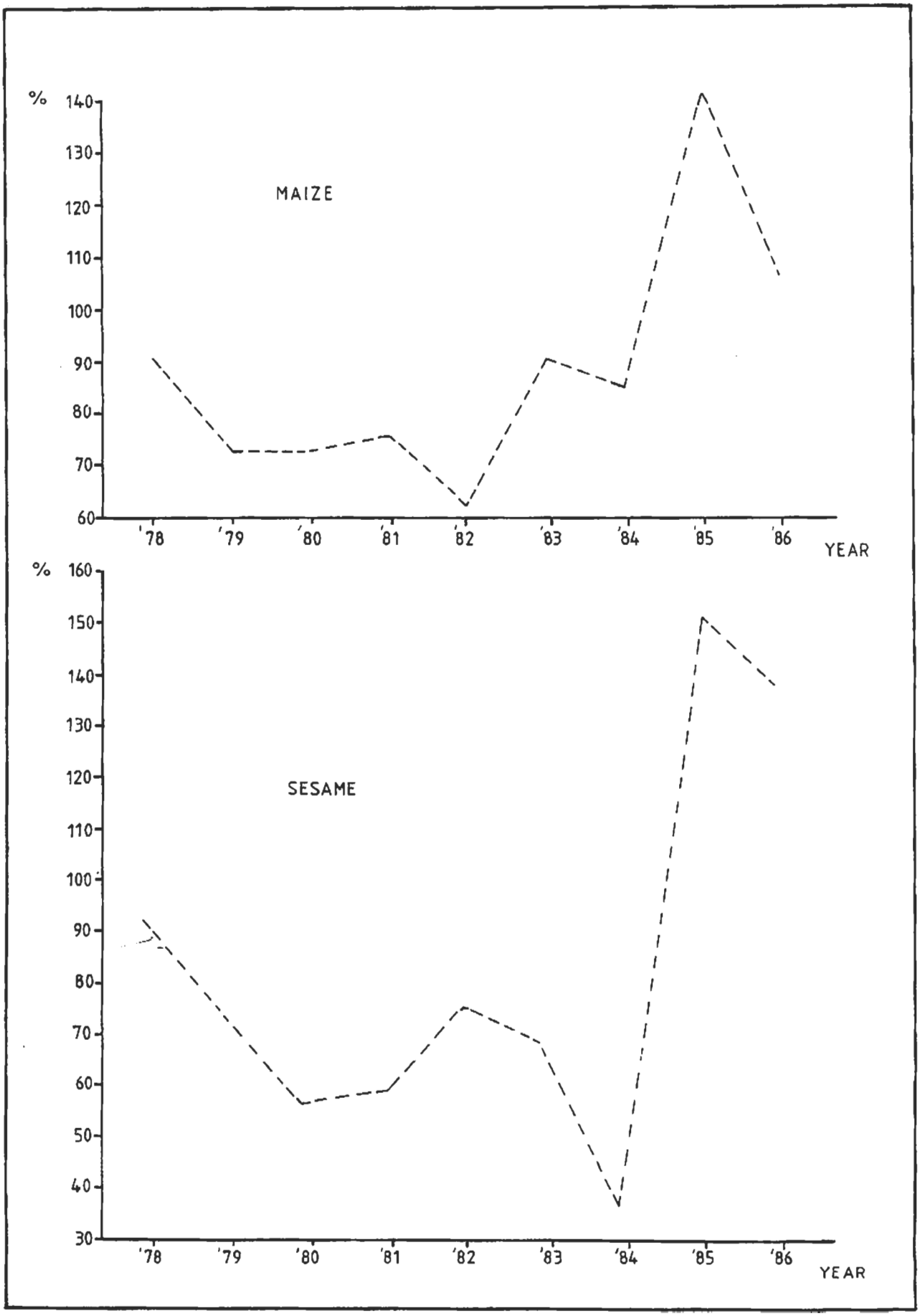


TABLE B4.4

National Grain Production and Imports: 1979-1986 and Forecasts for 1990 ('000 t)

	Domestic production				Imports						Proportion	
	Maize	Sorghum	Rice	Total	Maize	Sorghum	Rice	Other (1)	Total	Production and imports	Aid of imports (%)	Imports of total (%)
1979	108	140	9	258	30	-	79	100	209	467	39	45
1980	110	140	11	262	110	-	100	91	301	563	58	53
1981	142	222	13	378	91	11	85	200	387	765	47	51
1982	150	235	13	400	25	10	86	181	302	702	44	43
1983	235	120	2	358	175	25	52	125	377	735	67	51
1984	270	221	3	495	105	10	89	155	359	854	81	42
1985(2)	280	233	10	524	83	-	85	165	333	857	-	39
1986(2)	298	241	11	551	75	-	83	162	320	871	-	37
1990(2):												
A	420	277	18	716	1	-	57	114	172	888	-	19
B	420	277	18	716	(46)(3)	-	48	51	99	769(4)	-	13

Notes: (1) Predominantly wheat.
(2) Estimated.
(3) (46) = projected surplus for export - low population increase projections (see text).
(4) Net of exports.

Source: Somalia Agricultural Sector Survey. Task Force Nr 5. Planning and Statistics Draft Report, 1985. Figures may not total due to the inclusion in the production total of locally grown wheat.

The data show the high proportion of imports (48%) in the period 1979 to 1984: a proportion was imported as food aid during the same period (56%), especially in 1983 and 1984. This has undoubtedly affected local producer prices. There are many gaps in the present understanding of Somalia's grain market operations. Nevertheless, it is apparent that aid and other concessional imports have reduced the incentives for local production.

B4.3.2 Maize

While local production is increasing as shown in Table B4.4, imports remain high. By 1990, however, assuming the higher population growth rate, supply and consumption may be in balance, or with the lower population, there may be surpluses. The forecasts do, however, rely upon reasonable dryland farming conditions and rainfall, and a steady increase in average yields from 800 kg/ha in 1986 to 1 200 kg/ha in 1990. In view of these major uncertainties, it would be more prudent to assume that Somalia will continue to be a net importer of maize in most years.

B4.4 Oilseeds

Sesame is the main oilseed crop. Vegetable oil imports supply between 40% and 50% of national consumption. Sesame is the preferred oil, with a price premium over imported vegetable oils of about 120%. The figures in Table B4.5 indicate a consumption increase of 68% between 1979 and 1985 (local production plus imports). This is extremely high and probably reflects under-estimation of production in the early years or over-estimation in recent years. What is clear, however, is that vegetable oil imports increased from an annual average of almost 17 500 t between 1979 and 1982 to over 29 200 t/year between 1983 and 1985. Demand will therefore remain high for some years and the preference for sesame oil is not likely to change.

TABLE B4.5

Oilseed and Vegetable Oil Production and Imports 1979 to 1985 ('000 t)

	1979	1980	1981	1982	1983	1984	1985(1)
Oilseed production:							
Total	46.10	44.0	59.00	63.50	65.70	53.40	67.7
Sesame	40.60	38.40	53.00	57.00	60.0	46.0	60.00
Vegetable oil:							
Local production	14.21	13.44	18.55	19.95	21.00	16.10	24.90
Imports	18.49	12.60	19.80	19.00	29.00	28.70	30.00

Note: (1) Estimate.

Source: State Planning Commission and Ministry of Agriculture.

As can be seen in Table B4.3 and discussed in Section B4.2.2, the crop was mainly marketed through the ADC. With market liberalisation private trading has increased and official and producer prices have also increased substantially in recent years; ADC increased its procurement price from SoSh 8 700/t in 1983 to SoSh 60 000/t in 1986. While production has risen there is as yet no sign that prices have been affected. A significant proportion of the sesame produced is processed locally by small private machines and camel oil extraction units. As the use of these units is mainly to satisfy family demands, traded quantities are less than for cereals.

B4.5 Legumes

Table B4.6 sets out recent estimates of legume production and shows the low level of imports. Legumes, including various varieties of beans, cowpeas and some groundnuts, are widely grown in Somalia but on a small scale compared with maize and sesame; about 30 000 ha compared with 800 000 ha in 1984.

Demand can be expected to grow in line with population growth and the present estimated low per-capita consumption of 2 to 3 kg can be expected to rise. The data are, however, uncertain and forecasts can only be very approximate.

TABLE B4.6

Legume Production and Imports
1977 to 1985 ('000 t)

	1977	1978	1979	1980	1981	1982	1983	1984	1985
Total production	12.0	12.9	11.0	12.1	16.6	18.2	23.8	23.4	37.0
Imports	na	0.2	0.7	1.0	0.4	0.3	0.3	0.5	0.5

Source: Agriculture Sector Review, 1986. IBRD and Ministry of Agriculture.

B4.6 Cotton

Seed cotton is grown mostly under flood irrigation in the project area on a low-input, low-output basis and marketed through Somaltex. The company operates from Balcad with a local officer in Shalambood, and provides a tractor service, seed and pesticides, seasonal credit but little technical advice. Seed cotton grown in the Lower Shabeelle region is taken to Balcad, about 30 km north of Mogadishu, for ginning. Producer prices rose from SoSh 3.5/kg in 1982 to SoSh 25/kg in 1985 and SoSh 45/kg in 1986. Somaltex buying points in the project area are open over a 90-day buying period in the two districts. Their locations vary according to production location. Producers receive cash on the spot for ungraded seed cotton.

Recent production has been about 4 000 t/year with, however, low purchases by Somaltex. The company's textile mill at Balcad has an annual capacity of 18 Mm of cloth, representing a lint requirement of 4 000 t, equivalent to about 12 000 t of seed cotton. Somaltex at present import lint, as well as ready-made yarn and cloth for finishing. Details are given in Table B4.7.

TABLE B4.7

Cotton Statistics

	1981	1982	1983	1984	1985
Local seed cotton ('000 t):					
Production	1.6	4.7	4.0	4.0	na
Somaltex purchases	-	0.6	0.3	0.1	-
Imports ('000 t):					
Cotton lint	0.51	0.66	0.49	0.57	0.41
Imported yarn (SoSh '000)	15 819	14 080	7 734	774	113
Imported grey cloth (SoSh '000)	-	190	5 485	3 743	2 373
Textile production (million yards)	10.1	11.1	6.8	5.2	na

While the value of imports has declined significantly, this has been related more to under-utilisation of the textile mill's capacity than replacement by local cotton. Somaltex indicates that it wishes to resume higher output levels as the recent significant increases in seed cotton producer prices indicate. Cotton is therefore expected to again become an important cash crop in the project area, where production is already being encouraged.

B4.7 Other Crops

For vegetables, there are uncertainties about the long-term strength of the local and export markets, despite the recent rapid increases in production. Also, the only reliable future profitable ventures are likely to lie in off-season and high quality vegetables. However, communications, infrastructure, horticultural and marketing services do not yet exist at levels required to support major expansion into a high-risk, perishable market.

There are better prospects for fruit crop exports. The long-term nature of the capital investments required for perennial tree crops means that this prospect is likely to be more applicable to large- and medium-scale farmers with an independent water supply. Since the CEC investment is to be directed towards the smallholders it is not expected that this project will contribute to this sector in any meaningful way.

At present only a few farmers with larger holdings cultivate perennials on some 115 ha or only 3% of the gross cultivated area in the irrigation zone.

It is possible that new oilseed crops could supplement the role of sesame. Cotton is a multi-purpose crop: it produces lint, oil and cattle food. Another possibility is the introduction of some safflower in the rainfed zones, due to its drought resistance and compatibility with existing oil extraction methods. The reaction of consumers to taste differences of the new oils has yet to be tested, but first reactions to safflower oil in the Sablaalle area were favourable.

B4.7.1 Vegetables

Local farmers grow small areas of vegetables, some are primarily for home consumption with surpluses going for sale to local markets such as Shalambood, Marka and Mogadishu. While tomatoes have been taken as representative of vegetables in the study's analyses a variety of vegetables are and will be grown. Based on present reported consumptions Table B4.8 estimates possible production levels.

TABLE B4.8

Vegetable Production Estimates

	Per cent	Area (ha)	Output (t/ha per year)	Losses (%)	Net tonnes
Tomatoes	60	81	10	10.0	729
Onions	30	40	20	7.5	740
Sweet potato/peppers	5	7	30	5.0	200
Leaf vegetable	5	7	4	5.0	27
Total		135			1 696

Note: Output on basis of double cropping.

Based on estimates used in the Homboy Study (MMP 1987) local families may now consume from 0.5 to 1.0 kg per family each week. With vegetables freely available this could increase to 1.2 kg a week or about 350 kg a year for a family, taking into account seasonal availability. At this level the producers, 3 500 families, would consume three-quarters of net output. The balance would be sold in the nearby village and small town markets. It should however be noted that the Afgoi to Janaale reach of the Shabeelle has the greatest concentration of vegetable producers in Somalia. Thus, while some expansion prospects may exist, these should be treated cautiously.

Local production of tomatoes concentrates on the small cherry type, for which there are three growing seasons. The first plantings are in April and early May, followed by a second planting in June. The third, and main, crop is planted in November. The crop is more prone to diseases in the gu and haggai seasons but producers can take advantage of higher market prices. In 1986 the early season prices were around SoSh 150 per kg. From October onwards prices fell until March. The mid-season price in 1986 was SoSh 40 per kg which had fallen to SoSh 20 per kg in March and April 1987. During the main der season the bulbous tomatoes suitable for marketing to ITOP are also produced. On the local markets these fetch a lower price than the cherry types, at SoSh 15 per kg. The current prices paid by ITOP for processing at its Afgoi factory are SoSh 8 per kg. The nature of this marketing and pricing system shows the clear preference local consumers have for the local cherry types and, from the producers' viewpoint, the price incentives are also to be gained from the cherry type.

B4.7.2 Water Melons

Water melons are grown on a limited scale locally but regionally have taken on increasing significance in recent years. These have been selected as a representative alternative minor crop. The main production area is the Middle

Shabeelle Valley which meets local demand and supplies the modest export trade which has been developed by the private sector and Somalfruit. This export trade, however, has been developed to utilise spare capacity in ships, loading bananas and other cargo at Kismaayo, and in trucks travelling to Djibouti. At this time any major development of this crop, for what may be a doubtful market, should be approached with caution.

Somalfruit has studied potential markets in the Middle East and Europe. Export to Europe is limited to a short season (December to March), because the Mediterranean countries are able to meet the demand for the remainder of the year. In 1986, Somalfruit exported 1 010 t to the Middle East and 340 t to Italy, worth a total of US$ 371 000. The company has sought additional export outlets but without success. Although it has no plans to increase the exports of water melons, it intends to continue to monitor those world markets which could be supplied from Somalia.

On the local markets water melons were fetching SoSh 20 to 40 a piece in 1984 and by 1987 this had moved to SoSh 35 to 55 each. These pieces are usually the larger sized fruits, which are not of exportable quality. In 1986/87 Somalfruit was buying smaller export quality at SoSh 12 per kg.

B4.8 Food Storage

Somali farmers have long stored certain crops in 'bakaar' or pit stores. Sorghum, the staple crop of the area last century, was reported to have been storable for as long as 10 years. Although it lost its value as seed it still remained edible. Today sorghum has been replaced by maize, but pit stores are still common, although their method of use has changed, as discussed below. The quantity of grain in store on the farm is believed to be considerable and estimated usually at around one year's demand. But this is affected by drought and cash needs.

A type of store known as 'raar' is used by people from other regions who are familiar with it. It is a walled raft constructed above ground out of poles and sticks and lined with suitable material (e.g. corn stalks). The crop stored, usually beans, is mixed with sand, and a thatched roof covers the whole store. Those using this method report good results. Beans are particularly vulnerable to storage pest losses and are usually consumed or sold immediately after harvest. Another method of storage used consists simply of storing maize on the cob on the floor of a spare house or outhouse. The storage methods more commonly used are summarised in Table B4.9.

Storage strategies are related to sales strategies. A number of researchers and local farmers report a change of storage methods due to commercialism. The traditional method of long-term storage in large communal village pit stores is now no longer practised. Instead, the crop is stored in smaller pits for a maximum of two seasons. The reasons for this relate to grain prices, grain imports, an increasing fear of thefts from communal stores and the better security provided by individual family pits. Also, grain stored for a substantial period tends to discolour and its taste is affected. With increased national maize output and importing of foreign grain this darker grain may no longer be acceptable either for sale or the consumer. In addition, the price of grain drops immediately after harvest, thus putting pressure on dealers and storers to sell their stocks before the harvest. This reflects the degree to which the cash economy has become important. Those people who have fully adjusted to a monetary way of life may also be able to rely on other economic strategies during lean years. The most successful of them can replace crop storage with cash savings. However, the abandoning of long-term grain reserves has serious implications for the less well-off in the event of severe drought.

TABLE B4.9

Crop Storage Methods

Crop	Storage method	Remarks
Maize, beans	Pit store	Local farmers and agropastoralists only. Maize stored on the cob or as grain beans in pods. Main problem: water penetration.
Maize, beans, sesame, sweet potato, hot peppers	Sack	In the sack, all grains are stored threshed. Storage chemicals can be added and sacks stored off the ground. Losses due to pests and damp reported.
Tobacco	Tying in bundles after drying	Very small areas, only for local use.
Onions	Stored indoors spread on the floor	Effective for up to 8 months. Also stored in sacks after drying and periodically inspected.

B4.9 By-products

There appears to be a good market for crop by-products, particularly in drought years such as 1987. Maize stalks are regularly hauled long distances to Mogadishu in bulk, where they are sold for SoSh 2.0 per stalk. Bean pods are reported to sell for SoSh 300 to 350 per sack in Mogadishu. When grazing is scarce farmers do sell maize stalks but, more usually they feed it to their own livestock.

Prices of on-farm fodder sales were found to be variable, depending on the relationship between the farmer and pastoralists concerned. Prices were lower, or fodder was given free, to local agropastoralists who have reciprocal arrangements for the seasonal use of fodder and water resources with agropastoralists from the Bay Region. In general, whole farms would be worth between SoSh 20 000 to 30 000 for use as a grazing area or stover. This would be roughly equivalent to SoSh 2 000 to 3 000 per hectare, similar to the charges for land rent for seasonal cultivation on a tenant farm.

Processing by-products, such as maize bran and sesame seed cake, are regularly fed to milking stock; during times of severe fodder shortages they are also fed to other stock. In early 1987 bran was selling from Janaale at around SoSh 20 per kg and sesame seed cake at around SoSh 35 per kg.

B4.10 Agro-Processing

At independence in 1960, Somalia had virtually no processing capacity except for the Jowhar sugar factory, the Sopral meat factory and some local oil and cotton processing units. Attempts to boost and develop this sector have been disappointing mostly due to a lack of experience, lack of skilled labour and poor

vertical integration characteristics. After the 1969 revolution, successive Governments' plans have emphasised the need to develop processing facilities to enable import substitution and use of locally produced resources, and to satisfy internally the domestic demand for processed and manufactured goods.

Three scales of processing enterprises exist: the small local and often traditional units, such as camel presses for oil extraction; medium-scale commercially managed units processing imported and locally semi-finished inputs; and large-scale agro-industrial units, almost exclusively in the public sector. The most effective are the small units. The private sector with medium-scale units has generally fared better than the large-scale public enterprises.

Some data and performance indicators are given in Tables B4.10 and B4.11.

TABLE B4.10

Status of Agricultural Processing Facilities 1984

Type of operation	Number	Owner	Start-up date	Major raw[1] materials and source	Products	Capacity Installed daily	Capacity % used 1985
Seed Processing:							
Edible oil	1	Public	1976	Sesame seed (L)	Sesame oil	50 t	0
	260-285	Private	Variable	Sesame seed (L)	Sesame oil	Variable	30-60
Grain milling	7	Public	1974-1977	Maize (L) Sorghum (L) Rice (L) Wheat (I)	Meal, polished rice, flour, bran	8-10 t each	25-50
Flour and pasta	1	Public	1976	Wheat (I)	Flour, semolina, bran	100 t	80
	200-250	Private	Variable	Maize (L) Sorghum (L)	Meal (soor) Floor (anjeero)	2-10 t each	70-80
	1	Public	1976	Semolina (I) Flour (I)	Long and short pasta	55 t	70-80
	2	Private	1981	Semolina (I) Flour (I)	Short pasta	2 t	50-70
Bakeries	3	Public	na	Flour (I) Sugar (I)	Bread	2-4 t	40-80
	20-125	Private	Variable	Oil (L+I) Yeast (I)	Bread, cakes pastries	0.2-4 t	60-75

TABLE B4.10 (cont.)

Type of operation	Number	Owner	Start-up date	Major raw[1] materials and source	Products	Capacity Installed (Daily)	Capacity % used 1985
Dairies: Mogadishu	1	Public	1966	Milk (L) Dry milk (I)	Milk	22 500 litres	na[2]
Hargeisa	1	Private	1985	Dry milk (I)	Milk	28 350 litres	na
	10-15	Private	Variable	Milk (L)	cheese, yoghurt	Variable	40-70
Vinegar	2	Private	Variable	Acetic acid (I) Flavour (I)	Vinegar	800 litre	40-60
Sugar:							
Juba Sugar	1	Public	1980	Sugar cane (L)	Sugar, molasses	65 000 t/year	40
SNAI - Jowhar	1	Public	1927	Sugar cane (L)	Sugar, alcohol	40 000 t/year	2
Private	3	Private	1984	Sugar cane (L)	Sugar, molasses	4.5-5.0 t	15-20
Fruit	1	Public	1972	Tomatoes (L) and Mangoes	Tomato paste	150 t	20-30
	1	Private	1984	Mango (L)	Mango juice	540 litre	33-45
	1	Private	na	Sugar (I) Colour (I) Essence (I) Flavour (I)	Fruit flavoured sugar, syrups	150-260 litre	40-60

TABLE B4.10 (cont.)

Type of operation	Number	Owner	Start-up date	Major raw[1] materials and source	Products	Capacity Installed daily	Capacity % used 1985
Beverages	5	Private	1968-85	Syrups (I) CO_2 (L+I) Sugar (I+L) Flavour (I+L)	Sweet beverages, Coke, Fanta, Sprite	100-750 case/h	20-75
Confectionery	1	Private	1974	Glucose (I) Sugar (L) Essence (I) Citric Acid (I) Colour (I)	Hard candy	10 t	10-15
Fresh water fish	1	Public	1984	River fish (L)	Fresh smoked and dried fish	na[2] presently catches about 1-2 t	na
Meat	3	Public	1960	Cattle (L) Camel (L) Sheep (L) Goats (L)	Fresh and frozen meat, canned beef, stewed steaks, gelatin, meat extract	200-340 t na	0-80
	50-70	Private	Variable	Cattle (L) Camel (L) Sheep (L) Goats	Fresh meat	na	na

TABLE B4.10 (cont.)

Type of operation	Number	Owner	Start-up date	Major raw[1] materials and source	Products	Capacity Installed (Daily)	Capacity % used 1985
Cotton	1	Public	1966	Seed cotton (L) Lint (I)	Yarn, cloth, mattresses, medical cotton, bandages	20×10^6 yards per year	10-30
Urea	1	Public	1984	Variable (I)	Urea	150 t/d	50
Cigarette	1	Public	1974	Tobacco (L = 30%) (I = 70%)	Cigarettes	1 200 t/ per year	14

Notes: (1) (L) = Local (I) = Imported
(2) na = Not available

Source: Lahmeyer, October 1986.

TABLE B4.11

Agricultural Processing Performance Indicators (1983 to 1985)

	Sales (SoSh million)			Profit/loss (-) (SoSh million)			Number of employees		
	1983	1984	1985	1983	1984	1985	1983	1984	1985
Juba sugar complex	373	289	840	Loss	-52	111	1 870	1 795	2 040
SNAI sugar factory	26	26	85	-82	-89	-23	1 863	1 277	2 620
Oil mill(1)	4	-	-	-1.6	-	-	80	-	-
Wheat, flour and pasta factory	100	-	-	-7	-	-	297	-	-
Meat factory, Kismaayo	8	17	1	-	-1.4	-8.5	303	219	180
Milk factory(1)	2	-	-	-0.7	-	-	71	-	-
National Bottling Company (private)	46	-	-	profit	-	-	160	-	-
SNAI-BIASA(2)	22	-	-	-	-	-	227	-	-
Cigarette and match factory	941	230	746	24	26.4	36.4	595	593	595
Somaltex	120	119	169	-10	-6.6	1.5	1 200	1 239	650
Foundry and mechanical workshop	5	9	-	-2	-1	-	109	120	60

Notes: (1) Out of operation since 1984.
(2) Included in accounts of SNAI sugar factory from 1984.

Source: Ministry of Industry and Ministry of National Planning.

CHAPTER B5

PRICE ASSUMPTIONS

B5.1 Introduction

This chapter covers the financial and economic price c
tions used for agricultural inputs and output. Wherever possible, economic prices have been based on relevant border parity values. This uses CIF prices for imported inputs and crop outputs which replace imports, and FOB prices for commodities which would be exported, such as water melons and livestock. World market prices have been taken from the World Bank Commodity Price Forecasts (October 1986) which published values in US dollars at 1985 constant prices. Values for labour, transport, non-fertiliser agrochemicals and crops for which world market prices are either not available or not appropriate have been based on existing local market prices.

A review of recent project reports shows a variety of pricing asumptions. This is partly the result of using different data sources, but also of different methodologies. The absence of national planning standards set by Government planning departments is a significant cause of this type of inconsistent analytical approach. However, a further anomaly has also arisen, due to uncertainties concerning the recent long-term price projections by the World Bank's Commodity Studies and Projections Division.

Over the 10 to 15 years the IBRD statistics have been recognised internationally as an acceptable source of price data for project analysis. The recent consistent falls in the real values of many agricultural commodities, and the projection that this decline will continue at least until the end of the century, imply that benefits from agricultural projects will diminish. It was noticeable that two appraisal teams in 1985 based economic benefit flows on the assumption that price levels in the year of the analysis will be maintained. The most recent analysis available for the study of the Homboy Irrigation Project and the Assessment of the Agricultural Flood Control Benefits from Bardheere Dam (MMP 1978) adopted average price levels derived from the period 1980 to 1985 and also used the price levels projected by the World Bank, thus giving a range of likely economic returns. The same methodology has been adopted for this study.

B5.2 Price Uncertainties

Clearly, the agricultural input and output prices adopted have a major impact on the levels of benefits calculated. Given the uncertainties involved, especially regarding future world market price trends, the estimation of future benefits is a somewhat arbitrary process: an optimistic approach will result in a high level of economic benefits; a pessimistic approach will have the opposite effect.

The World Bank's October 1986 projections (Table B5.1) predict world market prices well below 1980 to 1985 levels and much lower than the 1970 prices. The 1970 prices are presented in the October 1986 document as the reference year.

TABLE B5.1

IBRD World Market Actual and Projected Prices of Selected Commodities (US$/t at 1985 Constant Prices)

Commodity	IBRD projected price Year 2000	Actual prices 1970	Actual prices 1980 to 1985
Food			
Beef (US cents per kg)	263	357	236
Rice	206	395	316
Maize	94	160	122
Sorghum	89	142	116
Soya beans (as representative of oilseeds)	200	321	263
Cotton lint	1 650	1 730	1 700
Sugar	253	222	255
Bananas	321	453	382
Fertilisers			
Urea	171	132	169
Triple superphosphate	147	116	141
DAP	206	148	186
Muriate of potash	88	86	90

Source: IBRD Commodity Forecasts, October 1986.

All the crop commodities listed above had substantially higher prices in 1980 to 1985 and 1970 than is predicted for the long-term future, except for sugar and cotton lint. By contrast, the projected fertiliser prices are the same as, or higher, than past levels while meat prices are forecast to rise above recent price levels.

Despite the rationale presented in the IBRD forecasts, it could be argued that, if prices really fall as far as predicted, world output would decline and prices would then begin to rise again in response to market forces. Moreover, there are clear signs that the politically inspired over-production of recent years (e.g. the EEC's Common Agricultural Policy) is gradually being brought under control.

Given the major uncertainties involved, the economic analysis is based on two pricing alternatives, a Low Price Scenario, using the year 2000 projected prices and a High Price Scenario, using the average prices recorded in the 1980 to 1985 period. 1980 to 1985 was a period of slow growth, and even stagnation, in the world economy, rather than an economic boom, so in most cases the values are unlikely to be over-optimistic.

All prices used in the analyses are presented in 1987 constant values. The IBRD prices quoted above have been adjusted up to 1987 levels by applying the IBRD Manufacturing Unit Value (MUV) Index, which is commonly used in studies of this

type as an indicator of world inflation. Values for this index are 113 in 1986 and 116.5 in 1987. Prices in 1987 terms are thus taken to be 16.5% above 1985 constant values.

B5.3 Exchange Rate and Inflation

B5.3.1 Background

Somalia has undertaken major reforms of the exchange rate system in 1981, 1984 and at the start of 1985. As part of a major International Monetary Fund (IMF) adjustment programme in January 1985, the official exchange rate was devalued by 38.5% to SoSh 36 to the US dollar and a free foreign exchange market established for private transactions. The lifting of most controls of exports and imports and a virtual dismantling of the apparatus of price controls also occurred. A small third market for foreign exchange exists, administered by the Commercial Savings Bank. This is used mainly for tourist receipts, overseas travel and education expenditures and imports brought in under aid-financed Commodity Import Programs (CIPs). The exchange rates were to have been unified by the end of 1985, following a progressive monthly devaluation of the official rate and a gradual transfer of items from the official to the free market.

Only some elements of the IMF package have been implemented. Monetary and fiscal targets could not be met and inflation was higher than expected. Somalia also fell into arrears with the IMF. The devaluation of the official exchange rate was slowed down, retarding the unification of the foreign exchange market as the free market rate depreciated. The Commercial Bank rate was not adjusted, and was still at SoSh 84 per dollar in late 1986. Also, transactions were transferred from the official to the free market. The proportion of private export receipts to be surrendered at the official exchange rate has been raised from 35% to 50% with the remainder being sold at the free market rate. The official rate was envisaged to depreciate by SoSh 4 per month so as to reach parity with the free market rate by end-1986. The Commercial Bank rate was to be adjusted every 10 days in line with the free market rate. By early 1987 the official rate (at SoSh 91 = US$ 1) was still only about 60% of the free market rate. The Commercial Bank rate has moved to the same level as the official rate. The interest rate remained negative in real terms; the Commercial Bank overdraft rate was 15% to 20% while prices were rising at nearly 40% per annum.

Most of the Agricultural Sector Adjustment Program (ASAP) credit of US$ 70 million is being channelled through an exchange auction, which acts as a 'wholesale' market for foreign exchange usable for essential imports only. The Commercial Bank rate has now been eliminated, while the free market continues to function like a 'retail' foreign exchange market. Bids for the auction can be a minimum of US$ 5 000 and a maximum of US$ 200 000. Both public and private enterprises (except for Somalpetrol) as well as individuals can participate in the auction, which can finance all imports except for military equipment and luxury goods. The first auction was on September 1st, 1986, followed by others at 15-day intervals. Since the initial amounts were quite large, and the permissible import items were restricted, the auction rate was considerably lower than the free market rate. A broadening of the auction market, with additional supply of funds from Somalia's own resources as well as an extended list of imports, will give a more realistic price of foreign exchange and conceivably provide the basis for unifying the exchange rate.

Table B5.2 shows the evolution of the various exchange rates. The parallel market rate to the end-1984 is also shown for comparison; this market almost disappeared when the free market was introduced, since the latter fulfilled all its functions more conveniently and legally.

The free market value of the shilling declined fairly steadily through 1986. However, for the whole of 1985, the depreciation of 29% was close to the rate of inflation. In 1986, the rate of depreciation (about 66% at an annualised rate) was considerably higher than the rate of inflation (37% per annum). Table B5.3 shows the evolution of inflation between 1976 and 1985.

B5.3.2 Main Assumptions

The base value of most items of machinery and equipment was obtained in pounds sterling. In mid-January 1987, this was quoted at about US$ 1.50 = £1.00. The pound is generally considered weaker than most other European currencies, however, and is expected to fall back to a value around US$ 1.45 in the long term. Currency futures in the Financial Times of January, 1987, were quoted at US$ 1.47 for six months and US$ 1.44 for 12 months. The exchange rate with the US$ used in both the financial and economic costings has therefore been taken at US$ 1.45 = £1.00 to represent its long-term value.

The official value of the Somali Shilling has shown a continued downwards trend; over 1986 from SoSh 50 = US$ 1 to SoSh 90 = US$ 1. Government sponsored currency auctions have resulted in much lower rates, with a trend towards the free market rate of SoSh 150 = US$ 1.

There is no clear indication where the shilling will settle but assuming a shadow foreign exchange rate of SoSh 135 = US$ 1 (i.e. 50% above the financial exchange rate) is considered acceptable. This is assumed to take adequate account of the scarcity value of foreign exchange (FE) in the economy and does provide direct comparison with other project appraisals in 1987.

In the financial analysis, an official rate of SoSh 90 = US$ 1 has been applied. This was the rate quoted for the commercial importation of agricultural machinery and equipment in early 1987.

For the detailed analysis of the 5-year financing period expected exchange and inflation rates have been projected. Table B5.4 lays out a comparative review of projections provided by World Bank sources, analysis of recent projects in Somalia and as advised to the Consultant by the Delegation of the CEC in Mogadishu. An assessment of the accuracy of historical projections against actual figures shows that the Delegation's estimates are the most appropriate for the foreign exchange projections. Recent analyses have consistently under-estimated local inflation and devaluation parameters and thus again the Delegation's estimates appear the most realistic. It should be pointed out, however, that strong pressure is being applied on the Somali economy by the international community to unify and stabilise its exchange rates and that if this strategy proves more successful now, compared with the last 5-years, then the devaluation rate adopted in this analysis might prove pessimistic in hindsight (By September 1987 for instance, the official rate was SoSh 140 = US$ 1).

TABLE B5.2

Exchange Rates 1972 to 1987
(SoSh per US$ at end-period)

Date	Official bank rates			Free market rates		Parallel	Ratio of
	Central	Commercial	Dual rate	Market	Auction	market	free to official
1972 Jun	7.14	-	-	-	-	na	na
1981 Jun	6.30	-	-	-	-	13 - 15	2.0 - 2.4
1982 Jul	6.30	-	12.59	-	-	25 - 30	2.0 - 2.4
1983 Oct	15.60	-	-	-	-	30 - 35	2.0 - 2.3
1984 Sep	17.56	-	-	-	-	45 - 50	2.5 - 2.8
1984 Dec	26.0	-	-	-	-	80 - 100	3.1 - 3.8
1985 Jan	36.0	83.6	-	-	-	-	2.5
1985 Mar	37.0	84.0	-	91.4	-	-	2.5
1985 Jun	40.6	84.0	-	97.8	-	-	2.4
1985 Sep	40.6	84.0	-	100.7	-	-	2.5
1985 Dec	42.5	84.0	-	114.7	-	-	2.7
1986 Jan	54.5	84.3	-	114.8	-	-	2.1
1986 Feb	58.5	84.3	-	122.9	-	-	2.1
1986 Mar	62.5	84.3	-	138.6	-	-	2.2
1986 Apr	66.5	84.3	-	149.0	-	-	2.2
1986 May	70.5	84.3	-	152.9	-	-	2.2
1986 Jun	74.5	84.3	-	152.3	-	-	2.0
1986 Jul	78.5	84.3	-	157.0	-	-	2.0
1986 Aug	82.5	84.3	-	136.0	-	-	1.7
1986 Sep	86.5	84.3	-	134.0	105	-	1.5
1986 Oct	90.5	84.3	-	134.0	96	-	1.5
1987 Mar	90.5	90.5	-	153.0	122	-	1.7

Note: Average of the clearing rates of two auctions per month.

Source: Commercial banks.

TABLE B5.3

International and Mogadishu Consumer Price Index, 1976 to 1985
(% Rates of Inflation)

Item	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
MUV Index 1	1.4	9.9	15.0	13.3	11.0	0.5	-1.4	-2.6	-1.8	0.7
General index (weight 100.0)	14.7	9.8	10.2	23.7	59.0	44.6	22.6	36.4	92.1	37.9
Food (weight 60.1)	13.6	15.5	12.9	21.9	77.5	40.4	6.4	40.5	115.1	13.3
Beverages & tobacco(2) (weight 2.2)	-	-	6.9	15.4	34.3	41.3	24.0	92.6	148.1	34.3
Clothing (weight 5.6)	24.1	6.6	6.9	23.0	31.8	46.1	30.5	60.4	41.8	41.0
Rent and water (weight 15.3)	2.2	2.1	0.1	9.0	38.6	50.4	64.7	9.5	47.5	76.0
Fuel and lighting (weight 4.7)	-5.0	22.0	23.6	32.6	44.0	74.8	71.6	38.7	68.6	69.3
Miscellaneous (weight 12.1)	9.7	2.8	6.5	48.5	16.2	51.5	46.9	31.6	55.8	135.3

Notes: (1) Manufacturing unit value (MUV) Index percentage annual change based on five industrial market economies exports to developing countries on a CIF basis.
(2) Included in 'miscellaneous' for the period 1970 to 1976.

Source: Ministry of Planning, Central Statistical Department and World Bank Commodity Price Projections, October 1986.

TABLE B5.4

Estimated Price Contingencies and Foreign Exchange Rates

			1987	1988	1989	1990	1991	1992
Foreign exchange component	- World Bank[1]	(a)	3.1	1.3	1.3	1.3	1.3	1.3
		(b)	5.0	1.0	1.0	1.0	3.5	3.5
	- CRDP		7.0	7.5	7.7	7.6	4.5	4.0
	- CEC		5.0	5.0	5.0	5.0	5.0	5.0
Local currency	- World Bank[2]	(a)	15	10	10	10	10	10
		(b)	5.0	1.0	1.0	1.0	3.5	3.5
	- CRDP		20	20	15	10	10	10
	- CEC		25	25	25	25	25	25
SoSh to US$ 1.0	- World Bank	(a)	100	100	100	100	100	100
		(b)	83	83	83	83	83	83
	- CRDP		80	100	100	100	100	100
	- CEC		90	117	152	183	219	241

Source: World Bank - (1) MUV Index from October 1986 Projections.
(2) Recent Project Analysis in Somalia.
(a) Livestock Health Services Project, and
(b) Second Agricultural Extension Project.

CRDP - Central Range Development Project, MASCOTT, November 1985, Foreign Exchange based on UK Retail Price Index.

CEC - Delegation of the CEC, Mogadishu; derived approximate rate. The Consultant was requested to use these rates (see text).

B5.4 Duties and Taxes

Economic prices exclude duties and taxes levied on imports or exports. For the most part, these are not applied to agricultural inputs, including machinery, except in the case of some agrochemicals. The Administration and Statistical Fee (ASF) which is levied on certain imports at 20% of CIF value has also been excluded, since it is in effect an import duty. Local municipal taxes have been allowed for as a percentage charge on the farmgate value.

Taxes on wages and salaries are also excluded from project staff costs in the economic analysis. Details are given in Section B5.8.

B5.5 Port Handling Costs and Marketing Margins

The cost of handling and administration of imports and exports varies. The analysis assumes the typical levels set out in Table B5.5. For crops and crop inputs, these amount to the harbour fee of 3% of the border value plus SoSh 2 720 per tonne. A wholesale marketing margin on these commodities is also included as a percentage of border values, plus port handling charges, to cover import financing, the importer's administration and miscellaneous costs and profit margins to the port-of-entry wholesale warehouse. Marketing margins between this point and the project area are also taken into account as a percentage of farmgate values.

TABLE B5.5

Breakdown of Port Handling Charges and Fees

	Crops and crop inputs		Machinery and equipment	
Harbour fees	3% of CIF value			
	Unit	Rate (SoSh)	Unit	Rate (SoSh)
Port handling charges				
Agency fees	tonne	2 000	each	2 000
Handling	tonne	300(1)	tonne	750(2)
Storage	tonne	200(3)	tonne	200(3)
Transport to local warehouse	tonne	220(4)		

Notes:
(1) SoSh 15/100 kg x 2 for unloading from ship and loading onto vehicle. Source: Mogambo Irrigation Project.
(2) Source: commercial machinery importers.
(3) Assume 20 days: first 10 days free, thereafter SoSh 2/100 kg a day. Source: commercial machinery importers.
(4) Source: National Transport Agency, Mogadishu.
(5) Included in transport cost to project.

B5.6 Transport Costs

Transport costs used in the analyses are based on late 1986 rates quoted by the National Transport Agency (NTA). The rates assume good roads, which will be the case between port-of-entry and the project. These rates were increased by 12% to bring them up to anticipated 1987 levels. The composite cost rate used in the financial and economic analyses is SoSh 5/t-km, calculated as follows:

Vehicle	Rate 1986 (SoSh/t-km)	Rate 1987 (SoSh/t-km)	Proportion (%)	Assumed (SoSh/t-km)
6-10 tonnes	4.70	5.26	70	3.68
20-25 tonnes	4.10	4.59	30	1.38
Assume: SoSh 5/t-km			Total	5.06

It should be noted that the TAMS and Lahmeyer reports estimated SoSh 7.5/t-km. The effect of such differences on final farmgate parity prices is minimal.

The port-of-entry for the project has been taken as Mogadishu, for both project inputs and the calculation of import and export parity prices. At present, Mogadishu is the harbour used for most commodities, except for banana exports and Somalfruit fertiliser imports, which pass through Kismaayo port.

B5.7 Labour

Daily wage rates for unskilled and semi-skilled hired labour vary between enterprises and the nature of tasks. Table B5.6 shows data from Somalfruit in late 1986, giving the company's farm and packing shed labour costs.

TABLE B5.6

Variations in Labour Rates - Somalfruit 1986

Farm labour		Packing shed labour		
Daily rate (SoSh)	Percentage of payroll	Monthly rate (SoSh '000)	Percentage of payroll	Daily rate (26 days)
30-70	36	1.5-1.8	1	60-70
130-170	17	2.0-2.8	33	75-110
180-220	39	3.0-4.0	33	115-155
230-270	5	4.3-6.5	23	165-250
280-320	3	7.2-9.5	6	280-365
		10.0-13.0	3	385-500
		14.0-20.0	1	540-770

Source: Somalfruit.

The differences reflect different operations - from SoSh 30/day for crop surveillance to SoSh 300/day for tractor drivers - and differences in levels of responsibility. At the Juba Sugar Project (JSP), daily rates, including an allowance for food rations, vary from SoSh 70 for general fieldwork to SoSh 120 for cane cutting.

There is also a significant seasonal variation in wages, as illustrated in Table B5.7.

TABLE B5.7

Daily Wage Rates in 1986

Employer/source	Gu season April-June/July	Other periods July/August-March
Homboy		
- smallholder rainfed farms	160	60
Juba Sugar Project (JSP)(1)		
- general fieldwork	(70+)	70
- cane cutting	125	125
Fanoole Irrigation Project(1)	150	100
Mogambo Irrigation Project(1)	150	80
Commercial banana estates	140	60
Dara Salaam Busley Project		
- weeding	150-400	40-60
- day irrigation	200-300	100-150
- night irrigation	300-400	200-300
- harvesting	200	100
- herding(3) (locally)	25-50	25-50

Notes: (1) Including estimated food rations value.
(2) Excluding Juba Sugar Project general fieldwork rate. At JSP the additional educational, medical and recreational facilities which are provided and are a significant attraction to staff have not been included in these rates.
(3) Rates do not include the value of full food provisions, clothing and medical care.

Source: Consultants' field data and information provided by the quoted enterprises.

From July to March, the supply of labour is generally adequate, depending on the enterprise's location and the nature of the work. Most commercial enterprises have to provide either accommodation or, more usually, transport to and from home for their employees. Certain work, particularly sugar cane cutting, night irrigation and pesticide spraying, are unpopular and command premium rates. In this 8 to 9 month period, daily rates vary between SoSh 60 and SoSh 150, with an average of SoSh 83. Wages for herding are significantly less in cash terms but are supplemented by provisions in kind.

In the gu season, when labour requirements on irrigated and rainfed holdings are highest, the rate outside the project area averages SoSh 145/day, varying from SoSh 125 to SoSh 160 - excluding the probably under-reported JSP general fieldwork rate. In the project area there appears to be more pressure on the labour market, probably due to the traditional and plantation demands of the Janaale irrigation area. The problems of the Janaale labour market are long standing and are described in Chapter A3. During the off-peak labour demand periods wage rates are similar to other areas. During the time of peak demand in

May and June for weeding maize, wage rates rise to levels well over double those found on the Juba farms, indicating a significant shortage of labour. The existence of this constraint and its economic impact on farm budget and decision making were clearly recounted by many farmers spoken to during the field surveys.

Since the seasonal wage rates vary considerably it can be assumed that they represent realistically the opportunity cost of labour at different times of the year. The rates assumed are SoSh 200/day in the gu season (as an average) and SoSh 80/day in the der season. This would lead to an annual weighted average rate of SoSh 135/day.

B5.8 Taxation

Wages and salaries of project staff are subject to personal taxes, which are not included in the economic analysis. Taxes are levied at the following rates:

Earnings (SoSh/month)	Tax rate (%)
Up to 200	0
Up to 800	6
801 to 1 500	12
over 1 500	18

In addition, there is a local government tax of 5% of the monthly tax payable.

In the crop budgets, the calculated economic benefits are net of family, farm, market and land taxes which are raised on the basis of variable local taxation as indicated in Table B5.8.

B5.9 Crop Prices

Calculations of projected low and high and 1986 crop prices are set out in Tables B5.9 to B5.14. The calculations are self-explanatory and incorporate the handling, transport and other cost components discussed above. The individual crops are discussed below.

B5.9.1 Maize

The future financial prices for the analysis are based on the Low Price projections, as a means of taking account of the possibility of national maize output rising to levels sufficient to meet national demand, and thus exerting downward pressure on market prices.

Based on the assumption of import parity pricing, present producer prices can be seen to be well below those of farmgate parity prices. This would suggest that local supply pressures have suppressed producer prices recently but that there is still room for further price incentives for producers if the local and international economies were better integrated and less subject to the effects of food grants.

TABLE B5.8

Transport Costs and Local Taxes (SoSh)

Item	Unit	Baraawe 1985 Transport cost[1]	Baraawe 1985 Market tax	Qoryooley market tax (1984)
Maize	Quintal	20-60	10-40	27
Cowpea	Quintal	20-60	16-40	20
Sesame	Quintal	20-40	10-40	32
Long pumpkin	Piece	1-2	1	na
Round pumpkin	Piece	1-2	1	na
Onion	Quintal	20	7-20	10
Tomatoes	Half-drum	5-15	5-10	2
Melons	Piece	1-2	1	2
Tobacco	Quintal	15	15	50
Sweet potato	Piece	1	1	0,5
Mango - small	Quintal	na	na	5
Mango - large	Quintal	na	na	10
Animals	Head	----------5% of sales price----------		
Milk	2 litres	5-8	1.6-10	5-7
Whey	2 litres	5.7	13-8	na
Ghee	kg	6	3-5	na
Farmhouse	Annual	----------standard rate----------		

Farms:

- Rainfed 5 ha (actual payment reported 9)
- Irrigated 10 ha (actual payment reported 12)

Note: (1) From Sablaalle to Baraawe.

Sources: EAA (1985) and GTZ (1984).

TABLE B5.9

Prices of Maize (SoSh/t) at Constant 1987 Prices

	Import parity		1986	Projected High	Low
US Nr 2 yellow FOB Gulf Ports	US$		90	142	110
Quality premium 5%(1)	+		5	7	6
Insurance and freight to Mogadishu	+		60	60	60
CIF Mogadishu US$	=		155	209	176
Equivalent to:					
at official exchange rate	SoSh		(13 950)	(18 810)	(15 840)
at shadow exchange rate	SoSh		20 925	28 215	23 760
Excise duty (20% of CIF)			(2 790)	(3 762)	(3 168)
Harbour fees (3% of CIF cost at official exchange rate)	+		419	564	475
Port handling	+		2 720	2 720	2 720
Landed value - Economic	=		24 064	31 499	26 955
Importer's other costs and margin (5% of CIF cost at OFE)	+		698	940	792
Value at Mogadishu wholesale	=		24 762	32 439	27 747
Transport from project 80 km x SoSh 5	-		400	400	400
Municipal taxes (5 % of farmgate values)			(877)	(1 148)	(982)
Marketing margin (10% of farmgate value)	-		2 215 (1 755)	2 913 (2 295)	2 486 (1 965)
Farmgate value:					
Economic	=		22 147	29 126	24 861
Financial	=		17 545	22 953	19 648
Current producer price	=		14 000		

Notes: (1) Local maize grown and consumed locally is mixed, with a predominance of yellow grains.

Figures in brackets indicate financial values excluded or that vary in the derivation of economic parity prices.

TABLE B5.10

Prices for Sesame (SoSh/t) at Constant 1987 Prices

	Import parity	1986	Projected High	Projected Low
Sesame seed CIF Europe	US$	438	610	464
Insurance/freight savings from Sudan cv Europe = 50%	-	40	40	40
CIF Mogadishu US$	=	398	570	424
Equivalent to:				
at official exchange rate	SoSh	(35 820)	(51 300)	(38 160)
at standard exchange rate	SoSh	53 730	76 950	57 240
Harbour fees (3% of CIF cost at official exchange rate)	+	1 075	1 539	1 145
Port handling				
Excise duties (20% of CIF)	+	2 720	2 720	2 720
		(7 164)	(10 260)	(7 632)
Landed value - Economic	=	57 525	81 209	61 105
Importer's other costs and margin (5% of CIF cost at OFE)	+	1 791	2 565	1 908
Mogadishu value wholesale	=	59 316	83 774	63 013
Transport from project 80 km x SoSh 5	-	400	400	400
(Municipal taxes 5% of farmgate value)	-	(2 094)	(2 956)	(2 225)
Marketing margin (10% of farmgate value)	-	5 356	7 580	5 692
		(4 189)	(5 912)	(4 491)
Farmgate value:				
Economic	=	53 560	75 795	56 921
Financial	=	41 887	59 117	44 491
Current producer price		60 000		

Note: Figures in brackets indicate financial values excluded or that vary in the derivation of economic parity prices.

TABLE B5.11

Prices for Cotton (SoSh/t) at Constant 1987 Prices

	Import parity	1986	Projected High +3%	Projected Low
Lint CIF Europe middling (1-3/32 in.) equivalent to CIF Mogadishu[1]	US$	917	1 980	1 922
Equivalent to:				
at official exchange rate	SoSh	82 530	178 200	172 980
at shadow exchange rate	SoSh	123 795	267 300	259 470
Excise duty (20% of CIF)		16 506	35 640	34 596
Harbour fees (3% of CIF cost at official exchange rate (OFE))	+	2 476	5 346	5 189
Port handling	+	2 720	2 720	2 720
Landed value (lint) - Economic	=	128 991	275 366	267 379
Transport to Balad and importer's other costs (6% of landed value)	+	7 739 (6 254)	16 522 (13 314)	16 043 (12 929)
Value at Balad textile mill/ginnery	=	136 730 (110 486)	291 888 (235 220)	283 422 (228 414)
Ginnery cost net of seed value	-	5 000	5 000	5 000
Value at ginnery	=	131 730	286 888	278 422
Seed cotton equivalent 33%	=	43 471	94 673	91 879
Transport from project to Balad 100 km x SoSh 15[2]	-	1 500	1 500	1 500
Municipal taxes (5% of farmgate value)	-	(1 448)	(3 238)	(3 140)
Handling, marketing and administration (10% of farmgate value)	-	3 816 (2 897)	8 470 (6 476)	8 216 (6 281)
Farmgate value:				
Economic	=	38 155	84 703	82 163
Financial[3]	=	28 966	64 759	62 806
Current producer price		45 000		

Note: (1) Assuming that insurance and freight cost USA or other source to Europe costs the same as CIF to Mogadishu.
(2) SoSh 5 x 3 for bulk product
(3) Figures in brackets indicate financial values excluded or that vary in the derivation of economic parity prices.

TABLE B5.12

Prices for Tomatoes (SoSh/t) at Constant 1987 Prices

	Import parity	1986	Projected High	Projected Low
Tomato puree FOB N. Europe	US$	590	750	400
Insurance/sea freight	+	60	60	60
CIF Mogadishu	=	650	810	460
Equivalent to:				
At official exchange rate	SoSh	(58 500)	(72 900)	(41 400)
At shadow exchange rate	SoSh	87 750	109 350	62 100
Excise duty (20% of CIF)	+	(11 700)	(14 580)	(8 280)
Harbour fees (3% of CIF at OER)	+	1 755	2 187	1 242
Port handling	+	2 720	2 720	2 720
Landed value				
Economic	=	92 225	114 257	66 062
Importers other costs and margin (5% of CIF)	+	4 388	5 467	3 105
		(2 925)	(3 645)	(2 070)
Mogadishu warehouse value	=	96 613	119 724	69 167
Conversion to fresh fruit (at ratio of 10 to 1)	=	9 661	11 972	6 917
		(7 760)	(9 603)	(5 571)
ITOP overheads (6% of warehouse value)	-	580	718	415
		(466)	(576)	(334)
Transport to Mogadishu 80 km at SoSh 5	-	400	400	400
Marketing loss (25% of farmgate value)	-	1 608	2 010	1 130
		(1 231)	(1 540)	(896)
Municipal taxes (5% of farmgate value)	-	(246)	(308)	(179)
Marketing margin (10% of farmgate value)	-	643	804	452
		(492)	(616)	(358)
Farmgate value:				
Economic	-	6 430	8 040	4 520
Financial	-	4 924	6 162	3 583
Current producer prices:				
ITOP processed (at Mogadishu warehouse value)		8 000		
Wholesale processed (at Mogadishu warehouse value)		10 000		
Local variety wholesale (includes two qualities)		15 - 150 000		

Note: Figures in brackets indicate financial values excluded or that vary in the derivation of economic parity prices.

TABLE B5.13

Prices for Water Melons (SoSh/t) at Constant 1987 Prices

	Export parity	1986	Projected High	Projected Low
Watermelon CIF S. Europe	US$	300	500	390
Insurance/air freight	-	90	90	90
FOB Mogadishu	=	210	410	300
Equivalent to:				
at official exchange rate	SoSh	(18 900)	(36 900)	(27 000)
at shadow exchange rate	SoSh	28 350	55 350	40 500
Excise duty (5% of FOB)	-	(945)	(1 845)	(1 350)
Harbour fees (3% of FOB at OER)	-	567	1 107	810
Port handling	-	2 720	2 720	2 720
Exporters value - Economic	=	25 063	51 523	36 970
Exporters costs and margins (10% of exporters value)	-	2 506 (1 467)	5 152 (3 123)	3 697 (2 484)
Mogadishu wholesale value	=	22 557	46 371	33 273
Transport to Mogadishu (80 km at SoSh 5)	-	400	400	400
Marketing losses (5% of farmgate value)	-	963 (533)	1 999 (1 154)	1 429 (915)
Municipal taxes (5% of farmgate value)	-	(533)	(1 154)	(915)
Marketing margin (10% of farmgate value)	-	1 927 (1 067)	3 997 (2 309)	2 859 (1 830)
Farmgate value:				
Economic	-	19 267	39 974	28 585
Financial	-	10 668	23 087	18 297
Current producer price:				
Export quality		12 000		
Local market		10 - 30 000		

Note: Figures in brackets indicate financial values excluded or that vary in the derivation of economic parity prices.

TABLE B5.14

Prices of Urea (SoSh/t) at Constant 1987 Prices

	Import parity	1986	Projected price[1]
Urea FOB Northwest Europe	US$	105	198
Insurance and freight to Mogadishu	US$	60	60
CIF Kismaayo	US$	165	258
Equivalent in SoSh:			
at official exchange rate	SoSh	(14 850)	(23 220)
at shadow exchange rate	SoSh	22 275	34 830
Port handling	+	2 720	2 720
Harbour fees (3% of CIF cost at official exchange rate)	+	445	697
Landed value	=	25 440	38 247
Importer's other costs and margin (5% of CIF cost)	+	742	1 161
Value at Mogadishu warehouse	=	26 182	39 408
Sales tax[2]	+	(938)	(1 390)
Transport from Mogadishu to project 80 km at SoSh 5	+	400	400
Supplier's margin and costs (10%)	+	2 658	3 981
		(1 876)	(2 780)
Farmgate price:			
Economic	=	29 240	43 789
Financial		21 971	32 368
Local producer costs[3]		25 000	

Note: (1) Since there is only US$ 2 per tonne difference between the high price (1980-85 average) and low price (IBRD projected year 2000 price) the average of the two has been taken for the projected future price.

(2) 5% of the financial value at the Mogadishu warehouse.

(3) Based on existing farmgate prices as supplied through AFMET.

Figures in brackets indicate financial values excluded or that vary in the derivation of economic parity prices.

B5.9.2 Sesame

The derivation of appropriate prices for sesame used in various 1986 appraisals is believed to be misleading. Some quote CIF price in Japan. This is believed to represent confectionery quality and would achieve a price premium of some significance over sesame destined for the oil extraction market. The economic prices and future price projections in the Homboy study were based on ratios of the local producer prices for sesame to the economic farmgate parity price derived for maize. This ratio is significantly affected by the level of the exchange rate assumed. It is also not clear that there is a strong correlation of price trends between cereals and oilseeds. Therefore the Homboy sesame pricing method has been rejected as unsuitable for this analysis where sesame is likely to play a significant role in creating both the streams of project benefits and also the stream of cash flows affecting farmers incomes.

In trying to derive a rational basis on which to derive a farmgate parity price for sesame, importers in the UK reported that there are significant quality differences; prices for Chinese and Vietnamese seed are US$ 500 to US$ 390 per tonne, respectively. It is not clear what quality premium Somali sesame would achieve, therefore an average between Chinese and Vietnamese sesame prices has been taken: US$ 445 per tonne.

To reach a basis for projecting future prices, the ratio of the present prices of sesame or a similar oilseed has been taken. The current price of soyabeans, CIF Rotterdam is US$ 224 per tonne, almost exactly half that of sesame. Using the same methods of making future projections as for the other crops the future High Price for sesame, based on the ratio of sesame to soya bean price levels and projections, would be US$ 610; the Low estimate, US$ 464. The 1986 price would have been US$ 438 per tonne. Current producer prices are only slightly above the current import parity.

B5.9.3 Cotton

The derivation of cotton prices has followed closely the methodology adopted by all the recent studies, with minor adjustments for local project conditions and taxes.

The national requirement for seed cotton, as an import substitute to save on scarce foreign exchange, will be high, as discussed above. The future financial prices adopted for the analysis have been calculated from the High Price assumptions, to reflect the upward pressure of demand on the crop price. It is to be noted that local producer prices are well above those derived from parity pricing and indicate the level of producer incentives that Somaltex is giving to save on foreign exchange.

B5.9.4 Tomatoes

Recent studies' estimations of the world price of tomatoes have been based on the prices quoted for the West German market for processed tomatoes. There are two aspects of note about this source. First, the West German market has lower quality standards of mould counts and pH than the UK and USA markets. Second, at the time the prices were quoted, the market was in a state of oversupply and prices were depressed. Their 1985 price FOB North Europe was US$ 389 per tonne.

Discussions with the major shippers of tomatoes from the Italian markets into the UK supermarket chains indicated that the current price levels were US$ 430 to 500 per tonne (FOB) and that these prices were likely to be more representative of general price levels than those from 1985. However, the shipper also made it clear that, in the longer term, the market is particularly volatile and that large price variations can be expected.

The analysis for this study of the future High and Low Price projections takes these facts into account. The future Low Price reflects the price levels that have recently been experienced during the period of oversupply. The High level reflects the prices that may reflect conditions of out-of-season marketing or when supply lines have been adversely affected by poor production conditions. Naturally, the spread of prices is wide and more than adequately covers the effect of quality premiums between the UK and West German markets, which would appear to range between about 2% to 5%. What is more significant is that FOB South Europe price differentials relate to the size of container in which the tomatoes are packed. Small tins in 48 x 230 g packs sell for a considerably higher price than the large tins in 12 x 780 g or 24 x 396 g packs. However, at the retail end margins are lower on the medium-size tin, as this commands a significantly greater volume of sales.

A comparison of the import parity or economic prices with current producer prices indicates that ITOP has to pay well above import parity price to stimulate production in order to provide throughput for its processing facilities. A further problem is the strength of the market for the local tomato varieties which is also indicated by the price differential. Prices of local types always significantly outstrip those of processing varieties. It is therefore to be expected that most rational producers would prefer to select local varieties in preference to the processing sector under the current conditions.

The price projections and the state of world marketing in processed tomatoes would not support any project strategy to encourage farmers to produce tomatoes for processing. Neither should the situation encourage the GOS to continue subsidising this sector. The problems, however, are the shortage of foreign exchange to finance imports that may be in demand and how to justify existing processing capacity. These are factors beyond the scope of this project.

Future financial prices have been based on the average price paid currently during the peak marketing seasons.

B5.9.5 Water Melons

Deriving an appropriate international price for water melon is complicated by the seasonality of the crop on the world markets and the large differences in freight costs that are incurred by different supply sources in order to maintain a regular flow of produce into the European and Middle Eastern markets. The main season for Somali produce is ahead of the main production season of the major European suppliers in Cyprus, Greece, Italy and Spain. European producers use road transport which is considerably cheaper than air. Air freighting is used to supply the off-season markets from Zambia, Kenya, Pakistan and Mexico. Somalia can exploit the lower freight rates by sea into the Gulf and Saudi Arabian markets and by using excess sea freight capacity on Somalfruit shipments of bananas to Italy. The effect of freight differences can cause these rates to rise from around 15% to 60% of European CIF prices where air freighting is used.

The basic world demand and supply for water melons appears firm enough throughout the year to maintain prices within reasonably stable overall limits, which are reported to have stayed steady over the last 5 years. This suggests that the market organisation is well developed and that exploiting the market will be a specialised operation requiring careful management and consideration of seasonal implications.

Minimum prices in the UK market over the last 5 years have fallen to around £3 per 15 kg case, with the maximum being £10 per case. The usual price in the wholesale market has been between £4 and £6 per case. There were no data available on the comparable prices for Somali produce in the Gulf or Italian markets, which Somalfruit is only just beginning to develop. The 1986 Somalfruit exports seem to have had an equivalent CIF value of £3 per case; i.e. at the low end of the price scale but based mainly on the Middle Eastern markets.

Discussions with major importers purchasing from African suppliers indicate that UK FOB prices are currently in the order of US$ 200 per tonne while the Somalfruit statistics indicate FOB prices of around US$ 220 per tonne, based on the Middle Eastern market outlets during 1986. For the purposes of this analysis this general FOB price level has been assumed. For the future price levels it has been necessary to take into account the general stability of price levels over recent years and the increasing capture of the Middle Eastern and European markets by Asian and African developing countries. It is also significant that there are existing proposals to expand the water melon areas in the Janaale irrigation area. These would probably satisfy any major expansion of water melon exports that Somalfruit or the private sector might organise in the medium-term future. The projections of High Prices have been made to show the price which could be attained if there was a firm foothold in the off-season markets and with a reliable good quality supply. The Low Price projections give what may be a more realistic average price level, given rising production levels both in Somalia and elsewhere.

The current level of producer prices seems to conform reasonably well with the export parity pricing calculations and indicate further that there are unlikely to be unexploited price incentives on which the project could build any strong support programme to expand the water melon production. What can be done is to assist existing producers in their production problems and to assist them in maintaining closer links with the developments in the water melon market, giving them better access to market price information and helping to integrate them with the export developments and potential contract possibilities with Somalfruit.

Future financial prices have been based on the future Low Price scenario.

B5.10 Crop Input Prices

B5.10.1 Fertiliser

Somalia has a urea plant. However, its production history has been poor and in view of its high production costs, which have been estimated as anything up to six times the cost of imported urea, its future must be uncertain. Urea has therefore been valued on the basis of import prices. The price calculations are set out in Table B5.14. Since from other studies the prices of compound fertilisers do not differ dramatically from that of urea, this price has been used as an indicator for any fertiliser used on the project. Fertiliser usage is discussed further in Annex 4.

B5.10.2 Herbicides and Pesticides

Agrochemicals commonly used and available in Somalia are subsidised but others which are only occasionally used are not, and attract a 10% import duty. It has been assumed that, if such chemicals become widely used, government subsidies will be applied and their financial prices will bear the same relation to economic prices as for chemicals already subsidised. On this basis the financial prices shown in Table B5.15 are 67% of the known import cost. The figures have been taken from the Homboy study.

TABLE B5.15

Prices for Herbicides and Pesticides (SoSh/unit)

	Unit	Financial	Economic(1)
Herbicide			
Stam 34	litre	240	360
Pesticides			
Fernasan D	kg	138	207
Bronopol dust	kg	125	188
Diazinon 10	kg	140	210
Carbofuran	kg	212	318
Polytrin C440 EC	litre	549	823
Malathion	kg	173	260
Ridomil M2 63.5%	kg	420	630
Nuvocron	litre	149	224

Note: (1) Used for both high and low base assumption analyses. Figure excluding duties and taxes.

B5.10.3 Seed

In the analysis seed has been valued at 1.5 times the calculated output prices, with one exception: cotton seed is valued at the estimated cost of ginning and transport back from the ginnery over and above the farmgate price paid for the seed cotton. This gives an economic price of SoSh 101.2/kg under the High Price assumption and SoSh 98.4/kg under the Low Price scenario.

At financial levels the High Price reverts to SoSh 82.4/kg and at the Low Price to SoSh 80.2/kg. In financial terms, however, this cost is borne totally by Somaltex, as seed is given free to growers.

B5.11 Summary of Crop and Crop Input Prices

The future financial and economic prices are summarised in Table B5.16.

B5.12 Agricultural Machinery and Equipment Costs

B5.12.1 Introduction

Financial and economic operating costs for farm machinery and equipment are calculated for the different implements used and include the wages of the driver. The results are applied to the individual crop budgets to give a cost per hectare for machinery input.

TABLE B5.16

Projected Financial and Economic Crop and Crop Input Constant 1987 Prices (SoSh)

Item	Unit	Financial	Economic	
			High	Low
Crops				
- Maize	kg	19.6	29.1	24.9
- Sesame	kg	44.5	75.8	56.9
- Cowpea	kg	28.6	50.6	34.3
- Cotton	kg	64.8	84.7	82.3
- Tomato	kg	20.0	8.0	4.5
- Water melon	kg	18.3	40.0	28.6
Crop inputs				
Seed:				
- Maize	kg	29.5	43.7	37.3
- Sesame	kg	66.7	113.7	83.4
- Cotton	kg	free	101.2	98.4
- Cowpea	kg	42.9	75.9	51.5
- Tomato	kg	30.0	12.0	6.8
- Water melon	kg	27.4	60.0	42.8
Fertilisers:				
- Urea	kg	32.4	43.8	43.8
- Composite	kg	32.4	43.8	43.8
Herbicide:				
- Stam 34	l	240	360	360
Pesticides:				
- Fezuasan D	kg	138	207	207
- Brovopol dust	kg	125	188	188
- Diazinon	kg	140	210	210
- Carbofuran	kg	212	318	318
- Polytrin C440	l	549	823	823
- Malathion	kg	173	260	260
- Ridomil	kg	420	630	630
- Nuvocron	l	149	224	224
- Composite	kg/l	200	300	300
Containers:				
- Sacks	each	60	60	60
Labour:	man-day			
- Gu season		200	200	200
- Other periods		80	80	80

B5.12.2 Capital Costs

Tables B5.17 and B5.18 set out the financial and economic price unit capital costs for agricultural machinery and equipment delivered to the project. CIF costs are given in US dollars which, where necessary, have been converted at US$ 1.45 = £1 sterling.

Harbour fees, port handling and other costs were calculated on the basis described above in Sections B5.4, B5.5 and B5.6, with 15% added to transport costs to cover administrative and miscellaneous expenses.

B5.12.3 Fuel Prices

Retail prices of petroleum products in Somalia between 1979 and 1987 are shown in Table B5.19.

In their October 1986 forecasts IBRD predict a very slow and partial recovery in oil prices, to US$ 15/barrel (US$ 17.5/barrel in 1987 constant price terms) in 1990 and US$ 23.5/barrel (US$ 27.4 in 1987 constant prices) by the year 2000. This is some 19% below the 1980 to 1985 average. For analysis purposes the assumption made is that long-term future oil prices would be the average of the IBRD year 2000 forecast (US$ 23.5) and the 1980 to 1985 average (US$ 29). The resultant figure of US$26.2/barrel at 1985 constant prices is 120% above the actual 1986 price. This percentage has been applied to calculate the projected prices of petrol (benzine) and diesel oil.

In early 1987 petrol and diesel oil retail prices were SoSh 30.00/l and SoSh 22.84/l respectively. Total taxes and levies on each are SoSh 5.89/l and SoSh 1.84/l respectively, in which case the prices excluding taxes would be:

	SoSh/l
Petrol	24.11
Diesel oil	21.00

These have been taken as the present economic prices before foreign exchange shadow pricing. Assuming a foreign exchange content of 80% in this price (this makes allowance for local refining) the present and projected economic prices would be as follows:

	Present (SoSh/l)	Projected* (SoSh/l)
Economic		
Petrol, say	33.8	74
Diesel oil, say	29.4	65
Financial		
Petrol, say	30.0	66
Diesel oil, say	23.0	51

Note: * 120% above present prices.

TABLE B5.17

Agricultural Machinery and Equipment Unit Capital Costs at Financial Prices

Machinery Type	CIF Mogadishu		Harbour fees, stamp duty and handling	Transfer to project	Delivered cost
	US$	SoSh '000[1]	SoSh '000	SoSh '000	SoSh '000
Tractor - 60 kW	17 400	1 566.0	53.7	2.3	1 622.0
Plough	2 874	258.7	10.9	0.6	270.2
Disc harrow	4 350	391.5	14.9	0.6	407.0
Ridger	1 015	91.4	5.4	0.3	97.1
Leveller blade[2]	350	31.5	3.9	0.3	35.7
Trailer - flat 5 t	3 770	339.3	13.8	0.9	354.0
Knapsack sprayer	60	5.4	3.0	0.1	8.5

Note: (1) At SoSh 90 : US$ 1.00
(2) Based on an Indian imports equivalent European source would be US$ 1 400.

Source: Consultant's estimates based on 1987 quotations.

TABLE B5.18

Agricultural Machinery and Equipment Unit Capital Costs at Economic Prices

Machinery Type	CIF Mogadishu		Harbour fees stamp duty and handling	Transfer to project	Delivered cost
	US$	SoSh '000(1)	SoSh '000	SoSh '000	SoSh '000
Tractor - 60 kW	17 400	2 349.0	72.3	2.3	2 423.6
Plough	2 874	388.0	14.6	0.6	403.2
Disc harrow	4 350	587.3	20.6	0.6	608.5
Ridger	1 015	136.0	6.7	0.3	144.0
Leveller blade	350	47.3	4.4	0.3	52.0
Trailer - flat 4 wheel 5 t	3 770	509.0	18.7	0.9	528.6
Knapsack sprayer	60	8.1	3.1	0.1	11.3

Note: (1) At SoSh 135 : US$ 1.00

Source: Consultant's estimates based on 1987 quotations.

TABLE B5.19

Retail Prices of Petroleum, 1979 to 1986

	Diesel fuel SoSh per litre	Kerosene SoSh per litre	Gasoline SoSh per litre	Gasoline SoSh per gallon	Gasoline US$ per gallon[1]
1979	1.65	1.45	2.40	9.08	1.44
1980	2.15	2.00	3.00	11.36	1.80
1981					
August	2.90	2.80	10.00	27.85	3.01
1982					
January	6.53	6.00	10.00	37.85	3.01
1983					
June	6.53	6.00	10.50	39.74	2.60
1984					
November	8.30	9.85	13.00	49.21	1.89
1985					
January	11.00	10.26	15.00	56.78	1.58
May	12.00	17.00	16.00	60.56	1.51
June	13.00	18.00	17.00	64.35	1.60
July	14.00	19.50	18.00	68.14	1.68
August	15.75	20.50	18.75	70.97	1.75
October	16.50	20.50	20.75	78.54	1.93
December	18.00	20.50	23.50	88.95	2.09
1986					
February	19.00	20.50	25.50	96.53	1.77
March	20.00	21.50	27.50	104.10	1.78
June	20.00	21.50	27.50	104.10	1.48
1987					
March	22.84	35.00	30.00	113.56	1.26

Note: (1) Converted at prevailing official exchange rate.

Source: National Petroleum Agency.

B5.12.4 Machinery Operating Costs

The financial and economic cost calculations for machinery are given in Table B5.20. These are:

	Financial (SoSh/hour)	Economic (SoSh/hour)
Tractor:		
60 kW	1 260	1 770

Note: Including cost of driver.

Allowance is made for difficult operating conditions. Nevertheless the quality of operation and maintenance is assumed to be reasonable and higher than generally observed by the Consultants during the study. Current ONAT rates are SoSh 350 to 380 per hour excluding drivers, while local contractors are SoSh 600 to 700 per hour for an equivalent rate.

B5.12.5 Field Operation Costs

The hourly costs of operating and maintaining the field equipment recommended are given in Tables B5.21 (financial) and B5.22 (economic). The hourly tractor costs have been added to arrive at a total cost, excluding drivers and ancillary labour. For comparison, the rates charged to LIBSOMA tenants are also given in Table B5.21. The figures exclude charges for interest on investment, insurance and taxes.

B5.13 Livestock Prices

In Table B5.23 the current prices for livestock have been derived from reports from traders on current sales levels. The projected prices are from the World Bank projections for meat price increases from present trends to those expected in the year 2000. These have been converted to an equivalent price on the hoof assuming a live weight of export quality stock at 270 kg. The methodology for marketing costs is based on the detailed analysis from 1984 and 1985 (MASDAR and MASCOTT), updated to 1987. The current export transactions allow traders to remit only a portion (65%) of their foreign exchange earnings at the free market rate; the remainder has to be remitted at the official rate. For the projection, it is assumed that, in this area of major economic importance the exchange rates will be unified and full incentives given to the traders. The price projections maintain an element of an export premium which is created by the Hadj market.

Government operates a minimum export pricing system (see Table B3.7) which currently is set C and F Jeddah at US$ 420 for camels, US$ 42 for shoats and US$ 252 for cattle. Customs, labour and fiscal charges are based either upon the FOB value, the letter of credit value or a valuation of stock set by the customs authorities which is much lower than the FOB value. In the recent past the holding down of the customs valuation figures has been a mechanism for reducing export taxation.

TABLE B5.20

Tractor Operating Costs at Financial and Economic Prices (SoSh/h)

	Financial	Economic
Capital cost '000 SoSh	1 622.0	2 432.6
Depreciation:		
Life 6 000 hours(1) - salvage value 15%	229.8	344.6
Interest 10%	-	73.6
Fuel (diesel):		
12 l/h at SoSh 51 per litre	612.0	-
at SoSh 65 per litre	-	780.0
17 l/h at SoSh 51 per litre	-	-
at SoSh 65 per litre	-	-
Oil and greases:		
18% fuel cost	110.2	140.4
Repairs and maintenance(2)		
90% of capital cost over 6 000 h	243.3	364.9
Driver SoSh 350/7 h	50.0	50.0
Miscellaneous:		
Licence, insurance, etc. - 1.5%	17.8	16.7
Total	1 263.1	1 770.2
SoSh/h assumed	1 260	1 770

Notes: (1) Under good conditions 10 000 h. This reduced by 40% to allow for difficult working and management conditions.
(2) Includes spare parts, tyres, regular maintenance and repairs.

Source: Consultants' estimates based on Homboy Study.

TABLE B5.21

Machinery and Implement Operating Costs by Field Operation - Financial Prices (SoSh/h)

	Plough	Disc harrow	Ridger	Leveller blade	Trailer	Knapsack sprayer
Capital cost '000 SoSh	270.2	407.0	97.1	35.7	354.0	8.5
Life (h)(1)	2 000	1 760	2 000	2 000	3 500	500
Depreciation(2)	122	208	44	16	91	15
Repairs and maintenance	108(4)	150(3)	32(3)	12	61(5)	-(6)
Total implement cost(7)	230	360	80	28	150	15
Tractor cost:						
115 kW	1 260	1 260				
60 kW			1 260	1 260	1 260	-
Total cost	1 490	1 620	1 340	1 288	1 410	15
LIBSOMA	1 140	1 117	1 095	na	na	na

Notes:
(1) Average UK and USA life less 20%.
(2) Allowing for 10% salvage value.
(3) At 65% of capital cost.
(4) At 80% of capital cost.
(5) At 60% of capital cost.
(6) Item to be replaced only.
(7) Rounded to nearest SoSh 10.

Source: Consultant's estimates from Homboy Study and LIBSOMA.

TABLE B5.22

Machinery and Implement Operating Costs by Field Operation - Economic Prices (SoSh/h)

	Plough	Disc harrow	Ridger	Leveller blade	Trailer	Knapsack sprayer
Capital cost '000 SoSh	403.2	608.5	144.0	52.0	528.6	11.3
Life (h)(1)	2 000	1 760	2 000	2 000	3 500	500
Depreciation(2)	181	311	65	23	136	20
Interest 10%	37	54	13	5	42	1
Repairs and maintenance	161(4)	225(3)	47(3)	17	91(6)	-
Total implement cost(7)	380	590	120	45	270	21
Tractor cost:						
115 kW	1 770	1 770				
60 kW			1 770	1 770	1 770	-
Total cost	2 150	2 360	1 890	1 815	2 040	21

Notes:
(1) Average UK and USA life less 30% for combine drill, 20% for other items.
(2) Allowing for 10% salvage value.
(3) At 65% of capital cost.
(4) At 80% of capital cost.
(5) At 60% of capital cost.
(6) Item to be replaced only.
(7) Rounded to nearest SoSh 10.

Source: Consultant's estimates from Homboy Study.

TABLE B5.23

Livestock Prices (SoSh/Head) Constant 1987 Prices

	Export parity to	1986 Camels Gulf	1986 Shoats Gulf	1986 Cattle Suez	Projected Camels Gulf	Projected Shoats Gulf	Projected Cattle Suez
Live animal CIF	US$	540	54	380	700	69	500
Insurance/sea freight	-	140	13	90	140	13	90
Government commission	-	10	1	5	10	1	5
Mogadishu FOB	=	390	40	285	550	55	405
Equivalent to:							
At trader rates	119	46 508	4 770	33 986	-	-	-
At shadow rates	135	52 650	5 400	38 475	74 250	7 425	54 675
Taxes and duties (at 4% of FOB)	-	(1 860)	(191)	(1 359)	(2 970)	(297)	(2 187)
Exporting costs	-	365	36	300	365	36	300
Marketing costs and margin (6% of FOB)	-	2 790	286	2 039	4 455	446	3 281
Mogadishu wholesale							
Economic	=	49 495	5 078	36 136	69 430	6 943	51 095
Financial	=	41 493	4 257	30 288	66 460	6 646	48 907
Trekking costs	-	200	20	180	200	20	180
Veterinary costs	-	90	12	55	90	12	55
Marketing margin	-	5 661	580	4 130	7 954	795	5 851
(at 13% of farmgate value)		(4 501)	(462)	(3 283)	(7 229)	(723)	(5 317)
Market taxes (at 6% of farmgate value)	-	(2 077)	(213)	(1 515)	(3 336)	(334)	(2 454)
Farmgate value:							
Economic	=	43 544	4 465	31 770	61 186	6 119	45 008
Financial	=	34 624	3 550	25 255	55 605	5 561	40 901
Current producer prices		14 - 31 000	13 - 4 000	12 - 30 000			

Exporting costs include the animal feed costs while in transport, port and handling charges and municipal fees for use of water and staging facilities. The marketing costs and margins allow for mortality and weight losses in transit and the exporters other costs and local margin at a total of 6% of FOB value. Trekking costs include herders, feed and water charges, based on recent survey costings and consignment of 1 000 shoats, 200 cattle or 100 camels. Veterinary costs include immunisations and treatment now required by importing countries plus the costs of certifications, inspection and movements fee imposed by the veterinary authorisation for export quality stock. Local taxes are levied at 5% but also include other charges for self-help schemes. The marketing margins allow 10% for the traders and agents involved plus a 3% allowance for auctioner's and trader's chargers.

B5.14 Animal Traction

The current proposals from the animal traction research project at Bonka see all equipment eventually being made locally at the Mogadishu foundry. Final production-scale costs are difficult to derive, as only experimental scale units have been costed to date. Costs for equipment also depend significantly on the design and degree of sophistication. The Consultant proposes that the simplest designs be tested. The costs estimated for project analysis are based on imported equipment at current prices CIF Mogadishu with a similar allowance made for delivery to the project, as derived in Sections B5.4 to B5.6. Discussions with the foundry indicate that they would expect to produce equipment at ex-works prices at least comparable to CIF costs Mogadishu.

Table B5.24 derives the costs assumed for the analysis. This assumes that the future cost of oxen equates to the farmgate parity prices, as given in Table B5.24, with donkeys worth 40% of that value. Animals are assumed to work for 500 hours per year and will require supplementary feeding for 200 days a year at a cost of SoSh 85 per day for oxen and SoSh 60 per day for donkeys, based on the rations given in Annex 5. This is included under the maintenance item. To this is added a veterinary cost of SoSh 215 per year based on the recommendations given in Annex 5. To derive a total cost including operators SoSh 350 per day has to be allowed for operators working 7 hours per day; i.e. an additional SoSh 50 per hour.

TABLE B5.24

Animal Traction Costs

	Donkey	Oxen	Drill	Hoe	Yoke and harness
CIF Mogadishu US$	-		200	100	50
Equivalent to:					
- at official rate SoSh			18 000	9 000	4 500
- at shadow rate	not imported bought locally		27 000	13 500	6 750
Handling and delivery charge					
- economic			3 960	3 460	3 250
- financial			3 690	3 320	3 190
Project cost					
- economic	18 000	45 000	30 960	16 960	10 000
- financial	16 400	41 000	21 290	12 320	7 690
Life (h)	2 500	2 500	2 500	2 500	2 500
Depreciation(1)					
- economic	6.5	16.2	11.1	6.1	3.6
- financial	5.9	14.8	7.8	4.4	2.8
Interest (10%)	0.6	1.5	0.8	0.4	0.3
Repairs and maintenance(2)					
- economic	24.4	32.4	1.9	1.0	0.6
- financial	24.4	32.4	1.3	0.7	0.5
Total cost					
- economic	30.9	48.6	13.0	7.1	4.2
- financial	30.9	48.7	9.9	5.5	3.6
Cost donkey unit (SoSh/h)(3)					
- economic (say)			98.0	92.0	
- financial (say)			94.0	90.0	
Cost oxen unit					
- economic			116.0	110.0	
- financial			112.0	108.0	

Notes: (1) Allows 10% salvage value.
(2) Animal cost includes feed and veterinery costs. Equipment at 15% of capital costs.
(3) Including operator at SoSh 50 per hour.

CHAPTER B6

DEVELOPMENT ISSUES

B6.1 Introduction

The following chapter presents the socio-economic and development rationale for the proposed project. The project objectives are given first, with a description of how these relate to project proposals. This is followed by the planning assumptions and then a review of the main constraints which have been identified.

The finances for the proposed project will be mainly EDF grant funds. The choice of this particular project area stems from ideas developed by the MOA and submitted as a request to the CEC. Although the Lower Shabeelle Region already receives more donor funds and development resources than other areas of the country, the proposed project area has not been the subject of previous research or development inputs. On the right bank of the Shabeelle, opposite the proposed project area, GTZ is implementing a smallholder assistance programme for irrigation and agricultural development. The project proposed in this study should complement the GTZ inputs, as the beneficiaries of both projects often live in the same villages and share the benefit of project works that are not area-specific.

The project area was originally expected to be about 30 000 ha. Allowing for the removal of the Mogadishu Fuelwood Project, but taking into account the additional area of the flood relief channel around Jilaal Moogi on the north eastern boundary of the project, the total area is now estimated at 22 135 ha. The total gross area which is within the current irrigation zone is 9 460 ha, the rainfed zone is 8 030 ha and the area for swamp development is 4 645 ha.

Originally the area was believed to rely mainly on rainfed agriculture, this understanding has changed to account, first, for the role livestock plays, and also the wider access which people have to irrigated land as tenants and home cultivators. While most villagers have a rainfed plot, most also strive to gain access to irrigated plots. This includes villagers currently residing on, or near to, the sand dunes on the south-eastern boundary of the project area.

The local farming systems have significantly changed in recent years, adopting both a commercial and mechanised approach. Thus, the suggestion in the proposal that traditional cultivation practices are employed is only partly correct. Also, sorghum is no longer grown in the project area.

The project area exhibits a particularly heterogeneous socio-economic structure due to cultural influences, economic strategies and a range of agricultural and livestock systems. These systems are interlocked and inter-dependent, most particularly via the mechanisms of the labour market and the subsistence and commercial economies. The economy is dynamic under the pressure of rapid changes. These aspects have been discussed in Section A.

The uncertainties of climate, river flows, ecological conditions, economic circumstances and security of tenure engenders a high degree of risk aversion in decision-making. Nevertheless, recent pressures on the system have brought forth significant innovation, adaptation and change.

A long history of irrigation development dating back to at least the 1830s has created an indigenous system of local organisation and management that is well adapted to solving the problems of the irrigation systems which they operate. The systems are based on minimising disputes and achieving an equitable distribution of tasks and resources amongst the resource users.

Economic stratification does occur locally and thus development strategy could address the problems particular to the target groups.

The farming systems analysis has identified a multitude of interactions involving social, economic, technical and commercial forces operating both within and outside the family and/or farm environment which would require further study. The limited database identifies the main categories of farming groups in the area. It is amongst these that more detailed studies of farming systems should take place to identify characteristics or constraints that are particular to any one or more target groups. The main groups include:

(a) A small group of absentee landlords and land speculators who often employ farm managers and/or let land to smallholders.

(b) A small group of large farms run by resident landlords or institutions. Their incentives to farm productively are greater than that of others.

(c) A small number of farmers and livestock keepers of pastoral background who have sufficient resources to sustain a regular and commercially managed level of production.

(d) A significant number of medium- and small-scale farmers, agro-pastoralists and pastoralists who, subject to droughts, have the capacity to produce surplusses. They usually manage a range of enterprises for commercial purposes; they diversify and thereby reduce risk.

(e) A significant group of small-scale farmers, agro-pastoralists and pastoralists who produce mostly at subsistence level, except in the years of better rainfall or irrigation conditions. They may also be more restricted to engage in strategies to spread their risks compared with Group (d).

(f) The absolute poor rural families, either without resources, or with little latitude in managing such resources they have.

(g) Groups of commercial operators, civil servants or artisans with a part-time or no direct involvement in farming or livestock keeping but who, nonetheless, invest or service the agricultural sector. Most of this category reside only in the larger villages or towns outside the project boundaries.

Social and cultural influences are important mainly in identifying families solely engaged in farming or labouring. Cultural influences are also reflected in diets and dietary habits.

The field studies have highlighted the multiplicity of canal and water management systems which have evolved. An understanding of this is crucial for project planning purposes.

One major characteristic is that the canals include systematically laid-out networks, where some organised planning and construction of the system is apparent. These are often schemes where Italian settlers had previously developed irrigated concessions which have since been taken over by large landlords. At the other end of the scale there are also hand-built, hand-maintained canals, most probably developed and constructed by eye. Some canals are wide and long, while others are small and short. The field surveys indicate that some 40% of canals are between 1.0 to 5.0 km, about 35% are between 0.5 m to 1.0 m and the remaining 25% are less than 0.5 km long.

A second major difference is that out of the 53 canals only two come under the direct control of the MOA. A few come under institutional control, such as the military farms, but the majority are either short canals under private ownership and management as individual farms, or large canals feeding a wide variety of different farm types: smallholders, medium- and large-scale farms and companies and co-operatives. The field surveys indicate that about 35% fall into the small private scale and some 40% into the larger size with a mixture of users.

The vast majority of the multiple-user canals are run with a high degree of co-operation and organisation between users and under the auspices of elected canal committees. On only two canals were there two competing groups: the large farmers operated independently of the smallholders downstream from them creating difficulties of timely, equitable water supplies.

B6.2 Project Objectives

B6.2.1 General

A summary of the project objectives as given in the Terms of Reference are:

- to increase agricultural production by increasing the area under cultivation, raising yields and introducing improved varieties;
- to settle population by increasing agricultural incomes and by providing improved water supplies;
- to train farmers in more efficient cultivation and animal husbandry techniques;
- to improve living standards through the development of basic health and education facilities.

B6.2.2 Improvements to Agriculture

The Consultants believe that savings in water use brought about by improvements to the delivery and distribution system and by land levelling will allow up to about 16% increase in the area irrigated reliably (see Annexes 4 and 6). The impact of land levelling will be to ensure a more even application of water across the fields and thus raise yields by minimising over- or under-watering. Other yield improvements are expected to result from more timely operations, a greater use of seasonal inputs and by the introduction of animal traction to

speed up weeding. The expanded use of inputs is promoted under existing extension and credit programmes and would be further assisted by an additional Subject Matter Specialist and a Project Coordinator. The existing programmes have already identified the improved package of practices.

B6.2.3 The Settlement Objective

The successful completion of both irrigation and agricultural programmes should guarantee better incomes for those who participate. However, the Consultant's study of the settlement, farming and economic systems indicates that permanently settling the population may not be practicable.

Analysis of the existing agropastoral system suggests that it is well adapted to the local ecological, climatic and economic conditions. To plan for a totally settled life style based on permanent village locations could disrupt a vital flexibility built into the existing system which protects against over-use of local resources and enables the survival capacity of some families. The need for flexibility is imposed by the recurrence of droughts and the integral role which livestock plays in the irrigated and rainfed sectors.

The local system is not based on a nomadic life style but does include shifting settlement. This occurs on the coastal plain (from Marka to Barkawa) and within the project area. It should be stressed that most villages are already relatively permanently located and that the desirability of achieving this for all is not certain, particularly as long as agropastoralism forms a key aspect of survival strategies.

B6.2.4 Improvements to Farmer Services

In an effort not to duplicate existing government services the proposed project will support the existing crop extension efforts. It would also advise that the new staff proposed by the Janaale office for Sagaroole, Km 60, Buufow, Jawhar/Aw Dheegle and Buulo Mude are posted in the near future under the AFMET programme.

The future for technical assistance to stock owners is less certain. Proposals have been made for the training of some local professional stockmen under the Nomadic Animal Health Auxiliary Programme operated under the Central Rangelands Development Programme. It is also proposed to set up a livestock inputs revolving fund and to request the MLFR to second an officer to the project to promote various animal and fodder production improvements (see Annex 5).

B6.2.5 Improvements in Living Standards

The objective of improving living standards has been covered by planning for a number of investments which are not directly productive. This includes the extension of a feeder road network, the refurbishment of the school at Busley-Dawd, assistance to a smallholder land registration system and a major investment in potable water development (see Annex 6). The agricultural programme, by its effect on nutrition standards, should raise local food production capacities, although more detailed work would be required to identify target groups who are now nutritionally disadvantaged.

B6.3 Planning Assumptions

The recommended investment programme has been selected based on a number of assumptions and on local conditions. The major project assumptions derived from the TOR. Discussions with the MOA and CEC are summarised in Section B1.2. Those which have resulted from the field studies are as follows:

(a) Given the importance of the existing multi-purpose use of the project area's resources by crop farmers, livestock keepers, agropastoralists, fishermen, beekeepers, fuel and timber operators and commercial and trading interests, the development strategy has tried to maintain this diversity of interests and economic interactions rather than to favour any one particular sector. Emphasis is however given to maximise benefits to smallholders.

(b) The field studies indicate that the area's farming systems have been modernised, especially mechanised in recent years which has caused constraints for those who are dependent on new technologies. At the same time the basic and long-standing problems of seasonal labour shortages still exist and have become increasingly important in recent years as economic patterns have changed. The Consultants have recommended a planning strategy to address these issues.

(c) The field studies have indicated that a lack of land tenure security is significantly undermining confidence amongst local producers, particularly with regard to their capacity and willingness to invest. The project proposes to assist the MOA to address this constraint as it already proposes to do in an adjoining area under the Shabeelle Water Management Project.

(d) The field studies have shown the project area to have a complex economy, with a wide range of farming systems. The implications of this are that the level of understanding that now exists does not exceed that normally regarded as being of a reconnaissance level. This limits the confidence of some of the detailed project designs and scheduling of recommendations at this stage. In certain key areas further studies and testing are required if a reliable outcome is to be ensured from the investment programme.

(e) The market prospects for the main crops grown in the area indicate possible future problems for maize (paragraph B4.3.2) but not for sesame (paragraph B4.4). The prospects for perishable crops and those grown for further processing suggest caution of any concerted attempt to promote a major expansion, even though crop diversification is a desirable objective.

B6.4 Constraints to Development

B6.4.1 Flooding

The hydrological analysis and operating recommendations based on it should generally alleviate and, in all but exceptional years, prevent flooding along the lower reaches of the Shabeelle. Thus, there would appear to be no need for additional flood relief (as opposed to relatively minor flood protection) works within the project area.

The situation at Jilaal Moogi has important economic implications other than flood relief. However, villagers still report problems of flooding from breaches in the river banks and the existing flood bund and from breaches in their canals. Provisions have been made to assist the MOA in strengthening and maintaining the flood bund.

B6.4.2 Irrigation Development

The rapid expansion in irrigated farming and the growing population make increasing the efficiency of water use an important issue. The present flood irrigation system is particularly wasteful. Any means of improving water use efficiency in either the abstraction or distribution systems will create potential for further development, either of new land or more reliable and adequate water applications to existing areas.

The solutions to this problem are to improve or install control structures for abstraction from the river. The benefits of these should be clearly discernible and would not involve any basic changes to the existing system of farming or canal operations and management. Further, the canals would have to be resectioned to make them hydraulically more efficient and control structures installed to enable the management of water distribution to be easier, more responsive and less wasteful. A further possible improvement for the distribution system may be the installing of field turnout structures. However, while the design and expected benefits of the head regulators and well-designed regulated canals is obvious, the exact design of or indeed the need for, turnout structures best suited to operating conditions of the project area has to be determined. Therefore they would, initially, be installed only on three canals and their effect monitored. The work would only continue after all parties, including the farmer irrigators, were satisfied of their benefits.

The key to improving field efficiencies of irrigation water is land levelling. The project would prepare integrated land levelling plans, including detailed cut-and-fill calculations and mapping, but would confine its direct involvement in the operation to a demonstration programme. A revolving credit fund, repayable on appropriate terms, would be set up to finance the operation, under the technical guidance of the project authorities.

B6.4.3 Crop Production

The field surveys identified a number of different farming systems. The major distinctions are between rainfed and irrigated areas, farm sizes and the degree to which integrated agropastoralism is practised. Other major distinctions result from the degree to which mechanised farming is practised.

Land preparation procedures and achieving a good seedbed are limiting factors. The most pressing constraint, overshadowing most others, is the long-standing shortage of labour during the main periods of gu season weeding. Peak demands create significant short-term labour shortages and raise the price of labour to levels that may even make planting some areas uneconomic. The action recommended is to direct project funds into alternative methods of weed control, including different land preparation techniques, animal traction and chemical means. It will be the responsibility of the proposed baseline survey to clarify this issue further and for the proposed agricultural adviser and project coordinator to respond accordingly. The farm financial analysis presented in Chapter B7 throws some light on these issues.

Given the inherent natural risk and uncertainty in the farming systems due to variable rainfall and river flows, farmers are understandably cautious when investing capital. This is reflected in the use of improved seed, fertiliser and chemicals. However, the field surveys indicate that farmers do recognise where they can rationally increase their returns, with many using pesticides but fewer using fertilisers or purchased seeds (Annex 8). The priorities which farmers place on methods of raising productivity differ according to economic and social situations and the farming enterprises being managed. The growth in the use of modern seasonal inputs and use of formal credit programmes in the area is encouraging. It is proposed that these facilities be further promoted. To assist ready access to inputs, a series of multi-purpose village stores is recommended.

B6.4.4 Livestock Production

The role of livestock in the riverine farming and economic systems is a much neglected and poorly researched topic: the problems inherent in the agropastoral system, which has evolved over many hundreds of years, are only just being brought to the attention of planners and decision-makers. The main constraint for livestock is a lack of a suitable conceptual approach and an understanding of how to develop appropriate intervention strategies.

The field studies indicate that the nature of the stock grazing and water systems demand a transhumant system of range and herd management if the present intensity of livestock use in the area is to be maintained.

The desire to settle pastoral people should clearly distinguish between those who are nomadic or transhumants in a family and social sense, and those who employ herders and stock movement patterns similar to that found on any extensive range management system, even on fenced ranches.

The greatest threat to livestock production comes from trypanosomiasis, other diseases and overstocking. More widespread settled farming has led to significant bush clearing over recent decades. This in itself has reduced the problem of tsetse. However, at the same time selective over-grazing of pasture and browse has caused bush encroachment in some other areas, creating a more favourable habitat for the flies.

Local stock owners have a range of management strategies which they employ to minimise their losses. The most significant are zero-grazing, transhumance and the widespread use of the modern veterinary drugs, now widely available through the black market. These drugs are frequently used without adequate training or supervision. The training of local herders, creating mechanisms to coordinate the reporting of disease and the boosting of the local capacity to provide an improved animal health service, is described in Annex 5. This selects a strategy to make the most effective use of limited government staff. The day-to-day veterinary skills are considered to be with the herders and the project proposes formalising their access to non-prescriptive drugs linked with training in their use. The use of prescriptive drugs should remain confined to trained veterinary staff. A series of collecting and handling pens are proposed in strategic locations linked to the proposed village stores. Local associations of traders should be involved to help coordinate the programme and thus minimise the extent of black market operations.

The livestock economy overlays the grain-based economy of the crop production areas. There is a well developed and commercialised dairy industry based on a multitude of small traders and producers supplying the urban dairy markets.

Alongside this, surplus male stock are brought on for the meat markets and for the live animal exports. In general the production and marketing systems seem to operate effectively.

A thriving economy is based on goats. They are the most widely marketed smallstock, which allows stock keepers to ease cash flow problems. Investments in providing stock water would benefit livestock owners most in the area; small-scale trials into the production and fodder systems would be tested.

B6.4.5 Commercial Development

The area is fully integrated into extensive commercial and monetary networks. This is evident from the disappearance of reciprocal labour groups and the decline in barter and exchange mechanisms. Furthermore, the labour market is based solely on wage payments, even in the hiring of herders.

The liberalisation of the marketing arrangements over the last 5 years has allowed some commercial activity to thrive. The flow of consumer goods and commodity trade has also flourished and is influencing the villages in the project area. This is particularly assisted by the project area's strategic location on the main road to Mogadishu and its proximity to Janaale, Shalambood and Marka. The proximity of the banana plantations on the Janaale irrigation system and the commercial and economic spin-offs this sector creates also affects the villages. This is further stimulated now that a period of revival in banana production is being witnessed.

Nevertheless, even though commercial development has made some major progress in recent years, there are some basic constraints which are likely to block or inhibit progress. The main problems relate to the lack of basic financial services and facilities. There is only one bank, in Marka. Until banking facilities are expanded and access to them increased, commercial development will remain restricted to the activities of traders and the transport sectors. Allied to this is the lack of other modern services like insurance, investment opportunities and commercial management services that can assist in either agricultural production, the agricultural services sector or the rural industries sector. Establishing indigenous capacities will allow the local economy to integrate itself more quickly and effectively into the wider international, financial and trade networks. The small commercial training proposals and coordination recommendations are geared to address these problems.

Local traders and institutional sources are increasing their capacity to provide agricultural inputs. However, marketing management and supply links are still limited and are not organised to meet the strict requirements of timing and bugeting that face farmers. In particular, there is a lack of confidence amongst smallholders and an inability to produce collateral security for raising credit. This is caused by cumbersome land registration procedures and possibly outdated land legislation. The majority of smallholders have not, and cannot adequately gain title to land they cultivate. Thus, they cannot easily gain access to the institutional credit schemes set up primarily for their benefit.

B6.4.6 Social Services

The prevalence of diseases like malaria and bilharzia in the project area is of concern for agricultural development in that they exacerbate labour problems. Furthermore there are known to be basic problems of malnutrition and nutritional deficiencies amongst certain groups of villagers. The regional health programme

is starting an intensive village-based programme of primary health care and referral that the project can do little to assist in at this stage. The primary objective should be one of trying to ensure that basic food production is better guaranteed amongst the poorest groups and amongst those who do not have access to irrigation.

The provision of basic education services to the rural population is declining after a decade of relative success. This is partly due to a declining capacity of government to guarantee post-educational employment and the lack of any vocational content to the educational syllabuses. Within the area education is limited to the traditional religious schools that are widespread and to one primary school at Busley-Dawd. Renovating this school with project funds and considering any future self-help demand is recommended for inclusion in the project strategy.

B6.4.7 Infrastructure

The main infrastructure constraint is the lack of drinking water wells. At present wells are mostly found in the river bed, on the river bank and in some areas on the sand dunes. Therefore, women have to walk long distances to get water. The implications of this are further to exacerbate the labour problem. The Consultant has identified a programme for developing alternative sources of water from either deep wells (at about 60 m depth) or from shallow wells. The possibilities of trucking and storage systems were discarded as impractical. Rainwater harvesting and storage systems were not examined but these may also help prevent people from using canal water in the rainy season; the canal systems being probably a mechanism by which water-borne diseases are spread.

The lack of roads does not appear to have been a major constraint on development to date. The main season for selling produce is the jilaal, when the existing network of unsurfaced roads and trace lines provide adequate access for vehicular transport. The majority of people still carry small quantities of produce by foot, cart or on pack animals. A further network of feeder roads has been identified and recommendations made on the priorities from the viewpoint of construction and maintenance needs. Details are in Annex 6.

CHAPTER B7

FINANCIAL ANALYSIS

B7.1 Introduction

This chapter provides a detailed appraisal of crop budgets, farm and family incomes and expected repayment capacities based on the input-output relationships given in Annex 4. The farm models have been based on 1-ha units. This allows for an easy translation into larger farms. The ratio of project families to cultivated land based on the available data indicates that a 1-ha farm is about the average. The detailed survey taken of the Barwaaqo canal confirms this and also that, when the large farms are excluded, a large proportion of families may cultivate only about 0.5 ha in any one canal area. It would appear from the field surveys that, in an attempt to reduce risks, some families had more than one plot but in different canal commands. Since the effects of land tenure, farm size and management systems have a marked influence on productivity, and the demands for capital and labour, comparisons in the analysis are also made between a 1-ha and a 10-ha farm size.

B7.2 Land Utilisation and Analytical Areas

The main database for deriving analytical areas is the aerial photography taken in March 1983. Detailed figures are presented in Annex 1. Caution in the use of these figures has been recommended, both because of the time of the year when the photographs were taken (the dry season) and because of the economic context of that time. The gross land areas which appear to have been in current production in 1983 were about 50% of the irrigable land and only 7% of the rainfed areas.

The field surveys were able to provide some clarification of low land utilisation. In the irrigated areas land was not in current production for the following reasons:

(i) Disputes on rights to land and use of canal and water allocation procedures were identified on the Minnow and Dhere canals which had left many farmers without access to irrigation water. On the Dhere canal smallholders have since built an alternative canal to supply irrigation water but this has resulted in about 160 ha of land being now out of command.

(ii) The economic context in 1982 (the cropping year to which the aerial photographs relate) corresponds to the time when the ADC monopoly of crop marketing was being removed. The rapid increases in free market prices had not yet taken full effect and thus some land may have been left fallow because of lack of market incentives.The Consultant's field surveys indicated that much land lying fallow in 1982/83 is now being cultivated.

(iii) There are some logistical problems which deny farmers to produce effectively. These include shortages of tractors for land preparation and delays in their arrival. Also some land is

deliberately left fallow in one season if either extra grazing land is desired or if a gu season crop clashes with a preferred haagai or der season crop.

(iv) Various economic problems cause land to be fallowed, including lack of capital to finance cropping, a lack of labour or cash to hire labour, the need for a family to move off the farm to earn wages to meet current family needs and a decision to forego production if a farmer judges the risks of water or crop failure to be too high to warrant an initial investment in cropping.

(v) There are various social reasons which lead to fallowing: sickness, disabilities and family reasons requiring a family or family members to leave their village at crucial times in the cropping season.

Many of these reasons apply to fallowing in the rainfed sector as well. In addition the nature of land use here is slightly different. Some families are utilising rainfed land on a more temporary basis while they remain with their stock on the nearby coastal plains. In a drought some of these families will move down the coast and take up residence and cultivation at a new site. For the local Bimaal the zone of movement occurs between the project area and as far as Baraawe, some 180 km to the south-west. While local residence may extend for a number of years the net effect, in the long term, is to create a semi-shifting cultivation system which includes fallowing as part of the land use. With land registration now becoming extensive in the rainfed areas this system may well be under threat.

The risks of drought and crop failure also lead to significant amounts of fallowing as part of the rainfed farming system. Thus, for both these reasons some areas of fallow should be considered as an integral part of current production, as opposed to land unavoidably lying unutilised. An adjustment for this has been made in the calculations.

The problem of poor land utilisation is not particular to this project area, as is indicated in Table B7.1 (on page B7-6) which gives land utilisation figures for other parts of Somalia as well as the project area.

The calculations to derive the net areas within the overall project boundaries are given in Table B7.2. Furthermore, the proposed project investment will not affect the whole project area, in either the irrigated or rainfed sectors. In the irrigation area, the project is designed primarily to assist smallholders. Given the limited implementation capacity and only a 5-year programme tackling mainly the rehabilitation of the irrigation and livestock sectors, the project impact is not expected to reach all the rainfed farms. The areas assumed to be affected for the purposes of the economic analysis are given in Table B7.3.

TABLE B7.2

Production Areas Assumed - 1983 Database
(rounded to nearest 50 ha)

A. Irrigated Zone

Total area			9 460
Less	-	villages	55
	-	not suitable	295
	-	assumed out of command area, including tracks, field bunds, canals, etc. at 6%	600

Net Irrigable Area, say = 8 500

Assumed area for actual production annually within farming system.

Gross cultivated area		4 450
-	less tracks, field bunds etc. at 6%	280
-	plus allowance for seasonal fallow at 10% of total net fallow	350

Present Net Irrigated Area, say = 4 500

Areas still to be developed:

-	Uncultivated area	845
-	Dense bush	60
Gross area		905
-	less tracks, field bunds, canals etc. at 6%	55

Net Areas Still to be Developed, say = 850

Area lying in fallow net of seasonal fallow or receiving irrigation irregularly		3 385
-	less tracks, field bunds, canals, etc.	215

Net Areas to be Redeveloped, say = 3 150

Grazing area	4 900
Crop residue area	4 500

TABLE B7.2 (cont.)

B. Rainfed Zone

Total area excluding woodlot			8 030
Less	-	villages, main road	210
	-	not suitable	1 955
	-	tracks, live fencing, etc. at 3%	175

Net Rainfed Area, say = 5 700

Assumed area for actual production within farming system.

Gross cultivated area			425
Less	-	tracks, live fencing, etc. at 3%	15
Plus	-	allowance for shifting cultivation/ fallow systems both seasonally/ annually at 30% of fallow (net)	1 150

Present Net Rainfed Production Area, say = 1 550

Areas still to be developed

-	Uncultivated area	1 260
-	Dense bush	235
Gross area		1 495
Less	- tracks, live fencing, etc. at 3%	

Net Area Still to be Developed, say = 1 450

Areas lying fallow net of seasonal fallow			2 765
Less	-	tracks, live fencing, etc. at 3%	80

Net Area to be Redeveloped = 2 700

Grazing area	7 165
Crop residue - present	1 550
Total grazing	13 850
Total crop residue	6 050

TABLE B7.3

Project Area Analysis Calculations (ha)

	Area within irrigation zone	8 500
	Currently cultivated	4 500
	Reliably irrigated - present	4 000
A.	Area improved by regulator/canal remodelling	3 000
	Additional area due to resultant water saving	300
		3 300
	At 180% CI, annual crop area	5 940
B.	Area improved by better turnouts	1 600
	Additional area due to resultant water saving	240
		1 840
	At 180% CI, annual crop area	3 312
C.	Area improved by levelling	600
	Additional area due to resultant water saving	120
	At 180% CI, annual crop area	1 296
D.	Total area redeveloped by water saving	660
E.	Area improved by animal traction and land levelling in rainfed zone	660

TABLE B7.1

Land Utilisation Statistics

Year	Item	Percentage of total area cultivated
1984(1)	State farms	3
1984(1)	Registered cooperatives	10
1984(1)	Registered companies	3
1984(1)	Registered smallholders	8
1984(1)	Unregistered smallholders	76
1984(2)	Marka District	53
1984(2)	Qoryooley District	49
1982(3)	DSM-Busley-irrigated	49
1982(3)	DSM-Busley-rainfed	7
1986(3)	DSM-Busley-irrigated	69
1983(1)	Controlled irrigation - Shabeelle	41
1983(1)	Controlled irrigation - Juba	9
1983(1)	Controlled irrigation - north-west	25
1983(1)	Rainfed areas	7

Notes: (1) Data for the whole of Somalia with farm type as a percentage of the total land registered; irrigation and rainfed figures as a percentage of potentially available. Taken from MV Boguslawski-Agriculture in the Winds of Change.

(2) Data from FEA area surveys with tilled area shown as a percentage of total land under cultivation. Taken from Boateng et al., Farming Systems in the Lower Shabeelle Region.

(3) Consultants API from March 1983 photographs and 1987 rapid survey of 1986 cropping.

B7.3 Main Assumptions and Approach

For the financial analysis five different situations were formulated to illuminate the financial problems or viability of different situations. These include:

- the Present Situation (P)
- the Future Without Project (FW0)
- the Future With Project - Level 1 (FW1)
- the Future With Project - Level 2 (FW2)
- the Future With Project - Level 3 (FW3)

The relative differences in input-output relations in each situation can be seen in the tables in Appendix C. In general these situations distinguish between the different levels of adoption of development inputs. However, in practice the proposed and on-going improvements will be variously synchronised and integrated and will include the impact of both project and non-project investments. The main items involved include the effects of:

- the existing extension and credit programme;
- the proposed additional extension resources under the project;
- the head regulators and canal remodelling;
- the farm turnouts programme;
- the introduction of animal traction;
- the increased use of inputs; and
- the effect of land levelling.

The individual benefits derived from each input cannot be separated in analysis.

The situation 'FW0' reflects the likely impact of the on-going extension and credit programmes.

The situation 'FW1' includes both non-project and project extension and credit impact. Situation 'FW2' reflects the introduction of animal traction for planting and weeding operations; 'FW3' reflects the additional impact of land levelling. These three levels of input-output relations could also be read to reflect the situation of the poor, average and better farmers or the situation in a poor, average or better year of climatic or irrigation conditions.

There are four sets of circumstances in which crop techniques have been examined. These included irrigated or rainfed conditions using either mechanised or hand cultivation techniques. A number of recent surveys in the Lower Shabeelle region and that of the Consultant in the project area indicate that the majority of farmers now use mechanised land preparation.

The main crops analysed are maize (in both gu and der seasons), sesame and grazing available from fallowed land. To represent the conditions of farmers involved in more diversified cash cropping cotton, tomatoes and water melon have been included under the irrigated mechanised condition.

The crop budgets derive the gross margin per hectare and the returns to labour. Each is calculated at the projected economic and financial prices, derived in Chapter B5 for inputs and outputs. Appendix C gives the calculations. Farm gross margins and labour requirements have been calculated using the cropping pattern, cropping intensity and labour use by operation as discussed in Annex 4. Allowances are made for farm fixed costs and interest charges on working capital in order to calculate a net farm income.

The yields projected for the various situations exclude provision for either storage losses or the impact of drought and crop failure. Adjustments are made

to net farm income to calculate the final value of farm income which is available for consumption, savings or investment purposes. These figures are derived in detail and the underlying assumptions clarified in Appendix D.

B7.4 Farm Productivity

The calculation of farm income on the various farm models and situations produces a set of productivity criteria which are summarised in Table B7.4. This shows the returns to land, labour and capital based on the levels of disposable income created by each farm situation.

Farmer decision-making reacts to all three resource pressures, to assessments of potential risk from climatic and ecological pressures and consideration of alternative enterprises, such as livestock or off-farm employment. Thus the disaggregation of the separate factors can be misleading. A better insight into the farmer's decision-making process is possible if the various parameters are synchronised into a holistic environment. Bearing in mind this context for using the analytical tools employed, certain important conclusions can be drawn.

The largest relative gains from the developments proposed will be seen in the rainfed mechanised sector, but the irrigated mechanised sector will achieve the greatest value increases. In the rainfed sector greatest value will be achieved in assisting those involved in hand cultivation. In both sectors smallholders are more productive than medium-scale farmers. If the project proposals are adopted, this position will change in the irrigated, but not in the rainfed, sector.

With the major problems affecting the labour markets it is probable that farmers will appraise carefully the returns to labour. As farm sizes increase or the families become more involved in agropastoralism the returns to labour fall, unless an adequate foothold in livestock production can be maintained. Throughout, the returns to labour from irrigated farming greatly exceed those from rainfed farming, even if all the proposed project works are implemented. This situation will maintain a steady demand for irrigated land.

The vast majority of farmers have to have capital to finance cropping activities. This is either for the monetarised wage market or to purchase inputs. To increase levels of gross output in the future, or to increase the area cultivated, will require even greater financial resources. With the inherent risks of failure in either rain, irrigation, mechanisation or input supplies, farmers indicated their caution in investing capital which might be lost. The figures in Table B7.4 indicate why capital investment can be risky. To farm more than just a smallholding or to improve a rainfed hand cultivated holding would involve accepting a much lower return on capital than on an irrigated holding. To adopt improvements like animal traction would also reduce the returns to capital invested, even if in good years returns to land would be improved.

For mechanised farmers and those on larger holdings the levels of capital investment are already well established. Project improvements would help improve the return to capital. However, it would also raise the capital stakes significantly, as a study of rising variable costs in Appendix D shows. The risks of major capital loss would thus increase in the face of recurring drought or deficiencies in river flows.

TABLE B7.4

Comparisons of Financial Productivity (based on the levels of disposable income)

Model	Farm size (ha)	P	FW0	FW1	FW2	FW3
		Returns to land (SoSh/ha) situation				
Irrigated Mechanised						
Agropastoralist	1	20.0	29.9	52.5	69.8	84.5
Medium-scale farmer	10	16.8	25.1	48.1	64.3	79.2
Irrigated Hand Cultivation						
Tenant labourer	1	22.3	28.3	50.2	62.1	na
Agropastoralist	1	22.3	28.1	49.0	61.4	na
Rainfed Mechanised						
Agropastoralist	1	3.9	7.3	20.9	24.2	36.2
Medium-scale farmer	10	2.3	4.7	15.1	21.0	32.8
Rainfed Hand Cultivation						
Agropastoralist	1	13.1	16.2	23.2	29.9	na
Medium-scale farmer	10	8.6	10.7	18.5	24.0	na
		Returns to labour (SoSh/man-day)				
Irrigated Mechanised						
Agropastoralist	1	247	329	427	629	754
Medium-scale farmer	10	207	276	391	580	707
Irrigated Hand Cultivation						
Tenant labourer	1	221	263	356	515	na
Agropastoralist	1	221	261	347	509	na
Rainfed Mechanised						
Agropastoralist	1	56	95	214	299	442
Medium-scale farmer	10	33	61	154	259	400
Rainfed Hand Cultivation						
Agropastoralist	1	148	169	193	288	na
Medium-scale farmer	10	97	112	154	231	na
		Returns to capital (SoSh '000/SoSh of working capital)				
Irrigated Mechanised						
Agropastoralist	1	1.7	2.5	2.9	2.6	4.0
Medium-scale farmer	10	1.1	1.5	2.1	2.0	3.0
Irrigated Hand Cultivation						
Tenant labourer	1	13.4	15.4	16.6	4.3	na
Agropastoralist	1	11.8	7.7	4.0	3.2	na
Rainfed Mechanised						
Agropastoralist	1	0.3	0.6	1.7	1.1	2.2
Medium-scale farmer	10	0.2	0.3	0.8	0.8	1.6
Rainfed Hand Cultivation						
Agropastoralist	1	8.2	8.2	3.1	2.0	na
Medium-scale farmer	10	1.4	1.4	1.5	1.2	na

B7.5 The Impact of Animal Traction and the Project on Labour Markets

The data generated by the input-output assumptions, the farm models created and the price projections allow some partial budgeting of the impact of introducing animal traction. For a large number of farmers, animal traction is seen as complementary to mechanised land preparation. The main rationale for animal traction is to speed up weeding and enable it to be carried out at the time when benefits of weed control are greatest. The relevant comparisons are thus of hand weeding versus animal or chemical means. These options are not mutually exclusive. As long as animal traction can reduce labour needs, pay for itself and not increase risks, its introduction would be justified. Reliable answers will only come from field testing and monitoring.

The calculations made here start from a prior assumption made in Annex 4 that labour will be saved and output raised as a result of better weed control.

The main variables from the calculations in Appendix D are presented in Table B7.5. This shows the levels of labour savings made from four different farming situations and the extra gross output achieved. Against this, the extra costs incurred have to be taken into account. Contained in this are some other extra inputs which have been used in the move from the future "with project" situation level 1 to level 2.

TABLE 7.5

Impact of Animal Traction

	Model and farm size			
	Irrigated mechanised (10 ha)	Irrigated hand (1 ha)	Rainfed mechanised (10 ha)	Rainfed hand (1 ha)
Benefits Produced				
Labour saved (man-days)	120	21	168	16
Hired labour saved (SoSh)	16 200	4 000	22 680	3 200
Extra output (SoSh)	303 430	27 684	180 180	16 249
Total benefit	319 630	31 684	202 860	19 449
Extra Costs				
Animal traction	93 100	9 576	87 780	9 044
Variable cost	5 920	498	2 170	483
Total cost	99 020	10 074	89 950	9 527
Net Benefits				
Labour saving	(76 900)	(5 576)	(65 100)	(5 844)
Total output	220 610	21 610	112 910	9 922
Benefit : Cost Ratio				
Labour saving	(0.2)	(0.4)	(0.3)	(0.4)
Total	3.2	3.2	2.3	2.0

The results indicate that while gross output will rise sufficiently to produce a positive net benefit, and a benefit-cost ratio of around 2 to 3 : 1; the extra cost of adopting animal traction does not balance the saving in hired labour. Therefore, it will be important to ensure that any animal units which are set up are fully and effectively utilised. The operation must ensure that the operators obtain adequate returns while hire charges are kept low. Also, the quality of the work in weeding will have to produce the projected yield benefits.

The most important impact will be the projected savings in labour use. Should animal traction for weeding become widespread, then this could eventually influence the labour market and assist in bringing down peak wage rates. This in turn could induce more farmers to leave less land fallow when this is a response to the fear of not being able to finance or find sufficient labour for weeding.

The labour demand analysis faces two other variables. Future population growth and migration will affect labour supply; and project-generated improvements will extend the area of cultivation and thus increase total labour demands. The uncertainties of the base data on population parameters make projections of a final labour balance unreliable.

Based on the present cultivated area of 3 000 ha irrigated and about 550 ha of rainfed land (in and outside the irrigation zone), the current labour demand would be some 334 000 man-days. In the "with project" situation, labour demands would increase by 152 000 man-days or by 46%. This rate of growth over 10 years would exceed the likely rate of population growth, unless significantly supplemented by immigration or immigrant labour. This situation would suggest that the labour problems will not be alleviated by the project unless some major inroads can be achieved in labour-saving cropping systems. Further policies which would assist would be promoting smallholder strategies on a more widespread basis and reducing the risks in production. This strategy would increasingly apply to the rainfed sector, since access to irrigated land is already difficult and irrigation development is at its limit. Without these policies labour shortages would continue, and, given the existing socio-economic relations in the area, large holdings will continue to remain poorly utilised.

B7.6 Impact on Farm Incomes

The need for field studies and a pilot approach to some of the project components has been stressed elsewhere. The assumptions on which benefits have been calculated are given in Annex 4 and Appendices C and D. Table B7.6 summarises the increases in net farm income which arise from the three levels of input assumptions. To indicate the relative levels of impact, cost-benefit ratios have been calculated based on the increases of extra financial commitments to the farmer. These calculations indicate the value of extension work in the rainfed sector and the desirability of investing in land levelling.

B7.7 Family Payment Capacity

The analysis presented in Appendix D has tried to include the key losses and outgoings which local families really face. Care has also been taken to try and frame the analysis around the various farming, labour and land tenure situations which exist in the project. This particularly relates to including allowances for drought losses and by integrating livestock and labouring options into the final family budget balance. The movement of assets from the crop sector into livestock investments, or the cashing in of livestock assets to finance farm and

TABLE B7.6

Impact of Development on Net Farm Income

	Benefits of project development			
	Additional income	Cost : benefit ratio	Additional income	Cost : benefit ratio
	(1.0 ha)		(10.0 ha)	
Irrigated Mechanised				
FW0 to FW1 (Irrigation development)	27 901	3.2	282 219	3.2
FW1 to FW2 (Animal traction/extension)	21 715	2.3	208 187	2.2
FW2 to FW3 (Land levelling)	16 382	5.1	164 565	5.1
	(Tenant farmer)		(Agropastoralist)	
Irrigated Hand Cultivation				
FW0 to FW1 (Irrigation development)	25 983	3.0	24 993	2.9
FW1 to FW2 (Animal traction/extension)	16 088	1.7	16 688	1.7
	(1.0 ha)		(10.0 ha)	
Rainfed Mechanised				
FW0 to FW1 (Extension)	7 169	4.1	72 304	4.2
FW1 to FW2 (Animal traction/extension)	18 944	2.3	182 463	2.1
FW2 to FW3 (Land levelling)	13 782	4.2	136 270	4.2
	(1.0 ha)		(10.0 ha)	
Rainfed Hand Cultivation				
FW0 to FW1 (Extension)	11 057	6.4	118 684	6.8
FW1 to FW2 (Animal traction/extension)	8 973	1.0	78 390	0.9

family cash flow deficits is a major dynamic input into agropastoralism. It is thus a key variable in understanding farmer priorities, motivation and decision making.

The family income analysis shows that, if a minimum standard of living is to be maintained, then very few, if any, smallholders could be relied upon regularly to have surplus funds to pay the service charges to maintain project works. In years of good rainfall or river flows, this capacity will exist but in the poor or drought years many will produce barely enough for basic food subsistence. These people will also have to forego certain other basic family expenses to live within their income.

The situation portrayed in these budgets gives strong confirmation of the need to direct project resources at the smallholder sector in a strategy to raise their levels of productivity, their access to land and to creating viable farming systems in the irrigated, rainfed and livestock sectors.

By converting the deficits which smallholders make from crop farming into equivalent values of extra land, livestock or wage labouring, the strategic implications become clearer. Smallholders who have irrigated land and have mechanised land preparation would need about 2 ha of land with the extension adoptions contained in the level 1 projection (FW1). Alternatively, this could be provided from an annual surplus offtake of either 3 cattle or 16 shoats.

With the full effects of animal traction and land levelling, the family would just about balance its budget but would still have no surplus for paying service charges. The situation for those still operating with hand cultivation techniques is slightly worse and would require a large surplus capacity from stock rearing.

The analysis indicates that to balance the budgets by relying solely on wage labouring would require an inordinate input at current wage rates and, in the long run, could not sustain the family. It is interesting to note the relative values of wage labouring to livestock assets. Locally, at the peak season wage rate of SoSh 200 per day, it would take 17 and 127 man-days of work to equate to one shoat or one head of cattle. In the United Kingdom the current equivalent ratio is 2 and 17 man-days. This indicates the enormous differences in the value of rural labour, even where local wage rates already constrain production.

For the rainfed sector the need for land currently demands an average farm of about 4 ha. With the full effects of animal traction, extension and land levelling, this requirement could drop to about 2 ha. Alternatively, a capacity for a surplus offtake of 3 head of cattle or between 18 and 22 shoats would be needed.

The analysis of the medium-scale farmer with 10 ha shows that a payment capacity of service charges will exist. However, it is only in the irrigated mechanised sector that a clear surplus arises. In the rainfed sector, the level of capitalisation involved reduces the payment capacity and it would be from hand cultivators that a more reliable payment capacity would result. The results of these calculations are given in Table B7.7.

The implications of this analysis are that a much better database and understanding of the farm management systems is required. Close monitoring of the field trials and pilot schemes should be carried out. Project management must manage and adapt the strategy effectively on the ground during implementation. It will require that the CEC look sympathetically on the use of the EDF grant

TABLE B7.7

Potential Payment Capacity of Various Farm Types at Full Adoption of Development (SoSh '000)

Sector	Model	Farm size (ha)	Situation FW1	FW2	FW3
Net Available Income					
Irrigated	Mechanised	1	0	0	0
		10	311.7	449.9	576.5
Irrigated	Tenant farmer	1	0	0	na
	Agropastoralist	1	0	0	na
Rainfed	Mechanised	1	0	0	0
		10	31.2	81.2	181.7
Rainfed	Hand cultivation	1	0	0	na
		10	59.9	107.1	na
Development Charges Per Hectare					
- Irrigation development			8 709	8 709	8 709
- Land levelling			-	-	3 241
- Project management			188	188	188
- Extension			1 740	1 740	1 740
Net Profit or (Loss) After Charge					
Irrigated	Mechanised	10	205.3	343.5	466.9
Rainfed	Mechanised	10	11.9	61.9	130.0
Rainfed	Hand cultivation	10	40.6	87.8	na

funds to assist smallholders but not to expect that significant contributions to central government revenues will be immediately forthcoming. It also demands that the GOS consider carefully the recurrent cost implications of donor intervention, until the extra operating costs incurred as a result of the project can be fully recouped from all project beneficiaries. It should also be looked at from the viewpoint of the local communities who will also have to bear the future costs of maintaining a much more capital-intensive form of production, infrastructure and social services.

B7.8 Credit and Financial Services

Credit services to villagers are available from a number of informal and formal sources. Informal credit is provided within kinship networks, from friends and neighbours and by traders. Migrant work in Saudi Arabia and the Gulf since the 1970s have provided families with rural credit and investment funds from remittances. For those who are forced to borrow from shopkeepers and traders a system of credit is practised similar to the 'sheil' credit system found in the Sudan. This involves creditors valuing monetary contributions as sacks of farm produce well below the market prices and requesting repayment in farm produce equivalent (at that value) to the cash amount loaned.

Formal credit is available either through schemes financed by development aid or from Somali credit institutions. Two major donor-supported credit schemes are relevant to the project area and to the planning strategy adopted. The first is supported by funds and staff of the United Nations Capital Development Fund (UNCDF). This scheme is operated by the Commercial and Savings Bank (CSB) assisted by AFMET extension agents. In 1986 it was operating in 26 villages with some 1 635 smallholder farmers. Farmers from Dara Salaam, Mubaarak and Aw Dheegle are major participants. To date, this programme has concentrated on credit for seasonal inputs but is now considering assistance for land preparation. The recovery performance is currently running at over 90%.

The second major donor credit programme derives from CEC line of credit and associated technical assistance. Implementation rests with both major local agricultural credit institutions - the Somali Development Bank (SDB) and the CSB. This programme will serve small- and medium- scale farmers, and fishermen. Both seasonal and medium-term credit (1 to 5 years) are to be included, with the normal prevailing interest rates applying, as with the UNCDF programme. Current interest rates are summarised in Appendix D.

Despite the problems facing farmers, the current repayment rates to the on-going local credit programmes administered by the SDB and CSB are high. Seasonal credit repayments stand at around 90% for small-scale farmers and 80% for large-scale farmers. Medium-term credit loan repayments are running at almost 85%.

Two major constraints are being encountered. The first relates to credit operational policies which are inflexible, not well structured for an agro-pastoral situation and require security which is often difficult for potential customers to provide. In an effort to relieve the problem it is proposed that the project assists in a land registraton programme for smallholders. The issue of collateral from the livestock sector is more difficult. A recent review of this in the Central Rangelands recommended that the lending institutions study more closely schemes that could service the credit and insurance potential in the pastoral and agropastoral sector.

The second major constraint concerns the lack of banking and financial services easily available to local villages. The nearest bank is in Marka and has no specialised financial service orientation to assist farmers other than

administering agricultural credit. It is encouraging that a system of mobile rural banking is now being slowly introduced. The first units are about to be set up in Sablaalle and Kurtun Warey district in the Lower Shabeelle Region. These will operate on two days each week. The possibilities of opening up a similar unit in Afgoi district are being discussed. This would serve as far as Mubaraak and Jawhar/Aw Dheegle. The main project area villages in Marka district would not be served. If these units prove popular a strong foundation will be formed from which more modern financial and (potentially) insurance services could start to be offered to these rural communities.

CHAPTER B8

PROJECT COST ANALYSIS

B8.1 Introduction

Details of unit rates and individual component costs and implementation schedules are given in the respective annexes, together with design assumptions. A discussion of project objectives, constraints and strategy is given in Chapter B6. This chapter summarises the overall project costs and analyses the proposed components.

Most of the project costs were derived in United States dollars and converted to Somali shillings at a rate of US$ 1.0 = SoSh 90.0. The main tables derived base costs, which are valued at constant 1987 prices and exclude physical contingencies. These are added subsequently at the rate of 10% of base costs for all elements except technical assistance for which 20% has been applied.

The project costs at constant prices are inflated to current price levels by applying the financial price contingencies as directed by the CEC Delegation and are presented in Section B5.3. The final conversion to European Currency Units (ECU) is at a rate of US$ 1.13 = ECU 1.0 and at the future exchange rates assumed.

Various adjustments are made for the economic analysis, which are discussed in Chapters B5 and B9.

To allow for a well-coordinated start to the implementation programme a pre-investment period has been proposed, in which the following tasks should be performed:

(i) complete a baseline survey;

(ii) carry out any surveys required and have discussions with farmers to ensure that the contractors can work without any hold-ups;

(iii) award the contract to construct project headquarters and staff housing;

(iv) award the supply contracts for project vehicles and equipment;

(v) complete an orderly tendering and issuing of contracts to allow time for contractors to have necessary imports delivered.

The bulk of the capital costs will be incurred within the first 3.5 years of the 5-year period requested by the CEC, although the nature of the forestry component demands continuing expenditure for up to 9 years. Total costs over the 5-year period are estimated to be ECU 9.35 million, of which 59% or ECU 5.9 million will be foreign exchange. This includes ECU 0.79 million estimated cost escalation due to inflation. Tables B8.1 and B8.2 summarise the total project costs and their composition.

TABLE B8.1

Summary of Total Project Costs(1)

	Total costs (Million SoSh)	Total costs (Million ECU)	Foreign exchange (Million SoSh)	Foreign exchange (Million ECU)
Base costs at constant 1987 prices	785.2	7.72	467.1	4.59
Physical contingencies	85.0	0.84	52.5	0.52
Sub-total	870.2	8.56	519.6	5.11
Financial contingencies	(2)	0.79	(2)	0.78
Project cost at current price	(2)	9.35	(2)	5.89

Notes: (1) Since financing will be done entirely by the CEC and the exchange rate is expected to change drastically, it was not considered meaningful to quote cost escalation in SoSh.

(2) Total costs include years 1 to 5 only and are inclusive of costs attributable to the donor, GOS and the project beneficiaries.

* At annually changing rate, aggregated.

** Converted at applicable rate for five years.

Exchange rates assumed:

1987 US$ 1.0 = SoSh 90
US$ 1.13 = ECU 1.0

Expected devaluation of the SoSh vs ECU

SoSh rate to the ECU devaluates as follows:

1988 and 1989	30% per annum
1990 and 1991	20% per annum
1992 and 1993	10% per annum

B8.2 Swamp Development

The proposed works for the development of the Jilaal Moogi swamp are discussed in Annex 7. It is separate from other components but has a significant impact for the local economy and livestock sectors. Table B8.4 summarises the base costs to be incurred. The total base cost would be SoSh 42.7 million or ECU 0.41 million and comprises some 5% of total base costs.

The component proposes to restore the irrigation facilities to about 830 ha of grassland. The proposed canal system will also be linked to three stock watering ponds to be built close to the main trade route on the way to Mogadishu. The total area in the Jilaal Moogi zone to be opened up for re-development as a

TABLE B8.2

Summary of Total Project Cost by Component (SoSh '000 Constant 1987 and Current Prices)

Component	Year 0	1	2	3	4	5	Total	Percent Foreign exchange	Foreign exchange	Year 6	7	8	9	10-30
Swamp development	-	10 456	27 801	1 473	1 473	1 473	42 676	58	24 630	1 473	1 473	1 473	1 473	1 473
Flood control	-	450	450	450	450	450	2 250	50	1 125	-	-	-	-	-
Irrigation development)	-	59 115	102 707	87 280	36 658	22 888	309 648	56	173 451	12 796	12 796	12 796	12 796	12 796
Land development)	-													
Project infrastructure	-	128 622	5 708	5 708	5 708	5 708	151 454	57	86 345	5 708	5 708	5 708	5 708	5 708
Forestry and agriculture development	-	13 224	6 871	4 452	4 532	4 711	32 990	54	17 890	3 135	3 109	2 915	2 765	2 515
Livestock development	-	50 949	2 108	2 108	2 108	2 108	59 381	67	39 851	39 851	2 108	2 108	2 108	2 108
Project management	1 201	39 646	5 146	6 946	5 146	6 946	35 031	18	6 390	5 146	5 146	5 146	5 146	5 146
Technical assistance	8 850	19 950	19 950	11 100	2 250	2 250	64 350	90	57 915	-	-	-	-	-
Vehicles and equipment	7 316	11 265	5 292	6 203	5 292	5 292	40 660	71	28 912	5 292	5 292	5 292	5 292	5 292
Buildings	38 814	1 792	1 792	1 792	1 792	1 792	47 774	64	30 663	1 792	1 792	1 792	1 792	1 792
(Foreign exchange)	(140 352)	(191 540)	(103 762)	(73 209)	(32 221)	(26 061)	-	-	(467 145)	(16 530)	(16 516)	(16 404)	(16 318)	(16 175)
(Percent foreign exchange)	(72)	(63)	(59)	(57)	(49)	(49)	-	-	-					
Total base costs	56 181	305 469	177 025	127 512	65 409	53 618	785 214	59	-	37 450	37 424	37 230	37 080	36 830
Physical contingencies	6 503	32 542	19 697	13 861	6 766	5 587	84 956	62	-	3 745	3 742	3 723	3 708	3 685
(of which FE)	(4 832)	(20 950)	(12 171)	(8 310)	(5 425)	(2 809)	-	-	52 497	(1 653)	(1 652)	(1 640)	(1 632)	(1 617)
Total costs at constant 1987 prices	62 684	338 011	196 722	141 373	72 175	59 205	870 170	60	519 642	41 195	41 166	40 953	40 788	40 515
Financial Equivalent in ECU '000	616	3 524	1 934	1 390	710	582	8 556							
Financial contingencies in ECU '000 (Table B8.5)														
Foreign exchange	22	215	100	173	97	97	704							
Local currency	-7	-92	-31	1	50	88	9							
Sub total	15	123	149	174	147	185	713							
Total project cost at current prices in ECU '000	631	3 647	2 083	1 564	857	767	9 269							

TABLE B8.3

Financial Contingency Calculations

Year	1988	1989	1990	1991	1992	1993	Total SoSh '000	Total ECU '000
Total project costs at 1987 prices, including physical contingency	62 684	338 011	196 722	141 373	72 175	59 205	870 170	
of which (SoSh '000):								
- Foreign exchange costs	45 184	212 490	115 933	81 519	35 646	28 870	519 642	
- Local costs	17 500	125 521	80 789	59 854	36 529	30 335	350 528	
(a) FE Cost Inflation								
Foreign exchange costs at 1987 prices (ECU '000)	444	2 089	1 140	802	351	284	-	5 110
Inflation at 5% per annum (ECU '000)	22	215	180	173	97	97	-	784
Total foreign exchange costs (ECU '000)	466	2 304	1 320	975	448	381	-	5 894
Assumed future SoSh/ECU exchange rates	132.2	171.8	206.8	247.5	272.3	299.5		
Total FE costs at future exchange rates (SoSh '000)	61 605	395 827	272 976	241 312	121 990	114 109	1 207 819	
(b) Local Cost Inflation								
Local costs, adjusted to expected local cost escalation at 25% per annum (SoSh '000)	21 875	196 127	157 791	146 128	111 478	115 719	749 118	
Cost escalation (SoSh '000)	4 375	70 606	77 002	86 274	74 949	85 304	398 590	
Local costs at 1987 prices (ECU '000)	172	1 234	794	589	359	298	-	3 446
Local costs at escalated prices at future exchange rates (ECU '000)	165	1 142	763	590	409	386	-	3 455
Price escalation (ECU '000)	-7	-92	-31	+1	+50	+88	-	+9
(c) Total Project Costs								
Total Project Costs at assumed exchange rates and price escalations, in ECU '000	651	3 446	2 003	1 565	857	767		9 349
of which: cost escalation	15	123	149	174	147	185		793

Notes: (1) For derivation of exchange rates see text.
(2) For expected currency changes see text.

TABLE B8.4

Swamp Development Base Costs (SoSh '000 Constant 1987 Prices)
(US$ 1.0 = SoSh 90)

Capital Cost	Unit	Quantity	Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Total SoSh	% FE	Total FE (in SoSh)	Responsibility Year 1 to 5	Responsibility Year 6+
Canal Works													
- Survey	Sum			631	-	-	-	-	631	50	316	Donor	-
- Bush clearance	ha	11	62.2	684	-	-	-	-	684	55	376		
- Earthworks	m^3	70 000	225	4 266	11 484	-	-	-	15 750	55	8 662		
- Structures	Nr	1	9 000	4 875	4 125	-	-	-	9 000	65	5 850		
Sub-total				10 456	15 609	-	-	-	26 065	58			
(of which FE)				(6 207)	(8 997)	-	-	-	(15 204)	-	15 204		
Water Points (3 Nr)													
- Earthworks	m^3	31 200	225	-	7 020	-	-	-	7 020	55	3 861	Donor	-
- Structures	Nr	3	1 305	-	3 915	-	-	-	3 915	60	2 349		
- Fencing	m	990	0.9	-	891	-	-	-	891	90	802		
Sub-total				-	11 026	-	-	-	11 026	59			
(of which FE)				-	(7 012)	-	-	-	-	-	7 012		
Total Capital Costs				10 456	27 435	-	-	-	37 891	-			
(of which FE)				(6 207)	(16 009)	-	-	-	-	-	22 216		
Operating Costs													
Canal													
- Earthworks	Capital cost		4%	-	171	630	630	630	2 061	60	1 237	Donor	MOA
- Structures	Capital cost		4%	-	195	360	360	360	1 275	30	382		
Sub-total				-	366	990	990	990	3 336	21			
(of which FE)				-	(161)	(406)	(406)	(406)	-	-	1 619		
Water Points													
- Earthworks	Capital cost		4%	-	-	201	201	201	843	60	506		
- Structures	Capital cost		4%	-	-	157	157	157	471	30	141	Donor	MOA
- Fencing	Capital cost		5%	-	-	45	45	45	135	90	121		
Sub-total				-	-	403	403	403	1 449	53			
(of which FE)				-	-	(256)	(256)	(256)	-		768		
Total Operating Costs				-	366	1 473	1 473	1 473	11 785	53			
(of which FE)					(161)	(742)	(742)	(742)			2 307		
TOTAL				10 456	27 801	1 473	1 473	1 473	42 676				
(of which FE)				(6 207)	(16 170)	(742)	(742)	(742)			24 603		

result of flood protection is 1 280 ha (including the grassland area). Current production, measured from the 1983 photography, is estimated to come from around 205 ha. The cost of loss of grassland will only be partially covered by the fodder produced from irrigated crops. It would, however, allow the flood irrigation farms to be reclaimed which had to be abandoned because of uncontrolled floods caused by the present system. Some of the old canal systems date back to the 19th century and thus have long historical claims of land use in the area.

The costs of operating the Jilaal Moogi canal are assumed to become an additional cost to MOA. The annual operating costs, including a gate operator, are estimated to be SoSh 1.52 million or ECU 15 thousand.

B8.3 Irrigation Development

Investments proposed to improve the irrigation potential of the area include rehabilitation on the canal system with the provision of head regulators and distribution structures, the provision of canal maintenance equipment, a survey and mapping programme and a credit fund for land levelling. Table B8.5 summarises the annual base costs for these components. These would be SoSh 311 million or ECU 3.06 million or 40% of base project costs.

The main strategy of this component is based on the provision of water control structures. This, together with a credit programme for larger farmers and land levelling, is expected to improve the efficiency of irrigation, to create water savings and thus expand the area reliably irrigated and to improve crop yields. However, the difficulties of trying to integrate the development programme with existing farming activities with the minimum of disruption suggest an initially cautious approach.

Thus, a short delay in full implementation has been proposed (see also Section B8.1) while various surveys and a pilot scheme for the farm turnout programme are carried out. Other works should not be affected.

While the main contractors will be responsible for supply of equipment and materials it has been considered important to extend the mechanised canal maintenance capacity. Two hydraulic excavators with spares have been budgeted for Years 2 and 3. Since running costs would be recouped from hire charges no financial allowance has been made for operation costs. During the project implementation period these machines would be operated by project management. Eventually they would be passed on to ONAT. The cost of this component will be SoSh 10.8 million or ECU 106 thousand.

Operation and maintenance costs have been estimated using an annual rate of 4% of capital costs for earthworks and structures. Further details are given in Annex 6.

The costs of operating and maintaining the irrigation works are assumed to be absorbed within the on-going arrangements of the existing canal committees. It will be the function of the project management and technical staff to ensure that proposals and procedures pertaining to the commands areas are explained, discussed and worked through with each committee. Without this, the chances of good relations, motivated involvement and direct participation by the beneficiaries may be jeopardised. The rate of implementation proposed assumes that the foundations for implementation have been well laid.

TABLE B8.5

Irrigation Development and Land Levelling Base Costs (SoSh '000 Constant 1987 Price)
(US$ 1.0 = SoSh 90)

	Unit	Quantity	Rate	Year 1	2	3	4	5	Total SoSh	%FE	Total FE (in SoSh)	Responsibility Year 1 to 5	Responsibility Year 6+
Capital Cost													
Surveys												Donor	-
- Survey and mapping	Sum			5 784	-	-	-	-	5 784	80	5 027		
- Survey equipment	Sum			1 505	-	-	-	-	1 505	90	1 355		
					-	-	-	-					
Sub-total				7 289	-		-	-	7 289	83			
(of which FE)				(4 502)					(4 502)		(6 382)		
												Donor	-
Head regulators													
- New works - 0.45 m dia.	Nr	33	729	11 664	12 393	-	-	-	24 057	59	14 182		
- 0.60 m dia.	Nr	4	1 107	2 214	2 214	-	-	-	4 428	58	2 565		
- 0.75 m dia.	Nr	4	1 215	2 430	2 430	-	-	-	4 860	58	2 817		
- Rehabilitation	Nr	6	6 600	3 240	3 240	-	-	-	6 480	85	5 508		
Sub-total	-	-	-	19 548	20 277	-	-		39 825	60			
(of which FE)				(11 060)	(11 474)	-					(22 554)		
												Donor	-
Canal Remodelling													
- Earthworks	km³	1014	869.8	26 419	31 662	30 663	-	-	88 524	55	48 688		
- Hydraulic excavator	Hr	2	5 400	-	5 400	5 400	-	-	10 800	95	10 260		
Sub-total	-	-	-	26 419	37 062	35 863	-	-	99 324	59	-		
(of which FE)				(14 400)	(22 606)	(21 936)	-	-			58 948		
												Donor	-
Control Structures													
- Farm turnouts	Nr	1 065	90	5 670	56 000	56 000	19 800	-	95 670	55	52 619		
- Check structures	Nr	107	90	630	6 030	3 600	1 350	-	9 630	55	5 296		
Sub-total				6 300	40 050	59 600	19 350	-	105 300	55			
(of which FE)				(3 465)	(22 028)	(21 780)	(10 642)	-			57 915		
												Donor	
Land Levelling													
- Survey equipment	Sum			261	-	-	-	-	261	95	248		
- Leveller blades	Nr	5	31.4	26	63	-	-	-	157	95	149		
- Credit fund	ha	950	21.9	650	1 516	2 653	5 206	10 092	20 085	55	11 003		Rev. fund
Sub-total				1 013	1 579	2 653	5 206	10 092	20 423	56			
(of which FE)				(565)	(770)	(1 501)	(2 951)	(5 655)			11 400		
Total Capital Costs				58 569	98 768	78 096	24 656	10 092	230 161	57			
(of which FE)				(33 080)	(56 078)	(45 193)	(13 593)	(5 655)			(105 179)		
Operating Costs													
Head regulators	Capital cost		6%	-	802	1 593	1 593	1 593	5 561	50	1 668	Donor	Govt
Canals	Capital cost		6%	-	1 057	2 589	5 295	11 482	20 423	60	6 709	Govt	Govt
Structures	Capital cost		6%	-	292	1 056	3 958	6 212	11 518	50	3 927	Govt	Govt
Flood protection	Sum			450	450	450	450	450	2 250	50	1 125	Donor	UNDA
Hydraulic excavators	Hr	2	1 350	-	1 350	2 700	2 700	2 700	9 450	60	5 670	Donor	UNDA
Levelling demonstrations	ha	10	25	96	48	98	48	48	288	60	173	Donor	
Total Operating Costs				546	3 999	9 186	12 022	12 796	38 607	48			
(of which FE)				(282)	(2 189)	(4 451)	(5 659)	(5 891)			18 272		
TOTAL				59 115	102 767	87 281	36 678	22 888	268 768	56			
(of which FE)				(33 362)	(58 267)	(49 644)	(19 252)	(11 546)			123 451		

Canal maintenance costs are estimated as follows. The length to be maintained is 88 km; the silt load to be removed is about 350 mm, a cross section of 1.50 m, or about 45 000 m^3. The hire charge for the excavators is, at present prices, SoSh 1 500/h. They excavate about 300 m^3 per day, at a cost of SoSh 50 per m^3. Thus, the annual cost would be about SoSh 2.3 million.

Manual operations would consist of a man plus helper, costing SoSh 350 per day at the opportunity cost of labour at that time of the year. Their daily work output is about 6 to 7 m^3, i.e. the cost per m^3 with both methods is approximately the same. Whether the canal committees elect to hire an excavator or mobilise their members to do the job manually would thus depend on alternative employment opportunities, but would not substantially affect the cost of the operation.

It could be assumed that most canal committees could incorporate the control of the new regulators into their functions. As a result of the programme some stimulation will also be given to employment possibilities. This will be not only from employment with contractors but also for artisans to maintain various items of the project works.

The total costs to the canal users resulting from the project irrigation development are estimated at SoSh 58.9 million during the implementation period. The MOA will continue the flood bund maintenance programme at SoSh 450 000 per annum.

The proposed land levelling programme accords with the desire of MOA not to have it as a contractor item for the whole area. The project has been provided with the capacity to prepare all the necessary topographic mapping, which would be deposited with the MOA and canal committees before project completion. A credit fund is also proposed, to provide finance for interested and financially solvent farmers to have their land levelled. Estimates suggest that the cost benefit ratios from land levelling are very favourable.

B8.4 Infrastructure

The proposed infrastructure programme includes assistance to education (through the refurbishment of Busley Dawd School), the provision of multi-purpose village stores, the development of potable water supplies (both from shallow wells and boreholes) and the extension of a coral feeder road network to the main centres of population and cultivation in the project area. Table B8.6 summarises the costs involved which would be SoSh 151.4 million or ECU 1.49 million or 19% of base project costs.

Operation and maintenance costs for many of these items will devolve on the villagers and local government. For the analysis a rate on capital costs of 1.5% for buildings, 2½% for roads and 10% for water supplies has been calculated. Further details are in Annex 6.

The educational, stores and feeder road programmes will improve the general services to the project beneficiaries. The water supply development programme is of importance, not only for human health but also to release labour resources through better spatial distribution.

TABLE B8.6

Project Infrastructure Base Costs (SoSh '000 Constant 1987 Prices/ US$ 1.0 = SoSh 90)

	Unit	Qty	Rate	Year 1	2	3	4	5	Total	% FE	FE	Responsibility Year 1-5	Year 6+
Capital Cost													
Education assistance	Sum			2 250	-	-	-	-	2 250	90	2 025	Donor	
(of which FE)				(2 025)	-	-	-	-	(2 025)				
Marketing													
- Village stores	Nr	6	3 150	18 900	-	-	-	-	18 900	65	12 285	Donor	-
- Fence/gate	m	420	4.5	1 890	-	-	-	-	1 890	90	1 700	Donor	-
- Other furniture	Sum	-	-	374	-	-	-	-	374	75	280	Donor	-
Sub-total				21 164	-	-	-	-	21 164	67	14 266		
(of which FE)				(14 267)	-	-	-	-	(14 267)				
Feeder roads	km	19.1	3 581	68 400	-	-	-	-	68 400	50	34 200	Donor	-
(of which FE)				(34 200)	-	-	-	-	(34 200)				
Water Development													
- Lifting device 3T	Nr	1	198	198	-	-	-	-	198	95		Donor	
- Mobile drill	Nr	1	2 153	2 153	-	-	-	-	2 153	95			
- Exploration	Nr	3	4 005	12 015	-	-	-	-	12 015	55			
- Shallow wells (SW)	Nr	7	378	2 646	-	-	-	-	2 646	70			
- SW rehabilitation	Nr	3	364.5	1 094	-	-	-	-	1 094	70			
- Boreholes	Nr	7	2 700	18 900	-	-	-	-	18 900	70			
Sub-total				36 008	-	-	-	-	36 808				
(of which FE)				(24 689)	-	-	-	-	(24 689)	(67)			
Total Capital Costs				128 622	-	-	-	-	128 622				
(of which FE)				(75 181)	-	-	-	-	(75 181)	(58)			
Operating Costs													
- Schools	Capital cost		n.a.	-	-	-	-	-	-	30		L. Govt	L. Govt
- Stores	Capital cost		1.5%	-	317	317	317	317	1 268	30		Donor	MOA
- Roads	Capital cost		2.5%	-	1 710	1 710	1 710	1 710	6 840	50		Donor	L. Govt
- Shallow wells and boreholes	Capital cost		10.0%	-	3 681	3 681	3 681	3 681	14 724	50		Donor	L. Govt
Sub-total				-	5 708	5 708	5 708	5 708	22 832	49			
(of which FE)				-	(2 791)	(2 791)	(2 791)	(2 791)	(11 164)				
TOTAL				128 622	5 708	5 708	5 708	5 708	151 454				
(of which FE)				(75 181)	(2 791)	(2 791)	(2 791)	(2 791)	(86 345)	(57)	86 345		

B8.5 Agricultural Development

The main investments for agricultural development include the provision of tillage machinery initially to be operated by the project, hand-operated sprayers, an animal traction programme and the provision of specialist staff and technical assistance. The costs of staff are dealt with in Section B6.6. Major investments are proposed for improving stock watering facilities and veterinary services, some minor programmes for improvements to fodder and genetic resources and for training of professional herders as Nomadic Animal Health Auxiliaries. An inputs revolving fund is also recommended. The base costs are summarised in Tables B8.7 and B8.8.

It is assumed that project management will recoup through hire charges the operating costs of the three tractor units. The costs of maintaining the stock watering facilities will fall on local government and the project beneficiaries. Discussions with the MLFR and the local communities would establish the most suitable methods of operating the river water points and uars, the basis of charges to users and the origin of the staff required to manage and maintain each unit. The costs incurred by them could be covered by watering charges. A similar principle might be considered for the proposed veterinary centres located alongside the multi-purpose village stores. However, the need for controls on the use of prescribed drugs and for coordination of monitoring and reporting of livestock disease outbreaks demands a close involvement of MLFR staff in the operation of these centres.

The proposed forestry component comprises investment into tree and live fencing along stock routes, shelterbelts and village fuelwood plantations. The longer-term establishment period required for this programme means that some capital expenditure will extend through to year 9. Once established, no operation or maintenance costs are envisaged until cutting takes place. Further details are given in Annex 4.

During the 5-year donor-supported period the forestry costs total SoSh 8.8 million or ECU 86.5 thousand or 1% of project base costs. Of this SoSh 1.6 million or 18% comprises bounty payments for farmers who maintain trees through to full establishment. The complete 9-year forestry programme will cost SoSh 10.6 million or ECU 0.1 million at 1987 prices. The total bounty comprises SoSh 3.3 million or ECU 32 thousand being 31% of total base forestry costs.

It is proposed that the project staff would assist in the coordination of the development of the area's commercial capacity. This will require coordination of marketing between farmers and organisations such as ADC (as a residual buyer), Somaltex, Somalfruit and private sector traders and exporters. The staff would also help promote the on-going UNCDF and CEC credit programmes and input distribution system by working with the existing input coordinating committees at the district level. The project staff will oversee the effective setting up of credit schemes, bounty payments and credit/cost recovery during the the implementation phase, before handing over to the relevant institutions or local organisations. Primarily to assist local organisations, it is proposed to allow a budget for both the training of local canal committee and farmer group representatives and to provide funds for promoting the various project proposals as well as privatising tractor hire, animal traction units and input distribution. It is also proposed to assist the MOA in speeding up the smallholder land registration process so that proper collateral can be fixed for smallholder credit involvement. Table B8.7 summarises the base costs which would be SoSh 4.3 million or ECU 42 thousand or 1% of project base costs.

TABLE B8.7

Forestry and Agricultural Development Base Costs (SoSh '000 Constant 1987 Prices)
(US$ 1.0 = SoSh 90)

	Unit	Qty	Rate	Year 1	2	3	4	5	Total	% FE	FE	Responsibility Year 1-5	Year 6+
Capital Cost													
Forestry												Donor	MLFR
- Stock routes	km	96	58.9	1 094	2 512	970	790	288	5 654	20	1 131		
- Shelterbelts	km	70	13.1	20	82	165	275	412	962	20	192		
- Fuelwood	ha	23	30.7	22	48	101	150	263	592	20	119		
Sub-total				1 144	2 642	1 236	1 223	963	7 208	20			
(of which FE)				(229)	(528)	(247)	(245)	(193)	(1 442)		1 442		
Agriculture												Donor	
- Animal traction units	Nr	3	95.6	287	-	-	-	-	287	55	158		
- ONAT tractors/implements	Nr	3	2 299	6 897	-	-	-	-	6 897	95	6 552		
- Sprayers	Nr	12	8.5	102	-	-	-	-	102	95	97		
Sub-total				7 286					7 286	93			
(of which FE)				(6 807)							6 807		
Support Services													
- Land registration	Sum			1 769	530	-	-	-	2 299	50	1 149		
- Training aids	Sum			180	-	180	-	-	360	90	324		
Sub-total				1 949	530	180	-	-	2 659				
(of which FE)				(1 047)	(265)	(162)	-	-	(1 474)	55	1 474		
Total Capital Costs				10 379	3 172	1 416	1 223	963	17 153	57			
(of which FE)				(8 083)	(793)	(409)	(245)	(193)	(9 723)		9 723		
Operating Costs													
Forestry													
- Bounty on shelterbelts	km	70	14.5	-	29	116	289	578	1 012	-	-	Donor	-
- Bounty on fuelwood	ha	23	100.0	-	25	75	175	325	600	-	-	Donor	MLFR
Sub-total					54	191	464	903	1 612	-	-		
Agriculture													
- Animal traction	Nr	3	46.4	139	139	139	139	139	695	20	139	Donor	MOA
- ONAT tractors	Nr	3	792	2 376	2 376	2 376	2 376	2 376	11 880	60	7 128	ONAT	ONAT
- Credit/marketing promotion	Sum			240	240	240	240	240	1 200	75	900	Donor	-
- Commercial training	Sum			90	90	90	90	90	450	-	-	Donor	-
Sub-total				2 845	2 845	2 845	2 845	2 845	14 225	57			
(of which FE)				(1 633)	(1 634)	(1 633)	(1 634)	(1 633)	-		(8 167)		
Total Operating Costs				2 845	2 899	3 036	3 309	3 748	15 837				
TOTAL				13 224	6 071	4 452	4 532	4 711	32 990	54			
(of which FE)				(9 716)	(2 427)	(2 042)	(1 879)	(1 826)	-		17 890		

TABLE B8.8

Livestock Development Base Costs (SoSh '000 Constant 1987 Prices)
(US$ 1.0 = SoSh 90)

	Unit	Qty	Rate	Year 1	2	3	4	5	Total	% FE	FE	Responsibility Year 1 to 5	Responsibility Year 6+
Capital Cost													
												Donor	
Livestock													
- River water points	Nr	6	2 016	12 096	-	-	-	-	12 096	80	9 677		
- Uars	Nr	8	3 762	30 096	-	-	-	-	30 096	60	18 058		
- Veterinary centres	Nr	6	691	4 146	-	-	-	-	4 146	90	3 731		
- Inputs revolving fund	Sum	-	-	3 400	-	-	-	-	3 400	90	3 060		Revolving Fund
- Miscellaneous improvements	Sum	-	-	1 081	-	-	-	-	-	-	973		
Sub-total				50 819	-	-	-	-	50 019	70	35 499		
(of which FE)				(35 499)	-	-	-	-	-	-	-		
Operating Costs													
- River water points	Capital cost		4%	-	484	484	404	404	1 936	55	1 065	Donor Donor	Users Users
- Uars	Capital cost		4%	-	1 204	1 204	1 204	1 204	4 816	55	2 649	Donor Donor	MLFR -
- Veterinary centres	Capital cost		7%	-	290	290	290	290	1 160	55	638		
- Training	Sum			130	130	130	130	130	650	-	-		
Sub-total				130	2 108	2 108	2 108	2 108	8 562	51	-		
(of which FE)				-	(1 000)	(1 000)	(1 000)	(1 000)	-	-	4 352		
TOTAL				50 949	2 108	2 108	2 108	2 108	59 301	67			
(of which FE)				(35 499)	(1 000)	(1 000)	(1 000)	(1 000)	-	-	39 851		

B8.6 Project Administration and Management

The main items comprising this component include the project headquarters, staff housing and services, the project equipment, vehicles and machinery, budgets for surveys, monitoring and evaluation, local staff wages and allowances and the costs of expatriate technical assistance. Summary base costs are given in Tables B8.9 to B8.11. Project management costs would be SoSh 187.8 million or ECU 1.85 million or 24% of project base costs.

The strategy underlying project staffing envisages an intensive management and coordination capacity during the final design and implementation phase. However, once these contracts and development inputs are completed or set up, operating responsibilities will be handed over to local committees and or development/ commercial institutions. In the post-implementation phase it is proposed to leave only a small additional Government staff presence to continue certain key advisory or coordinating roles. It is assumed that Government will take over the project headquarters for a use related either to the development of coordinating centres for water control on the Shabeelle or as an on-site district office for the delivery of government services in the area.

It is also assumed that much responsibility for successful development will derive from the involvement of local canal committees, village committees and farmers' groups and an improvement in their commercial and managerial capacities. To achieve this, some costs for training and promotions have been included but are also assumed to be contributed to from within the costs of the project coordinator and technical assistance.

During the project preparation phase various options for the coordination and management of the donor-supported and post-implementation phase were considered, from which the proposed strategy was finally selected as a means of minimising project management and bureaucratic costs. These included:

(i) To create a long-term government-run project structure in which a high proportion of the responsibilities for the achievement of successful development devolves to project staff drawn from the central ministries.

This option was rejected on the grounds that it would create additional significant recurrent costs and staffing requirements at a time when these can be ill-afforded. This strategy would also create a large and unwieldy project bureaucracy to accommodate the multi-ministerial inputs to this multi-component project. Experience with such an approach has been that participation of local people in the development process is minimal and has led to continued reliance on external donors to maintain the project works and implementation capacity.

(ii) To create a project which would link with the integrated rural development strategy now being given more prominence in government and donor circles. This would have aimed to raise the implementation capacities of local government and their coordinating role at the regional and district level.

This approach would provide one means of achieving local control over the integration of government sectoral inputs and support services. However, there is a shortage of experience and trained staff. This would significantly impinge upon the capacity of the project to be successfully implemented in the expected time.

TABLE B8.9

Project Management and Staff Base Costs (SoSh '000 Constant 1987 Prices)
(US$ 1.0 = SoSh 90)

	Unit	Qty	Rate	Year 0	1	2	3	4	5	Total SoSh	% FE	Total FE (in SoSh)	Responsibility Year 1-5	Year 6+
Capital Cost														
- Baseline survey	Sum			-	4 500	-	-	-	-	4 500	60	2 700	Donor	-
- Project evaluations	Sum			-	-	-	1 800	-	1 800	3 600	90	3 240	Donor	MOA
Sub-total				-	4 500	-	1 800	-	1 800	8 100				
(of which FE)				-	(2 700)	-	(1 620)	-	(1 620)		(73)	5 940		
Operating Costs														
- Monitoring surveys				-	900	900	900	900	900	4 500	10		Donor	MOA
(of which FE)					(90)	(90)	(90)	(90)	(90)			450		
Project staff														
- Project co-ordinator	Nr	1	250	125	250	250	250	250	250	1 375	-	-	MOA	MOA
- Accountant	Nr	1	225	113	225	225	225	225	225	1 238	-	-	MOA	-
- Engineer	Nr	2	225	113	450	450	450	450	450	2 363	-	-	MOA	MOA
- Livestock officer	Nr	1	225	-	225	225	225	225	225	1 125	-	-	MLFR	MLFR
- Subject matter specialist	Nr	1	225	-	225	225	225	225	225	1 125	-	-	MOA	MOA
- Surveyors	Nr	3	145	73	435	435	435	435	435	2 248	-	-	MOA	-
- Animal trainers	Nr	2	145	-	190	190	190	190	190	950	-	-	MOA	MOA
- Forest rangers	Nr	1	123	-	123	123	123	123	123	615	-	-	MLFR	MLFR (3 yr)
- Draughtsman	Nr	1	123	31	123	123	123	123	123	646	-	-	MOA	-
- Storemen	Nr	1	123	31	123	123	123	123	123	646	-	-	MOA	MOA
- Secretary	Nr	1	123	62	123	123	123	123	123	677	-	-	MOA	MOA
- Gate operator (J. Moogi)	Nr	1	86	-	-	43	86	86	86	301	-	-	MOA	MOA
- Pump attendant	Nr	1	86	22	86	86	86	86	86	452	-	-	MOA	MOA
- Drivers	Nr	9	86	215	774	774	774	774	774	4 085	-	-	MOA	MOA (Nr 2)
- Watchman	Nr	2	75	75	150	150	150	150	150	825	-	-	MOA	MOA
- Labourers	Nr	11	62	341	682	682	682	682	682	3 751	-	-	MOA	MOA (Nr 5)
- Messengers	Nr	1	62	-	62	62	62	62	62	310	-	-	MOA	MOA
Sub-total				1 201	4 246	4 246	4 246	4 246	4 246	22 431				
TOTAL				1 201	9 646	5 146	6 946	5 146	6 946	35 031				
(of which FE)				-	(2 790)	(90)	(1 710)	(90)	(1 710)		10	6 390		
Technical assistance														
- Project adviser	Man-month	36	750	4 500	9 000	9 000	4 500	-	-	27 000	90	24 300	Donor	-
- Engineering adviser	Man-month	36	725	4 350	8 700	8 700	4 350	-	-	26 100	90	23 490	Donor	-
- Audit	Man-month	5	750	-	750	750	750	750	750	3 750	90	3 375	Donor	MOA
- Consultancies	Man-month	10	750	-	1 500	1 500	1 500	1 500	1 500	7 500	90	6 750	Donor	-
Sub-total		87	-	8 850	19 950	19 950	11 100	2 250	2 250	64 350				
(of which FE)				(7 965)	(17 955)	(17 955)	(9 990)	(2 025)	(2 025)		90	57 915		
TOTAL				10 051	29 596	25 096	18 046	7 396	9 196	99 381	65			
(of which FE)				(7 965)	(20 745)	(18 045)	(11 700)	(2 115)	(3 735)	(64 305)		64 305		

TABLE B8.10

Project Vehicle and Equipment Base Costs (SoSh '000 Constant 1987 Prices)
(US$ 1.0 = SoSh 90)

	Unit	Qty	Rate	Year 0	1	2	3	4	5	Total	% FE	FE	Responsibility Year 1-5	Year 6+
Capital Cost														
- Minibus	Nr	1	3 422	-	3 422	-	-	-	-	3 422	95	3 251	Donor	MOA
- 4 WD Station Wagon	Nr	5	1 370	5 480	1 370	-	-	-	-	6 850	95	6 508	Donor	
- Water Tanker	Nr	1	270	-	270	-	-	-	-	270	95	257	Donor	
- Motor Cycles	Nr	8	194	-	776	-	776	-	-	1 552	95	1 474	Donor	
- Vehicle Trailer	Nr	2	135	-	135	-	135	-	-	270	95	257	Donor	
- Radio Sets	Nr	2	270	540	-	-	-	-	-	540	95	513	Donor	
Sub-total				6 020	5 973	-	911	-	-	12 904	95			
(of which FE)				(5 719)	(5 675)	-	(865)	-	-	(12 260)		12 260		
Operating Costs														
- Minibus	Nr	1	1 341	-	1 341	1 341	1 341	1 341	1 341	6 705	60	4 023	Donor	
- 4 WD Station Wagon	Nr	5	648	1 296	3 240	3 240	3 240	3 240	3 240	17 496	60	10 498	Donor	
- Water Tanker	Nr	1	54	-	54	54	54	54	54	270	60	162	Donor	
- Motor Cycle	Nr	4	144	-	576	576	576	576	576	2 880	60	1 728	Donor	
- Vehicle Trailer	Nr	1	27	-	27	27	27	27	27	135	60	81	Donor	
- Radio Set	Capital cost		10%	-	54	54	54	54	54	270	60	162	Donor	
Sub-total				1 296	5 292	5 292	5 292	5 292	5 292	27 756	60			
(of which FE)				(778)	(3 175)	(3 176)	(3 175)	(3 176)	(3 175)	(16 654)		16 654		
TOTAL				7 316	11 265	5 292	6 203	5 292	5 292	40 660	71			
(of which FE)				(6 497)	(8 050)	(3 176)	(4 040)	(3 176)	(3 175)	(28 914)		28 914		

TABLE B8.11

Project Headquarters Base Cost (SoSh '000 Constant 1987 Prices)
(US$ 1.0 - SoSh 90)

Item	Unit	Quantity	Rate	Year 0	1	2	3	4	5	Total SoSh	% FE	FE in SoSh	Responsibility Year 1-5	Responsibility Year 6+
Capital Cost														
Buildings													Donor	
- Office	m^2	102	49.41	5 040	-	-	-	-	-	5 040	65	3 276		
- Housing	m^2	306	49.41	15 120	-	-	-	-	-	15 120	65	9 828		
- Stores	m^2	63	35.71	2 250	-	-	-	-	-	2 250	65	1 463		
- Fuel/generator store	Sum			1 090	-	-	-	-	-	1 090	75	1 410		
- Furniture/equipment	Sum			1 553	-	-	-	-	-	1 553	75	1 165		
Services													Donor	
- Water	Sum			7 020	-	-	-	-	-	7 020	70	4 914		
- Drainage	Sum			2 070	-	-	-	-	-	2 070	60	1 242		
- Power	Sum			900	-	-	-	-	-	900	90	810		
- Fencing	m	70	4.5	315	-	-	-	-	-	315	90	284		
- Access	km	0.6	3.75	2 250	-	-	-	-	-	2 250	50	1 125		
- Office equipment	Sum			406	-	-	-	-	-	406	90	365		
Sub-total				38 814	-	-	-	-	-	38 814				
(of which FE)				(25 890)	-	-	-	-	-	-		25 890		
Operating Costs													Donor	MOA
- Building maintenance	Capital cost		1.5%	-	365	365	365	365	365	1 825	30	548		
- Office operations	Sum				630	630	630	630	630	3 150	80	2 520		
- Power	Capital cost		30%	-	270	270	270	270	270	1 350	60	810		
- Services	Capital cost		5%	-	455	455	455	455	455	2 275	30	683		
- Access	Capital cost		2.5%	-	56	56	56	56	56	280	50	140		
- Fencing	Capital cost		5%	-	16	16	16	16	16	80	90	72		
Sub-total				-	1 792	1 792	1 792	1 792	1 792	8 960				
(of which FE)					(955)	(954)	(955)	(954)	(955)	(4773)		4 773		
TOTAL				38 814	1 792	1 792	1 792	1 792	1 792	47 774	64			
(of which FE)				(25 890)	(955)	(954)	(955)	(954)	(955)	(30 663)		30 663		

It was also felt that the political, bureaucratic and small-scale self-help orientation of the existing local government approach would hinder the speed of implementation of this complex technical and managerial multi-component. The fact that there would be two districts involved (Afgoi and Marka) would further complicate the issue.

Nevertheless, the importance of the development mandate of local government in promoting integrated rural development and self-help capacities cannot be ignored. Thus, a significant involvement of local government representatives and coordinating committees has been included and alongside which the proposed project management will work.

(iii) To create a development context in which the project beneficiaries would organise themselves to manage their development resources.

The scale and technical complexity of the proposed works demand skilled and trained specialist staff to supervise the contractors and the execution of project works. In the implementation phase to try and place the total responsibility for such functions into the hands of the local community could not be considered realistic. However, as already stated, without close coordination with canal committee and village and farmer groups, successful and non-imposed development at the implementation rate assumed could not be achieved.

Consideration was also given to establishing a commercial organisation to undertake project management. This would have involved a shareholding involvement of project beneficiaries. The organisation could have been supported by a strong training component from technical assistance to create the commercial and managerial viability amongst local leaders and elected representatives in such a way as to enable them to continue the delivery of development services in the post-implementation period. Such a group could have also taken over the project headquarters facilities once the 5-year implementation period was over.

The possibilities of this approach are not precluded. It would require a significant shift in orientation and might involve the pressure of commercial interests running counter to those of smallholder development. It would, however, require more discussion and analysis and would probably demand that the rate of development be determined by progress of local organisational capacity.

The Consultant envisages these capacities being provided through the project management and technical assistance staff, but as technical assistance to existing organisations rather than creating a new one.

B8.7 Technical Assistance

The complexities of this multi-component project demand that specialist technical staff are available to oversee the contracting and implementation phases. Every effort has been made to minimise the need for expensive overseas

involvement. Four areas of expatriate input are proposed. A project adviser with a broad background of experience will assist the main project coordinator, who is to be selected by the MOA. An engineering adviser will assist the MOA engineers and surveyors in organising, supervising contractors and implementing project surveys and works. A short annual input is included for an internationally recognised auditing service to provide the donor with an up-to-date assessment of financial progress, to give the project coordinator and staff management accounting inputs and to help train the project accountant. A small allowance has also been made for short-term and as yet undefined specialist consultancies on which the project management can call during the 5-year implementation period.

The costs of technical assistance staff assume international recruitment at 1987 prices with full support services including air fares and other related allowances and expenses. It is also assumed that such staff do not pay local taxes and are provided with free accommodation and utilities.

On this basis the technical assistances base costs total SoSh 64.4 million or ECU 0.63 million, equivalent to 8% of the total base costs.

The role of the project coordinator and engineer in the implementation and post-implementation phases envisage them providing a technical assistance service to the local canal and village committees and to farmers' groups.

B8.8 Recurrent Costs and Cost Allocation

In the post-implementation period the annual recurrent base cost would be about SoSh 37 million or ECU 364 000.

CHAPTER B9

ECONOMIC ANALYSIS

B9.1 Introduction

This chapter derives the project economic benefits and economic costs based on the assumptions of the project's programme and impact described in the report.

The project's cost and incremental benefit flows have been calculated for both the High and Low Price level assumptions discussed in Chapter B5. The incremental benefits are the total crop benefits, less variable costs including labour and machinery, the net of the value of without-project rainfed and irrigated production. Details of inputs are given in Appendices C and D and the crop benefits and their build-up are described in Section B9.2. The net benefits (project costs less incremental benefits) are discussed in Section B9.3 also for the two price level assumptions.

The project costs that are given in Chapter B8 have been adjusted to arrive at the economic costs, by means of the following:

- local staff costs are calculated net of personal taxes as shown in Table B8.6, using a factor of 0.8 based on the levels of taxes set out in Chapter B5. It has been assumed that expatriate staff are not subject to personal taxation and the same costs have been used as in the financial costings;

- a foreign exchange conversion factor of 1.5 has been applied to reflect the difference between the shadow and foreign exchange rate of US$ 1.0 = SoSh 135 and the official financial rate of SoSh 90;

- physical contingencies at 10% are included but financial contingencies are excluded, since the analysis is carried out at constant 1987 prices.

No direct benefits from livestock have been included. During the development period, Years 1 to 10, it is not likely that participating farmers will earn significantly more with their livestock than at present. However, a slow build-up of higher offtake rates may be realised. There will also be benefits to animals passing through the project or seasonally kept in adjoining areas in the form of supplies of water and fodder. The quantities involved will be large in the average or better years when unit values are likely to be low, especially if the present depressed state of the livestock and meat market continues (see Chapter B3). However, in years of drought, locally or in neighbouring regions, demand for fodder rises rapidly, as has been witnessed in the project area in 1986/87. The analysis assumes that the value of fodder included in the farm benefits evaluates indirectly the livestock benefits.

It has been noted that the impact of recurring seasonal droughts is significant. Therefore the same assumptions used for the farm financial analysis have been tested in the economic analysis. The incremental and project net benefit cash flows provide results spanning the range of a number of key assumptions. This approach essentially shows both the sensitivity of cash flows and rates of return, but also the matrix area in which the final rates of return might fall once more accurate project data become available.

B9.2 Incremental Economic Benefits

The crop budget shown in Appendix C is derived for five different situations and at the two-price scenarios. Appendix E provides the calculations made to derive the economic benefits in the 'with' and 'without project' situations for both the irrigated and rainfed situations. Therefore, the analysis selects the most optimistic and the most pessimistic farm models to cover the likely extremes of economic benefit flows.

The areas over which the project will have an impact in its various components are discussed in Section B7.2. The pilot nature of the farm turnout programme, together with the use of credit funds to stimulate the uptake of land levelling, means that those factors which will stimulate increases in yield and productivity will not be synchronised area-by-area or even farm-by-farm. The uncertainties of data and the complexities of modelling how the multitude of factors might synchronise have meant that a simplified methodology has had to be applied.

In studying the likely rate of development of both land levelling and animal traction it is obvious that the full impact will be limited within the next decade to a relatively small proportion of farms. This being so, it would be over-optimistic to assume that the projected benefits of these components should be applied over the whole area. The economic benefits in the 'with project' situation have therefore drawn only on the results of the farm analysis, the first and second levels of project benefits (FW1 and FW2), to represent the pessimistic and optimistic situations. It was also assumed that, since the use of mechanised land preparation is widespread and is likely to increase, with or without project actions, this option was most representative of the 'without project' situation. It was also assumed that, while the costs of the on-going AFMET programme are not being counted, the project analysis for the 'without project' situation would be best represented by the benefits deriving from the future 'without-project' assumptions (two).

As discussed in Annex 4, the rate of build-up in yields and cropping intensity have been assumed to cover a period of 7 and 5 years, respectively, for any one farmer. Since many farmers are not expected to benefit from farm turnouts, animal traction or land levelling until after Year 4 a gradual build-up of project benefits over 10 years has been assumed, as shown in Table B9.1.

TABLE B9.1

Benefit Build-up Assumptions

	Percentage of full development for year									
	1	2	3	4	5	6	7	8	9	10
Irrigated area	-	5	15	30	45	70	85	95	100	100
Rainfed area	-	-	5	10	20	40	55	75	90	100

Based on these assumptions the full details of the calculation of economic benefits are presented in Appendix E and the main results are summarised in Table B9.2.

TABLE B9.2

Incremental Economic Benefits (SoSh '000 at 1987 Prices)

Affected area: Irrigated - 3 660 ha; Rainfed - 660 ha

Year	No allowances for losses from storage or drought		With allowances for losses from storage and drought	
	Low Price	High Price	Low Price	High Price
1. Pessimistic Situation				
1	-	-	-	-
2	7 332	9 046	6 149	7 631
3	22 645	27 908	18 903	23 430
4	45 288	55 817	37 805	46 861
5	68 581	84 496	57 164	70 829
6	107 832	132 808	89 730	111 133
7	131 771	162 257	110 906	135 638
8	149 027	183 430	124 569	153 050
9	158 302	194 787	131 173	162 293
10-50	159 597	196 327	132 082	163 368
NPV(1) at Year 0 at 10%:				
- 50 year project life	1 025 252	1 261 142	850 810	1 051 382
- 20 year project life	801 680	986 117	665 783	822 527
2. Optimistic Situation				
1	-	-	-	-
2	12 464	15 449	10 278	12 787
3	38 564	47 827	31 630	39 382
4	77 129	95 654	63 259	78 764
5	116 864	144 961	95 685	119 167
6	183 873	228 128	150 256	187 187
7	224 780	278 917	183 476	228 612
8	254 395	315 738	207 213	258 271
9	270 374	335 630	219 877	274 122
10-50	272 717	338 592	221 467	276 165
NPV at Year 0 at 10%				
- 50 year project life	1 750 350	2 172 696	1 424 132	1 775 346
- 20 year project life	1 368 314	1 698 379	1 113 889	1 388 480

Note: (1) NPV - Net Present Value

B9.3 Project Net Cash Flows and Rates of Return

The nature of the project's multi-component investments means that not all the project costs should be regarded as directly contributing to the flow of incremental benefits assumed. Therefore, the returns of directly productive investment would be higher than calculated: in the analysis below all project costs are included, not only those directly affecting farm output.

The project net economic cash flows for the various project situations and price assumptions are summarised in Table B9.3 from the calculations given in Appendix E. Table B9.4 shows the economic results.

B9.4 Conclusions and Project Risks

The economic analysis results, while only indicative at this stage, suggest that positive rates of return and cost-benefit ratios are highly probable. The most pessimistic scenario produces an economic rate of return of about 1%; the most optimistic scenario gives about a 17% rate of return. If a project economic life of 50 years were assumed, the rates of return would probably fall between 6% and 14%, which is in relation to the assumed opportunity cost of capital of 10%. The situation looks more favourable when it is considered that the analysis includes considerable non-productive as well as productive investments.

The results in Table B9.4 indicate that the project is far more sensitive to changes in benefits than to changes in costs.

Assuming a shorter economic life makes only marginal changes to the IRR in the optimistic scenarios but is more significant for the pessimistic situations.

However, while the economic status of the project appears stable and assured the reservations made in the financial analysis on farmers' financial capacities need to be borne in mind. There are also various other factors which could affect the project outcome.

Poor coordination or failure of project management to be able to implement at the rate foreseen would adversely affect the outcome. The impact of a lack of land tenure security may be faced by smallholders to whom the project is primarily directed. Furthermore, since the analysis is based on an assumed outcome from a pilot phase and a positive result to credit incentives and an animal traction programme, any lack of response because of the security and financial problems raised would also adversely affect the economic outcome. A final unknown involves the eventual impact of the Mogadishu firewood project, which, if it comes to pass, might undermine livestock production.

Another project rise would be if there were no annual, or preferably month-by-month (in the cropping season), water allocations to the project. It is understood, however, that the recently approved Shabeelle Water Management Project is addressing this issue as a matter of priority.

However, the issue of project-by-project water allocation within Somalia is overshadowed by the fact that no international water sharing agreement of Shabeelle waters exists with Ethiopia. This issue has been frequently highlighted (most recently by USAID in connection with the Shabeelle Water Management Project) and little would be gained in dwelling on it further.

TABLE B9.3

Economic Cash Flows (SoSh '000)

Year	No allowances for losses from storage or drought		With allowances for losses from storage and drought	
	Low Price	High Price	Low Price	High Price
1.	Pessimistic Situation			
0	(85 036)	(85 036)	(85 036)	(85 036)
1	(443 407)	(443 407)	(443 407)	(443 407)
2	(246 507)	(244 793)	(247 690)	(246 208)
3	(158 638)	(153 375)	(162 380)	(157 853)
4	(43 861)	(33 332)	(51 344)	(42 288)
5	(4 210)	(11 705)	(15 627)	(1 962)
6	58 395	83 371	40 293	61 696
7	82 070	112 556	61 205	85 937
8	99 901	134 304	75 443	103 924
9	109 388	145 873	82 259	113 379
10-50	111 037	147 767	83 522	114 808
2.	Optimistic Situation			
0	(85 036)	(85 036)	(85 036)	(85 036)
1	(443 407)	(443 407)	(443 407)	(443 407)
2	(241 375)	(238 390)	(243 561)	(241 052)
3	(142 719)	(133 456)	(149 653)	(141 901)
4	(12 020)	(6 505)	(25 890)	(10 385)
5	44 073	72 170	22 894	46 376
6	134 436	178 691	100 819	137 750
7	175 079	229 216	133 775	178 911
8	205 269	266 612	158 087	209 145
9	221 460	286 716	170 963	225 208
10-50	224 157	290 032	172 907	227 605

Note: Figures in brackets denote negative values.

TABLE B9.4

Results of the Economic Analysis (1)

	Pessimistic situation				Optimistic situation			
	With allowances for drought and storage losses		No allowances for drought and storage losses		With allowances for drought and storage losses		No allowances for drought and storage losses	
	Price assumption							
	Low	High	Low	High	Low	High	Low	High
Net present values at year 0 at 10%: (SoSh million)								
Costs	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Benefits	0.85	1.05	1.03	1.26	1.42	1.78	1.75	2.17
NPV	(0.39)	0.19	0.21	0.02	0.18	0.54	0.51	0.93
Cost : benefit ratio at 10%:	1:0.7	1:0.8	1:0.8	1:1.0	1:1.1	1:1.4	1:1.4	1:1.7
Internal rate of return (IRR) with project life of:								
50 years	6.0	8.2	7.9	10.1	11.6	14.5	14.3	17.3
20 years	1.4	4.6	4.2	7.2	9.7	12.7	12.5	16.0
Percentage increase in costs required to give a 10% IRR:	(31)	(15)	(17)	2	15	44	41	75
Percentage decrease in benefits required to give a 10% IRR:	(46)	(18)	(20)	2	13	30	29	43

Note: (1) 50 year analysis period assumed except where otherwise stated.

APPENDIX A

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APPENDIX A

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APPENDIX B

TERMS OF REFERENCE

APPENDIX B

TERMS OF REFERENCE

The main elements of the overall Terms of Reference for this study directly related to the specialist analysis covering socio-economics were as follows:

Objectives

The objective of the project is to contribute to the development of the area with an integrated action whose goal is:

- To increase traditional agriculture production through area extension, improvement of yields and varieties as well as for vegetables and fruits by using more efficient irrigation methods by gravity or pumping.

- To settle population in the villages by increasing their income from agicultural and livestock resources, providing drinking water for them and their herds by the construction of wells and boreholes.

- To train farmers in more efficient cultivation and animal husbandry techniques (fertilisers, storage, disease detection, etc.).

- To improve life standard through development of basic health and education facilities.

The administration, supported by other donors, is carrying out actions in the area concerning agricultural extension, fuelwood supply, and basic health and education. The EDF project, which will be implemented over a five-year period, should complement these and aim to achieve the objectives noted above, specially by:

- Rehabilitation, improvement and development of irrigation canals in cultivated and, if possible, in uncultivated areas.

- Extension of gravity irrigation periods.

- Improving availability and quality of extension services, inputs and appropriate mechanisation (if possible traction ox yoking) enabling a less arduous work and more productive one.

- Basic veterinary assistance for protection and improvement of livestock (dairy and beef breed - cattle yoking) and small animals.

- Strengthening of coordination between field operators (state companies, donors, etc.), improving extension work impact, economical and land use strategy by way of price of production, storage strategy, transportation, land and water use policy and management in the Lower Shabeelle.

- Creation of village and pastoral wells in the appropriate areas.

The study will have to:

- Describe the existing irrigation scheme with appropriate mapping including the levelling of primary and secondary canals.

- On the basis of already available data concerning the Shabeelle river regime and national policy for river water use, to determine topographically, at an approriate scale, the area suitable for irrigation, the period and the duration.

- Propose on this basis the crops to be developed (vegetables) considering also the agro-industrial needs.

- Considering the selected irrigation (retained) system, to establish detailed design of execution for the rehabilitation, the improvement and the extension of irrigation scheme relating to the quantity of water needed for the irrigation on the selected area. Costs estimation have to be included.

- Concerning the dry-farming area, the study will propose the cultivation scheme in an appropriate rotation, comprising the integration of live-stock combined with a reafforestation programme.

- Examine the possibility of cattle yoking introduction or lightly mechanised, etc., indicating modalities, technology and the organisation of a cattle yoking centre.

- On the basis of the population's needs, to define the number of wells or boreholes required and their location on the basis of existing hydrogeologic data and additional investigations, if necessary.

- To propose the improvement of farm roads within the area in order to allow traffic during the rainy season.

- To establish a detailed road network scheme, the topography, the executive design, terms and conditions of the contract document including cost estimation.

- To determine the most appropriate site for construction of the project's base. To propose the infrastructures and project's buildings like: offices, workshop for maintenance, warehouse, etc. The utilisation of local traditional construction materials for economy reasons has to be taken into account. To define the execution's design and cost estimations.

- In waiting for the private sector to be able to fulfil his role concerning the agricultural inputs supply, this gap should be filled by the project. The study should therefore propose the creation of a simple and efficient structure for the farmers allowing them to find, on the spot, the production's inputs (fertilisers, insecticides, seeds, etc.).

- To determine the quantities and type of inputs required, the means of distribution and sale (including appropriate arrangements for sale on credit) and the method of storage. Phased estimates of quantities and costs will be provided.

Economic and Financial Viability

Project proposals will be subjected to financial analysis at farm level (including projected returns to farmer's land and labour) to ensure that adequate incentives are available. Economic analysis will be carried out at project level with economic rates of return being calculated plus appropriate sensitivity tests. All project costs presented will be broken down into their local and foreign components and include details of unit costs, quantities, and phasing over five years.

Sociological Aspects

The study must be placed in the social context by evaluating: existing population, level of technical knowledges, receptivity of innovations relating to the extension services existing in the region.

The Consultant's proposal gave the following description of the work to be carried out which, followed by the results of the field studies, has been modified slightly as described in the text:

Agriculture

Crop budgets will be prepared on a modular basis in both financial and economic (Domestic Resource Cost) terms to show costs and returns per hectare for each of the selected crops. These will be used in conjunction with an analysis of crop calendars and a formulation of alternative cropping patterns to recommend farming sytems for the irrigated and rainfed areas taking into account seasonal labour and water supply variations, draught power availability, pest and disease incidence and soil patterns. From this the final phased and costed estimates of water and input requirements will be made.

Livestock

The livestock component will involve a review of existing data, particularly on the integration of livestock within the farming systems considered. In particular the possibilities of introducing draught oxen will be examined, together with the scope for development of beef and milk production.

Agricultural Input Supplies

It will be critically important to ensure that any inputs not currently in wide use in the area, but which are recommended as part of technological packages for adoption by farmers, will be available when the latter need them. The extension 'messages' currently being put across to farmers by the extension services under AFMET and the arrangements in force for supplying related inputs will be reviewed and experience gained to date evaluated. If existing channels for input supply appear inadequate, various options will be considered for improving input availability at the farm level taking into account related credit arrangements which may be needed. As far as possible, the strategy will be to offer farmers a range of technological improvements and inputs from which the farmers can choose what best suits their particular economic circumstances and capacity to handle risk. Experience indicates that this gives better results than insisting that farmers follow one course of action only, particularly if the reliability of

input supplies needed for this cannot be guaranteed. The implication is that distribution managements for inputs may need to be based on existing 'retailing' systems (e.g. village suppliers, farmer associations, etc.) as well as a public delivery system.

Institutions, Support Services and Farmer Organisations

The study area is already served by the World Bank supported Agricultural and Farm Management Extention and Training (AFMET) Project. A second phase of this project has recently been appraised by the World Bank and is due to be implemented in the near future. The study would, however, examine any special extension and training needs to be provided outside the scope of the AFMET project.

The study will identify the technical assistance to be provided to assist the Ministry of Agriculture in their management and organisation of extension work and farmer support services. Also an assessment will be made of project staffing identifying the overall management structure for the project and the inter-relationship between project staff and the various agencies within the Ministry of Agriculture.

Of prime importance for the success of the irrigated area within the project will be water management and the success of water management is usually dependent on the cooperation of the various water users. An institutional framework for the various water users will be required. Experience from the introduction of Water Users Associations in other countries will be reviewed to determine an appropriate form of this institution for the project.

Sociological Aspects

A thorough understanding of existing farming systems and associated crop and animal husbandry practices in the area will be an essential prerequisite for sound project design. Farmers' management strategies and their perception of the costs, benefits and risks attached to technological innovations need careful assessment before specific recommendations for agricultural improvements can be made.

For insights into the social organisation and economic activities of local communities in the project area, we shall rely substantially on the knowledge and advice of our farming systems/rural sociology specialist, Mr. Mohammed Juma. This will be supplemented by a review of existing data (e.g. population censuses, agricultural surveys and other project studies relevant to the area). In addition, a special survey of selected households will be undertaken by Mr. Juma and the agricultural economist using 'rapid rural appraisal' techniques. This approach, which has been refined considerably in recent years, involves interviewing a purposive sample of individuals and groups in order to pinpoint relatively quickly the aspects of existing production systems which represent major constraints on, and opportunities for, improvement. In this case, attention is likely to focus on land preparation (with and without animal draught power), irrigation water management, input availability and marketing outlets.

Careful note will be taken of the experience gained so far with other programmes in the project area (viz, agricultural extension, fuelwood supply, basic health and education) in terms of the receptivity of the local population to the services being provided. The objective will be to see what can be learned about the best way of organising both the delivery systems and the end users.

Economic and Financial Viability

The Agricultural Economist would review existing reports, studies, and other sources of economic data relating to agriculture in the project area in particular and to the agricultural sector of Somalia in general. He would discuss economic planning criteria and project appraisal parameters with the Ministry of Agriculture, the Delegation of the EC and national planning authorities. Thus the initial stage of the economic and financial studies would be concerned with establishing economic criteria to identify which cropping/ livestock systems, engineering improvements and services are likely to be most effective in generating net economic benefits. Later as more specific information on costs and project components is available from the other specialists and the results of the agro-economic/sociological surveys are known, the economic and financial analysis would concentrate on establishing the relative viability of the proposals and implications of them for rural household incomes.

An important part of the study will be the assessment of prospects for increasing the supply of both perishable (fresh) and preserved (processed) vegetables and fruits from the project area in relation to likely trends in market demand within Somalia and abroad. The extent to which this appears feasible will have a significant bearing on the economic attractiveness of the project investment. Market prospects for other crops which are/could be grown in the project area will also be examined and price projection prepared accordingly.

Using incremental budget data on crop, livestock and agro-processing enterprises and information provided by other specialists on the incremental costs of infrastructure and other services to be provided, the Agricultural Economist would prepare projections of input and output flows over the life of the project. She would prepare the project cost tables (both capital costs during implementation and recurrent costs over the life of the project) and calculate feasible rates of cost recovery (if required). Using methodology acceptable to the Somali authorities and the EC Agricultural Economist would calculate costs and benefits valued at economic prices and determine the economic rate of return. With the aid of appropriate computing facilities, he would carry out sensitivity tests to determine the stability of projected economic performances vis-a-vis key parameters and also to estimate their 'switching values' (i.e. the minimum values at which the project would remain just viable). This would help identify the initial factors affecting project risk; in addition simple simulation techniques would be employed in order to quantify the approximate variance of the expected rate of return so that the probability of an unacceptable rate occurring could be estimated. The Agricultural Economist, in collaboration with other team members, would also quantify, where possible, aspects of project impact, such as the expected contribution to net foreign exchange earnings, permanent and temporary employment and the accessibility of economic and social services.

The Agricultural Economist would construct farm household models for selected types of holdings to represent the present ('pre-project') situation and then, using information mainly provided by the Agriculturalist, develop projected versions of the models to represent 'future without project' and 'future with project' conditions. A tentative judgement would be made as to how the future population of holdings would be distributed among the selected types.

The farm models would be used to determine the impact of the project on net household income (in cash and in kind from all sources) and employment. Particular attention would be given to ascertaining whether or not:

(a) enough labour would potentially be available to meet the extra demand imposed by higher yields and/or greater land area cultivated;

(b) the returns, particularly in net cash terms, which could be earned from the extra work are likely to be sufficient actually to bring forth the additional labour required.

The feasibility of extending the use of draught animals (cattle yoking) or introducing light mechanisation will depend very much on the results of the farm model analysis. Experience elsewhere shows that it is easy to under-estimate the extra cost to farmers of switching from hand hoe to ox or tractor cultivation and attempts to introduce these techniques frequently fail as a result. They have to relieve a critical labour supply bottleneck during the peak period of the farming calendar or lower the farmer's unit costs of production in order to be attractive. This will require careful analysis.

Extent of Services

The title of the Terms of Reference (TOR) clearly defines the study as a Feasibility Study and therefore it is intended that the extent of the services provided is as would normally be appropriate for such a study. In particular the design work to be undertaken during the study for the various engineering components would comprise outline designs suitable for preparing project quantity and cost estimates to within a normal physical contingency limit. The outline designs would be accompanied by recommendations for bid packaging for the various engineering contracts identified, which in turn would be incorporated into an overall project phasing. This work would bring the project to a level whereby the detailed design phase could commence and the services proposed have been formulated to achieve this objective taking into account that only 5 months have been allowed for the assignment.

The detailed design phase, together with the production of bid documents (tender dossiers) will be dependent upon the feasibility study being able to identify a project that is both economically viable and acceptable both to the Government of Somalia and potential donor agencies. It would be inappropriate to proceed to detailed design and preparation of bid documents until the recommendations of the feasibility study have been discussed with the EEC and the Government of Somalia and the recommendations accepted.

APPENDIX C

CROP BUDGETS

22-Jun-87 13.2
File: immzgu

TABLE C.1
CROP BUDGET - IRRIGATED MECHANISED MAIZE, GU SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	1.2	1.2	1.2	1.5	1.5	1.5	1.9	1.9	1.9	2.6	2.6	2.6	2.8	2.8	2.8
Price	SoSh/kg	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6
Fodder yield	t/ha	1.3	1.3	1.3	1.7	1.7	1.7	2.1	2.1	2.1	2.8	2.8	2.8	3.0	3.0	3.0
Price	SoSh/kg	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Grain value	SoSh	29880	34920	23520	37350	43650	29400	47310	55290	37240	64740	75660	50960	69720	81480	54880
Stover value	SoSh	6500	6500	6500	8500	8500	8500	10500	10500	10500	14000	14000	14000	15000	15000	15000
Gross value	SoSh	36380	41420	30020	45850	52150	37900	57810	65790	47740	78740	89660	64960	84720	96480	69880
VARIABLE COSTS																
Seed	kg	18.0	18.0	18.0	20.0	20.0	20.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
	SoSh/kg	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5
	value	671	787	531	746	874	590	895	1049	708	895	1049	708	895	1049	708
Fertiliser	kg	15.0	15.0	15.0	20.0	20.0	20.0	25.0	25.0	25.0	40.0	40.0	40.0	40.0	40.0	40.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	657	657	486	876	876	648	1095	1095	810	1752	1752	1296	1752	1752	1296
Pesticide	kg	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	600	600	400	600	600	400	900	900	600	900	900	600	900	900	600
Land Prep	Tr.Hr	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	7.0	7.0	7.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	812	812	784	812	812	784
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	42.0	42.0	42.0	42.0	42.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	4620	4620	4536	4620	4620	4536
Total Inputs	SoSh	1928	2044	1417	2222	2350	1638	2890	3044	2118	3547	3701	2604	3547	3701	2604
Total Machine	SoSh	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	5432	5432	5320	5432	5432	5320
Total Variable	SoSh	10528	10644	7377	10822	10950	7598	9970	10124	6978	16059	16213	12784	11339	11493	9544
Gross Margin	SoSh	25852	30776	22643	35028	41200	30302	47840	55666	40762	62681	73447	52176	73381	84987	60336
Labour Input	md	51	51	51	58	58	58	66	66	66	59	59	59	59	59	59
	SoSh/md	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
	value	10200	10200	10200	11600	11600	11600	13200	13200	13200	11800	11800	11800	11800	11800	11800
Gross Margin with labour	SoSh	15652	20576	12443	23428	29600	18702	34640	42466	27562	50881	61647	40376	61581	73187	48536
Return to labour	SoSh/md	507	603	444	604	710	522	725	843	618	1062	1245	884	1244	1440	1023

22-Jun-87 12.55
File: immzdr

TABLE C.2
CROP BUDGET - IRRIGATED MECHANISED MAIZE, DER SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.7	0.7	0.7	0.9	0.9	0.9	1.4	1.4	1.4	2.0	2.0	2.0	2.2	2.2	2.2
Price	SoSh/kg	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6
Fodder yield	t/ha	0.8	0.8	0.8	1.0	1.0	1.0	1.6	1.6	1.6	2.2	2.2	2.2	2.4	2.4	2.4
Price	SoSh/kg	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Grain value	SoSh	17430	20370	13720	22410	26190	17640	34860	40740	27440	49800	58200	39200	54780	64020	43120
Stover value	SoSh	4000	4000	4000	5000	5000	5000	8000	8000	8000	11000	11000	11000	12000	12000	12000
Gross value	SoSh	21430	24370	17720	27410	31190	22640	42860	48740	35440	60800	69200	50200	66780	76020	55120
VARIABLE COSTS																
Seed	kg	18.0	18.0	18.0	20.0	20.0	20.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
	SoSh/kg	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5
	value	671	787	531	746	874	590	895	1049	708	895	1049	708	895	1049	708
Fertiliser	kg	10.0	10.0	10.0	13.0	13:0	13.0	20.0	20.0	20.0	25.0	25.0	25.0	30.0	30.0	30.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	438	438	324	569	569	421	876	876	648	1095	1095	810	1314	1314	972
Pesticide	kg	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	600	600	400	600	600	400	900	900	600	900	900	600	900	900	600
Land Prep	Tr.Hr	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	7.0	7.0	7.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	812	812	784	812	812	784
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	42.0	42.0	42.0	42.0	42.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	4620	4620	4536	4620	4620	4536
Total Inputs	SoSh	1709	1825	1255	1915	2043	1411	2671	2825	1956	2890	3044	2118	3109	3263	2280
Total Machine	SoSh	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	5432	5432	5320	5432	5432	5320
Total Variable	SoSh	10309	10425	7215	10515	10643	7371	9751	9905	6816	15402	15556	12298	10901	11055	9220
Gross Margin	SoSh	11121	13945	10505	16895	20547	15269	33109	38835	28624	45398	53644	37902	55879	64965	45900
Labour Input	md	49	49	49	55	55	55	63	63	63	56	56	56	57	57	57
	SoSh/md	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	value	3920	3920	3920	4400	4400	4400	5040	5040	5040	4480	4480	4480	4560	4560	4560
Gross Margin with labour	SoSh	7201	10025	6585	12495	16147	10869	28069	33795	23584	40918	49164	33422	51319	60405	41340
Return to labour	SoSh/md	227	285	214	307	374	278	526	616	454	811	958	677	980	1140	805

22-Jun-87 12.50
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TABLE C.3
CROP BUDGET - IRRIGATED MECHANISED SESAME, DER SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.4	0.4	0.4	0.5	0.5	0.5	0.7	0.7	0.7	1.0	1.0	1.0	1.1	1.1	1.1
Price	SoSh/kg	56.9	75.8	44.5	56.9	75.8	44.5	56.9	75.8	44.5	56.9	75.8	44.5	56.9	75.8	44.5
Fodder yield	t/ha	0.8	0.8	0.8	1.0	1.0	1.0	1.4	1.4	1.4	1.6	1.6	1.6	1.7	1.7	1.7
Price	SoSh/kg	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Grain value	SoSh	22760	30320	17800	28450	37900	22250	39830	53060	31150	56900	75800	44500	62590	83380	48950
Stover value	SoSh	400	400	400	500	500	500	700	700	700	800	800	800	850	850	850
Gross value	SoSh	23160	30720	18200	28950	38400	22750	40530	53760	31850	57700	76600	45300	63440	84230	49800
VARIABLE COSTS																
Seed	kg	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	SoSh/kg	83.4	113.7	66.7	83.4	113.7	66.7	83.4	113.7	66.7	83.4	113.7	66.7	83.4	113.7	66.7
	value	417	569	334	417	569	334	417	569	334	417	569	334	417	569	334
Fertiliser	kg	0.0	0.0	0.0	0.0	0.0	0.0	12.0	12.0	12.0	15.0	15.0	15.0	15.0	15.0	15.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	0	0	0	0	0	0	526	526	389	657	657	486	657	657	486
Pesticide	kg	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	0	0	0	0	0	0	300	300	200	300	300	200	300	300	200
Land Prep	Tr.Hr	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	7.0	7.0	7.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	812	812	784	812	812	784
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	42.0	42.0	42.0	42.0	42.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	4620	4620	4536	4620	4620	4536
Total Inputs	SoSh	417	569	334	417	569	334	1243	1394	922	1374	1526	1020	1374	1526	1020
Total Machine	SoSh	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	5432	5432	5320	5432	5432	5320
Total Variable	SoSh	9017	9169	6294	9017	9169	6294	8323	8474	5782	13886	14038	11200	9166	9318	7960
Gross Margin	SoSh	14143	21552	11907	19933	29232	16457	32207	45286	26068	43814	62563	34101	54274	74913	41841
Labour Input	md	57	57	57	59	59	59	66	66	66	58	58	58	58	58	58
	SoSh/md	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	value	4560	4560	4560	4720	4720	4720	5280	5280	5280	4640	4640	4640	4640	4640	4640
Gross Margin with labour	SoSh	9583	16992	7347	15213	24512	11737	26927	40006	20788	39174	57923	29461	49634	70273	37201
Return to labour	SoSh/md	248	378	209	338	495	279	488	686	395	755	1079	588	936	1292	721

22-Jun-87 12.44
File: imwmdr

TABLE C.4
CROP BUDGET - IRRIGATED MECHANISED WATER MELON, DER SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	10.0	10.0	10.0	12.0	12.0	12.0	17.0	17.0	17.0	20.0	20.0	20.0	20.0	20.0	20.0
Price	SoSh/kg	28.6	40	18.3	28.6	40	18.3	28.6	40	18.3	28.6	40	18.3	28.6	40	18.3
Fodder yield	t/ha	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Price	SoSh/kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grain value	SoSh	286000	400000	183000	343200	480000	219600	486200	680000	311100	572000	800000	366000	572000	800000	366000
Stover value	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gross value	SoSh	286000	400000	183000	343200	480000	219600	486200	680000	311100	572000	800000	366000	572000	800000	366000
VARIABLE COSTS																
Seed	kg	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	SoSh/kg	42.8	60.0	27.4	42.8	60.0	27.4	42.8	60.0	27.4	42.8	60.0	27.4	42.8	60.0	27.4
	value	128	180	82	128	180	82	128	180	82	128	180	82	128	180	82
Fertiliser	kg	0.0	0.0	0.0	15.0	15.0	15.0	25.0	25.0	25.0	30.0	30.0	30.0	30.0	30.0	30.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	0	0	0	657	657	486	1095	1095	810	1314	1314	972	1314	1314	972
Pesticide	kg	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	0	0	0	0	0	0	300	300	200	600	600	400	600	600	400
Land Prep	Tr.Hr	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs	SoSh	128	180	82	785	837	568	1523	1575	1092	2042	2094	1454	2042	2094	1454
Total Machine	SoSh	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Variable	SoSh	8728	8780	6042	9385	9437	6528	8603	8655	5952	9122	9174	6314	4402	4454	3074
Gross Margin	SoSh	277272	391220	176958	333815	470563	213072	477597	671345	305148	562878	790826	359686	567598	795546	362926
Labour Input	md	75	75	75	80	80	80	90	90	90	96	96	96	96	96	96
	SoSh/md	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	value	6000	6000	6000	6400	6400	6400	7200	7200	7200	7680	7680	7680	7680	7680	7680
Gross Margin with labour	SoSh	271272	385220	170958	327415	464163	206672	470397	664145	297948	555198	783146	352006	559918	787866	355246
Return to labour	SoSh/md	3697	5216	2359	4173	5882	2663	5307	7459	3391	5863	8238	3747	5912	8287	3780

22-Jun-87 12.38
File: imtmdr

TABLE C.5
CROP BUDGET - IRRIGATED MECHANISED TOMATO, DER SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	5.0	5.0	5.0	6.0	6.0	6.0	10.0	10.0	10.0	12.0	12.0	12.0	14.0	14.0	14.0
Price	SoSh/kg	4.5	8	20	4.5	8	20	4.5	8	20	4.5	8	20	4.5	8	20
Fodder yield	t/ha	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Price	SoSh/kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grain value	SoSh	22500	40000	100000	27000	48000	120000	45000	80000	200000	54000	96000	240000	63000	112000	280000
Stover value	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gross value	SoSh	22500	40000	100000	27000	48000	120000	45000	80000	200000	54000	96000	240000	63000	112000	280000
VARIABLE COSTS																
Seed	kg	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	SoSh/kg	6.8	12.0	30.0	6.8	12.0	30.0	6.8	12.0	30.0	6.8	12.0	30.0	6.8	12.0	30.0
	value	1	2	6	1	2	6	1	2	6	1	2	6	1	2	6
Fertiliser	kg	15.0	15.0	15.0	20.0	20.0	20.0	30.0	30.0	30.0	35.0	35.0	35.0	35.0	35.0	35.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	657	657	486	876	876	648	1314	1314	972	1533	1533	1134	1533	1533	1134
Pesticide	kg	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	0	0	0	0	0	0	300	300	200	600	600	400	600	600	400
Land Prep	Tr.Hr	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs	SoSh	658	659	492	877	878	654	1615	1616	1178	2134	2135	1540	2134	2135	1540
Total Machine	SoSh	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Variable	SoSh	9258	9259	6452	9477	9478	6614	8695	8696	6038	9214	9215	6400	4494	4495	3160
Gross Margin	SoSh	13242	30741	93548	17523	38522	113386	36305	71304	193962	44786	86785	233600	58506	107505	276840
Labour Input	md	118	118	118	118	118	118	122	122	122	125	125	125	127	127	127
	SoSh/md	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	value	9440	9440	9440	9440	9440	9440	9760	9760	9760	10000	10000	10000	10160	10160	10160
Gross Margin with labour	SoSh	3802	21301	84108	8083	29082	103946	26545	61544	184202	34786	76785	223600	48346	97345	266680
Return to labour	SoSh/md	112	261	793	148	326	961	298	584	1590	358	694	1869	461	846	2180

22-Jun-87 12.32
File: imctgu

TABLE C.6
CROP BUDGET - IRRIGATED MECHANISED COTTON, GU SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.5	0.5	0.5	0.7	0.7	0.7	1.0	1.0	1.0	1.3	1.3	1.3	1.5	1.5	1.5
Price	SoSh/kg	82.2	84.7	64.8	82.2	84.7	64.8	82.2	84.7	64.8	82.2	84.7	64.8	82.2	84.7	64.8
Fodder yield	t/ha	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Price	SoSh/kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grain value	SoSh	41100	42350	32400	57540	59290	45360	82200	84700	64800	106860	110110	84240	123300	127050	97200
Stover value	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gross value	SoSh	41100	42350	32400	57540	59290	45360	82200	84700	64800	106860	110110	84240	123300	127050	97200
VARIABLE COSTS																
Seed	kg	17.0	17.0	17.0	20.0	20.0	20.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
	SoSh/kg	98.4	101.2	0.0	98.4	101.2	0.0	98.4	101.2	0.0	98.4	101.2	0.0	98.4	101.2	0.0
	value	1673	1720	0	1968	2024	0	2460	2530	0	2460	2530	0	2460	2530	0
Fertiliser	kg	0.0	0.0	0.0	10.0	10.0	10.0	18.0	18.0	18.0	20.0	20.0	20.0	25.0	25.0	25.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	0	0	0	438	438	324	788	788	583	876	876	648	1095	1095	810
Pesticide	kg	0.0	0.0	0.0	3.0	3.0	3.0	5.0	5.0	5.0	6.0	6.0	6.0	7.0	7.0	7.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	0	0	0	900	900	600	1500	1500	1000	1800	1800	1200	2100	2100	1400
Land Prep	Tr.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	7.0	7.0	7.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	812	812	784	812	812	784
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	42.0	42.0	42.0	42.0	42.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	4620	4620	4536	4620	4620	4536
Total Inputs	SoSh	1673	1720	0	3306	3362	924	4748	4818	1583	5136	5206	1848	5655	5725	2210
Total Machine	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	5432	5432	5320	5432	5432	5320
Total Variable	SoSh	1673	1720	0	3306	3362	924	4748	4818	1583	10568	10638	7168	11087	11157	7530
Gross Margin	SoSh	39427	40630	32400	54234	55928	44436	77452	79882	63217	96292	99472	77072	112213	115893	89670
Labour Input	md	54	54	54	62	62	62	74	74	74	68	68	68	75	75	75
	SoSh/md	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	value	4320	4320	4320	4960	4960	4960	5920	5920	5920	5440	5440	5440	6000	6000	6000
Gross Margin with labour	SoSh	35107	36310	28080	49274	50968	39476	71532	73962	57297	90852	94032	71632	106213	109893	83670
Return to labour	SoSh/md	730	752	600	875	902	717	1047	1079	854	1416	1463	1133	1496	1545	1196

22-Jun-87 12.25
File: imfwgu

TABLE C.7
CROP BUDGET - IRRIGATED MECHANISED FALLOW, GU SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Price	SoSh/kg	34.3	50.6	28.6	34.3	50.6	28.6	34.3	50.6	28.6	34.3	50.6	28.6	34.3	50.6	28.6
Fodder yield	t/ha	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.2
Price	SoSh/kg	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Grain value	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stover value	SoSh	2000	2000	2000	2000	2000	2000	2200	2200	2200	2200	2200	2200	2400	2400	2400
Gross value	SoSh	2000	2000	2000	2000	2000	2000	2200	2200	2200	2200	2200	2200	2400	2400	2400
VARIABLE COSTS																
Seed	kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertiliser	kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pesticide	kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Land Prep	Tr.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Machine	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Variable	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gross Margin	SoSh	2000	2000	2000	2000	2000	2000	2200	2200	2200	2200	2200	2200	2400	2400	2400
Labour Input	md	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	SoSh/md	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	value	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
Gross Margin with labour	SoSh	1600	1600	1600	1600	1600	1600	1800	1800	1800	1800	1800	1800	2000	2000	2000
Return to labour	SoSh/md	400	400	400	400	400	400	440	440	440	440	440	440	480	480	480

22-Jun-87 12.19
File: imfwdr

TABLE C.8
CROP BUDGET - IRRIGATED MECHANISED FALLOW, DER SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Price	SoSh/kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fodder yield	t/ha	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
Price	SoSh/kg	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Grain value	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stover value	SoSh	1500	1500	1500	1500	1500	1500	1800	1800	1800	1800	1800	1800	2000	2000	2000
Gross value	SoSh	1500	1500	1500	1500	1500	1500	1800	1800	1800	1800	1800	1800	2000	2000	2000
VARIABLE COSTS																
Seed	kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertiliser	kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pesticide	kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Land Prep	Tr.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Machine	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Variable	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gross Margin	SoSh	1500	1500	1500	1500	1500	1500	1800	1800	1800	1800	1800	1800	2000	2000	2000
Labour Input	md	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	SoSh/md	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	value	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
Gross Margin with labour	SoSh	1100	1100	1100	1100	1100	1100	1400	1400	1400	1400	1400	1400	1600	1600	1600
Return to labour	SoSh/md	300	300	300	300	300	300	360	360	360	360	360	360	400	400	400

23-Jun-87 14.28
File: ihmzgu

TABLE C.9
CROP BUDGET - IRRIGATED HAND MAIZE, GU SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	1.0	1.0	1.0	1.2	1.2	1.2	1.7	1.7	1.7	2.4	2.4	2.4	0.0	0.0	0.0
Price	SoSh/kg	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6
Fodder yield	t/ha	1.1	1.1	1.1	1.3	1.3	1.3	1.9	1.9	1.9	2.6	2.6	2.6	0.0	0.0	0.0
Price	SoSh/kg	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Grain value	SoSh	24900	29100	19600	29880	34920	23520	42330	49470	33320	59760	69840	47040	0	0	0
Stover value	SoSh	5500	5500	5500	6500	6500	6500	9500	9500	9500	13000	13000	13000	0	0	0
Gross value	SoSh	30400	34600	25100	36380	41420	30020	51830	58970	42820	72760	82840	60040	0	0	0
VARIABLE COSTS																
Seed	kg	20.0	20.0	20.0	20.0	20.0	20.0	24.0	24.0	24.0	24.0	24.0	24.0	0.0	0.0	0.0
	SoSh/kg	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5
	value	746	874	590	746	874	590	895	1049	708	895	1049	708	0	0	0
Fertiliser	kg	10.0	10.0	10.0	15.0	15.0	15.0	23.0	23.0	23.0	36.0	36.0	36.0	0.0	0.0	0.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	438	438	324	657	657	486	1007	1007	745	1577	1577	1166	0	0	0
Pesticide	kg	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	600	600	400	600	600	400	600	600	400	600	600	400	0	0	0
Land Prep	Tr.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	0.0	0.0	0.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	812	812	784	0	0	0
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	42.0	42.0	0.0	0.0	0.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	4620	4620	4536	0	0	0
Total Inputs	SoSh	1784	1912	1314	2003	2131	1476	2503	2656	1853	3072	3226	2274	0	0	0
Total Machine	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	5432	5432	5320	0	0	0
Total Variable	SoSh	1784	1912	1314	2003	2131	1476	2503	2656	1853	8504	8658	7594	0	0	0
Gross Margin	SoSh	28616	32688	23786	34377	39289	28544	49327	56314	40967	64256	74182	52446	0	0	0
Labour Input	md	65	65	65	71	71	71	79	79	79	69	69	69	0	0	0
	SoSh/md	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
	value	13000	13000	13000	14200	14200	14200	15800	15800	15800	13800	13800	13800	0	0	0
Gross Margin with labour	SoSh	15616	19688	10786	20177	25089	14344	33527	40514	25167	50456	60382	38646	0	0	0
Return to labour	SoSh/md	440	503	366	484	553	402	624	713	519	931	1075	760	0	0	0

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File: ihmzdr

TABLE C.10
CROP BUDGET - IRRIGATED HAND MAIZE, DER SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.6	0.6	0.6	0.8	0.8	0.8	1.3	1.3	1.3	1.8	1.8	1.8	0.0	0.0	0.0
Price	SoSh/kg	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6
Fodder yield	t/ha	0.7	0.7	0.7	0.9	0.9	0.9	1.5	1.5	1.5	2.0	2.0	2.0	0.0	0.0	0.0
Price	SoSh/kg	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Grain value	SoSh	14940	17460	11760	19920	23280	15680	32370	37830	25480	44820	52380	35280	0	0	0
Stover value	SoSh	3500	3500	3500	4500	4500	4500	7500	7500	7500	10000	10000	10000	0	0	0
Gross value	SoSh	18440	20960	15260	24420	27780	20180	39870	45330	32980	54820	62380	45280	0	0	0
VARIABLE COSTS																
Seed	kg	20.0	20.0	20.0	20.0	20.0	20.0	24.0	24.0	24.0	24.0	24.0	24.0	0.0	0.0	0.0
	SoSh/kg	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5
	value	746	874	590	746	874	590	895	1049	708	895	1049	708	0	0	0
Fertiliser	kg	10.0	10.0	10.0	12.0	12.0	12.0	18.0	18.0	18.0	23.0	23.0	23.0	0.0	0.0	0.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	438	438	324	526	526	389	788	788	583	1007	1007	745	0	0	0
Pesticide	kg	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	0.0	0.0	0.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	600	600	400	600	600	400	900	900	600	900	900	600	0	0	0
Land Prep	Tr.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	0.0	0.0	0.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	812	812	784	0	0	0
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	42.0	42.0	0.0	0.0	0.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	4620	4620	4536	0	0	0
Total Inputs	SoSh	1784	1912	1314	1872	2000	1379	2584	2737	1891	2803	2956	2053	0	0	0
Total Machine	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	5432	5432	5320	0	0	0
Total Variable	SoSh	1784	1912	1314	1872	2000	1379	2584	2737	1891	8235	8388	7373	0	0	0
Gross Margin	SoSh	16656	19048	13946	22548	25780	18801	37286	42593	31089	46585	53992	37907	0	0	0
Labour Input	md	64	64	64	70	70	70	77	77	77	69	69	69	0	0	0
	SoSh/md	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	value	5120	5120	5120	5600	5600	5600	6160	6160	6160	5520	5520	5520	0	0	0
Gross Margin with labour	SoSh	11536	13928	8826	16948	20180	13201	31126	36433	24929	41065	48472	32387	0	0	0
Return to labour	SoSh/md	260	298	218	322	368	269	484	553	404	675	782	549	0	0	0

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File: ihssdr

TABLE C.11
CROP BUDGET - IRRIGATED HAND SESAME, DER SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.3	0.3	0.3	0.4	0.4	0.4	0.6	0.6	0.6	0.9	0.9	0.9	0.0	0.0	0.0
Price	SoSh/kg	56.9	75.8	44.5	56.9	75.8	44.5	56.9	75.8	44.5	56.9	75.8	44.5	56.9	75.8	44.5
Fodder yield	t/ha	0.7	0.7	0.7	0.9	0.9	0.9	1.3	1.3	1.3	1.5	1.5	1.5	0.0	0.0	0.0
Price	SoSh/kg	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Grain value	SoSh	17070	22740	13350	22760	30320	17800	34140	45480	26700	51210	68220	40050	0	0	0
Stover value	SoSh	1400	1400	1400	1800	1800	1800	2600	2600	2600	3000	3000	3000	0	0	0
Gross value	SoSh	18470	24140	14750	24560	32120	19600	36740	48080	29300	54210	71220	43050	0	0	0
VARIABLE COSTS																
Seed	kg	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	0.0	0.0	0.0
	SoSh/kg	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5	37.3	43.7	29.5
	value	187	219	148	187	219	148	187	219	148	187	219	148	0	0	0
Fertiliser	kg	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	13.0	13.0	13.0	0.0	0.0	0.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	0	0	0	0	0	0	438	438	324	569	569	421	0	0	0
Pesticide	kg	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	0	0	0	0	0	0	300	300	200	300	300	200	0	0	0
Land Prep	Tr.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	0.0	0.0	0.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	812	812	784	0	0	0
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	42.0	42.0	0.0	0.0	0.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	4620	4620	4536	0	0	0
Total Inputs	SoSh	187	219	148	187	219	148	925	957	672	1056	1088	769	0	0	0
Total Machine	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	5432	5432	5320	0	0	0
Total Variable	SoSh	187	219	148	187	219	148	925	957	672	6488	6520	6089	0	0	0
Gross Margin	SoSh	18284	23922	14603	24374	31902	19453	35816	47124	28629	47722	64700	36961	0	0	0
Labour Input	md	67	67	67	69	69	69	76	76	76	61	61	61	0	0	0
	SoSh/md	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	value	5360	5360	5360	5520	5520	5520	6080	6080	6080	4880	4880	4880	0	0	0
Gross Margin with labour	SoSh	12924	18562	9243	18854	26382	13933	29736	41044	22549	42842	59820	32081	0	0	0
Return to labour	SoSh/md	273	357	218	353	462	282	471	620	377	782	1061	606	0	0	0

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TABLE C.12
CROP BUDGET - RAINFED MECHANISED MAIZE, GU SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.7	0.7	0.7	0.8	0.8	0.8	1.2	1.2	1.2	1.6	1.6	1.6	1.8	1.8	1.8
Price	SoSh/kg	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6
Fodder yield	t/ha	0.8	0.8	0.8	0.9	0.9	0.9	1.4	1.4	1.4	1.8	1.8	1.8	2.0	2.0	2.0
Price	SoSh/kg	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Grain value	SoSh	17430	20370	13720	19920	23280	15680	29880	34920	23520	39840	46560	31360	44820	52380	35280
Stover value	SoSh	4000	4000	4000	4500	4500	4500	7000	7000	7000	9000	9000	9000	10000	10000	10000
Gross value	SoSh	21430	24370	17720	24420	27780	20180	36880	41920	30520	48840	55560	40360	54820	62380	45280
VARIABLE COSTS																
Seed	kg	18.0	18.0	18.0	20.0	20.0	20.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
	SoSh/kg	51.5	75.9	42.9	51.5	75.9	42.9	51.5	75.9	42.9	51.5	75.9	42.9	51.5	75.9	42.9
	value	927	1366	772	1030	1518	858	1236	1822	1030	1236	1822	1030	1236	1822	1030
Fertiliser	kg	10.0	10.0	10.0	12.0	12.0	12.0	17.0	17.0	17.0	22.0	22.0	22.0	23.0	23.0	23.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	438	438	324	526	526	389	745	745	551	964	964	713	1007	1007	745
Pesticide	kg	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	600	600	400	600	600	400	900	900	600	900	900	600	900	900	600
Land Prep	Tr.Hr	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	7.0	7.0	7.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	812	812	784	812	812	784
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	42.0	42.0	42.0	42.0	42.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	4620	4620	4536	4620	4620	4536
Total Inputs	SoSh	1965	2404	1496	2156	2644	1647	2881	3466	2180	3100	3685	2342	3143	3729	2375
Total Machine	SoSh	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	5432	5320	5432	5432	5432	5320
Total Variable	SoSh	10565	11004	7456	10756	11244	7607	9961	10546	7040	15612	16197	12522	10935	11521	9315
Gross Margin	SoSh	10865	13366	10264	13664	16536	12573	26919	31374	23480	33228	39363	27838	43885	50859	35965
Labour Input	md	43	43	43	49	49	49	59	59	59	48	48	48	49	49	49
	SoSh/md	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
	value	8600	8600	8600	9800	9800	9800	11800	11800	11800	9600	9600	9600	9800	9800	9800
Gross Margin with labour	SoSh	2265	4766	1664	3864	6736	2773	15119	19574	11680	23628	29763	18238	34085	41059	26165
Return to labour	SoSh/md	253	311	239	279	337	257	456	532	398	692	820	580	896	1038	734

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TABLE C.13
CROP BUDGET - RAINFED MECHANISED MAIZE, DER SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.6	0.6	0.6	0.7	0.7	0.7	0.9	0.9	0.9	1.2	1.2	1.2	1.3	1.3	1.3
Price	SoSh/kg	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6
Fodder yield	t/ha	0.7	0.7	0.7	0.8	0.8	0.8	1.1	1.1	1.1	1.4	1.4	1.4	1.5	1.5	1.5
Price	SoSh/kg	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Grain value	SoSh	14940	17460	11760	17430	20370	13720	22410	26190	17640	29880	34920	23520	32370	37830	25480
Stover value	SoSh	3500	3500	3500	4000	4000	4000	5500	5500	5500	7000	7000	7000	7500	7500	7500
Gross value	SoSh	18440	20960	15260	21430	24370	17720	27910	31690	23140	36880	41920	30520	39870	45330	32980
VARIABLE COSTS																
Seed	kg	18.0	18.0	18.0	20.0	20.0	20.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
	SoSh/kg	51.5	75.9	42.9	51.5	75.9	42.9	51.5	75.9	42.9	51.5	75.9	42.9	51.5	75.9	42.9
	value	927	1366	772	1030	1518	858	1236	1822	1030	1236	1822	1030	1236	1822	1030
Fertiliser	kg	0.0	0.0	0.0	0.0	0.0	0.0	15.0	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	0	0	0	0	0	0	657	657	486	745	745	551	745	745	551
Pesticide	kg	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	600	600	400	600	600	400	900	900	600	900	900	600	900	900	600
Land Prep	Tr.Hr	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	7.0	7.0	7.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	812	812	784	812	812	784
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	42.0	42.0	42.0	42.0	42.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	4620	4620	4536	4620	4620	4536
Total Inputs	SoSh	1527	1966	1172	1630	2118	1258	2793	3379	2116	2881	3466	2180	2881	3466	2180
Total Machine	SoSh	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	5432	5432	5320	5432	5432	5320
Total Variable	SoSh	10127	10566	7132	10230	10718	7218	9873	10459	6976	15393	15978	12360	10673	11258	9120
Gross Margin	SoSh	8313	10394	8128	11200	13652	10502	18037	21231	16164	21487	25942	18160	29197	34072	23860
Labour Input	md	42	42	42	48	48	48	57	57	57	47	47	47	47	47	47
	SoSh/md	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	value	3360	3360	3360	3840	3840	3840	4560	4560	4560	3760	3760	3760	3760	3760	3760
Gross Margin with labour	SoSh	4953	7034	4768	7360	9812	6662	13477	16671	11604	17727	22182	14400	25437	30312	20100
Return to labour	SoSh/md	198	247	194	233	284	219	316	372	284	457	552	386	621	725	508

22-Jun-87 11.0
File: rmssdr

TABLE C.14
CROP BUDGET - RAINFED MECHANISED SESAME, DER SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.3	0.3	0.3	0.4	0.4	0.4	0.6	0.6	0.6	0.9	0.9	0.9	1.0	1.0	1.0
Price	SoSh/kg	56.9	75.8	44.5	56.9	75.8	44.5	56.9	75.8	44.5	56.9	75.8	44.5	56.9	75.8	44.5
Fodder yield	t/ha	0.7	0.7	0.7	0.9	0.9	0.9	1.3	1.3	1.3	1.5	1.5	1.5	1.6	1.6	1.6
Price	SoSh/kg	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Grain value	SoSh	17070	22740	13350	22760	30320	17800	34140	45480	26700	51210	68220	40050	56900	75800	44500
Stover value	SoSh	1400	1400	1400	1800	1800	1800	2600	2600	2600	3000	3000	3000	3200	3200	3200
Gross value	SoSh	18470	24140	14750	24560	32120	19600	36740	48080	29300	54210	71220	43050	60100	79000	47700
VARIABLE COSTS																
Seed	kg	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	SoSh/kg	83.4	113.7	66.7	83.4	113.7	66.7	83.4	113.7	66.7	83.4	113.7	66.7	83.4	113.7	66.7
	value	417	569	334	417	569	334	417	569	334	417	569	334	417	569	334
Fertiliser	kg	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	0	0	0	0	0	0	438	438	324	569	569	421	569	569	421
Pesticide	kg	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	0	0	0	0	0	0	300	300	200	300	300	200	300	300	200
Land Prep	Tr.Hr	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	7.0	7.0	7.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	812	812	784	812	812	784
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	42.0	42.0	42.0	42.0	42.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	4620	4620	4536	4620	4620	4536
Total Inputs	SoSh	417	569	334	417	569	334	1155	1307	858	1286	1438	955	1286	1438	955
Total Machine	SoSh	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	5432	5432	5320	5432	5432	5320
Total Variable	SoSh	9017	9169	6294	9017	9169	6294	8235	8387	5718	13798	13950	11135	9078	9230	7895
Gross Margin	SoSh	9453	14972	8457	15543	22952	13307	28505	39694	23583	40412	57270	31915	51022	69770	39805
Labour Input	md	53	53	53	55	55	55	62	62	62	48	48	48	48	48	48
	SoSh/md	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	value	4240	4240	4240	4400	4400	4400	4960	4960	4960	3840	3840	3840	3840	3840	3840
Gross Margin with labour	SoSh	5213	10732	4217	11143	18552	8907	23545	34734	18623	36572	53430	28075	47182	65930	35965
Return to labour	SoSh/md	178	282	160	283	417	242	460	640	380	842	1193	665	1063	1454	829

22-Jun-87 10.41
File: rmfwgu

TABLE C.15
CROP BUDGET - RAINFED MECHANISED FALLOW, GU SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Price	SoSh/kg	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Fodder yield	t/ha	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.2
Price	SoSh/kg	2.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grain value	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stover value	SoSh	2000	2000	2000	0	0	0	0	0	0	0	0	0	0	0	0
Gross value	SoSh	2000	2000	2000	0	0	0	0	0	0	0	0	0	0	0	0
VARIABLE COSTS																
Seed	kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertiliser	kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pesticide	kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Land Prep	Tr.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Machine	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Variable	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gross Margin	SoSh	2000	2000	2000	0	0	0	0	0	0	0	0	0	0	0	0
Labour Input	md	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	SoSh/md	80	80	80	0	0	0	0	0	0	0	0	0	0	0	0
	value	400	400	400	0	0	0	0	0	0	0	0	0	0	0	0
Gross Margin with labour	SoSh	1600	1600	1600	0	0	0	0	0	0	0	0	0	0	0	0
Return to labour	SoSh/md	400	400	400	0	0	0	0	0	0	0	0	0	0	0	0

22-Jun-87 10.36
File: rmfwdr

TABLE C.16
CROP BUDGET - RAINFED MECHANISED FALLOW, DER SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Price	SoSh/kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fodder yield	t/ha	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7
Price	SoSh/kg	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Grain value	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stover value	SoSh	1000	1000	1000	1000	1000	1000	1200	1200	1200	1200	1200	1200	1400	1400	1400
Gross value	SoSh	1000	1000	1000	1000	1000	1000	1200	1200	1200	1200	1200	1200	1400	1400	1400
VARIABLE COSTS																
Seed	kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertiliser	kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pesticide	kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Land Prep	Tr.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inputs	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Machine	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Variable	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gross Margin	SoSh	1000	1000	1000	1000	1000	1000	1200	1200	1200	1200	1200	1200	1400	1400	1400
Labour Input	md	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	SoSh/md	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	value	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
Gross Margin with labour	SoSh	600	600	600	600	600	600	800	800	800	800	800	800	1000	1000	1000
Return to labour	SoSh/md	200	200	200	200	200	200	240	240	240	240	240	240	280	280	280

22-Jun-87 10.50
File: rhmzgu

TABLE C.17
CROP BUDGET - RAINFED HAND MAIZE, GU SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.7	0.7	0.7	0.8	0.8	0.8	1.2	1.2	1.2	1.6	1.6	1.6	1.8	1.8	1.8
Price	SoSh/kg	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6
Fodder yield	t/ha	0.8	0.8	0.8	0.9	0.9	0.9	1.4	1.4	1.4	1.8	1.8	1.8	2.0	2.0	2.0
Price	SoSh/kg	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Grain value	SoSh	17430	20370	13720	19920	23280	15680	29880	34920	23520	39840	46560	31360	44820	52380	35280
Stover value	SoSh	4000	4000	4000	4500	4500	4500	7000	7000	7000	9000	9000	9000	10000	10000	10000
Gross value	SoSh	21430	24370	17720	24420	27780	20180	36880	41920	30520	48840	55560	40360	54820	62380	45280
VARIABLE COSTS																
Seed	kg	18.0	18.0	18.0	20.0	20.0	20.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
	SoSh/kg	51.5	75.9	42.9	51.5	75.9	42.9	51.5	75.9	42.9	51.5	75.9	42.9	51.5	75.9	42.9
	value	927	1366	772	1030	1518	858	1236	1822	1030	1236	1822	1030	1236	1822	1030
Fertiliser	kg	10.0	10.0	10.0	12.0	12.0	12.0	17.0	17.0	17.0	22.0	22.0	22.0	23.0	23.0	23.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	438	438	324	526	526	389	745	745	551	964	964	713	1007	1007	745
Pesticide	kg	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	600	600	400	600	600	400	900	900	600	900	900	600	900	900	600
Land Prep	Tr.Hr	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	7.0	7.0	7.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	812	812	784	812	812	784
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	42.0	42.0	42.0	42.0	42.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	4620	4620	4536	4620	4620	4536
Total Inputs	SoSh	1965	2404	1496	2156	2644	1647	2881	3466	2180	3100	3685	2342	3143	3729	2375
Total Machine	SoSh	8600	8600	5960	8600	8600	5960	7080	7080	4860	7080	7080	4860	2360	2360	1620
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	5432	5432	5320	5432	5432	5320
Total Variable	SoSh	10565	11004	7456	10756	11244	7607	9961	10546	7040	15612	16197	12522	10935	11521	9315
Gross Margin	SoSh	10865	13366	10264	13664	16536	12573	26919	31374	23480	33228	39363	27838	43885	50859	35965
Labour Input	md	43	43	43	49	49	49	59	59	59	48	48	48	49	49	49
	SoSh/md	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
	value	8600	8600	8600	9800	9800	9800	11800	11800	11800	9600	9600	9600	9800	9800	9800
Gross Margin with labour	SoSh	2265	4766	1664	3864	6736	2773	15119	19574	11680	23628	29763	18238	34085	41059	26165
Return to labour	SoSh/md	253	311	239	279	337	257	456	532	398	692	820	580	896	1038	734

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TABLE C.18
CROP BUDGET - RAINFED HAND MAIZE, DER SEASON. (1 ha MODULE)

ITEM	UNITS	SITUATION AND PRICE ASSUMPTION														
		P			FW			W1			W2			W3		
		EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN	EC L	EC H	FIN
GROSS RETURNS																
Crop yield	t/ha	0.5	0.5	0.5	0.6	0.6	0.6	0.8	0.8	0.8	1.1	1.1	1.1	0.0	0.0	0.0
Price	SoSh/kg	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6	24.9	29.1	19.6
Fodder yield	t/ha	0.6	0.6	0.6	0.7	0.7	0.7	0.9	0.9	0.9	1.4	1.4	1.4	0.0	0.0	0.0
Price	SoSh/kg	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Grain value	SoSh	12450	14550	9800	14940	17460	11760	19920	23280	15680	27390	32010	21560	0	0	0
Stover value	SoSh	3000	3000	3000	3500	3500	3500	4500	4500	4500	7000	7000	7000	0	0	0
Gross value	SoSh	15450	17550	12800	18440	20960	15260	24420	27780	20180	34390	39010	28560	0	0	0
VARIABLE COSTS																
Seed	kg	20.0	20.0	20.0	20.0	20.0	20.0	24.0	24.0	24.0	24.0	24.0	24.0	0.0	0.0	0.0
	SoSh/kg	51.5	75.9	42.9	51.5	75.9	42.9	51.5	75.9	42.9	51.5	75.9	42.9	51.5	75.9	42.9
	value	1030	1518	858	1030	1518	858	1236	1822	1030	1236	1822	1030	0	0	0
Fertiliser	kg	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	10.0	15.0	15.0	15.0	0.0	0.0	0.0
	SoSh/kg	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4	43.8	43.8	32.4
	value	0	0	0	0	0	0	438	438	324	657	657	486	0	0	0
Pesticide	kg	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	3.0	3.0	3.0	0.0	0.0	0.0
	SoSh/kg	300	300	200	300	300	200	300	300	200	300	300	200	300	300	200
	value	300	300	200	300	300	200	600	600	400	900	900	600	0	0	0
Land Prep	Tr.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SoSh/Hr	2150	2150	1490	2150	2150	1490	2360	2360	1620	2360	2360	1620	2360	2360	1620
	value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	0.0	0.0	0.0
	SoSh/Hr	116	116	112	116	116	112	116	116	112	116	116	112	116	116	112
	value	0	0	0	0	0	0	0	0	0	812	812	784	0	0	0
Weeding	An.Hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	42.0	42.0	0.0	0.0	0.0
	SoSh/Hr	110	110	108	110	110	108	110	110	108	110	110	108	110	110	108
	value	0	0	0	0	0	0	0	0	0	4620	4620	4536	0	0	0
Total Inputs	SoSh	1330	1818	1058	1330	1818	1058	2274	2860	1754	2793	3379	2116	0	0	0
Total Machine	SoSh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Animal	SoSh	0	0	0	0	0	0	0	0	0	5432	5432	5320	0	0	0
Total Variable	SoSh	1330	1818	1058	1330	1818	1058	2274	2860	1754	8225	8811	7436	0	0	0
Gross Margin	SoSh	14120	15732	11742	17110	19142	14202	22146	24920	18426	26165	30199	21124	0	0	0
Labour Input	md	54	54	54	60	60	60	68	68	68	62	62	62	0	0	0
	SoSh/md	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	value	4320	4320	4320	4800	4800	4800	5440	5440	5440	4960	4960	4960	0	0	0
Gross Margin with labour	SoSh	9800	11412	7422	12310	14342	9402	16706	19480	12986	21205	25239	16164	0	0	0
Return to labour	SoSh/md	261	291	217	285	319	237	326	366	271	422	487	341	0	0	0

APPENDIX D

FARM FINANCIAL ANALYSIS

APPENDIX D

FARM FINANCIAL ANALYSIS

D1 General Method

To derive farm income the crop budget data in Appendix C have been multiplied by the cropping pattern and intensity data given in Table D1. This derives the relative values in financial terms of gross output, variable cost and labour required and includes full allowances for fodder production from the farm. From the resulting farm gross margin (gross output less variable costs) is deducted a charge for hired labour, interest on working capital and farm fixed cost to derive a net farm income, but before allowing any losses in storage or due to drought. When these are deducted, a level of family disposable income is reached which must cover the costs of a family's basic needs. Calculations for this provide the following allowance:

(i) for the value of subsistence drawn from the farm gross output;

(ii) for additional basic foods which have to be purchased;

(iii) to cover other basic household expenses for housing, domestic equipment and travel;

(iv) for social expenses at such times as births, marriages, deaths and for religious festivals;

(v) to cover local taxation of land and housing and contribution to self-help works at the village district or regional level;

(vi) in the case of those who are still left with a surplus, a reserve fund to cover future drought losses or contingency needs.

The final level of family outgoings for an average family of five people is estimated at SoSh 96 900 per year. This compares with a target income set for the Homboy study at SoSh 72 000 per annum per family. The assumptions made in this study are thought more representative of the real cost of living, if a family is to achieve certain basic standards in food, shelter, security and social effectiveness. The sum equates to an allowance of SoSh 50 per head daily or US$ 3.00 per family daily or about US$ 215 per head annually.

When these are deducted it establishes a family budget balance derived from cropping and fodder production. If the balance is positive, this capital is available for savings, investment, consumption of consumer or luxury items or for the repayment of development charges which the project may induce by selecting this project area for intervention. If the balance is negative, it indicates the additional levels of income which would be required from other sources such as livestock or livestock product sales, farm labouring or off-farm earnings. A comparison of net farm income with the value of basic food subsistence required also indicates the level of potential poverty which might prevail.

To assist in the interpretation of the effect of these balances on the family budget, the surpluses or deficits have been converted into their equivalent values either as the additional land area it implies or the level of productivity achieved in each situation. This is taken as the value of net farm

TABLE D1

Typical Cropping Pattern Assumptions (ha)

Model: Irrigated Mechanised - Farm Size (10 ha)

Crop	Situation P	FW0	FW
Maize - gu	8.0	8.0	9.5
Maize - der	2.0	2.0	2.5
Sesame	4.0	4.0	4.5
Cotton	0.1	0.5	1.0
Tomato	0.3	0.3	0.3
Water melon	0.1	0.1	0.1
Fallow - gu	2.0	2.0	0.5
Fallow - der	3.5	3.1	1.5
Cropping intensity	145%	149%	180%

Model: Irrigated Hand - Farm Size (1 ha)

Maize - gu	0.85	0.85	0.95
Maize - der	0.20	0.20	0.25
Sesame	0.45	0.50	0.60
Fallow - gu	0.15	0.15	0.05
Fallow - der	0.35	0.30	0.15
Cropping intensity	150%	155%	180%

Model: Rainfed Mechanised - Farm Size (10 ha)

Maize - gu	8.5	8.5	9.5
Maize - der	1.0	1.0	1.5
Sesame	5.0	5.0	5.5
Fallow - gu	1.5	1.5	0.5
Fallow - der	4.0	4.0	3.0
Cropping intensity	145%	145%	155%

Model: Rainfed Hand Cultivation - Farm Size (1 ha)

Maize - gu	0.85	0.85	0.95
Maize - der	0.15	0.15	0.20
Sesame	0.50	0.50	0.55
Fallow - gu	0.15	0.15	0.05
Fallow - der	0.35	0.35	0.25
Cropping intensity	150%	150%	170%

income per hectare after storage and drought losses. Alternatively, the balance can be equated to a value of a certain number of stock (either sold or invested) or as a number of man-days of work (to earn or available to hire). Comparisons of these allow an impression of the farm size which would be needed or could be afforded and the degree of agropastoralism (or labouring) required or the potential available to invest in agropastoralism (or hired labour). The relative importance of different animal species in overcoming cash flow deficits becomes apparent.

D2 Labour Assumptions

Based on the available data, average family size in the project could be five persons. The quality of data is questionable and this makes broad generalisation of labour issues across the project area difficult, particularly when trying to derive a balance of total labour supply and demand in the with and without project situations. For the purposes of analysis, the following family labour profile has been assumed (Table D2).

TABLE D2

Farm Labour Availability

Person	Age	Nr	Lb.U(1)	Assumed field availability (man-days) Farmer	Agro-pastoralist	Tenants labourers
Husband	18-55	1	1.0	250	-	150
Wife	18-55	1	0.6	150	75	75
Adolescent	14-18	1	0.6	150	-	150
Child	under 14	1	-	-	-	-
Elders	over 55	1	0.2	50	25	25
Total		5	2.4	600	100	300

Note: (1) Value as labour units (Lb.U) = 250 man-days.

The analysis tries to distinguish between a farmer without stock and the implications of agropastoralism where both men (herding) and women (small stock and dairy processing and marketing) are more restricted in their availability for field work. To assess the implications for hiring labour, both these assumptions are built into the analysis as well as testing the demands on a medium sized 10 ha farm.

In valuing hired labour, the original crop budget for a gu season crop valued labour at SoSh 200 per man-day and a der season crop at SoSh 80 but, when amalgamated into an annual balance on family labour availability, the hired labour component has been costed at SoSh 200 per man-day on a small farm, as any deficit is deemed to consist solely of labour for weeding the gu season maize. For a medium-sized farm the average annual value of SoSh 135 per man-day has been applied to reflect the need for hired labour in times other than at the peak labour times.

Within the overall financial costing of labour, no allowance has been made for family labour. In the economic analysis, the full labour input is valued at the average annual wage rate of SoSh 135 per man-day. No allowance is made at this

stage on the short-term peaking of labour requirements and the effect that this may have on the need for additional hired labour. The downgrading of women in the labour unit reflects the fact that they have daily family chores, with children, water and fuelwood collection and cooking, that make them less available for work than men.

D3 Fixed Cost and Development Charges

To examine both the family repayment capacity and to analyse future development charge levels, a number of calculations were made to derive annualised costs per hectare and per farm. These have also been converted to cover a typical and generalised situation on one canal command system that might receive the full effects of the proposed development. An average canal system has been set at 200 ha with 200 farmers.

Table D3 shows the calculation of irrigation and land development costs. The approach assumes that the method of charging farmers in the future would be based on the areas actually under crop in any one year. Thus the future cropping intensities of 180% are built into the calculation of the area over which the investment costs are to be spread. Once converted to a 200-ha unit, Table D4 calculates the annual cost per farm for irrigation works and farm equipment for depreciation, amortization, maintenance and interest.

For the present and future without project situation, the rates have been assumed at the costs for farm tools (SoSh 1 625) and the canal maintenance cost (SoSh 1 537). For this calculation, no interest has been included, since a large number of canals remain with a hand labour maintenance system. For the future with project situation, it is assumed that use of the hand sprayer (SoSh 553) will become more widespread to bring the total fixed farm costs from SoSh 3 160 to SoSh 3 720 (rounded to nearest SoSh 10) before any development charges due to project works and technical assistance are added.

The estimation of the costs of extension and project management are more difficult to arrive at. The extension component is complicated by the existing on-going extension investment under the AFMET programme. Based on figures given in recent appraisals of this project, a cost of SoSh 1 740 per ha has been calculated. The post-implementation recurrent cost of project management is estimated at SoSh 2.6 million per annum. If half this were allocated as a potential cost to farmers and spread over a total impact area of 7 000 ha of both irrigated and rainfed land, it produces a cost of SoSh 188 per ha.

D4 Land Levelling Charges and Revolving Fund

The costings for the revolving fund for land levelling have been based on an equivalent contract cost per hectare. It has been assumed that rates given in Tables B5.17, B5.20 and B5.21 will apply, with a working rate of 0.6 ha per day over 125 days a year. This produces a machinery cost of SoSh 21 940 per ha. While the project will cover the initial costs of photogrammetric survey and mapping, the detailed field survey and controls have been costed in against the farmer, together with an allocation for office overheads. The annual costs of these have been spread across the annual work rate of a machine of 75 ha per year.

The resulting charges and build-up of the revolving fund for the purposes of analysis are shown in Table D5.

TABLE D3

Irrigation and Land Development Costs
(Base Costs plus 10% contingency)

	Project works	Credit fund	Total	Unit rate (SoSh)	Total cost (SoSh)
Head Regulators (Nr)					
0.45	1	2	3	801 900	2 405 700
0.60	10	11	21	1 217 700	25 571 700
0.75	3	3	6	1 336 500	8 019 000
Rehabilitation	4	-	4	1 188 000	4 752 000
Total					40 748 400
Over overall future cropped area at 75% reliability of 5 940 ha					
Per hectare of crop costs of 6 860/ha					
For a 200 ha canal area					1 372 000
Canal Remodelling (km)					
Length	52.6	24.3	76.9	277 200	21 316 680
Over overall future cropped area at 75% reliability of 5 940 ha					
Per hectare of crop cost of 3 589/ha					
For a 200 ha canal area					717 730
Farm Turnouts					
Length of canal (km)	40.4	-	40.4		
Number of turnouts	1 063	-	1 063	99 000	105 237 000
Number of checks	107	-	107	99 000	10 593 000
Total					115 830 000
Over overall future cropped area at 75% reliability of 3 312 ha					
Per hectare of crop cost of 34 973/ha					
For a 200 ha canal area					6 994 570
Land Levelling					
Area covered (ha)		600	600	21 940	13 164 000
Over overall future cropped area at 75% reliability of 1 296 ha					
Per hectare of crop costs of 10 157/ha					
For a 200 ha canal area					2 031 480

TABLE D4

Investment and Depreciation Costs

Item	Number of farmers	Capital costs ('000)	Depreciation Period	Depreciation Cost	Main-(1) tenance	Annual(2) interest	Total cost
				Costs per farm (ha)			
Project Components							
Regulators	200	1 372.00	20	343	274	515	1 132
Canal	200	717.73	20	-	1 537	269	1 806
Irrigation structure	200	6 994.57	20	1 749	1 399	2 623	5 771
Sub Total							8 709
Land levelling	200	2 031.48	10 (2)	1 016	1 463(3)	762	3 241
Family Components							
Hand sprayer	5	8 500	5	340	85	128	553
Farm tool	1	5 000	4	1 250	-	375	1 625
Sub-total							2 178

Notes: (1) Maintenance costs of regulators and structures at 4% canals at machine rate SoSh 1 537/ha which compares with SoSh 417/ha if done by hand.
(2) Interest charged at 15%.
(3) Amortisation period of 10 years assumed on loan, and maintenance at 20% of capital every three years.
(4) No depreciation charged, as maintenance costs will extend life of canal indefinitely.

TABLE D5

Land Levelling Costs (SoSh)

	Per hour	Per hectare
Machine	1 288	17 170
Staff	220	2 930
Demonstrations	48	640
Overheads	90	1 200
Total	1 646	21 940

Credit Fund Required	Year					
Hectares/year	1	2	3	4	5	Total
- Irrigated	20	40	80	160	300	600
- Rainfed	10	20	40	80	160	310
Total fund						
- Irrigated	438.8	877.6	1 755.2	3 510.4	6 582.0	13 164.0
- Rainfed	219.4	438.8	877.6	1 755.2	3 510.4	6 801.4

Clearly, actual costs per hectare will vary from farm to farm depending on the quantity of earth to be moved. The range indicated by the Consultant's sample survey suggests between 75 and 200 m^3/ha. This would lead to a range from about SoSh 12 650 to SoSh 33 750 per hectare on individual farms. Thus, depending upon the results of the photogrammetric survey, some flexibility in the level of the actual funds required should be allowed for project management.

No allowances for credit interest payments have been made in the analysis. It is assumed that this will be changed at current rates for long-term loans (see Table D6) and will be added to the value of the fund to protect it against infiltration.

D5 Interest Charges

For the financial analysis, interest charges that currently prevail on short, medium and long-term credit and investment programmes have been applied. Table D6 summarises these data. The working capital in each family farm model is taken as the variable costs of production plus the costs of hired labour as estimated. The seasonal interest charge is set at 15%.

D6 Family Subsistence Requirements

Based on an average family size of five persons, allowance has been made for a basic ration diet of 400 g of cereals, 40 g of oil and 40 g of beans per head per day. At the projected financial prices given in Chapter 5 this leads to a total annual family subsistence requirement of about SoSh 25 900. Beans have not been separately calculated in the farm cropping patterns. However, this crop is usually interplanted in small quantities in amongst the maize. It is assumed that the yield reduction in maize balances the value of cowpea produced in this interplanting system.

TABLE D6

Interest Rate Structure, June 1981 to February 1986 (%)

	From 6.30.81	From 6.30.82	From 1.1.83	From 1.1.85	From 2.1.86	From 1.1.87
Interest Rates on Credits						
Central Bank:						
Official discount rate	6.0	8.0		12.0	12.0	12.0
Government credits	6.0	8.0		12.0	12.0	12.0
Commercial Bank:						
Credit to cooperatives and small-scale farmers	-	-		15.0	15.0	15.0
Credit to public enterprises	-	-		19.0	19.0	19.0
Credit to export	10.0	12.0		15.0	15.0	15.0
Credit to national private enterprises	-	-		19.0	20.0	20.0
Credit to foreign enterprises	12.5	14.5		20.0	21.0	21.0
UNCDF	-	-		10.0	10.0	15.0
Development Bank:						
Medium-term (2-6 year) loans to agriculture and handicraft	10.0	10.0		14.0	14.0	21.0
Medium-term (2-6 year) loans to industry and mining	11.0	11.0		15.0	15.0	15.0
Medium-term (2-6 year) loans to others	12.0	12.0		16.0	16.0	16.0
Long-term (7-20 year) loans to agriculture and handicraft	11.0	11.0		15.0	15.0	15.0
Long-term (7-20 year) loans to industry and mining	12.0	12.0		16.0	16.0	16.0
Long-term (7-20 year) loans to others	14.0	14.0		17.0	17.0	17.0
Interest Rates on Deposits						
Private sector:						
Ordinary savings	6.0	8.0			12.0	12.0
Time savings 3 months	6.5	8.5			14.0	14.0
Time savings 6 months	7.0	9.0			15.0	15.0
Time savings 12 months	7.5	9.5			16.0	16.0
Time savings 24 months	8.5	10.5			17.0	17.0
Time savings over 24 months	9.0	11.0			18.0	22.0
External accounts:						
Ordinary savings			7.0			
Time savings 3 months			8.0			
Time savings 6 months			8.5			
Time savings 12 months			9.0			
Time savings 24 months or longer			10.5			

Source: Somali authorities.

D7 Storage and Drought Losses

The average crop yields used to derive gross output have not allowed for any losses that might occur in harvesting, transport, storage, processing or marketing. These are all costs incurred by a family and an allowance of 5% of gross output has been assumed. No allowance has been made for items which may be fed within the family farm to stock or poultry.

The average crop yields are also based on a year when sufficient rain or irrigation water to mature a crop is available. However, the nature of the rainfall and river flow regimes are such that regular failure of supply does occur. When it does, a complete grain failure results and family cash flow suffers accordingly. An attempt was made to correlate the occurrence of crop failures as reported in the Consultant's interviews with farmers and canal committees with the seasonal climate and hydrological records. The shortage of field survey time and gaps in records meant that this correlation could not be rigorous. After a considered appraisal of the information available, a rate of water and crop failure in the irrigated areas was judged to be once in every ten years in the gu season and less severe in the der season. In the rainfed areas, grain failure from drought is judged at one year in eight in the gu season and one year in four during the der season.

To reflect drought loss over time in the annualised farm budgets, deductions were made for irrigated crops of 10% of gross output and for the rainfed crops of 15% of the gu season crops and 25% of the der season.

D8 Farm Models: Farm and Family Incomes and Repayment Capacity

Based on the data just given and the methods laid out, Tables D7 to D22 provide the details of farm gross margins, labour requirements, farm incomes, family incomes and repayment capacity.

TABLE D7

Summary of Gross Margins (SoSh/ha)
Model: Irrigated Mechanised - Financial Prices

Item	P	Situation FW0	FW1	FW2	FW3
Maize - Gu					
Gross output	30 020	37 900	47 740	64 960	69 880
Variable cost	7 377	7 598	6 978	12 784	9 544
Gross margin	22 643	30 302	40 762	52 176	60 336
Labour required (MD)	51	58	66	59	59
Gross margin per MD	444	522	618	884	1 023
Maize - Der					
Gross output	17 720	22 640	35 440	50 200	55 120
Variable cost	7 215	7 371	6 816	12 298	9 220
Gross margin	10 505	15 269	28 624	37 902	45 900
Labour required (MD)	49	55	63	56	57
Gross margin per MD	214	278	454	677	805
Sesame					
Gross output	18 200	22 750	31 850	45 300	49 800
Variable cost	6 294	6 294	5 782	11 200	7 960
Gross margin	11 907	16 457	26 068	34 101	41 841
Labour required (MD)	57	59	66	58	58
Gross margin per MD	209	279	395	588	721
Cotton					
Gross output	32 400	45 360	64 800	84 240	97 200
Variable cost	-	924	1 583	7 168	7 530
Gross margin	32 400	44 436	63 217	77 072	89 670
Labour required (MD)	54	62	74	68	75
Gross margin per MD	600	717	854	1 133	1 196
Tomato					
Gross output	100 000	120 000	200 000	240 000	280 000
Variable cost	6 452	6 614	6 038	6 400	3 160
Gross margin	93 548	113 386	193 962	233 600	276 840
Labour required (MD)	118	118	122	125	127
Gross margin per MD	793	961	1 590	1 869	2 180
Water melon					
Gross output	183 000	219 600	311 100	366 000	36 000
Variable cost	6 042	6 528	5 952	6 314	3 074
Gross margin	176 958	213 072	305 148	359 686	362 926
Labour required (MD)	75	80	90	96	96
Gross margin per MD	2 359	2 663	3 391	3 747	3 780
Fallow - Gu					
Gross margin	1 500	1 500	1 800	1 800	2 000
Labour required (MD)	5	5	5	5	5
Gross margin per MD	300	300	360	360	400
Fallow - Der					
Gross margin	2 000	2 000	2 220	2 200	2 400
Labour required (MD)	5	5	5	5	5
Gross margin per MD	400	400	440	440	480

TABLE D8

Farm Gross Output, Costs and Labour Required

Model: Irrigated Mechanised - Financial Prices - 1 ha

Item	P	FW0	FW1	FW2	FW3
		Gross output (SoSh)			
Maize - gu	24 016	30 320	45 353	61 712	66 386
Maize - der	3 544	4 528	8 860	12 550	13 780
Sesame	7 280	9 100	14 333	20 385	22 410
Cotton	324	2 268	6 480	8 424	9 720
Tomato	3 000	3 600	6 000	7 200	8 400
Water melon	1 830	2 196	6 222	7 320	7 200
Fallow - gu	300	300	270	270	300
Fallow - der	700	620	330	330	360
Total	40 994	52 932	87 848	118 191	128 556
		Variable costs (SoSh)			
Maize - gu	5 902	6 078	6 629	12 145	9 067
Maize - der	1 443	1 474	1 704	3 075	2 305
Sesame	2 518	2 518	2 602	5 040	3 582
Cotton	-	46	158	717	753
Tomato	194	198	181	192	95
Water melon	60	65	119	126	61
Fallow - gu	-	-	-	-	-
Fallow - der	-	-	-	-	-
Total	10 117	10 379	11 393	21 295	15 863
		Labour required (man-days)			
Maize - gu	40.8	46.4	62.7	56.1	56.1
Maize - der	9.8	11.0	15.8	14.0	14.3
Sesame	22.8	23.6	29.7	26.1	26.1
Cotton	0.5	3.1	7.4	6.8	7.5
Tomato	3.5	3.5	3.7	3.8	3.8
Water melon	0.8	0.8	1.8	1.9	1.9
Fallow - gu	1.0	1.0	0.8	0.8	0.8
Fallow - der	1.8	1.6	0.8	0.8	0.8
Total	81.0	91.0	122.7	110.3	111.3

TABLE D9

Farm Net Incomes Analysis

Model: Irrigated Mechanised - Financial Prices

Item	P	Gross margin - 1 ha farm (SoSh) FW0	FW1	FW2	FW3
Farm Organisation					
Maize - gu	18 114	24 241	38 723	49 567	57 319
Maize - der	2 101	3 054	7 156	9 476	11 475
Sesame	4 763	6 583	11 731	15 345	18 828
Cotton	324	2 222	6 322	7 707	8 967
Tomato	2 806	3 402	5 819	7 008	8 305
Water melon	1 770	2 131	6 103	7 194	7 259
Fallow	1 000	920	600	600	540
Cropping intensity (%)	145	149	180	180	180
Gross output	40 994	52 932	87 848	118 191	128 556
Variable costs	10 117	10 379	11 393	21 295	15 863
Gross margin	30 877	42 553	76 455	96 896	112 693
Labour Organisation - 1 ha farm (e.g. Agropastoralist)					
Labour required (MD)	81	91	123	111	112
Labour available (MD)	100	100	100	100	100
Labour charge (SoSh/MD)	200	200	200	200	200
Labour cost	-	-	4 600	2 200	2 400
Farm fixed cost	3 160	3 160	3 720	3 720	3 720
Interest on working capital (15%)	1 518	1 557	2 398	3 524	2 739
Net income	26 199	37 836	65 737	87 452	103 834
Per man-day	323	416	534	788	927
Labour Organisation - 10 ha farm (e.g. Farmers only or with hired herders)					
Labour required (MD)	810	910	1 230	1 110	1 120
Labour available (MD)	600	600	600	600	600
Labour charge	135	135	135	135	135
Labour cost	28 350	41 850	85 050	68 850	70 200
Farm fixed cost	31 600	31 600	37 200	37 200	37 200
Interest on working capital (15%)	19 428	21 846	29 847	42 270	34 325
Net income	229 392	330 234	612 453	820 640	895 205
Per man-day	283	363	498	739	880

TABLE D10

Family Income and Repayment Capacity Analysis (SoSh '000)

Model: Irrigated Mechanised - Financial Prices

	P	FW0	FW1	FW2	FW3
One-Hectare Farm					
Farm Income	26.2	37.8	65.7	87.5	103.8
Storage losses (5%)	2.1	2.6	4.4	5.9	6.4
Drought losses (10%)	4.1	5.3	8.8	11.8	12.9
Disposable income	20.0	29.9	52.5	69.8	84.5
Family Outgoings:					
Basic consumption	25.9	25.9	25.9	25.9	25.9
Additional foods	13.0	13.0	14.0	15.0	16.0
Household expenses	47.0	47.0	47.0	47.0	47.0
Reserves	-	-	-	-	-
Social expenses	10.0	10.0	10.0	10.0	10.0
Taxes/self help	1.0	1.0	1.0	1.0	1.0
	96.9	96.9	96.9	96.9	96.9
Off farm/livestock income required or losses incurred	76.9	67.0	55.4	27.1	12.4
Surplus available for development charges	-	-	-	-	-
Equivalent to Extra:					
- land area of (ha) or	3.8	2.2	1.1	0.4	0.1
- shoats (Nr) or	22	19	16	8	4
- cattle (Nr) or	3	3	3	1	1
- camel (Nr) or	3	2	2	1	1
- MD at SoSh 200 or	384	335	277	136	62
at SoSh 80	961	838	693	339	155
Ten-Hectare Farm					
Disposable income (DI)	167.9	250.8	480.7	643.3	792.3
Family outgoings	96.9	96.9	96.9	96.9	96.9
Reserves (15% of DI)	25.2	37.6	72.1	96.5	118.9
Surplus available	45.2	116.3	311.7	449.9	576.5
Equivalent to:					
- land area of (ha) or	2.7	4.6	6.5	7.0	7.3
- shoats (Nr) or	12	32	87	126	162
- cattle (Nr) or	1	4	12	17	22
- camel (Nr) or	1	3	9	13	16
- MD at SoSh 200 or	226	581	1 558	2 249	2 882
at SoSh 80	565	1 453	3 896	5 623	7 206

TABLE D11

Summary of Gross Margins (SoSh/ha)

Model: Irrigated Hand Cultivation - Financial Prices

Item	Situation P	FW0	FW1	FW2
Maize - Gu				
Gross output	25 100	30 020	42 820	60 040
Variable cost	1 314	1 476	1 853	7 594
Gross margin	23 786	28 544	40 967	52 446
Labour required (MD)	65	71	79	69
Gross margin per MD	366	402	519	760
Maize - Der				
Gross output	15 260	20 180	32 980	45 280
Variable cost	1 314	1 379	1 891	7 373
Gross margin	13 946	18 801	31 089	37 907
Labour required (MD)	64	70	77	69
Gross margin per MD	218	269	404	549
Sesame				
Gross output	14 750	19 600	29 300	43 050
Variable cost	148	148	672	6 089
Gross margin	14 603	19 453	28 629	36 961
Labour required (MD)	67	69	76	61
Gross margin per MD	218	282	377	606
Fallow - Gu				
Gross margin	1 500	1 500	1 800	1 800
Labour required (MD)	5	5	5	5
Gross margin per MD	300	300	360	360
Fallow - Der				
Gross margin	2 000	2 000	2 200	2 200
Labour required (MD)	5	5	5	5
Gross margin per MD	400	400	440	440

TABLE D12

Farm Gross Output, Cost and Labour Required

Model: Irrigated Hand Cultivation - Financial Prices - 1 ha

Item	P	FW0	FW1	FW2
		Gross output (SoSh)		
Maize - gu	21 335	25 517	40 679	57 038
Maize - der	3 052	4 036	8 245	11 320
Sesame	6 638	8 820	17 580	25 830
Fallow - gu	225	225	90	90
Fallow - der	700	600	330	330
Total	31 950	39 198	66 924	94 608
		Variable costs (SoSh)		
Maize - gu	1 117	1 255	1 760	7 214
Maize - der	263	276	473	1 843
Sesame	67	67	403	3 653
Fallow - gu	-	-	-	-
Fallow - der	-	-	-	-
Total	1 447	1 598	2 636	12 170
		Labour required (man-days)		
Maize - gu	55.3	60.4	75.1	65.6
Maize - der	12.8	14.0	19.3	17.3
Sesame	30.2	31.1	45.6	36.6
Fallow - gu	0.8	0.8	0.3	0.3
Fallow - der	1.8	1.5	0.8	0.8
Total	100.9	107.8	141.1	120.6

TABLE D13

Farm Net Income Analysis

Model: Irrigated Hand Cultivation - Financial Prices

Item	Gross margin - 1 ha farm (SoSh) P	FW0	FW1	FW2
Farm Organisation				
Maize - gu	20 218	24 262	38 919	49 823
Maize - der	2 789	3 760	7 772	9 477
Sesame	6 571	8 754	17 177	22 177
Fallow - gu	225	225	90	90
Fallow - der	700	600	330	330
Cropping intensity (%)	150	155	180	180
Gross output	31 950	39 198	66 924	94 608
Variable costs	1 447	1 598	2 636	12 710
Gross margin	30 503	37 600	64 288	81 898
Labour Organisation - 1 ha farm (e.g Tenant labourers)				
Labour required (MD)	100.9	107.8	141.1	120.6
Labour available (MD)	300	300	300	300
Labour charge (SoSh/MD)	200	200	200	200
Labour cost	-	-	-	-
Farm fixed cost	3 160	3 160	3 720	3 720
Interest on working capital (15%)	217	240	395	1 907
Net income	27 126	34 200	60 183	76 271
Per man-day	269	317	427	632
Labour Organisation - 1 ha farm (e.g. Agropastoralist)				
Labour required (MD)	100.9	107.8	141.1	120.6
Labour available (MD)	100	100	100	100
Labour charge	200	200	200	200
Labour cost	200	1 600	8 200	4 200
Farm fixed cost	3 160	3 160	3 720	3 720
Interest on working capital (15%)	247	480	1 625	2 537
Net income	27 096	33 960	58 953	75 641
Per man-day	269	315	418	627

TABLE D14

Family Income and Repayment Capacity Analysis (SoSh '000)

Model: Irrigated Hand Cultivation - Financial Prices

	P	FW0	FW1	FW2
Tenant Labourer Farm				
Farm Income	27.1	34.2	60.2	76.3
Storage losses (5%)	1.6	2.0	3.3	4.7
Drought losses (10%)	3.2	3.9	6.7	9.5
Disposable income	22.3	28.3	50.2	62.1
Family Outgoings:				
Basic consumption	25.9	25.9	25.9	25.9
Additional foods	13.0	13.0	13.0	13.0
Household expenses	47.0	47.0	47.0	47.0
Reserves	-	-	-	-
Social expenses	10.0	10.0	10.0	10.0
Taxes/self help	1.0	1.0	1.0	1.0
Total	96.9	96.9	96.9	96.9
Off-farm income required or losses incurred	74.6	68.6	46.7	34.8
Surplus available for development charges	-	-	-	-
Equivalent to Extra:				
- land area of (ha) or	3.3	2.4	0.9	0.6
- shoats (Nr) or	21	20	14	10
- cattle (Nr) or	3	3	2	2
- camels (Nr) or	3	2	2	2
- MD at SoSh 200 or	373	343	234	174
at SoSh 80	932	857	584	435
Agropastoralist				
Disposable income	22.3	28.1	49.0	61.4
Family outgoings	96.9	96.9	96.9	96.9
Off-farm or livestock income required	74.6	68.8	47.9	35.5
Equivalent to Extra:				
- land area of (ha) or	3.3	2.5	1.0	0.6
- shoats (Nr) or	21	20	14	10
- cattle (Nr) or	3	3	2	2
- camels (Nr) or	3	2	2	2
- MD at SoSh 200 or	373	344	240	176
at SoSh 80	932	860	599	444

TABLE D15

Summary of Gross Margins (SoSh/ha)

Model: Rainfed Mechanised - Financial Prices

Item	Situation P	FW0	FW1	FW2	FW3
Maize - Gu					
Gross output	17 720	20 180	30 520	40 360	45 280
Variable cost	7 456	7 607	7 040	12 522	9 315
Gross margin	10 264	12 573	23 480	27 838	35 965
Labour required (MD)	43	49	59	48	49
Gross margin per MD	239	257	398	580	734
Maize - Der					
Gross output	15 260	17 720	23 140	30 520	32 980
Variable cost	7 132	7 218	6 976	12 360	9 120
Gross margin	8 128	10 502	16 164	18 160	23 860
Labour required (MD)	42	48	57	47	47
Gross margin per MD	194	219	284	386	508
Sesame					
Gross output	14 750	19 600	29 300	43 050	47 700
Variable cost	6 294	6 294	5 718	11 135	7 895
Gross margin	8 457	13 307	23 583	31 915	39 805
Labour required (MD)	53	55	62	48	48
Gross margin per MD	160	242	380	665	829
Fallow - Gu					
Gross margin	2 000	2 000	2 200	2 200	2 400
Labour required (MD)	5	5	5	5	5
Gross margin per MD	400	400	440	440	480
Fallow - Der					
Gross margin	1 000	1 000	1 200	1 200	1 400
Labour required (MD)	5	5	5	5	5
Gross margin per MD	200	200	240	240	280

TABLE D16

Farm Gross Output, Costs and Labour Required

Model: Rainfed Mechanised - Financial Prices - 1 ha

Item	P	FW0	FW1	FW2	FW3
		Gross output (SoSh)			
Maize - gu	15 062	17 153	28 994	38 342	43 016
Maize - der	1 526	1 772	3 471	4 578	4 947
Sesame	7 375	9 800	16 115	23 678	26 235
Fallow - gu	300	300	110	110	120
Fallow - der	400	400	360	360	420
Total	24 663	29 425	49 050	67 068	74 738
		Variable costs (SoSh)			
Maize - gu	6 338	6 466	6 688	11 896	8 849
Maize - der	713	722	1 046	1 854	1 368
Sesame	3 147	3 147	3 145	6 124	4 342
Fallow - gu	-	-	-	-	-
Fallow - der	-	-	-	-	-
Total	10 198	10 335	10 879	19 874	14 559
		Labour required (man-days)			
Maize - gu	36.6	41.7	56.1	45.6	46.6
Maize - der	4.2	4.8	5.7	7.1	7.1
Sesame	26.5	27.5	34.1	26.4	26.4
Fallow - gu	0.8	0.8	0.3	0.3	0.3
Gallow - der	2.0	2.0	1.5	1.5	1.5
Total	70.1	76.8	97.7	80.9	81.9

TABLE D17

Farm Net Income Analysis

Model: Irrigated Mechanised - Financial Prices

Item	P	Gross margin - 1 ha farm (SoSh) FW0	FW1	FW2	FW3
Farm Organisation					
Maize - gu	8 724	10 687	22 306	26 446	34 167
Maize - der	813	1 050	2 425	2 724	3 579
Sesame	4 229	6 654	12 971	17 553	21 892
Fallow - gu	300	300	110	110	120
Fallow - der	400	400	360	360	420
Gross output	24 663	29 425	49 050	67 068	74 738
Variable costs	10 198	10 335	10 879	19 874	14 559
Gross margin	14 465	19 090	38 171	47 194	60 179
Labour Organisation - 1 ha farm (e.g. Agropastoralist)					
Labour required (MD)	70	77	98	81	82
Labour available (MD)	100	100	100	100	100
Labour charge (SoSh/MD)	200	200	200	200	200
Labour cost	-	-	-	-	-
Farm fixed cost	3 160	3 160	3 720	3 720	3 720
Interest on working capital (15%)	1 530	1 550	1 632	2 981	2 184
Net income	9 775	14 380	32 819	40 493	54 275
Per man-day	140	187	335	500	661
Labour Organisation - 10 ha farm (e.g. Farmers only or with hired herders)					
Labour required (MD)	701	768	977	809	819
Labour available (MD)	600	600	600	600	600
Labour charge (SoSh/MD)	135	135	135	135	135
Labour cost	13 635	22 680	50 895	28 215	29 565
Farm fixed cost	31 600	31 600	37 200	37 200	37 200
Interest on working capital (15%)	17 342	18 905	23 953	34 043	26 273
Net income	82 073	117 715	269 662	372 482	508 752
Per man-day	117	153	276	460	621

TABLE D18

Family Income and Repayment Capacity Analysis (SoSh '000)

Model: Rainfed Mechanised - Financial Prices

	P	FW0	FW1	FW2	FW3
One-Hectare Farm					
Farm Income	9.8	14.4	32.8	40.5	54.3
Storage losses (5%)	1.2	1.5	2.5	3.4	3.7
Drought losses (10%)	4.7	5.6	9.4	12.9	14.4
Disposable income	3.9	7.3	20.9	24.2	36.2
Family Outgoings:	-96.9	96.9	96.9	96.9	96.9
Off-farm/livestock income required or losses incurred	93.0	89.6	76.0	72.7	60.7
Surplus available for development charges	-	-	-	-	-
Equivalent to Extra:					
- land area of (ha) or	23.9	12.3	3.6	3.0	1.7
- shoats (Nr) or	27	26	22	21	18
- cattle (Nr) or	4	4	3	3	3
- camel (Nr) or	3	3	3	3	2
- MD at SoSh 200 or	465	448	380	364	304
at SoSh 80	1 163	1 120	950	909	759
Ten-Hectare Farm					
Disposable income (DI)	23.1	46.7	150.7	209.5	327.8
Family outgoings	96.9	96.9	96.9	96.9	96.9
Reserves (15% of DI)	-	-	22.6	31.4	49.2
Off-farm or livestock income required	73.8	50.2	-	-	-
Surplus available for development charges	-	-	31.2	81.2	181.7
Equivalent to Extra:					
- land area of (ha) or	3.2	1.1	2.1	3.9	5.5
- shoats (Nr) or	21	15	9	23	51
- cattle (Nr) or	3	2	1	3	7
- camel (Nr) or	2	2	1	2	5
- MD at SoSh 200 or	369	251	156	406	908
at SoSh 80	923	628	390	1 015	2 271

TABLE D19

Summary of Gross Margins (SoSh/ha)

Model: Rainfed Hand Cultivation - Financial Prices

Item	Situation P	FW0	FW1	FW2
Maize - Gu				
Gross output	15 260	20 180	28 060	35 440
Variable cost	1 258	1 647	2 148	7 598
Gross margin	14 002	18 533	25 912	27 842
Labour required (MD)	56	63	71	62
Gross margin per MD	250	294	365	449
Maize - Der				
Gross output	12 800	15 260	20 180	28 560
Variable cost	1 058	1 058	1 754	7 436
Gross margin	11 742	14 202	18 426	21 124
Labour required (MD)	54	60	68	62
Gross margin per MD	217	237	271	341
Sesame				
Gross output	14 750	14 750	24 650	38 400
Variable cost	334	334	334	6 178
Gross margin	14 417	14 417	24 317	32 223
Labour required (MD)	61	61	68	56
Gross margin per MD	236	236	358	575
Fallow - Gu				
Gross margin	2 000	2 000	2 200	2 200
Labour required (MD)	5	5	5	5
Gross margin per MD	400	400	440	440
Fallow - Der				
Gross margin	1 000	1 000	1 200	1 200
Labour required (MD)	5	5	5	5
Gross margin per MD	200	200	240	240

TABLE D20

Farm Gross Output, Costs and Labour Required

Model: Rainfed Hand Cultivation - Financial Prices - 1 ha

Item	P	FW0	FW1	FW2
		Gross output (SoSh)		
Maize - gu	12 971	17 153	26 657	33 668
Maize - der	1 920	2 289	4 036	5 712
Sesame	7 375	7 375	13 558	21 120
Fallow - gu	300	300	110	110
Fallow - der	350	350	300	300
Total	22 916	27 467	44 661	60 910
		Variable costs (SoSh)		
Maize - gu	1 069	1 400	2 041	7 218
Maize - der	159	159	351	1 487
Sesame	167	167	184	3 398
Fallow - gu	-	-	-	-
Fallow - der	-	-	-	-
Total	1 395	1 726	2 576	12 103
		Labour required (man-days)		
Maize - gu	47.6	53.6	67.5	58.9
Maize - der	8.1	9.0	13.6	12.4
Sesame	30.5	30.5	37.4	30.8
Fallow - gu	0.8	0.8	0.3	0.3
Fallow - der	1.8	1.8	1.3	1.3
Total	88.8	95.7	120.1	103.7

TABLE D21

Farm Net Income Analysis

Model: Rainfed Hand Cultivation - Financial Prices

Item	Gross margin - 1 ha farm (SoSh) P	FW0	FW1	FW2
Farm Organisation				
Maize - gu	11 901	15 753	24 616	26 450
Maize - der	1 761	2 130	3 685	4 225
Sesame	7 209	7 209	13 374	17 723
Fallow - gu	300	300	110	110
Fallow - der	350	350	300	300
Cropping intensity (%)	150	150	170	170
Gross output	22 916	27 467	44 661	60 910
Variable costs	1 395	1 726	2 576	12 103
Gross margin	21 521	25 741	42 085	48 807
Labour Organisation - 1 ha farm (e.g. Agropastoralist)				
Labour required (MD)	89	96	120	104
Labour available (MD)	100	100	100	100
Labour charge (SoSh/MD)	200	200	200	200
Labour cost	-	-	4 000	800
Farm fixed cost	3 160	3 160	3 720	3 720
Interest on working capital (15%)	209	259	986	1 935
Net income	18 152	22 322	33 379	42 352
Per man-day	204	233	278	407
Labour Organisation - 10 ha farm (e.g. Farmers only or with hired herders)				
Labour required (MD)	888	957	1 201	1 037
Labour available (MD)	600	600	600	600
Labour charge (SoSh/MD)	135	135	135	135
Labour cost	38 880	48 195	81 135	58 995
Farm fixed cost	31 600	31 600	37 200	37 200
Interest on working capital (15%)	7 925	9 818	16 034	27 004
Net income	136 805	167 797	286 481	364 871
Per man-day	154	175	239	352

TABLE D22

Family Income and Repayment Capacity Analysis (SoSh '000)

Model: Rainfed Hand Cultivation - Financial Prices

	P	FW0	FW1	FW2
One Hectare Farm				
Farm Income	18.2	22.3	33.4	42.4
Storage losses	1.1	1.4	2.2	3.0
Drought losses	4.0	4.7	8.0	9.5
Disposable income	13.1	16.2	23.2	29.9
Family Outgoings:	96.9	96.9	96.9	96.9
Off-farm or livestock income required or losses	83.8	80.7	73.7	67.0
Surplus available for development charges	-	-	-	-
Equivalent to Extra:				
- land area of (ha) or	6.4	5.0	3.2	2.2
- shoats (Nr) or	24	23	21	19
- cattle (Nr) or	4	4	3	3
- camel (Nr) or	3	3	3	2
- MD at SoSh 200 or	419	404	369	335
at SoSh 80	1 048	1 008	921	838
Ten Hectare Farm				
Disposable income (DI)	85.8	106.8	184.5	240.0
Family outgoings	96.9	96.9	96.9	96.9
Reserve (15% of DI)	-	16.0	27.7	36.0
Off-farm or livestock income required or losses	11.1	6.1	-	-
Surplus available for development charges	-	-	59.9	107.1
Equivalent to Extra:				
- land area of (ha) or	1.3	0.6	3.3	4.5
- shoats (Nr) or	4	2	16	30
- cattle (Nr) or	1	1	2	4
- camel (Nr) or	1	1	1	3
- MD at SoSh 200 or	56	31	300	535
at SoSh 80	139	76	749	1 338

APPENDIX E

ECONOMIC BENEFITS CALCULATIONS

APPENDIX E

ECONOMIC BENEFITS CALCULATIONS

E.1 Introduction

This appendix shows the calculation used to derive the project economic incremental benefits shown in Table 10.2. The database is drawn from Appendices C and D and the benefit build-up assumptions in Table 10.1 and the land areas affected discussed in Chapter B7.

TABLE E1

Without Project Economic Benefits

Crop	Irrigated area			Rainfed area		
	Area (ha)	Low Price (gross margin/ha)	High Price (gross margin/ha)	Area (ha)	Low Price (gross margin/ha)	High Price (gross margin/ha)
Maize - gu	0.80	28 022	32 960	0.85	11 614	14 057
Maize - der	0.20	3 379	4 109	0.10	1 120	1 365
Sesame	0.40	7 973	11 693	0.50	7 772	11 476
Cotton	0.05	2 712	2 796	-	-	-
Tomato	0.03	526	1 157	-	-	-
Watermelon	0.01	3 338	4 706	-	-	-
Fallow - gu	0.20	440	440	0.15	330	330
Fallow - der	0.31	512	512	0.40	440	440
Total		46 902	58 373		21 276	27 668
Labour (man-days)						
- gu		47.4	47.4		42.4	42.4
- der		43.6	43.6		34.3	34.3
Labour value		12 968	12 968		11 224	11 224
Economic benefit per hectare		33 934	45 405		10 052	-16 444
Affected area (ha)						
- irrigated		3 000	3 000		-	-
- rainfed		660	660		660	660
Total benefits (SoSh '000)						
- irrigated		101 802	136 215		-	-
- rainfed		6 634	10 853		6 634	10 853
Total		108 436	147 068		6 634	10 853
If storage and drought losses accounted for:						
- storage loss		3 043	3 626		1 759	2 106
- drought loss		6 086	7 252		6 719	8 166
Benefit/hectare		24 805	34 527		1 574	6 172
Total benefit:						
- irrigated		74 415	103 581		-	-
- rainfed		1 039	4 074		1 039	4 074
Total		75 454	107 655		1 039	4 074

TABLE E2

With Project Economic Irrigated Benefits

Crop	Area (ha)	Pessimistic situation Low Price (gross margin/ha)	Pessimistic situation High Price (gross margin/ha)	Optimistic situation Low Price (gross margin/ha)	Optimistic situation High Price (gross margin/ha)
Maize - gu	0.95	45 448	52 883	59 547	69 775
Maize - der	0.25	8 277	9 709	11 350	13 411
Sesame	0.45	14 493	20 379	19 716	28 153
Cotton	0.10	7 745	7 988	9 629	9 947
Tomato	0.03	1 089	2 139	1 344	2 604
Watermelon	0.02	9 552	13 427	11 258	15 817
Fallow - gu	0.05	121	121	121	121
Fallow - der	0.15	297	297	297	297
Total		87 022	106 943	113 262	140 125
Labour (man-days)					
- gu		63.0	63.0	56.3	56.3
- der		59.1	59.1	53.3	53.3
Labour value		17 328	17 328	15 524	15 524
Economic benefit per hectare		69 694	89 615	97 738	124 601
Affected area		3 660	3 660	3 660	3 660
Total benefits at full development (SoSh '000)		255 080	327 991	357 721	456 040
If storage and drought losses accounted for:					
- storage loss		5 158	6 167	6 986	8 438
- drought loss		10 317	12 335	13 971	16 876
Benefit/hectare		54 219	71 113	76 781	99 287
Total benefit		198 442	260 274	281 018	363 390

TABLE E3

With Project Economic Rainfed Benefits

Crop	Area (ha)	Pessimistic situation		Optimistic situation	
		Low Price	High Price	Low Price	High Price
		(Gross margins per hectare)			
Maize - gu	0.95	25 573	29 805	31 567	37 395
Maize - der	0.15	2 706	2 425	3 223	3 891
Sesame	0.55	15 678	21 832	22 227	31 499
Fallow - gu	0.05	121	121	121	121
Fallow - der	0.30	396	396	396	396
Total		44 474	54 579	57 534	73 302
Labour (man-days)					
- gu		56.3	56.3	45.9	45.9
- der		44.2	44.2	35.0	35.0
Labour value		14 796	14 796	11 980	11 980
Economic benefit per hectare		29 678	39 783	45 554	61 322
Affected area		660	660	660	660
Total benefit at full development (SoSh '000)		19 587	26 257	30 066	40 473
If storage and drought losses accounted for					
- storage loss		2 971	3 551	4 087	4 912
- drought loss		11 354	13 773	15 797	19 282
Benefit/hectare		15 353	22 459	25 670	37 128
Total benefit		10 133	14 823	16 942	24 504

TABLE E4

Incremental Irrigated Area Economic Benefits (SoSh '000)

Affected area: 3 660 ha

Year	Without project		With Project		Incremental benefits	
	Low Price	High Price	Low Price	High Price	Low Price	High Price
1.	Pessimistic Situation (No allowances for storage or drought losses)					
1	108 436	147 068	-	-	-	-
2	108 436	147 068	115 768	156 114	7 332	9 046
3	108 436	147 068	130 433	174 206	21 997	27 138
4	108 436	147 068	152 429	201 345	43 993	54 277
5	108 436	147 068	174 426	228 483	65 990	81 415
6	108 436	147 068	211 087	273 714	102 651	126 646
7	108 436	147 068	233 083	300 853	124 647	153 785
8	108 436	147 068	247 748	318 945	139 312	171 877
9	108 436	147 068	255 080	327 991	146 644	180 923
10-50	108 436	147 068	255 080	327 991	146 644	180 923
2.	Optimistic Situation (No allowances for storage or drought losses)					
1	108 436	147 068	-	-	-	-
2	108 436	147 068	120 900	162 517	12 464	15 449
3	108 436	147 068	145 829	193 413	37 392	46 346
4	108 436	147 068	183 222	239 760	74 786	92 692
5	108 436	147 068	220 614	286 105	112 178	139 037
6	108 436	147 068	282 936	363 348	174 500	216 280
7	108 436	147 068	320 328	409 694	211 892	262 626
8	108 436	147 068	345 257	440 591	236 821	293 523
9	108 436	147 068	357 721	456 040	249 285	308 972
10-50	108 436	147 068	357 721	456 040	249 285	308 972

TABLE E5

Incremental Irrigated Area Economic Benefits (SoSh '000)

Affected area: 3 660 ha

Year	Without project		With Project		Incremental benefits	
	Low Price	High Price	Low Price	High Price	Low Price	High Price
1.	Pessimistic Situation (With allowances for storage and drought losses)					
1	75 454	107 655	-	-	-	-
2	75 454	107 655	81 603	115 286	6 149	7 631
3	75 454	107 655	93 902	130 548	18 448	22 893
4	75 454	107 655	112 350	153 441	36 896	45 786
5	75 454	107 655	130 799	176 334	55 345	68 679
6	75 454	107 655	161 546	214 488	86 092	106 833
7	75 454	107 655	179 994	237 381	104 540	129 726
8	75 454	107 655	192 293	252 643	116 839	144 988
9	75 454	107 655	198 442	260 274	122 988	152 619
10-50	75 454	107 655	198 442	260 274	122 988	152 619
2.	Optimistic Situation (No allowances for storage or drought losses)					
1	75 454	107 655	-	-	-	-
2	75 454	107 655	85 732	120 442	10 278	12 787
3	75 454	107 655	106 289	146 015	30 835	38 360
4	75 454	107 655	137 123	184 376	61 669	76 721
5	75 454	107 655	167 958	222 736	92 504	115 081
6	75 454	107 655	219 349	286 670	143 895	179 015
7	75 454	107 655	250 183	325 030	174 729	217 375
8	75 454	107 655	270 740	350 603	195 286	242 948
9	75 454	107 655	281 018	363 390	205 564	255 735
10-50	75 454	107 655	281 018	363 390	205 564	255 735

TABLE E6

Incremental Irrigated Area Economic Benefits (SoSh '000)

Affected area: 660 ha

Year	Without project		With Project		Incremental benefits	
	Low Price	High Price	Low Price	High Price	Low Price	High Price
1.	Pessimistic Situation (No allowances for drought and storage losses)					
1	6 634	10 853	-	-	-	-
2	6 634	10 853	-	-	-	-
3	6 634	10 853	7 282	11 623	648	770
4	6 634	10 853	7 929	12 393	1 295	1 540
5	6 634	10 853	9 225	13 934	2 591	3 081
6	6 634	10 853	11 815	17 015	5 181	6 162
7	6 634	10 853	13 758	19 325	7 124	8 472
8	6 634	10 853	16 349	22 406	9 715	11 553
9	6 634	10 853	18 292	24 717	11 658	13 864
10-50	6 634	10 853	19 587	26 257	12 953	15 404
2.	Optimistic Situation (No allowances for drought and storage losses)					
1	6 634	10 853	-	-	-	-
2	6 634	10 853	-	-	-	-
3	6 634	10 853	7 806	12 334	1 172	1 481
4	6 634	10 853	8 977	13 815	2 343	2 962
5	6 634	10 853	11 320	16 777	4 686	5 924
6	6 634	10 853	16 007	22 701	9 373	11 848
7	6 634	10 853	19 522	27 144	12 888	16 291
8	6 634	10 853	24 208	33 068	17 574	22 215
9	6 634	10 853	27 723	37 511	21 089	26 658
10-50	6 634	10 853	30 066	40 473	23 432	29 620

TABLE E7

Incremental Irrigated Area Economic Benefits (SoSh '000)

Affected area: 660 ha

Year	Without project		With Project		Incremental benefits	
	Low Price	High Price	Low Price	High Price	Low Price	High Price
1.	Pessimistic Situation (With allowances for storage and drought losses)					
1	1 039	4 074	-	-	-	-
2	1 039	4 074	-	-	-	-
3	1 039	4 074	1 494	4 611	455	537
4	1 039	4 074	1 948	5 149	909	1 075
5	1 039	4 074	2 858	6 224	1 819	2 150
6	1 039	4 074	4 677	8 374	3 638	4 300
7	1 039	4 074	7 405	9 986	6 366	5 912
8	1 039	4 074	8 769	12 136	7 730	8 062
9	1 039	4 074	9 224	13 748	8 185	9 674
10-50	1 039	4 074	10 133	14 823	9 094	10 749
2.	Optimistic Situation (No allowances for storage or drought losses)					
1	1 039	4 074	-	-	-	-
2	1 039	4 074	-	-	-	-
3	1 039	4 074	1 834	5 096	795	1 022
4	1 039	4 074	2 629	6 117	1 590	2 043
5	1 039	4 074	4 220	8 160	3 181	4 086
6	1 039	4 074	7 400	12 246	6 361	8 172
7	1 039	4 074	9 786	15 311	8 747	11 237
8	1 039	4 074	12 966	19 397	11 927	15 323
9	1 039	4 074	15 352	22 461	14 313	18 387
10-50	1 039	4 074	16 942	24 504	15 903	20 430

TABLE E8

Economic Cash Flows (SoSh '000)

Year	Incremental benefits Low Price	Incremental benefits High Price	Economic price	Net cash flow Low Price	Net cash flow High Price
1. Pessimistic situation (No allowances for storage or drought losses)					
0	-	-	82 143	(82 143)	(82 143)
1	-	-	240 506	(240 506)	(240 506)
2	7 332	9 046	176 858	(169 526)	(167 812)
3	22 645	27 908	168 962	(146 317)	(141 054)
4	45 288	55 817	149 028	(103 740)	(93 211)
5	68 581	84 496	130 170	(61 589)	(45 674)
6	107 832	132 808	42 037	65 795	90 771
7	131 771	162 257	41 950	89 821	120 307
8	149 027	183 430	41 787	107 240	141 643
9	158 302	194 787	41 514	116 788	153 273
10-50	159 597	196 327	41 239	118 358	155 088
2. Optimistic Situation (No allowances for storage or drought losses)					
0	-	-	82 143	(82 143)	(82 143)
1	-	-	240 506	(240 506)	(240 506)
2	12 464	15 449	176 858	(164 394)	(161 409)
3	38 564	47 827	168 962	(130 398)	(121 135)
4	77 129	95 654	149 028	(71 899)	(53 374)
5	116 864	144 961	130 170	(13 306)	14 791
6	183 873	228 128	42 037	141 836	186 091
7	224 780	278 917	41 950	182 830	236 967
8	254 395	315 738	41 787	212 608	273 951
9	270 374	335 630	41 514	228 860	294 116
10-50	272 717	338 592	41 239	231 478	297 353

Note: Figures in brackets indicate negative values.

TABLE E9

Economic Cash Flows (SoSh '000)

Year	Incremental benefits Low Price	Incremental benefits High Price	Economic price	Net cash flow Low Price	Net cash flow High Price
1. Pessimistic situation (With allowances for storage or drought losses)					
0	-	-	82 143	(82 143)	(82 143)
1	-	-	240 506	(240 506)	(240 506)
2	6 149	7 631	176 858	(170 709)	(169 227)
3	18 903	23 430	168 962	(150 059)	(145 532)
4	37 805	46 861	149 028	(111 223)	(102 167)
5	57 164	70 829	130 170	(73 006)	(59 341)
6	89 730	111 133	42 037	47 693	69 096
7	110 906	135 638	41 950	68 956	93 688
8	124 569	153 050	41 787	82 782	111 263
9	131 173	162 293	41 514	89 659	120 779
10-50	132 082	163 368	41 239	90 843	122 129
2. Optimistic Situation (With allowances for storage or drought losses)					
0	-	-	82 143	(82 143)	(82 143)
1	-	-	240 506	(240 506)	(240 506)
2	10 278	12 787	176 858	(166 580)	(164 071)
3	31 630	39 382	168 962	(137 332)	(129 580)
4	63 259	78 764	149 028	(85 769)	(70 264)
5	95 685	119 167	130 170	(34 485)	(11 003)
6	150 256	187 187	42 037	108 219	145 150
7	183 476	228 612	41 950	141 526	186 662
8	207 213	258 271	41 787	165 426	216 484
9	219 877	274 122	41 514	178 363	232 608
10-50	221 467	276 165	41 239	180 228	234 926

Note: Figures in brackets indicate negative values.