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FEASIBILITY STUDY FOR A FEEDLOT COMPLEX PROJECT IN WESTERN OMDURMAN - SUDAN

Volume 2

BACK GROUND

ARAB ORGANIZATION FOR
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VOLUME II

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CHAPTER 9

1. ECONOMIC BACKGROUND

1.1. INTRODUCTION :

Sudan is the largest country in Africa, with an area of about 2.5 million square kilometers. Its estimated population for 1982 is around 18.7 million. The country has a large development potential especially in agriculture and livestock. Out of 35 million hectares available for cultivation, only about one quarter is being utilised. The development of this agricultural potential requires the introduction of more modern irrigation techniques on the one hand, and the rapid expansion of rainfed agriculture on the other.

With such development potential, the major difficulty is the rudimentary infrastructure especially with the wide dispersion of the growth potential, and the enormous distances between domestic markets and export ports. To overcome these difficulties attention must be given to removing the severe infrastructural bottlenecks, attaining self-sufficiency in a number of consumer goods, and expanding agricultural exports to increase foreign exchange earnings. All of this, however, requires careful planning both at the macro and micro levels.

1.2. GROSS DOMESTIC PRODUCT :

The following table shows the changes in the G. D. P. at current prices by economic activity during the period 1973/74 - 1979/80.

The contribution of the Government Services Sector to the GDP fell markedly from 10.3% in 1973/74 to 9% in 1980/81. This was due to Government policy which was aimed at reducing expenditure under the stabilization programme.

A close review of the developments of Sudanese exports shows that few agricultural products constitute Sudan's main exports. Demand is inelastic and this leads to wide fluctuations in export revenues as prices are governed by the world market situation. In addition terms of trade seem to be deteriorating.

Cotton, Sudan's major export reached an average of 53.5% for the period 1976 - 80. Maize comes second with its export value reaching £S 43 million in 1980 constituting 15.9% of the total exports. Sesame and Gum Arabic come third and fourth reaching £ S 24.9 million (9.2%) and £ S 18.3 million (6.7%) respectively. Exports of groundnuts have fallen considerably dropping from 20.2% of total exports in 1976 to 2.2% in 1980.

Regarding imports, there has been a noticeable increase in the ratio of petroleum products, sugar, tea, wheat and wheat flour to total imports. Increases here are due mainly to the rise in prices internationally for these commodities, as well as the increased levels of domestic consumption.

The trade deficit for 1980 was partly offset by the surplus on the invisible account, mainly due to the substantial increase in private transfers from Sudanese nationals working abroad, net capital inflow and monetary movements.

1.5. ROLE OF LIVESTOCK IN THE ECONOMY :

Sudan's livestock resources are almost all concentrated in the traditional sector. The country's 18 million cattle, 21 million sheep, 13 million goats, and 2.5 million camels represent a tremendous potential for development that has been largely neglected. These livestock are owned principally by pastoralists

who inhabit some 60 million hectares of rangeland ; the bulk of the remainder are owned by small sedentary cultivators. It should be noted that, even when pastoralists have settled , any profits gained from crops are usually invested in more cattle because of the lack of investment opportunities or appropriate savings institutions.

The future of the livestock industry is largely based on realising its potential through improved productivity and better management of the range resources. However, there is no incentive for the individual to either destock or make grazing improvements on communal range. Any solution requires first, an improvement in the land management and adjudication of grazing areas into groups where improved range management can be introduced. It also requires the encouragement of greater offtake through improved marketing and the creation of a demand for feeder stock. This will have five fold advantages : easing grazing pressure on the heavily overstocked rangelands ; improving pastoralists' incomes ; increasing the quantity of meat available for the evergrowing population ; allowing a significant expansion of exports of livestock and meat ; and encouraging a stratification of the industry, thus enabling the marketing of higher quality animals and animal products.

It also requires further improvements in animal husbandry and animal health, and the encouragement of mixed farming systems for smallholders with oxen, or through mechanization to improve productivity and to provide alternative investment in crop agriculture as well as improving sedentary farming systems.

In the east, crop agriculture is producing increasing amounts of crop residues, little of which is at present being utilised but which can form the basis of an expanding stock feed industry with potential for both small and large scale development.

It seems apparent, however, that the development potential of the livestock sector has not been realised so far, and that livestock development deserves higher priority than it has received in the past. If the country channels additional resources to grazing lands, livestock, fodder crops and cash crop by-products, it can easily develop a high yielding meat industry.

2. MARKETING AND PRICES

This section reviews the domestic and foreign markets for Sudanese livestock. The first subsection reviews the livestock population in Sudan and the development of meat production. The second subsection discusses local marketing in terms of marketing channels, costs and marging, supply of livestock, levels of prices and domestic demands for meat. The third subsection discusses foreign marketing in terms of the basic foreign markets for Sudanese livestock and available marketing opportunities.

2.1. LIVESTOCK POPULATION AND MEAT PRODUCTION :

2.1.1. DEVELOPMENT OF LIVESTOCK POPULATION :

Table (2.1.) shows the development of the Sudanese livestock population by animal type i.e. cattle, sheep, goats and camels during 1970 - 1981. It also includes estimated for the development of these numbers for the period 1982 - 2000.

During the years 1970 - 1981 livestock population increased annually on the average by 3%, 5.7%, 4.5% and 1.3% for cattle, sheep, goats and camels respectively.

As for the period 1982 - 2000 various rates of growth have been assumed by the Sudanese Government, FAO, and the IBRD depending on estimates of the present livestock population and on the ability of range resources to absorb additional livestock. Estimates given by the Sudanese Government are 3%, 5.7%, 3.6% and 1.6% for cattle, sheep, goats and camels respectively. These figures appear to be more realistic and are utilised to obtain estimated livestock population.

TABLE 2.1 LIVESTOCK POPULATION, HERD OFF - TAKE AND MEAT PRODUCTION

Year	(1) Estimated Livestock Population (000 head)				(2) Estimated herd off-take (000 heads)				Estimated Meat Production (M ton)				
	Cattle	Sheep	Goats	Camels	Cattle	Sheep	Goats	Camels	Beef	Mutton	Goat meat	Camel	Total
1970	12900	11920	8260	2270	1670	2980	2070	182	317300	62600	35190	40950	456040
1977	16000	17000	11700	2400	2080	4250	2930	192	395200	89250	49810	43200	577460
1978	16460	17950	12120	2440	2140	4540	3100	195	406600	95340	52700	43900	598540
1979	16910	18940	12560	2480	2200	4850	3290	198	418000	101850	55930	44500	620280
1980	17350	19960	13000	2520	2250	5170	3480	200	427500	108570	59160	45000	640230
1981	18000	20900	13480	2560	2340	5510	3690	205	444600	115710	62730	46100	669140
1982	18210	22110	13960	2600	2550	5860	3910	208	497250	123060	66470	46800	733580
1983	18620	23240	14460	2640	2600	6230	4130	211	507000	146400	74340	47500	775240
1984	19020	24400	14990	2680	2660	6610	4380	214	518700	155300	78840	48100	800940
1985	19400	25260	15530	2720	2720	7020	4600	217	530400	164970	82800	48800	826970
1990	21420	31170	17670	2859	3000	9350	5300	229	585000	219700	100700	51520	956920
1995	23650	37920	19880	3000	3550	11380	5960	240	692000	284500	113240	54000	1143740
2000	26110	46140	22490	3160	3900	13840	6750	253	780000	321000	128250	57000	1286250

(1) Based on the 1975 - 1976 Pilot Livestock Census, Average growthrate used are 3% declining to 2% for Cattle, 5.7% declining to 4% for sheep, 3.6% declining to 2.5% for Goats and 1.6% declining to 1% for Camels.

(2) Herd Off-take rates used are 13% increasing to 15% for cattle, 25% increasing to 30% for Sheep and Goats, and 8% for Camels.

The geographic distribution of livestock in Sudan varies with environmental conditions and feed availability. Table (2.2) shows that the provinces of South Darfur, white Nile, Southern Kordofan, Upper Nile, and Jonglei contained 56% of the cattle population in 1981 . The same phenomenon appears in the distribution of sheep where 55% of its total population was concentrated in White Nile, Kassala, Northern Darfur, El Gezira, Southern Darfur and Blue Nile Provinces in 1981.

2.1.2. ANNUAL OFFTAKE AND PRODUCTION POSSIBILITIES :

The estimated meat production possibilities depend on the estimates of the livestock population and its expected rate of growth on the one hand, and on the offtake rate on the other. Estimates of livestock population have already been discussed in 2.1.1. above.

The estimates of livestock offtake rate vary between the different types of livestock, level of demand, marketing possibilities and the disparity of veterinary services in each of the provinces. Estimates made by the LMMC are 13% for cattle, 25% for sheep and goats, and 8% for camels are considered to be realistic and are utilised in table (2.1.). The rates for cattle, sheep and goats are increased gradually to reach 15% and 30% respectively in 1995.

Table (2.1.) shows also estimates meat production possibilities in Sudan, assuming that the average carcass weight for cattle will increase from 190 kg to 200 kg. ; for sheep from 21 kg to 25 kg ; and from 17 kg to 19 kg for goats. The average carcass weight for camel is assumed to be 225 kg.

TABLE 2.2. NUMBER OF LIVESTOCK BY PROVINCE
FOR THE YEAR 1980 - 1981

Province	Cattle	Sheep
Blue Nile	1,053,652	1,483,499
White Nile	1,831,407	2,830,695
El Gezira	590,236	1,759,567
Khartoum	66,613	380,769
Kassala	752,009	2,058,353
Red Sea	42,738	287,114
Nile	51,206	349,384
Northern	16,630	271,916
Upper Nile	1,672,724	1,343,060
Jonglei	1,645,153	223,897
Eastern Equatoria	984,433	1,172,987
Western Equatoria	268	1,627
Southern Kordofan	1,718,736	1,064,293
Northern Kordofan	1,097,657	1,167,778
Northern Darfur	1,062,464	1,857,301
Southern Darfur	3,204,829	1,579,701
El Buheyrat	820,752	427,139
Bahr El Ghazal	1,438,013	920,925
Total	18,000,000	20,900,000

Source : LMMC, Khartoum

2.2. LOCAL MARKETING OF MEAT :

Marketing of livestock and meat in Sudan is rather complex due to the huge area of the country, lack of adequate transportation, the poor shape of the infrastructure, the seasonal fluctuations of supply and because the animals are mainly concentrated in remote areas costs of transportation and marketing are high.

2.2.1. MARKETING CHANNELS :

Cattle , sheep and goats are offered for sale through auction either by head or by lot in the provincial markets or in the livestock holding grounds of the producing provinces. Producers or local traders usually sell their livestock to the big merchants or their representatives.

The purchased livestock are then trekked to the Central Market at Omdurman via the stock route, rail or by boat. The stock route is the most common way used for transferring the livestock to Omdurman due to its relatively low cost, £S 17.97 per head compared to £S 30.7 per head on the railway, see tables 2.3. and 2.4. By trekking animals during the wet season use can be made of the rangelands for feeding and watering the cattle, but the method is unsafe during summer (April, May, June) because of the scarcity of food and water.

Using the railway for moving the livestock from Western Sudan markets to the east would obviate the problems faced on the stock routes and reduce the seasonal fluctuations of supply. However, due to bad maintenance and other problems this mode of transportation has decreased in importance recently.

TABLE 2.3. TREKKING COSTS FOR FIFTY CATTLE FROM NYALA TO OMDURMAN

(£S)

	Nyala to El Obeid	El Obeid to Omdurman
Market fees	25	-
Holding fees	5	-
Shepherds	160(1)	140(2)
Leader	120(3)	120
Water	150	75
Salt(4)	56(4)	-
Vaccination	-	7.5
Movement fees for the Local authorities	-	15
Other expenses	25	-
Total cost	£S 541	£S 357.5

(1) Two shepherds, 40 days @ £S2 each/day.

(2) Two shepherds, each £ S 70.

(3) One leader, 40 days @ £S. 3/day.

(4) For the trip from Nyala to Omdurman

(5) Trekking from Nyala to El Obeid takes 40 days and from El Obeid to Omdurman 20 days. Costs of shepherds from Nyala to El Obeid are calculated on a daily rate basis while the same costs are calculated on a contract and agreement basis from El Obeid to Omdurman. The usual size of the herd is about 200 head divided into four groups of 50 ; the total herd can be controlled by one guide (leader) so if the number is increased to 200 heads the total guide cost for 50 will be only £S 60 instead of £S 240. This will reduce trekking cost. Average rate of losses on the way is 2% .

Source : LMMC, Khartoum 1982.

TABLE 2.4. RAILWAY CHARGES

(£ S.)

	Cattle	Calves
Nyala to Khartoum	30.668	18.952
Tibon to Khartoum	24.668	15.391
Babanoussa to Khartoum	22.077	14.214
El Rahad to Khartoum	17.078	10.661
El Obeid to Khartoum	17.078	10.078
Kosti to Khartoum	11.385	7.107
Khartoum to Port Sudan	18.975	11.845

Source : LMMG Khartoum, 1982.

The LMMC through its new livestock Marketing project is seeking to improve the year round movement of animals by rail viz cattle from the present 3,000 head to 48,000 annually, and sheep and goats from the present 51,000 to 486,000. This should lead to a reduction in the present seasonal fluctuations in the availability of meat during the summer on the domestic market.

On their arrival at Omdurman Central Market, livestock destined for domestic consumption are sold to agents who, in turn, sell them to the butchers either by the head or in carcass form. Live animals destined for exports enter the fattening period depending on their status and export requirements. They are transferred to the veterinary quarantine where they remain for three weeks before being moved by rail to Port Sudan for shipment.

In the case of meat exports, the livestock, after completing veterinary requirements, go to the slaughterhouse. After the meat has been chilled or frozen it is despatched to Khartoum airport for shipment to the country of destination.

2.2.2. MARKETING COSTS AND MARGINS :

Table 2.5. shows marketing costs and margins for livestock using the stock route Nyala/Khartoum. As can be seen from the table the producer price represents only 48% of the consumer price per head, while various duties and costs represent 11.2% of the consumer price, and the remaining 41% is accounted for by profit margins and commissions of the various middlemen.

Table 2.6. shows marketing costs and margins for exports of live cattle and beef. It may be noted that the initial prices used in this table are wholesale which includes £S. 35.4 per head

TABLE 2.5. CATTLE MARKETING COSTS FOR LOCAL CONSUMPTION PER HEAD

I t e m s	Absolute value LS.	% from the retailer price
Producer price	124,984	48.07
Local market fees	0,500	0.19
Commission in local market	1.635	0.63
Middlemen Profit (Local market)	9.133	3.51
Local market price	136.252	52.41
Veterinary treatment	0.260	0.100
Central market fees	0.500	0.19
Trekking costs	18.000	6.92
Holding fees	0.100	0.04
Commission in central market	1.500	0.58
Middlemen Profit (Central Market)	35.388	13.61
Wholesale price	192.000	73.85
Quarantine fees	3.000	1.15
Slaughterhouse fees	3.000	1.15
Preparation of meat fees	1.000	0.38
Transport to retailers	1.150	0.44
Retailer Profit spread	59.850	23.02
Retailer price	260.000	100.00

Source : LMMC Khartoum 1982.

will increase the culling rates and fertility.

The same phenomenon exists also in Omdurman central market where the supply of livestock usually exceeds the amount of sales, and the average percentage of sales to supply during 1981 was 66%.

2.2.4. PRICE LEVELS :

Price differentials among the various markets hinge on the distance between them and the central Omdurman Market, and on the risk premium of this marketing operation. The inevitable higher prices at Omdurman central market stem from all the operation costs in addition to duties and profit margins. From data given in tables 2.7. through 2.11. it can be seen that the weighted average price per head of cattle in Omdurman reached £S. 259 in 1981 which is 174%, 172%, 151% and 170% of the prices obtained in Nyala, Elfasher, El Obeid and Kosti respectively.

Seasonal fluctuations in prices are related to the supply of cattle whether in the provincial markets or in Omdurman central market.

Finally cattle prices exhibit increasing trends which correspond to the inflation being experienced by the Sudanese economy at the present time.

TABLE 2.7 CATTLE, ANIMALS ENTERED THE MARKET, ANIMALS SOLD AND AVERAGE PRICE/HEAD AT NYALA MARKET

Year	1978			1979			1980			1981			Index Number	
Month	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)
Jan.	949	405	36.120	3795	2289	83.570	4335	2638	185.000	3596	1681	120.000	86.16	68.84
Feb.	1232	279	45.994	3662	2221	90.000	3961	2314	177.500	2599	1145	103.000	78.45	58.49
March	1280	676	49.742	2625	1322	110.000	3892	1981	172.500	2180	1351	152.300	67.82	52.32
April	2678	737	51.690	1734	828	112.500	2580	1488	172.000	2574	1566	156.333	65.03	45.34
May	1646	1131	52.640	1790	1057	115.000	2297	1451	156.500	1301	731	165.690	47.82	42.89
June	2122	1656	65.930	1431	908	125.000	2143	1214	182.500	1376	845	160.000	48.07	45.38
July	3327	2303	50.460	2455	1425	145.000	5421	2778	175.000	4328	2307	210.000	105.58	86.51
Aug.	7568	4989	62.500	4535	2858	150.000	5917	5213	142.500	6933	5360	140.000	169.63	180.81
Sept.	6245	4768	75.250	10860	6154	183.000	8580	6643	152.500	9957	7812	165.000	242.28	249.10
Oct.	6270	4480	80.500	7087	4156	187.000	7824	2689	119.500	4563	2628	155.000	175.00	136.96
Nov.	4016	2260	75.700	5366	2498	160.000	4161	6643	100.500	5379	2099	140.000	128.63	132.43
Dec.	3111	1699	78.100	5330	3410	181.800	4144	2604	107.460	NA	NA	NA	114.06	100.94

TABLE 2.8 CATTLE, ANIMALS ENTERED THE MARKET, ANIMALS SOLD AND AVERAGE PRICE/HEAD AT KOSTI MARKET

Year	1979			1980			1981			Index Number	
Month	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered	No. Sold
Jan.	-	-	-	4333	2823	160.000	7292	5093	121.000	113.22	106.00
Feb.	-	-	-	4308	2785	166.000	5149	3599	107.000	92.11	85.49
March	-	-	-	4768	3266	150.000	5799	4379	160.000	102.92	102.37
April	-	-	-	4389	3214	145.000	2883	3567	160.000	90.30	90.80
May	-	-	-	2916	2549	145.000	4964	3382	170.000	76.75	79.42
June	-	-	-	2022	1678	125.000	4272	2184	170.000	61.30	51.72
July	2969	2538	156.000	3077	2489	132.000	4760	2921	172.530	70.16	106.43
Aug.	4966	4498	137.500	6199	4866	150.000	9105	5826	163.320	131.61	135.60
Sept.	5666	4747	150.000	8653	5750	145.000	6256	4340	170.000	133.59	132.45
Oct.	2869	2438	155.000	4751	3721	110.000	2404	2883	146.700	84.33	80.72
Nov.	4978	3605	139.000	6331	4565	110.000	8123	3950	162.400	126.17	108.20
Dec.	5535	4561	161.000	6534	4459	128.000	NA	NA	NA	117.54	120.79

TABLE 2.9 CATTLE, ANIMALS ENTERED THE MARKET, ANIMALS SOLD AND AVERAGE PRICE/HEAD AT EL OBEID MARKET

ar	1978			1979			1980			1981			Index Number	
nth	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)
n.	2904	1452	48.688	3693	1843	83.421	4328	2581	138.732	5191	2790	150.00	90.86	92.30
b.	2644	1322	49.882	2684	1486	97.829	3875	2335	152.726	4812	2274	230.00	79.02	78.99
rch	2564	1282	44.296	2937	1529	97.105	5831	2754	133.633	3886	2353	147.00	85.80	84.33
ril	2640	1320	43.412	3855	1663	101.120	2761	1676	143.532	4046	2218	151.00	74.99	73.24
y	2804	1402	51.082	2875	1447	109.989	2930	1557	132.500	2481	1795	162.919	62.52	66.04
ne	2252	1126	52.819	1640	1044	132.133	1482	1027	140.731	2208	1413	175.548	42.75	49.10
ly	3696	2075	46.292	3720	2033	152.982	4542	2785	165.780	3530	3339	169.00	87.32	108.97
gust	5329	3101	75.023	5249	3151	143.848	7580	3459	147.139	6576	4439	181.667	139.45	150.70
pt.	5391	2771	77.225	8726	4478	124.897	9017	4631	150.117	6524	4260	176.700	167.21	171.90
t.	5018	2329	66.186	5504	2873	152.835	7282	3808	158.906	NA	NA	NA	133.84	127.94
v.	3047	1494	71.042	4334	2042	150.789	9125	2651	152.688	NA	NA	NA	124.08	87.86
c.	3273	1669	86.030	5274	2882	142.797	6375	3098	150.000	NA	NA	NA	112.17	108.62

SOURCE : LMMC, KHARTOUM, 1982

TABLE 2.10 CATTLE AT EL FASHER MARKET : ANIMALS ENTERED THE MARKET, ANIMALS SOLD AND AVERAGE PRICES/HEAD

Year	1978			1979			1980			1981			Index Number	
Month	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)
Jan.	3605	1200	50.00	2774	2082	89.00	3218	2618	110.00	3229	2806	160.00	117.08	133.46
Feb.	3783	852	62.00	3476	2346	115.00	3188	2462	126.00	4994	2966	165.00	140.95	132.23
March	4643	978	67.00	3242	2069	115.00	3385	3206	125.00	4121	2318	160.00	140.49	131.39
April	5316	992	45.00	1125	1019	120.00	2002	1742	135.00	2458	1350	160.00	100.33	78.22
May	2438	901	28.00	1102	906	105.00	1696	1136	150.00	1977	952	160.00	65.84	59.70
June	950	680	75.00	619	556	120.00	1148	898	155.00	1455	919	180.00	38.08	46.80
July	1073	928	75.00	1221	864	150.00	1407	1034	165.00	1653	605	130.00	48.88	52.59
Aug.	1565	1067	75.00	1053	906	155.00	1892	1327	135.00	2550	1375	140.00	64.44	71.66
Sept.	1652	1008	80.00	2542	1846	120.00	4099	2493	145.00	4065	2229	145.00	112.80	116.13
Oct.	2569	1790	80.00	3001	2352	110.00	3347	2521	130.00	2276	1130	135.00	102.17	119.46
Nov.	1561	1374	88.00	3103	2432	95.00	8505	2030	130.00	NA	NA	NA	160.27	119.38
Dec.	2319	2179	75.00	3474	2604	120.00	3136	2016	140.00	NA	NA	NA	108.67	138.96

SOURCE : LMM C, KHARTOUM 1982

TABLE 2.11 CATTLE AT OMDURMAN MARKET, ANIMALS ENTERED THE MARKET, ANIMALS SOLD AND AVERAGE PRICES / HEAD

Year	1978			1979			1980			1981			Index Number	
Month	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)	Average Price LS.	No. Entered (Head)	No. Sold (Head)
Jan.	2603	1918	80.000	18348	13939	92.000	12613	8154	200.000	8932	6530	294.000	89.47	95.26
Feb.	1789	1109	80.000	16167	11516	75.000	11941	8565	212.000	9460	6980	239.000	82.86	87.87
March	2582	1782	80.000	18514	11662	110.000	13569	9224	211.000	7611	5760	192.000	89.01	88.67
April	1630	950	95.000	14087	9357	160.000	8716	4957	250.000	7637	6070	257.570	67.52	66.60
May	2009	1239	100.000	13630	9643	208.000	8328	6094	233.000	7338	6065	352.550	65.91	71.87
June	1528	773	110.000	9106	7600	180.000	6521	4849	264.000	3975	3197	325.290	44.49	51.16
July	10358	5603	110.000	10257	8530	228.242	6013	4115	303.000	5135	3911	372.450	66.88	69.12
Aug.	14967	7847	127.000	10981	7314	206.071	8873	6226	301.000	11475	7369	260.500	97.47	89.69
Sept.	21090	11725	115.000	28338	21570	208.000	18179	8078	271.000	13433	8699	232.000	170.62	156.17
Oct.	29833	21223	105.500	17521	12139	180.000	13755	8451	243.000	15660	10072	224.000	161.63	161.85
Nov.	18967	10312	97.500	14695	10984	166.500	12562	8316	275.100	17162	9804	229.000	133.46	122.96
Dec.	19882	13306	87.000	15109	11017	215.000	11557	9041	212.000	NA	NA	NA	130.67	138.76

TABLE 2.12. ACTUAL AND PROJECTED CATTLE PRICE PER HEAD IN THE LOCAL AND CENTRAL MARKETS

(£S)

Markets/ Months	1978	1981	1982 (Projected)
Nyala Market :			
January to March	44.92	125.79	177
April to June	58.69	159.50	223
July to September	65.24	163.05	207
October to November	78.73	148.34	184
El Fasher Market :			
January to March	58.86	161.83	227
April to June	46.80	165.71	249
July to September	76.68	141.21	174
October to November	80.02	135.00	162
El Obeid Market :			
January to March	47.69	173.58	260
April to June	48.60	161.34	240
July to September	68.29	176.40	241
October to November	73.54	153.90	219
Omdurman Market :			
January to March	80.00	243.54	353
April to June	101.01	295.76	423
July to September	117.63	270.01	356
October to November	98.17	226.47	299

Source : Tables (2.7.), (2.9.), (2.10), (2.11.).

2.2.5. LOCAL DEMAND FOR MEAT :

(1) Per Capita and Total Meat Consumption

Table 2.13. shows that the average per capita consumption of meat increased from 26 kg in 1975/76 to 29.9 kg in 1979/80 showing an annual growth rate of 3.6%. Using these estimates of meat consumption together with the population estimates of table 2.14 this table (2.13.) also gives the total meat consumption according to various types.

(2) Consumer Preferences

Table 2.13 shows that meat consumption patterns in Sudan favour red meat over white meat, as evidenced by the fact that per capita consumption of red meat was more than 30 times that of white meat in 1975/76 and 26 times in 1979/80.

In Sudan, cattle provide 42% of the total red meat consumed, sheep 27% and goats and camels 31%. Despite beef having the greater share of total red meat consumption lamb meat is preferred as can be seen from the price differential where the price per kilogram of lamb reach 155% that of beef in early 1980, see table 2.15.

(3) Seasonality of Consumption

Per capita and total consumption of beef show the same seasonal fluctuations as the supply of meat in the markets. Though only about one half of the cattle are slaughtered in public abattoirs, these figures can be used to show the seasonal fluctuations in meat consumption.

TABLE 2.13. PROJECTIONS OF MEAT CONSUMPTIONS IN SUDAN

Food	Consumption (1975/76)		Consumption (1979/80)		Income Elasticities of demand applied	Projected per Capita		Projected Demand (000 MT)	
	per capita (kg)	total 000 MT	per capita (kg)	Total 000 MT		1985	1995	1985	1995
Beef & Veal	10.4	163	11.9	210	0.8	13.2	15.5	275.9	420.1
Mutton & Lamb	6.4	101	7.7	135	1.0	8.8	10.7	183.9	290.0
Goat Meat	1.4	22	1.6	28	0.6	1.7	1.9	35.5	51.5
Camels Meat	7.0	110	7.6	133	0.5	8.0	8.9	167.2	241.2
Total others Animals Meat	25.2	396	28.8	506	-	31.7	37.0	662.5	1002.8
Poultry Meat	0.8	13	1.1	20	1.0	1.3	1.6	27.2	43.4
Total Meat	26.0	409	29.9	526	-	33.0	38.6	689.7	1046.2

SOURCE :

(1) WORLD BANK : Sudan Agricultural Sector Survey Volume, 1979 for per capita Projections

(2) Table (2.14) for Total Population.

TABLE 2.14. URBAN AND TOTAL POPULATION

(MILLION)

Years	Total Population	Urban Population	
			%
1970	14.1	2.5	17.7
1975	15.7	3.0	19.1
1979	17.9	4.1	22.9
1980	18.4	4.2	23.0
1985	20.9	5.4	26.0
1990	23.8	6.9	29.0
1995	27.1	8.4	31.0
2000	30.8	10.2	33.0

Gorwth rate in total population used in projections equals 2.6%.

SOURCE : Arab Organization for Agricultural Development
Year Book of Agricultural Statistics Vol. 1.

TABLE 2.15 AVERAGE RETAIL PRICES OF ANIMAL PRODUCTS IN KHARTOUM (LS. PER KG.)

Food	1977	1978	1979	Jan. 1980
Beef (kg.)	0.592	0.794	1.251	1.400
Mutton (Kg.)	0.807	1.131	1.779	2.167
Milk (Kg.)	0.209	0.260	0.302	0.331
Eggs (Each)	0.053	0.060	0.077	0.100
Poultry Meat (kg)	1.000	1.200	1.300	1.680
Durra (Kg)	0.082	0.117	0.124	0.128

Source : Department of Statistics.

Table 2.16. shows monthly slaughtering figures for cattle in Omdurman, El Obeid and Nyala over the period 1978 - 1981. The data indicates similarity in the pattern of seasonal fluctuations in these cities where slaughtering increases during September to January, and decreases from February to August. This seasonal fluctuation in beef supply reflects also seasonal fluctuations in prices. Beef prices during the shortage period, February - August, are about 125% of prices for the period September to January.

(4) ESTIMATES OF QUANTITY DEMANDED AND PRICES :

Table 2.13 shows the projected total demand for meat on the basis of the growth of per capita meat consumption, and the growth in population. The growth in per capita meat consumption in turn depends on the expected growth rate of the per capita income, and the income elasticity of demand for meat. As can be seen from the table, per capita consumption of beef and veal is going to increase from 11.9 kg in 1979/80 to 13.2 kg in 1985, and to 15.5 kg in 1995. This means that total demand for beef and veal in 1985 and 1995 will reach 275.9 and 420.1 thousand tons respectively.

Regarding meat prices, table 2.17 shows them for beef, veal and mutton in Khartoum during the period 1979 - 81. The table shows the seasonal fluctuation in prices, mentioned above, and also some differences in actual and official prices, where the difference tends to increase during the period of supply shortage. Finally, the table shows the rising trend of meat prices that correspond with the current inflationary trends in Sudan.

TABLE 2.16 OFFICIAL SLAUGHTERING OF CATTLE IN SOME SELECTED TOWNS

(HEADS)

Month	1978			1979			1980			1981			Index Number		
	Omdurman	El Obeid	Nyala	Omdurman	Elobeid	Nyala	Omdurman	Elobeid	Nyala	Omdurman	Elobeid	Nyala	Omdurman	Elobeid	Nyala
Jan.	5454	1146	NA	7359	1391	345	4742	1391	245	3250	1306	326	110	117	106
Feb.	4490	1097	NA	3819	862	234	4208	1105	228	2304	1258	348	79	96	93
March	4962	1228	NA	6059	1103	344	4505	1399	323	1359	1430	372	89	115	120
April	4381	1133	NA	6234	1152	353	3739	1028	199	1634	1299	290	85	103	97
May	4052	1092	NA	5579	1129	340	3428	1179	178	3095	1099	238	86	100	87
June	3984	879	NA	5245	705	340	3128	758	301	3833	924	243	86	73	102
July	4903	956	330	5978	1018	105	2911	1004	408	NA	1065	253	97	86	95
Aug.	5515	1103	334	4268	748	185	2708	1093	266	NA	1068	256	88	88	90
Sept.	11759	1054	282	5830	1044	190	6799	1230	280	NA	1194	249	172	99	87
Oct.	8112	1191	334	5843	1177	203	2871	1074	362	1059	NA	256	95	102	100
Nov.	8380	1134	311	4272	1068	172	3383	1268	396	3965	NA	360	106	103	107
Dec.	7288	1307	341	5065	1305	245	2904	1270	428	NA	NA	NA	108	115	117

SOURCE: LMMC , KHARTOUM, 1982

TABLE 2.17 OFFICIAL AND ACTUAL PRICES OF MEAT IN KHARTOUM PER KILO/LS IN 1979 - 1981

Months	1979						1980						1981					
	Beef		Veal		Mutton		Beef		Veal		Mutton		Beef		Veal		Mutton	
	Official	Actual	Official	Actual	Official	Actual	Official	Actual	Official	Actual	Official	Actual	Official	Actual	Official	Actual	Official	Actual
Jan.	0.680	0.680	0.800	0.800	0.960	0.960	1.200	1.200	1.300	1.800	1.600	2.500	1.200	2.000	1.300	2.500	1.600	3.000
Feb.	0.680	0.680	0.800	0.800	0.960	0.960	1.200	1.500	1.300	1.800	1.600	2.500	1.200	2.000	1.300	2.500	1.600	3.000
March	0.680	0.950	0.800	1.100	0.960	1.500	1.200	1.500	1.300	1.800	1.600	2.500	1.200	2.000	1.300	2.500	1.600	3.000
April	0.680	1.000	0.800	1.200	0.960	1.500	1.200	1.500	1.300	1.500	1.600	2.250	1.200	2.500	1.300	3.000	1.600	3.500
May	0.680	1.100	0.800	1.200	0.960	1.600	1.200	1.500	1.300	1.500	1.600	2.500	1.200	2.500	1.300	3.000	1.600	3.500
June	0.680	1.200	0.800	1.400	0.960	1.800	1.200	1.500	1.300	1.500	1.600	2.500	1.200	2.500	1.300	3.000	1.600	3.500
July	0.680	1.200	0.800	1.400	0.960	1.800	1.200	1.700	1.300	2.000	1.600	2.900	1.200	3.000	1.300	3.500	1.600	4.000
Aug.	1.200	1.200	1.300	1.300	1.600	1.800	1.200	1.500	1.300	2.000	1.600	2.500	1.200	2.500	1.300	3.000	1.600	4.500
Sept.	1.200	1.400	1.300	1.600	1.600	1.800	1.200	2.000	1.300	2.500	1.600	3.000	1.200	2.500	1.300	3.000	1.600	4.500
Oct.	1.200	1.600	1.300	1.800	1.600	2.000	1.200	2.000	1.300	2.500	1.600	3.000	1.600	1.600	1.800	1.800	2.400	2.400
Nov.	1.200	1.700	1.300	1.800	1.600	2.250	1.200	1.700	1.300	2.000	1.600	3.000	1.600	1.600	1.800	1.800	2.400	2.400
Dec.	1.200	1.900	1.300	2.000	1.600	2.500	1.200	1.700	1.300	2.000	1.600	2.500	1.600	1.600	1.800	1.800	2.400	2.400

SOURCE : LMMC, KHARTOUM, 1982

TABLE 2.21. (Contd.)

Quantity (Q) = Tons
Value (V) = US$'000

		Production			Imports		Exports		Apparent Consumption
		From indigenous animals	From animals imported for slaughter	Total	Q	V	Q	V	Q
	1975	30,000	18,250	48,250	40,379	45,434	11	28	88,595
	1976	30,000	24,213	54,213	78,137	98,236	11	28	132,339
TOTAL	1977	86,000	24,623	110,623	121,938	165,877	27	82	232,534
	1978	90,000	71,399	161,359	147,054	200,439	59	91	308,354
	1979	91,000	60,507	151,507	196,097	293,858	-	-	347,604

SOURCE : ITC, The Market for Sudanese Livestock and Meat in selected ARAB Countries Second Phase, July 1981.

TABLE 2.22 THE ESTIMATION OF MEAT CONSUMPTION IN SAUDI ARABIA FOR 1985 AND 1995

	1972/1974		1985		1995	
	(2) Per capita Kg.	Total Consumption 000 Tons	(2) Per capita kg.	(1) Total Consumption 000 tons	(3) Per capita Kg.	Total Consumption 000 tons
Beef & Veal	2.4	16,824	4.5	41,850	7.9	98,000
Mutton & Lamb	4.8	33,648	7.8	67,890	12.1	150,100
Poultry Meat	4.1	28,741	15.8	146,940	25.7	318,809

(1) Based on AOAD Projections of total population

(2) Based on FAO Projection of Meat Consumption, 1979

(3) Based on Per Capital Growth rate between 1985 and 1995 which equals 5.8% for Beef and Veal, 4.5% for Mutton and 5% for Poultry Meat.

TABLE 2.23. SAUDI ARABIA : IMPORTS OF LIVESTOCK FOR SLAUGHTER BY COUNTRY OF ORIGIN

1975 - 1979

Quantity (Q) : Heads
Value (V) : SR'000

	1975		1976		1977		1978		1979	
	Q	V	Q	V	Q	V	Q	V	Q	V
Cattle :										
of which from :	16,136	10,380	38,886	26,915	39,708	30,410	96,181	69,683	62,250	58,960
Somalia	9,805	6,201	34,081	23,712	22,621	16,815	75,516	54,550	49,368	47,556
Sudan	1,354	846	295	179	4,793	4,409	9,145	6,847	8,828	8,103
India	-	-	140	93	2,747	2,251	2,815	2,061	2,931	2,355
United States	-	-	-	-	-	-	-	-	726	584
Australia	-	-	70	50	320	224	6,810	4,835	200	200
Mauritania	-	-	-	-	-	-	-	-	114	92
Others	4,977	3,333	4,300	2,881	9,227	6,711	1,895	1,390	-83	70
Sheep										
of which from :	299,398	41,383	751,419	79,117	899,636	112,640	2726,448	356,558	2870,195	547,639
Somalia	236,963	29,097	520,921	54,557	277,153	32,182	1134,139	139,182	1138,251	221,105
Australia	14,502	3,418	83,742	8,626	318,944	37,103	709,636	102,324	823,105	139,293
Sudan	25,591	6,231	83,647	8,890	136,587	23,130	639,022	86,764	386,349	94,946
Turkey	-	-	11,655	1,160	9,778	1,095	85,170	9,660	191,825	27,965
Egypt	-	-	-	-	16,399	1,737	70,097	8,451	112,751	25,518
Syria	4,864	201	2,707	276	6,417	704	25,929	2,902	74,599	13,390
Bulgaria	-	-	5,544	652	-	-	10,554	1,069	20,764	3,442
Romania	-	-	-	-	4,426	601	716	78	13,878	2,268
Iraq	-	-	-	-	-	-	1,174	130	12,214	1,957
Malaysia	-	-	-	-	-	-	-	-	11,000	1,950
Jordan	1,355	113	5,071	527	1,196	159	1,414	160	9,688	1,817
Ethiopia	3,158	324	11,931	1,210	38,898	4,600	483	68	7,334	519
India	-	-	14,553	1,997	4,779	568	3,274	443	7,171	1,186
Afars &	1,000	303	2,929	317	10,878	1,402	3,897	546	6,200	1,240
Kuwait	-	-	-	-	8,622	929	1,203	133	6,128	959
Lebanon	-	-	-	-	-	-	-	-	4,460	836
Others	11,965	1,696	8,719	905	65,559	8,430	39,740	4,648	44,478	9,248
Goats	261,561	25,876	81,085	10,133	116,917	11,696	669,386	75,692	190,421	28,137
of which from :										
Australia	17,280	1,728	39,785	5,633	22,303	2,230	232,197	23,946	116,137	17,972
Syria	5,888	660	2,013	178	3,957	396	11,793	1,180	22,651	2,966
Turkey	-	-	9,027	886	5,846	367	26,429	2,892	15,914	2,216
Egypt	-	-	-	-	-	-	12,318	1,232	11,806	1,711
Somalia	189,413	19,011	15,441	1,939	500	61	286,030	34,990	8,381	1,380
Yemen	-	-	-	-	-	-	458	46	5,248	542
Ethiopia	1,140	107	710	65	-	-	363	37	3,126	91
Jordan	-	-	1,668	137	-	-	743	104	1,354	231
Iraq	-	-	-	-	-	-	-	-	705	120
Bulgaria	-	-	-	-	-	-	-	-	691	127
Sudan	44,006	4,022	11,528	1,203	36,385	3,649	90,999	10,428	665	101
Others	3,834	348	913	92	49,926	4,993	8,056	838	3,743	680
Poultry	14,466	270	17,998	574	26,360	116	15,150	423	11,937	148
of which from :										
Somalia	-	-	-	-	-	-	-	-	7,860	98
Denmark	-	-	-	-	-	-	-	-	4,077	51

TABLE 2.23. (Contd.)

Quantity (Q) : Heads
Value (V) : SR'000

	1975		1976		1977		1978		1979	
	Q	V	Q	V	Q	V	Q	V	Q	V
Camels :	35,405	32,868	38,988	39,415	20,626	21,607	28,985	30,003	15,366	20,814
of which from :										
Somalia	30,618	28,937	34,530	35,354	13,716	14,616	24,052	24,872	12,781	17,292
Sudan	1,355	1,334	4,053	3,695	1,641	1,643	4,572	4,753	2,553	3,490
Turkey	-	-	-	-	-	-	-	-	32	32
Other Animals	-	-	9,966	206	18,806	3,304	75,078	1,173	37,252	516
of which										
Horses :	-	-	-	-	993	1,050	218	230	135	145
of which from										
Egypt	-	-	-	-	-	-	-	-	79	85
Tame, wild rabbits	-	-	9,966	206	17,000	1,425	74,730	752	37,117	371
of which from :										
Somalia	-	-	9,366	195	-	233	54,744	550	34,800	348
Total		110,777		156,360		179,772		533,532		656,214
Total in US$'000 4/		31,492		44,295		50,998		156,940		195,255

Source: National foreign trade statistics.

1/ Included about 10 origins of which the netherlands, Kuwait, Ethiopia, Afars and Issas and Turkey.
2/ Included about 10 countries of which Bahrain, Hungary, France and Italy.
3/ Included more than 5 countries of which Cyprus , Lebanon and Romania.
4/ IMF annual par rate/market rate according to International Financial Statistics (Washington, D.C. June 1981): OSE- SR 3.5176(1975): SR 3.5300 (1976): SR 3.5251 (1977): SR 3.3996 (1978) : SR 3.3608 (1979).

TABLE 2.24. SAUDI ARABIA : IMPORTS OF MEAT AND MEAT PRODUCTS BY COUNTRY OF ORIGIN
1975 - 1979

Quantity (Q) : Tons
Value (V) : SR'000

	1975		1976		1977		1978		1979	
	Q	V	Q	V	Q	V	Q	V	Q	V
Bovine meat	1,804	13,621	2,880	19,910	8,178	64,712	19,304	128,545	32,134	246,891
Fresh chilled	73	729	233	2,103	1,062	7,955	1,156	7,273	1,322	11,829
of which from :										
Australia	22	252	35	215	83	778	329	2,285	546	5,563
India	-	-	-	-	-	-	227	838	211	1,117
United States	5	126	-	-	73	385	91	827	71	554
Argentina	-	-	-	-	10	80	162	870	57	275
Others 1/	46	351	198	1,888	896	6,712	357	2,453	437	4,320
Frozen	1,731	12,922	2,647	17,807	7,116	56,757	18,148	121,272	30,812	235,062
of which from :										
Australia	856	5,650	213	1,413	2,314	18,973	6,996	50,182	11,212	104,799
India	-	-	17	78	231	955	2,025	8,869	7,188	31,827
Argentina	-	-	-	-	113	613	2,706	14,201	3,685	21,060
United States	84	1,033	74	974	751	8,233	1,386	13,526	2,903	29,359
New Zealand	80	826	15	122	257	2,198	1,115	8,975	1,045	11,177
Denmark	102	1,395	61	467	221	2,822	350	2,841	676	5,444
Others 2/	609	4,048	2,267	14,753	3,229	22,963	3,570	22,678	4,103	31,396
Mutton lamb and goats meats	1,854	10,050	4,374	28,853	10,531	75,656	14,443	99,213	19,327	134,143
Fresh or chilled	66	643	988	7,251	1,960	16,534	2,089	17,372	1,486	10,316
of which from :										
Australia	-	-	-	-	135	1,065	589	4,663	409	4,032
India	-	-	-	-	-	-	63	489	406	384
United States	38	200	1	24	135	819	25	118	152	1,138
Romania	-	-	18	166	252	2,405	120	1,151	134	1,378
Bulgaria	-	-	508	4,396	173	1,843	332	3,415	109	1,063
Others 3/	28	443	461	2,665	1,265	10,402	960	7,536	276	2,321
Frozen	1,788	9,407	3,386	21,602	8,571	59,122	12,354	81,841	17,841	123,827
of which from :										
Australia	552	3,093	306	1,856	2,044	13,694	3,931	27,849	5,265	43,347
Argentina	-	-	8	34	371	2,151	2,149	12,974	3,530	21,996
India	-	-	-	-	48	277	1,870	8,325	2,706	11,979
New Zealand	725	2,932	-	-	72	597	584	4,363	1,701	11,144
Other 4/	511	3,382	3,072	19,712	6,036	42,403	3,820	28,330	4,639	35,361

TABLE 2.24. (Contd.)

	1975		1976		1977		1978		1979	
	Q	V	Q	V	Q	V	Q	V	Q	V
Poultry meat	36,541	135,144	69,777	290,446	100,839	431,014	108,991	439,398	140,364	577,485
Fresh of chilled of which from :	1,800	5,574	2,178	9,809	9,769	41,818	7,113	32,042	4,492	19,955
France	150	588	129	478	1,777	8,097	1,047	4,667	1,618	7,005
Bulgaria	38	137	35	198	150	690	1,257	5,100	639	2,745
United States	-	-	10	18	109	506	550	2,995	572	3,088
Czechoslovakia	-	-	-	-	20	84	73	251	259	572
Hungary	-	-	3	26	123	402	1,872	7,495	212	817
Others 5/	1,612	4,849	2,001	9,089	7,590	32,039	2,334	11,534	1,192	5,730
Frozen of which from :	34,741	129,570	67,599	280,637	91,070	389,196	101,878	407,356	135,872	557,530
France	3,037	12,029	16,867	72,691	18,325	81,432	23,369	97,138	42,198	178,445
Hungary	2,365	9,622	8,399	34,180	7,453	31,712	29,385	112,951	20,608	84,644
Brazil	505	1,917	285	1,197	366	1,631	1,229	5,569	15,951	63,714
Bulgaria	110	462	263	1,084	2,092	8,651	11,968	47,270	14,387	56,757
Germany F. R.	70	209	1,136	4,962	2,048	8,082	9,225	38,060	8,195	31,638
Others 6/	28,654	105,331	40,649	166,523	60,786	257,688	26,702	106,368	34,533	142,332
Camel meat	12	84	69	310	251	966	123	464	266	1,003
Fresh	-	1	35	191	178	603	88	304	22	132
Frozen	12	83	34	119	73	363	35	160	244	871
Other meats	109	725	944	6,659	2,000	11,478	3,770	11,434	3,361	23,687
Fresh or chilled of which from :	12	60	74	415	227	1,208	1,995	1,326	52	331
India	-	-	-	-	-	-	15	35	22	84
Frozen of which from :	97	665	870	6,244	1,773	10,270	1,775	10,108	3,309	23,356
Argentina	-	-	-	-	8	53	384	1,993	1,337	8,600
Australia	17	125	54	324	37	230	826	5,047	611	5,932
New Zealand	-	-	-	-	-	-	-	-	-	-
Meat and edible offals of all kinds, salted, etc. and poultry liver	52	194	93	597	139	909	423	2,359	645	4,388
Total	40,379	159,818	78,137	346,775	121,938	584,735	147,054	681,413	196,097	987,597
Total value in $'000 6/		45,434		98,236		165,877		200,439		293,858

Source : National foreign trade statistics.

1/ About 21 countries, including Italy, Denmark, Swaziland, Hungary and Thailand.
2/ About 40 countries, including Germany, F.R., Singapore, the Netherlands, Italy and Romania.
3/ About 14 countries, including Argentina, Hungary and Chile.
4/ About 37 countries, including Chile, United States, Bulgaria, Romania, Hungary and Denmark.
5/ About 25 countries, including Australia, Denmark, Romania, Brazil and India.
6/ About 53 countries, including the United States, Romania, Argentina, the United Kingdom, etc.
7/ IMF annual per rate/market rate according to International Financial Statistics (Washington, D. C. June 1981)
US$ = SR 3.5176 (1975) ; SR 3,500 (1976) SR 3.5251 (1977) ; SR. 3.3996 (1978) ; SR 3,3608 (1979).

TABLE 2.25 AVERAGE LIVESTOCK AND MEAT IMPORT PRICES IN SAUDI ARABIA BY THE END OF 1980

I t e m s	Notes
(a) Live Cattle :	
- Sudan (400-500 kg/head)$ 600-700/head	C & F Jeddah
- Somalia (220-300 kg/head)$ 400/head	"
- Ireland (400-450 kg/head) $ 700/head	"
Camels :	
Live Sheep :	
- Sudan ($ 120-150/head)	"
- Somalia ($ 70-75/head)	"
- Australia ($75-80/head)	"
(c) Fresh beef/veal(boneless)$ 3000-3500/ton	"
(d) Frozen beef/veal (bone-in)$2000/ton	"
(e) Frozen veal forequarters(bone-in)$3450/ton	"
(f) Frozen beef cuts(Australia and Argentina)	
- Top side $ 4000/ton	"
- Silver side - $ 4000/ton	"
- Tenderloin - $ 8/9000/ton	"
- Beef filet - $ 7700/ton	"
(g) Frozen lamb carcasses - $ 2300/ton	"(from Uruguay)
(h) Frozen lamb carcasses - $2400 - 2500/ton	"(from Australia)
(i) Frozen lamb cuts (Australia)	
- Boneless legs - $ 3150 - 3000/ton	" " "
- Bone-in legs - $ 2500 - 2800/ton	" " "

Source : ITC

2.3.2. KUWAIT MARKET :

(1) Livestock Population and Meat Production :

Table 2.26 shows the livestock population of Kuwait for the period 1974 - 1979, and that cattle numbers increased from 3791 heads in 1974 to 5941 in 1978. Sheep, goats and poultry also increased significantly during the same period.

Because of agricultural constraints, Kuwait cannot expect to meet its growing meat requirements from its own livestock resources, except for poultry, where some sources indicate that the country could be self-sufficient by 1985.

Table 2.27. gives the estimated domestic production during the period 1974 - 1978 where the total population increased by 14% per annum on the average, from 16,500 tons in 1974 to 27,700 tons in 1978 with 40% of total production coming from indigenous animals.

(2) Meat Imports and Consumption :

Table 2.27 shows that the total imports of meat and meat products increased from 21 263 tons in 1974 to about 50,790 tons in 1978 with an average growth rate estimated to be 24% per annum. The figures also show that imports of beef , mutton, lamb and goat meat increased from 9 097 tons in 1974 to about 22,025 tons in 1978, equivalent to an average of 24% per annum. The ratio of total exports (mainly re-exports) which consisted largely of mutton, lamb and goats, to total imports was estimated as low as 10% in 1978.

The figures show that meat consumption increased from 37,500 tons in 1974 to about 74,000 tons in 1978 giving an average annual

growth rate of 20%.

According to the expected rate of total population and per capita meat consumption estimated at about 59 kg/year in 1978 total consumption could reach about 207,000 tons in the year 2000[1].

For the suppliers share of the Kuwait market, table 2.28 shows that 98.4% of cattle imports during the period 1974 - 1978 came from Australia and India. In 1974 Sudan was its largest supplier with a market share of 73%, but by 1981 it had declined to 0.1%. Australia and Turkey are the main suppliers of sheep and goats with a market share of about 99.8% in 1978.

Table 2.28 also shows that Australia and India supplied Kuwait with 68% of its total beef and mutton, lamb and goat meat in 1978. In 1974 Sudan had been the largest supplier of red meat with a market share of 26% but by 1978 was no longer in the market. Brazil and Denmark are the main suppliers of poultry meat holding market shares of 38% and 33% respectively.

(3) Consumer Preferences and Prices :

The figures in the previous table show that the consumers prefer fresh and chilled meat to frozen meat, and this is the reason why Kuwait imports such a big proportion of live animals for slaughtering within country.

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(1) Total Population expected about 1.3 million in 1980 and 3.5 million in the year 2000.

TABLE 2.26. LIVESTOCK POPULATION IN KUWAIT 1974 - 1978

I t e m s	1974	1975	1976	1977	1978
Cattle	3,791	4,653	4,638	5,618	5,941
Sheep	6,863	7,322	13,363	28,347	14,528
Goats	1,294	1,380	1,593	2,237	1,641
Poultry	1,470,212	988,474	1,008,562	1,377,619	1,145,640

Source : International Trade Centre UNCTAD/GATT
The Market for Sudanese Livestock and meat in selected Arab Countries, Second Phase, 31, July 1981.

TABLE 2.27. KUWAIT PRODUCTION, IMPORTS RE-EXPORT AND APPARENT CONSUMPTION OF MEAT AND MEAT PRODUCTS
1974 - 1978

Quantity (Q) : Tons
Value (V) : US$'000

		Production			Imports		Exports		
		From indigenous animals	From Imported animals	Total	Q	V	Q	V	Apparent Consumption Q
Bovine Mutton, Lamp and goat meats	1974	92	9,372	9,464	9,097	14,174	119	140	18,442
	1975	120	8,808	8,928	17,050	26,283	237	356	25,741
	1976	123	10,066	10,189	15,665	25,881	1,545	1,950	24,309
	1977	173	14,242	14,415	20,648	35,547	2,814	3,687	32,249
	1978	151	17,330	17,481	22,025	41,373	3,223	4,995	36,283
of which:									
Bovine meat	1974	76	2,784	2,860	-	-	-	-	2,860
	1975	93	2,348	2,441	-	-	-	-	2,441
	1976	93	1,096	1,189	2,383	2,634	-	-	3,572
	1977	112	2,128	2,240	4,034	6,924	-	-	6,274
	1978	119	3,147	3,266	4,300	8,101	-	-	7,566
Mutton, lamb and goat meats	1974	16	6,588	6,604	9,097	14,174	119	140	15,582
	1975	27	6,460	6,487	17,050	26,283	237	356	23,300
	1976	30	8,970	9,000	13,282	23,247	1,545	1,950	20,737
	1977	61	12,114	12,175	16,614	28,623	2,814	3,687	25,975
	1978	32	14,183	14,215	17,725	33,272	3,223	4,955	28,717
poultry meat	1974	6,000	-	6,000	11,242	11,861	86	92	17,156
	1975	7,000	-	7,000	11,708	12,357	912	893	17,796
	1976	7,000	-	7,000	19,731	23,754	835	950	25,896
	1977	9,000	-	9,000	26,729	32,405	2,220	2,733	33,509
	1978	10,000	-	10,000	27,302	32,960	1,337	1,934	35,965
Camel meat	1974	n.a.	n.a.	1,065	-	-	-	-	1,065
	1975	n.a.	n.a.	314	-	-	-	-	314
	1976	n.a.	n.a.	311	-	-	-	-	311
	1977	n.a.	n.a.	237	-	-	-	-	237
	1978	n.a.	n.a.	227	-	-	-	-	227
Others 1/	1974	-	-	-	924	455	79	25	845
	1975	-	-	-	970	503	44	19	926
	1976	-	-	-	1,700	1,143	141	73	1,559
	1977	-	-	-	1,613	838	260	143	1,353
Total	1974	6,092	9,372	16,529	21,263	27,583	284	257	37,508
	1975	7,120	8,808	16,242	29,728	40,376	1,193	1,268	44,777
	1976	7,123	10,066	17,500	37,096	53,069	2,521	2,973	52,075
	1977	9,173	14,242	23,652	48,990	70,878	5,294	6,563	67,348
	1978	10,151	17,330	27,708	50,790	77,626	4,832	7,083	73,666

Sources: Production: Poultry meat - FAO estimates - Production Yearbook 1977,1978 and 1979: bovine, sheep and camel meat - ITC estimates based on data published by Central Statistical Office-Kuwait, on number of animals slaughtered in municipal slaughterhouses.
Imports and exports: National foreign trade statistics and FAO estimates.

1/ include meat and edible offals, fresh, chilled or frozen, meat dried, salted, etc. and meat whether or not in air-tight containers.

•	1978	-	-	-	1,463	905	272	154	1,191

TABLE 2.28. KUWAIT : IMPORTS OF LIVESTOCK BY COUNTRY OF ORIGIN - 1974 - 1978

Quantity (Q) : Heads
Value (V) : KD'000

	1974		1975		1976		1977		1978	
	Q	V	Q	V		V	Q	V	Q	V
Cattle of which from	126,827	1,270	12,639	866	5,831	596	10,499	1,234	28,720	1,668
Australia	19,380	266	2,344	159	1,024	176	860	118	16,480	461
India	-	-	-	-	1,236	100	7,690	763	11,792	1,014
Germany, F.R.	-	-	-	-	-	-	-	-	295	135
United Kingdom	93	57	-	-	106	36	1,019	148	128	55
Sudan	92,639	134	285	20	-	-	-	-	18	1
Netherlands	70	25	-	-	373	118	532	170	4	2
Others 2/	14,645	788	10,010	687	3,092	166	398	35	3	-
Sheep, lamb and goats of which from:	373,997	3,570	409,895	4,672	635,836	7,004	763,663	10,096	975,556	13,737
Australia	331,056	3,176	362,401	4,102	533,309	5,785	647,661	8,468	874,047	12,015
Turkey	-	-	33,883	417	89,417	1,160	49,953	639	96,169	1,649
Bulgaria	-	-	-	-	-	-	7,735	88	2,389	30
Syria	8	-	-	-	-	-	210	4	1,910	24
Romania	-	-	-	-	-	-	-	-	690	13
Lebanon	-	-	-	-	3	-	-	-	301	5
India	-	-	-	-	300	3	2,408	103	50	1
Others 3/	42,933	394	13,611	153	12,807	56	55,696	794	-	-
Total 4/		4,840		5,538		7,600		11,330		15,405
Total 5/ US$ 000		16,506		19,097		25,994		39,539		56,016

Source: National foreign trade statistics.

1/ Include animals for slaughter and breeding purposes.
2/ Included about 10 countries, of which Tanzania, Somalia, Ethiopia, Qatar, Turkey, Egypt and Iraq.
3/ Included about 10 countries, of which Sudan, Iraq, Somalia, Yemen PDR and Syria.
4/ Does not include baby chicks, horses, mules and hinnies.
5/ IMF annual per rate/market rate according to International Financial Statistics (Washington, D.C. June 1981). Kd, USS 3.4104 (1974) USS 3.4483 (1975): USS e.4203 (1976) : USS 3.4898 (1977): USS 3.6362 (1978).

TABLE 2.29 KUWAIT : IMPORTS OF MEAT AND MEAT PRODUCTS BY COUNTRY OF ORIGIN 1974 - 1978

Quantity (Q) : Tons
Value (V) : KD'000

	1974		1975		1976		1977		1978	
	Q	V	Q	V	Q	V	Q	V	Q	V
Bovine, mutton, lamb and goat meats, fresh, chilled of frozen	9,097	4,156	17,050	7,622	15,665	7,567	20,648	10,186	22,025	11,378
of which from										
Australia	1,104	438	6,202	2,641	7,195	3,491	8,311	4,220	9,871	5,241
India	1,468	424	2,012	713	3,782	1,559	5,528	2,349	5,098	2,180
Argentina	181	67	75	30	209	80	1,127	439	1,464	590
Romania	1,014	438	13	10	805	473	1,048	667	1,307	796
New Zealand	1,273	527	3,622	1,517	905	452	1,705	855	1,180	637
China, P.R.	812	319	1,508	435	493	102	1,086	352	1,155	442
Bulgaria	47	22	506	334	589	352	937	576	890	516
Uruguay	-	-	-	-	321	90	61	33	345	130
United States	22	28	78	61	124	175	143	223	184	307
Denmark	71	91	320	166	285	221	227	157	175	104
Sudan	2,405	1,093	-	-	-	-	-	-	-	-
Others 1/	700	709	2,714	1,715	957	572	475	315	356	235
Puultry meat, Fresh, Chilled or frozen	11,242	3,472	11,708	3,584	19,731	6,806	26,729	9,286	27,302	9,065
of which from:										
Brazil	-	-	500	161	5,395	1,837	12,489	4,183	10,382	3,158
Denmark	5,870	1,829	2,539	935	5,751	2,081	4,869	1,871	9,016	3,117
China, P.R.	1,267	337	3,361	912	2,337	686	1,897	540	1,862	531
Hungary	717	189	2,651	704	3,008	944	1,561	527	1,520	478
United States	802	345	302	147	525	282	765	405	1,401	722
France	1,083	317	533	189	1,139	413	1,356	486	1,262	421
Bulgaria	586	177	464	149	710	253	518	182	1,004	354
Uruguay	-	-	-	-	208	72	1,019	336	300	95
United Kingdom	205	64	681	250	166	91	403	127	224	69
Netherlands	349	109	-	-	-	-	-	-	201	69
Czechoslovakia	-	-	-	-	-	-	-	-	89	31
Argentina	-	-	-	-	10	3	1,534	517	21	9
Others 2/	363	115	677	221	398	144	318	112	18	9
Meat and edible offals N.e.s. fresh, Chilled or frozen	96	73	164	122	617	527	66	50	106	99
of which from:										
Hungary	14	7	-	-	-	-	-	-	38	39
Meat dried, salted, etc. whether or not in air-tight containers	2	2	-	-	30	14	3	2	5	5
Meat in air tight containers	826	380	806	381	1,053	602	1,544	786	1,352	801
of which from:										
Denmark	194	103	177	102	330	226	260	174	433	264
Total	21,263	8,088	29,728	11,709	37,096	15,516	48,990	20,310	50,790	21,348
Total US$'000 3/		27,583		40,376		53,069		70,878		77,626

Sources : National Foreign trade Statistics.

1/ Including about 10 countries of which Hungary, United Kingdom, Austria and Chile.

2) Including about 10 countries of which Argentina, Cyprus, Egypt, Germany, F.R. and Australia

3/ IMF annual per rate/market rate according to international Financial Statistics (washington, D.C. June, 1974. KD - US$ 3.4104 (1974) US$ 3.4481 (1975) US$ 3.4203 (1976) ; US$ 3.4898 (1977) US$ 3.6362 (1978).

In general the importers prefer big and fat cattle because they are concerned with the quantity of meat ; also they like fat sheep. High quality cuts of meat are favoured.

Table 2.30. shows the import and retail prices in Kuwait for the last quarter of 1980 with prices varying according to the kind of meat. The Government subsidises the retail prices as well as controlling them. There are no customs duties payable on imports of livestock and meat.

TABLE 2.30. LIVESTOCK AND MEAT IMPORT PRICES TO THE END OF 1980

Live Cattle	45 cents/kilo C&F Kuwait	India Buffalo
Live Sheep	$70 to 80/head C&F Kuwait	Australia
	$ 1.42/kilo FOB Bombay	India
Chilled veal legs (bone in)	$ 4.8/Kilo C&F Kuwait	
Chilled mutton carcasses	$ 2.4/kilo C&F Kuwait	
Frozen beef cuts	$ 1.6 to 2.7 C&F Kuwait	
Frozen veal	$ 2.1/kilo C&F Kuwait	

Source : ITC

2.3.3. YEMEN ARAB REPUBLIC MARKET :

(1) Livestock Population and Meat Production :

Animal population based on population figures is estimated at 840,000 heads of cattle, 800,000 sheep and goats and 80,000 camels, plus 3 million poultry. In 1979 the Government reports determined very low production rates for livestock, for cattle about 2.5% and for sheep and goats, 2.1%, causes being attributed to many constraints such as health problems, shortage of feed, poor genetic characters, etc.

In 1979 local meat production was estimated at about 10,828 tons beef and veal, 14,947 tons from sheep and goats, and 600 tons from camels.

(2) Meat Imports and Consumption :

Available statistics in table 2.31 shows that imports of cattle increased from 18,839 tons in 1976 to 49,17 tons in 1979, and from 67,414 tons to 710,575 tons in the same period for sheep.

Imports of cattle during the period 1976 to 1980 were limited from Somalia, Ethiopia, Djibouti1979 the Army and Police Economical Corporation signed a contract with a Sudanese exporter for 20,000 heads of cattle per year to be air lifted to Sanaa.

Imports of sheep and goats came mainly from Somalia, Djibouti, Ethiopia and Saudi Arabia (re-export).

The figures in table 2.32 show that the total meat imports increased rapidly from about US$ 2.4 million in 1976 to about

US$ 62.5 million in 1979 . For beef meat, France and Denmark are the main exporters, and China is the largest supplier for sheep and goat meat. For poultry meat there are many suppliers such as France, F. R. of Germany, Netherlands and Denmark.

For total consumption, table 2.33 shows that local production contributed about 37.7% of total demand in 1978/79. Total meat consumption was estimated at 69,951 tons in the same year.

(3) Imported Prices and Duties :

Table 2.34 shows the prices paid for live animals and meat imported to the end of 1980. Import duties are about 27% of the CIF value for live animals and poultry and 7% of the CIF value for the red and poultry meat.

2.3.5. LIBYAN ARAB REPUBLIC MARKET :

(1) Livestock Population and Meat Production :

The Libyan market represents an important possible outlet for Sudanese exports of red meat due to its proximity to Sudan as well as the consumers preference for high quality meat.

Table 2.37 shows the development of livestock population in Libya. AOAD estimates show that domestic production is expected to reach 139,100 tons in 1985 and 227,400 tons in 2000.

(2) Meat Consumption and Imports :

The absorptive capacity of the Libyan market has increased considerably due to the population growth rates, large numbers of immigrants, and the rapid rise in per capita income. Per capita consumption of red meat has increased from 32.4 kg in 1970-72 to about 64.8 kg in 1977-79. This rate of per capita consumption is expected to increase by 2% per annum, with a decreasing trend until it reaches 73 kg by 2000. These consumption estimates will lead to higher levels of imports reaching 112,480 and 184,476 tons by 1985 and 2000 respectively.

This shows the possibility of augmenting Sudan's exports of red meat to Libya, provided that attention is given to improving the quality of the products and methods of transportation.

(3) Competition and Consumer Preference :

In general sheep meat is given first priority in all regions of Libya : the second priority goes to camel meat in Tripoli Province, while in Benghazi Province it goes to beef.

Libyan consumers prefer fresh, lean meat, locally slaughtered, and all slaughtering must be done according to Islamic law. Frozen meat has a very small share of the market and is not popular.

For meat requirements, they mainly import beef forequarters, though they also import hindquarters sometimes.

The biggest competitors in the Libyan market are Romania and Bulgaria for live sheep ; Ireland and Scotland for chilled lamb. The strongest competitor in live cattle is Hungary, while frozen meat is imported mainly from Argentina.

Import prices paid by the Livestock and Meat National Company in 1978 were as shown in (Table 2.39).

TABLE 2.37 TOTAL LIVESTOCK POPULATION IN LIBYA

1970 - 1979

('000 head)

Types of animals	1970	1975	1979
Livestock numbers			
Cattle and Buffaloes	108.000	189.000	181.000
Sheep & Goats	3397.000	5880.000	1607.000
Camels	163.000	71.000	134.000
Number of Slaughtered Animals			
Cattle and Buffaloes	39.350	108.880	202.94
Sheep & Goats	1939.560	2027.370	3295.410

Source : AOAD, Year Book of Agricultural Statistics Vol. (1), 1981.

TABLE 2.38 LIBYA'S ANIMAL & MEAT PRODUCTION, CONSUMPTION AND BALANCE OF INTERNATIONAL TRADE IN 1970 - 1979 AND ITS PROJECTIONS AT 1985 - 2000

Items	1970-1972	1977-1979	PROJECTIONS			
			1985	1990	1995	2000
Local Production	53.85	98.85	139.1	169.2	196.2	227.4
Exports	-	-	-	-	-	-
Imports	13.32	79.65	112.48	137.32	159.14	184.426
Balance of Trade	-13.32	-79.65	-112.48	-137.32	-159.14	-184.426
Total population(2)	2.076	2.753	3.623	4.200	4.869	5.643
Per Capita Consumption(3)	32.36	64.84	69.44	72.98	72.98	72.98
Total Consumption	67.17	178.5	251.58	306.52	355.34	411.83

(1) Projections based on increasing rates about 5% (1985) decreasing to 3% (1995, 2000)

(2) Projections based on increasing rates about 4% decreasing to 3%.

(3) Projections based on increasing rate about 1% decreasing to 0.0%.

Source : AOAD Studies on Economics of Food in Arab Countries, 198.

TABLE 2.39 IMPORT PRICES OF LIVESTOCK AS OF 1978

Commodity	Price
Live sheep	US$ 1,200 -1,400 /ton CIF
Live cattle	US $ 1,200 - 1,300/ton CIF
Chilled sheep meat	US$ 3,000 /ton CIF Triploi Airport
Chilled beef	US$ 2,000 - 2,200 /ton CIF Tripoli Airport

Source : ITC Market for Sudanese Livestock and Meat in selected Arab countries.

3. BEEF PRODUCTION

3.1. TRADITIONAL SECTOR :

In the Sudan there are two major zones for livestock production, specially cattle, and they are distinctly different from each other climatically. i.e. rainfall, vegetation, temperature etc.

The first zone is the Savannah belt where rainfall ranges from 300 mm to 800 mm. It lies across the provinces of Northern Kordofan and Northern Darfur where wide stretches of grassland scattered with trees, chiefly the *acacia spp.*, are found. In the southern parts of the zone rainfall is heavier and clay soils are dominant thus making it possible to practise mechanized farming.

The second zone is the southern rangeland where the rainfall ranges from 800 mm to 1500 mm with heavy vegetation cover. Up to now, this zone has not made any significant contribution to the national livestock industry for more than one reason.

3.1.1. MAJOR TYPES OF CATTLE :

The indigenous cattle of the country are medium sized, thoracic humped, mixed Zebu stock of two main types.

The overall herd production parameters reflecting the problems of nomadic management and disease control have been estimated by many workers and are shown in table (3.1.).

TABLE 3.1. OVERALL HERD PARAMETERS

Age at first calving		3 - 4 years
Calving rate		55% - 65%
Death rate :	calves	30%
	adults	5%

Source : World Bank (1978) Appraisal of the livestock and marketing project.

(a) Cattle Population : the total cattle population in 1981/82 is estimated to be about 18 million heads according to Murry Watson (Consultant) who conducted an aerial and ground survey in the Sudan during 1976/77. The previous estimates made by Animal Resources Directorate General, and which were confirmed by Murry Watson (Consultant) 1976/77 , showed that the four western provinces together with the White Nile Province are the main cattle-producing areas in Northern Sudan (See Table 2.1.) These five provinces hold about 50% of the total cattle population of the country.

(b) Baggara Cattle : these are typical East African Zebu and are found mainly in the Northern Savannah country of Kordofan and Darfur, White Nile Province and in the Blue Nile areas of Kenana and Butana. The genetic potential of the Baggara cattle is excellent for beef production. The main cattle owning tribes in Darfur are the Rezeigat, Habania, Falata, Beni, Helba and Taasha ; and in Kordofan the

Meseiria, El Hawazma and Nuba, Meseiria Humr, Meseiria Zurug, Awlad Himeid, While in the White Nile the tribes are Al Ahmada and Seleim.

(c) Nilotic Cattle : the cattle of the south are of the Sanga breed (long horn humpless). They are smaller than the Baggara cattle with large horns. The main cattle owing tribes are the Dinka, Nuer and Shilluk and they are found mainly in Upper Nile, Bahr El Ghazal and Eastern Equatoria.

3.1.2. CATTLE PRODUCTION SYSTEMS :

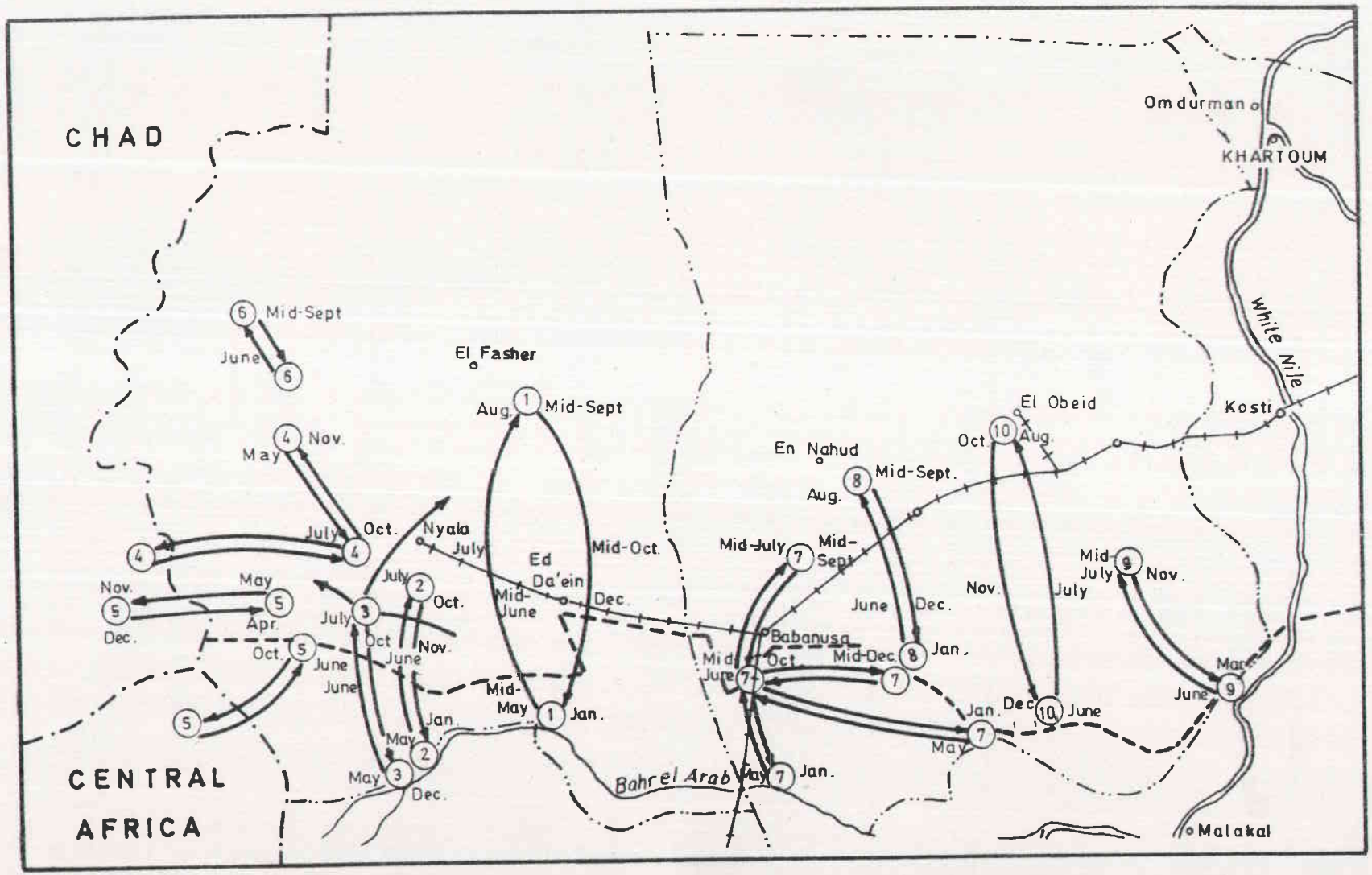
The main system for producing beef in the Sudan is through nomadism. Mixed farming and feedlot operations play only a small role compared to that of the nomadic section. It is clear that nomadic production will continue to be the dominant system in the country, whatever progress in range improvement and water supplies may be made in the northern parts of the Western and White Nile provinces.

(a) NOMADIC PRODUCTION :

It is estimated that 60% of cattle production originates from migratory pastoralists, and that much of the remainder comes from small, mixed, sedentary farmers. Traditional producers in the Sudan are fully aware of the economic importance of their herds, although they continue to place considerable emphasis on the social factors connected with livestock ownership. In rural areas the justification for keeping increasing numbers of livestock has developed around such social factors as prestige, tribal traditions and dowry. Also cattle have always been considered a reasonably safe means for the accumulation and retention of wealth. Consequently, the pastoralists normally sell their livestock only

FIGURE No. 3.1.

NOMADIC MIGRATIONS IN WESTERN SUDAN



1. RIZEIQCT
2. HABANIYA
3. FELLCTA
4. BENI HELBA
5. TA'AISHA
6. BENI HUSSEIN
7. MESIRIYA HUMR
8. MESIRIYA ZURUG
9. AWLAD HIMEID
10. HAWAZMA

subcutaneous fat in beef carcass. Most of the slaughtered animals in Sudan come from areas where feeding depends totally on natural pastures. The nutritive value of the grass in natural pastures is greatly affected by the amount of rainfall and its distribution the age of the plant and the season of the year. Therefore the condition of the animals coming to the markets varies considerably. In order to improve the quality of the meat, it is necessary hold these animals for certain periods in an area where they can be fed properly. It is generally accepted that meat (i.e. muscle) from a well-finished animal is better flavoured, more juicy and, usually, tenderer than meat from a lean one. Improvement in the quality of lean meat, and not the storage of fat as such, is the main object in finishing cattle prior to their slaughter for meat. Following are some technical aspects that should be considered in the finishing of cattle :-

(1) growth rate of the Sudanese cattle ;
(2) optimum period for finishing ;
(3) suitable formulation of the ration.

The following sections will deal with these three aspects.

3.2.1. GROWTH RATE OF SOME SUDANESE CATTLE :

Most Sudanese breeds of cattle belong to the short horn Zebu strain, therefore their productive characteristics are more or less similar to the Zebu cattle of the African countries where high standards of animal production have been achieved due to good management and proper feeding.(1) Calves were weaned at 31 days

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(1) Agabawi, K.A., Osman, H. El Sayed and Abou Akkada, A.R.(1968) Early weaning of Zebu cattle.1. Feed efficiency, Ruminal activity and blood constituents of early weaned calves. J. Dairy Sci. 51:44.

of age without adverse effect on their body weight gain. The calves reached 90 kg at 4 months of age. The mortality rate was 3% in the critical period of life during the first year when high mortality rates can be expected. The calves showed high feed efficiency similar to that of the calves in neighbouring African countries, Europe and U.S.A. (1)

Under normal grazing conditions, animals need over five years to reach the slaughter weight. Data in table (3.2.) show the weights of the different age groups of the Sudanese cattle. Better growth results of Sudanese cattle were achieved in the El Rahad Project in 1975 (see table 3.3.). Results obtained on feedlot fattening bulls in the Sudan during the last twenty years are summarized in table (3.4.). The average daily gain in Kenana animals was related to age. Higher values of average daily gains were obtained when the animals reached two years of age. From the purely scientific point of view, young animals require much less feed per kg of gain in weight than do older ones, thus making their gains decidedly cheaper(2). Yet usually young animals are not available in adequate numbers in the local livestock markets.

The mean average daily gain in overall breeds and age groups was low as 0.97 kg/head/day (table 3.4.) which is a little bit lower than expected under better feeding conditions. It would appear that all types of Sudanese cattle could secure an average gain of at least one kg of daily body weight when feedlot operations are applied.

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(1) Osman, H. El Sayed, Abou Akkada, A.R. and Agabawi, K.A.(1970) Influence of ruman ciliate Protozoa on digestion of food and growth rate of early weaned Zebu calves. J. Animal Prod.12:247

(2) Morrison, F.B. (1959). Feeds and feeding 22nd Ed. The Morrison Publishing Co. Ithica, New York PP. 720.

3.2.2. OPTIMUM AGE AND PERIOD FOR FINISHING CATTLE :

Successful fattening operations depend, among other things, on the age of animals and the length of the fattening period according to Morrison[1]. The gain made by cattle which are fattened when nearly full grown will be about two thirds fat and only some 8 to 10% protein ; where younger animals (since they are also growing) will have much less actual fat and a much higher proportion of protein. Because the efficiency of gain, as measured by units of feed intake per unit of live weight gain, decreases with age, so the fattening of cattle would be expected to be the most productive when applied to animals aged about three years. But the circumstances of market requirements cannot be ignored (table 3.5.).

Concerning the fattening period for cattle, 67 days was found to be more profitable than 109 days (table 3.5.). A guide to the amount of feed and the required fattening period to bring different aged (range bred) Western Baggara cattle to a satisfactory slaughter weight and to yield the optimum grade of carcass beef, considering anticipated feedlot performance, is presented in table 3.6.

3.2.3. FORMULATION OF THE RATION FOR FINISHING CATTLE :

The main objective of the finishing rations is to deposit fats in the body of the adult animal. Grain is essential in the production of carcasses with an adequate amount of fat so as to improve the flavour and tenderness of the beef. However, the feeding of grain alone would limit the progress of cattle feeding. A well balanced ration can be formulated with the finest feed

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(1) Morrison, F.B.(1959). Feeds and feeding 22nd Ed.. The Morrison Publishing Co. Ithica, New York PP. 720.

available , but unless the ration is thoroughly mixed and fed regularly the animals may not perform any better than if they were on an unbalanced ration. Therefore, in formulation rations for finishing cattle, the following points should be considered :

- availability of feed ;
- cost of available feeds ;
- quality of feeds ;
- suitability of feeds for storage.

TABLE 3.2. WEIGHT OF DIFFERENT AGE GROUPS OF THE SUDANESE CATTLE

Group No.	Approximate Age (years)	Weight (Kg)	
		Minimum	Maximum
1. Thenny (One pair of permanent teeth)	2	110	150
2. Rabaa (two pairs of permanent teeth)	3-4	200	220
3. Sadees (three pairs of permanent teeth)	4-5	250	350
4. Gamia	Over 5	350	400

Source : The Arab Organization for Agricultural Development (1974). The Economic and Technical Feasibility for Meat Production in the Democratic Republic of the Sudan.

TABLE 3.5. THE OPTIMUM PERIOD FOR FINISHING OF CALVES OF ZEBU TYPE IN KENYA

I t e m	Fattening Period (days) 67	(109
Average daily gain (kg/day)	1.16	0.99
Average feed intake (kg/day)	9.40	8.61
Average feed intake (kg)gain	8.10	8.70
Amount of sorghum required to produce kg. gain	4.7	5.1
Cost of feed required to :		
- Produce/kg gain (P.T.)	9.2	9.7
- Other daily expenses (P.T.)	4.05	4.05
- Total daily expenses (P.T.)	13.25	13.75
- Daily profit	19.40	8.25

The study was made on 3800 heads of Zebu cattle calves in Kenya.

Source : Greek, M. J., Reidforn, D.M., Robb, J., Scleider, E.W., and Squire, A.H. (1971) Review of the results of intensive beef feeding trials using maize grains. Beef Research Station, Nakuru, Kenya.

TABLE 3.6. FEEDLOT FINISHING PERIOD REQUIRED TO BRING CATTLE TO SATISFACTORY SLAUGHTER WEIGHT.

I t e m	Age of cattle (years)				
	1	2	3	4	5
Average initial weight (kg)	111.111	166.66	222.2	311.11	400
Average final weight (kg)	288.9	333.33	355.5	377.79	444.44
Required days of feeding	180	145	115	60	45
Average daily gain (kg/day)	.99	1.15	1.16	1.11	.99
Feed kg/gain ratio	6.5	7.12	7.75	8.50	9.25

Source : El Shafie, S. A. (1966) , Abid

3.3. LIVESTOCK MARKETING SYSTEMS :

The system is dominated by a small number of merchants who finance and organise the movement of livestock from the producing areas to the large consumer centres through a network of agents, traders and brokers. This informal network of financial and personal contacts provides the credit, market information, transport and a wide range of other services so essential to the functioning of the system. A general limited access to capital and credit has ensured that trading has remained in the hands of the larger merchants although there is some evidence that in recent years an increasing number of small independent merchants and traders have started to participate in the marketing process.

3.3.1. LIVESTOCK MARKETS :

There are three types of livestock markets in the country each divided as such according to their location, volume of trade and the facilities available in each type.

(a) Primary Livestock Markets :

These are located in the smaller and more remote towns and villages within the livestock producing areas. Animals are brought to these markets by the producers and by bush traders who visit the pastoralists' camps. Markets may be held weekly, fortnightly or monthly. Almost all sales are conducted by brokers who operate as midelemen between the sellers and the agents, and others traders interested in purchasing the animals.

(b) Secondary Markets :

These are located in the larger towns of the producing areas. Although some producers visit these markets, the majority of the sales are between the bush traders on the one hand, and agents and small independent traders on the other.

(c) Terminal Markets :

These are simply very large secondary markets located in major urban centres. At present, Omdurman Livestock Market is the only one in the country that comes under this category, and is the hub of the livestock marketing system. Not only does it attract the major share of all marketed livestock, but it is also the financial and organisational centre of the livestock trade. The major merchants of the Omdurman market provide most of the working capital for the system in the producing areas, credit for the butchers on the domestic market, and capital and expertise for funding and supplying markets abroad.

(d) Administration of Livestock Markets :

In the past all three types of markets were administered by the relevant provincial council. But after the establishment of the Livestock and Meat Marketing Corporation some secondary markets like Nyala, Fasher, Milit, Kosti, Wad Medani and Omdurman terminal market came under the full administration of the Livestock and Meat Marketing Corporation (LMMC).

Despite the large network of established markets, it is estimated that some one third to one half of all animals moving out of the producing areas never pass through an official market. This can be attributed to the fact that, at the present time, there is

no real incentive for the producer to bring his animals over the long distances to the market .

3.3.2. The TRADING PROGRESS :

One of the most important characteristics of the livestock marketing system is the number of extremely complex functional relationships which exist between all the individuals engaged in the livestock trade. They include :-

(a) Brokers (Sebabi) :

A producer willing to sell some of his animals has relatively few outlets available. The majority go to a livestock market where they sell through a broker who, through his knowledge of the market situation, knows the current prices and also has the self confidence for dealing with the merchants. He receives his commission from the seller. Sometimes he extends his activities and visits some camps to collect animals for selling to the merchant. In this case, he collects a commission from the merchant : if he cheats, he can get it from both sides.

(b) Traders (Gelaja) :

They are distinguished from the brokers in that they use their own capital to finance the purchases. They are small-scale local traders specialising in short-term and short-distance buying and selling. They collect the animals from the camp lots, each comprising 15 heads of cattle, and sell the collected animals on the local markets. In the peak marketing period they operate between the local markets.

During the dry season many traders, who may have herds of

their own, travel southwards where they are able to profit from " hardship " sales of stock at Babanusa and Ed'dein.

(c) Agents (Wakils)

These act as buying agents for a merchant(s) . The only difference between him and a trader is that the agent is financed by someone else. The agents are generally financed by local merchants, or the large merchants and exporters of Omdurman. His qualification is his thorough knowledge of the livestock trade so that he can be trusted by the merchant.

(d) Merchants (Jellabas)

They are the controllers of capital. Every year they supply millions of pounds in working capital to ensure that the marketing system will continue to function properly. Unlike the trader who operates with small amounts of working capital over a limited time, the merchant may have his money tied up for six months or longer through stock purchases and financing the movement of animals from the producing areas to the domestic consumer, or to export markets. City merchants rarely go to the producing areas themselves : they rely on experienced agents to do their buying. However, they do maintain a close watch on local and world prices, and send orders and advice to their agents.

(e) Guarantors (Damins)

The guarantor or Damin guarantees all sales and his stamp or signature testifies to the ownership of the animal and the seller's right to sell it. In order to be able to do this, the guarantor must know all the families within the tribe which he represents in his capacity, as Damin. In the major markets, such as Nyala or

TABLE 4.1. THE PREDOMINANT MAJOR ECOLOGICAL GRAZING ZONES

The Ecological Zones	Total Area (km^2)	% Total	Rainfall (mm)
Desert	725,200	29	0 - 75
Semi-Desert	492,100	19.6	75 - 300
Savannah Belt :			
Low Rainfall Savannah	688,950	27.5	300-800
High Rainfall Savannah	347,060	13.8	800-1300
Total Savannah	1,036,010	41.3	-
Flood Region	246,050	9.8	800-1000
Mountain Vegetation	6,475	0.3	-
Total	2,505,835	100	-

Source : Harrison and Jackson - Vegetation Classification of the Sudan (1958)

This range zone is known locally as " Gizu" grazing area. The " Gizu " is a remarkable form of vegetation complex appearing at irregular intervals on sandy soils. The translation of the work " Gizu " is the name given to plants that satisfy the water requirements of camels so that they will not be in need of free water. The most important species are composed of the following :-

Latin Name	Arabic Name
Fagonia Cretica	Agul
Aristida Papposa	Nawi
Indigofera Pancifolia	Singit
Neurada Procumbens	Saadan
Pannicum Turgidum	Tumam

(b) The semi-Desert Range Type

This ecological range type comprises a total of about 492,100 km^2 representing 19.6% of the total range land. The vegetation is a varying mixture of grasses, herbs, and some scattered bushes. Due to soil variations, this type has been classified into five major sub-types.

(1) Acacia Tortilis - Maerau Grassifolia
Desert Scrub.

This sub-type is seldom homogenous because of geological erosion which occurs particularly in the Red Sea area. Acacia Tortilis is the only feature of vegetation that is generally constant. Acacia Radiana and Salvadora Persica are abundant on sandy drainage systems. Capparis decidua, Ziziphus spine-christi and Balanites aegyptiaca are dominant on clay drainage systems.

Common herbs and grasses are generally composed of Schoenfeldia gracilis, Typhrosia spp., Eragrostis minor, Aristida hertigluma, and Aristida adsensionis.

(2) Semi-Desert Grass Land on Clay

This range sub-type occupies mostly the Butana area of Eastern Sudan. The soil is dark cracking clay with a loosely friable and spongy surface texture. Most of the Butana area is completely without trees or bushes. Acacia mellifera is confined to narrow vallies and foothills while Acacia nubica dominates water courses. The most dominant herbaceous species are Cymbopogan nervatus, Sorghum spp., Blepharis edulis, and Schoenefeldia gracilis.

(3) Semi-Desert Grass Land on Sand

Vegetation cover varies greatly and generally speaking there are more annuals than perennial plant species. The key forage species are : Aristida spp., Schoenfeldia gracilis , Tetrapogon spathaceus, Chrysopogon aucheri, Lasiurus hirsutus and Pannicum tergidum. The perennials are only abudant in areas not exposed to seasonal fires, overgrazing or agricultural activities.

(4) Acacia mellifera Commiphora sub-types

Vegetation cover varies greatly. Bare flats of mixed sand and clay are frequent. Generally, there are more annuals plant species. The key forage species are : Aristida spp., Schoenfeldia gracilis, Tetrapogon spathacus, Chrysopogon aucheri, Lasiurus hirsutus, and Pannicum tergidum.

(5) Acacia Glaucophylla, Acacia Etbaica Association

This range association is confined to lower slopes of southern part of the Red Sea Hills . Associated species are : Delonix elata, and Euphorbia euneata.

(c) The Savannah Belt

This ecological region covers a total area of about 1,036,050 km^2 representing almost 41.3% of the country's total range resources. The region is composed of a varying mixture of vegetation which include grasses, bushes and trees in variable proportions determined by the frequency and intensity of bush fires. It is the type of vegetation characteristic of the dry tropics with monsoon rainfall confined to a few months followed by a long, hot dry season. Since the region falls under precipitation ranging from 300 mm to 1300 mm, it has been sub-divided into two main sub-divisions : low rainfall savannah and high rainfall savannah.

(1) Low Rainfall Savannah

This sub-division covers a total area of almost 688,950 km^2 representing about 27.5% of the grazing resources and is considered to be the most important grazing and agricultural potential of the country. This sub-division is classified into the following range associations.

Low Rainfall Savannah on Clays

This range association dominantes the east central part of the country and the area surrounding the flood region. The

dominant vegetation species are : Acacia mellifera, Cadaba glandulosa Boscia senegalensis associated with Cymbopogon nervatus, Sorghum spp., and Seteria verticillata.

Low Rainfall Savannah on Sand

This association is the best developed type of vegetation of the Low Rainfall Savannah. In drier parts of this association, the vegetation grades into semi-desert grassland on sand where Acacia raddiana, and Maerua grassifolia are found mixed with Acacia Senegal. Towards its wetter areas, Combretum cordofanum and Guiera senegalensis patches alternating with Acacia senegal are readily marked. In depressions into which little clay has been washed, Adansonia digitata is often found together with Acacia nubica. The dominant forage grasses are : Aristida pallida , Eragrostis tremula and Cenchrus bifloris. In the triangle of El Nahud, Sungokai and El Obeid, the soil is red and iron salt binding. This red soil is exposed near villages due to erosion. Terminalia brownii and Albizzia sericephala are the typical trees characteristic of this area and Zornia glucodiata and Blepharis linariifolia are dmoinant.

Special Area of Low Rainfall Savannah

Toposa Area

This sub-association is dominated by grassland of sour perennial grasses such as Hyperphenia rufa and Setaria incrassata. The Sweet perennial grasses are composed of Chrysopogon aucheri and Schima nervosum. Annual grasses are mainly composed of Sporobolus marginatus and Aristida adscensionis.

Hill Catena

Hills have a characteristic vegetation of their own. Sometimes hills are grouped together in large masses such as the Nuba Mountains and Ingessana Hills. The seasonal water courses, formed from the run-off of the hill vary greatly as a function of the size of the catchment area. The most dominant vegetation are : Acacia albida and Ziziphus spina-christi. The main forage grasses are : Cynodon dactylon, Pennisetum pedicellatum, and Pannicum coloratum and Chlorisgayana.

Bagarra Repeating Pattern

It consists of frequently alternating small patches of two contrasting types of soil namely flats of non-cracking clay (Nagga), stands on the surface and then collects into shallow rainwater pools (Rahad) which are a feature of the area. Most dominant grasses on clay are : Aristida spp., Tripogon minimus, Sporobolus margin atus, while on sandy soil Dactyloctenium aegyptium and Brachiaria spp. are abundant.

Ragaba Repeating Pattern

This area has a characteristic identify of its own and cannot easily be lumped in with any other single type of vegetation. The three different dominant types of grazing are known locally as " Gardud", " Talha" and " Fau". All of these are in clay soils. Gardud, which occupies the biggest area, consists of non-cracking clay flats with a big run-off and has an almost sparse vegetation. Talha occurs on dark cracking clay, subject to shallow flooding and consists of open grassland of perennial grasses mostly Seteria incrassata and Hyperhenia rufa.

(2) High Rainfall Savannah

It occupies most of Bahr El Ghazal and Equatoria provinces. The trees are mostly broad-leaved species ; thorn trees are relatively infrequent. Perennial grasses are predominant. After they are burned early in the dry season they produce a short tender green highly palatable re-growth.

The vegetation composition is not uniform because of variations in topography. The most dominant species are Khaya senegalensis, Anogeissus schimperi and Combretum spp. The major forage grasses are composed of Hyperhenia rufa , Ctenium elegans and Loudetia simplex.

(d) The flood region

This is sub-divided into :

Highland : rarely flooded and the soil is composed of sand loam. The vegetation includes Hyphaena thebiaca, Acacia sieberiana and Balanites spp.

Swamps : flooded from adjacent rivers and inland vallies. The dominant species are mostly Cyperus papyrus, Echinochloa stagnina and Phragmites communis.

Intermediate: a mixture of the above two sub-divisions.

(e) Mountain Region

The vegetation in this region differ from the surrounding plains because of altitude and sometimes the higher rainfall. The four main mountains are Imatong, Didinga, Red Sea Hills and Jebel Marra. In the lower areas (1500 - 2600 metres), Olea hochtteri,

Albizzia spp. and Loudetia spp. are found in harmonised associations. In higher areas (26 00 - 3000 metres) some other species such as Hyporicum lanceolatum and Dombeya goetzenii are abundant. The Red Sea Hills are dominated with Juniperus procera and Olea chrysophylla.

4.1.2. RANGE PRODUCTION :

Apart from the existing cultivated area which, according to the 1981/82 census, amounts to 15.2 million feddans (1.3% of the total area), and areas which currently are not available for agriculture or grazing uses (48.5%), the range and forest resources comprise almost 279.4 million feddans, or almost 50.2% of the area of the country.

The best immediate measure of range productivity is the live-stock population that are supported which, according to the 1978/79 census, amount to about 27 million animal units. From estimates made by the Range and Pasture Administration, the actual forage production in the usable areas throughout the seven major regions of the country is shown in Table (4.2.).

The total forage production is currently confined to areas available for grazing utilization only, whereas areas which are not available for use (48.5%) seem to experience physical as well as environmental constraints, such as flooding problems in the High Rainfall Savannah, and the Flood Regions.

In the Western provinces (the proposed project area) grazing lands, though available, are not utilised because of the grazing system adopted by the nomadic tribes which is mainly governed by the seasonal availability of both grazing and drinking water supplies. The Rural Water and Land Use Survey conducted in Kordofan Province 1962/65 indicated that the empty areas, or the unused grazing lands, amount to about 35% of the total area.

surveyed (86,000 km^2). These untapped grazing resources could be opened up for grazing if the water provision problem could be solved in the basement complex formation.

4.1.3. RANGE UTILIZATION :

The desert and semi-desert regions (48.6%) of the total area are utilised mainly by the nomadic camel and sheep tribes of Northern Kordofan, Northern Darfur and the Eastern Province. According to recent studies by the Ministries of Agriculture, Irrigation and the National Council of Research in 1973 it was concluded that the semi-desert which extends between 16° and 14°N is at present in the process of being converted into true desert, because of the drought and the progress of desertification.

The high rainfall savannah and the flood region are partially utilised by livestock only during the dry season. Apart from areas not fully utilised (the desert, semi-desert, high rainfall savannah and the flood region), the low rainfall savannah (27.5%) is to be considered the most important grazing, as well as agricultural, land in the country. This area is currently considered to be the economic backbone of the country and possibly an area of readily available, untapped potential for future development. The low rainfall savannah region within the Western Provinces (the project area) has been identified by the Government, as well as the International Organisations, as the most suitable and currently available potential for livestock development.

Within the proposed project area (the Western and White Nile Provinces) 92% of the livestock population is still owned by the nomadic and migrant population. Therefore, nomadism is the major form of grazing management and utilization.

TABLE 4.2. ESTIMATED TOTAL RANGE FORAGE PRODUCTION IN THE COUNTRY

Region	Dominant Ecological Zones	Usable Range land (feddan)	Average forage production	Total range production (Ton/feddan
1) Northern Region	Desert and Semi-Desert	11,046,780	0.082	905,836
2) Eastern Region	Desert/Semi-desert/Low Rainfall Sav.,	43,419,850	0.15	6,512,978
3) Middle Region	Semi-Desert/Low and High Rainfall Sav.,	15,148,920	0.64	9,695,309
4) Khartoum	Semi-Desert	3,830,900	0.14	536,326
5) Kordofan Region	Desert/Semi-Desert/Low and High Rainfall Sav., and the Flood Region	53,502,370	0.27	14,445,639
6) Darfur Region	Desert/Semi-Desert/Low and High Rainfall Savannah	64,743,850	0.23	14,891,085
7) Southern Region	High Rainfall Savannah, the Flood Region and Mountain Vegetation	87,803,890	0.35	30,731,361
Total		279,496,560		77,718,534

Source : Halbook and Just (1964), Range and Pasture Administration records (1979).

4.2. CONCENTRATES :

The Sudan is a big producer of agricultural crops and its agro-industrial by-products are of prime importance to the fodder industry. The data of total area, total production and average yield/feddan of cereal grains and oil crops in the last 5 years are presented in tables (4.3) and (4.4) respectively. Sudan also exported some of its production from cereal grains and cakes (cottonseed, sesame, groundnut) to other countries. However, these exports have decreased during the latter years. The quantities of cottonseed cake, groundnut cake and sesame cake exported are presented in table (4.5). It would appear that exportation of these commodities will be discontinued in the future because of the increase in local consumption.

Concentrates are feeds with high energy but low crude fibre content . The protein content of concentrates varies tremendously, ranging from 2 to 88%. Furthermore concentrates vary considerably in protein quality.

4.2.1. LOW PROTEIN CONCENTRATES (Less than 15% Protein)

(a) Cereal Grains

Cereal grains in general are relatively high in energy content and, therefore, are used in large quantities for rations which require this nutrient. Sorghum, the main indigenous food crop in Sudan, has a production area much larger than that of any other crop. Out of the total crop cultivated area in Sudan during 1980/81, sorghum contributed 68.53%, millet 25.6% , wheat 4.31%, maize 1.31% and rice 0.22%. Samples of more than 600 local types have been collected from different parts of the country, and are being grown and evaluated for desirable characteristics at the

TABLE 4.3. CEREAL GRAINS PRODUCTION IN THE SUDAN

1975/76 - 1980/81

Year	Sorghum			Millet			Maize			Wheat			Rice		
	Area '000 F	Prod. 000 T	Av. Yield kg/ fd.	Area '000 F	Prod. 000 T	Av. Yield kg/ fd/	Area '000 F	Prod. 000 T	Av. Yield kg./ fd.	Area '000 F	Prod. 000 T	Av. Yield kg/ fd.	Area '000 F	Prod. 000 T	Av Yield kg/ fd.
1975/76	6311	1991	315	2701	370	136	210	53	252	690	255	370	17	7	411
1976/77	6287	1801	287	2223	472	170	149	42	281	639	294	460	23	11	478
1977/78	6662	2017	303	2948	488	166	139	45	303	602	319	527	28	13	464
1978/79	7202	2408	334	3078	529	179	145	43	310	586	178	302	20	10	500
1979/80	5563	1669	300	1931	309	160	134	41	305	728	233	320	23	11	428
1980/81	6956	2068	297	2598	491	189	133	40	300	437	218	499	23	10	410

Source : (1) Agricultural Statistics Bulletin, 1979.

(2) Statistics Department, Ministry of Agriculture, 1982.

TABLE 4.4. OIL CROP PRODUCTION IN THE SUDAN

1975/76 - 1980/81

Year	Cotton			Groundnut			Sesame		
	Area 000 fed.	Prod. 000 tons	Average kg/fd	Area 000 fed.	Prod. 000 tons	Average kg/fd	Area 000 fed	Prod. 000 tons	Average kg/fd
1975/76	981	316	322	2321	796	342	2216	218	98
1976/77	1006	459	456	1880	748	391	2288	247	108
1977/78	1120	559	499	2661	1027	391	2349	245	104
1978/79	1036	407	392	2328	798	343	2057	214	104
1979/80	1025	400	390	2372	1133	477	2272	289	104
1980/81	964	287	298	2129	707	332	2011	221	111

Source : (1) Current Agricultural Statistics, Vol. 1, No. 3 June 1979.

(2) Department of Statistics, Ministry of Agriculture, Jan. 1982

usually leaves less than 2% of the oil in the seed. The residue " oil meal " is less palatable than oilseed cake and has a lower fat content which reduces their energy value.

(1) Cottonseed Cake

For every ton of lint in seed cotton there are approximately 1.7 tons of cotton seed. One ton of seed yields about 200 kg of oil, 500 kg of cottonseed meal, and 300 kg of hulls. The residual oil in hydraulic-pressed cake is usually between 4% and 8% ; in screw-pressed cake between 3% and 5% ; and in solvent extracted meal less than 3%.

It should not be given to younger animals because of the high content of crude fibre. It can have the poisoning effect of gossypol in certain farm animals but, generally, it has no effect on beef cattle. The biological effect of gossypol can be prevented by adding iron in the form of ferrous sulphate. The increase growth, the following proportions of iron to free gossypol have been used : for cattle (1:1), for broilers (2:1), for layers (4:1). Only free gossypol (which can be extracted with aqueous acetone) is physiologically active and toxic. In raw seed, free gossypol amounts to 0.4 - 1.4% of weight of the kernel. During processing much of this becomes bound gossypol. The remaining free gossypol in direct solvent - extracted cake is 0.2 - 0.5% in hydraulic press cake and 0.02 - 0.06% in screw press cake.

Cottonseed cake is a very palatable protein supplement and is relished by beef cattle. However it can have a constipating effect on cattle which is beneficial in feeds with a high molasses or wheat bran content. It is usually poor in calcium and carotine, and rations including this cake should be fortified with calcium and vitamin A.

(2) Groundnut Cake

Two types of groundnut cake are produced in Sudan. The first is produced after extraction of oil from shelled groundnuts, and the second from pressing unshelled groundnuts. The first type is more nutritious. However, both types are delicious in taste and have a laxative effect as well as containing high proportions of digestible protein with high biological values. Combined with sesame cake it provides a well-balanced protein supplement.

Sudan's total groundnut production in 1980/81 was 707,000 tons giving 396,000 tons of cake. As the local saleable quantity in the market did not exceed 122,000 tons, it means that appreciable quantities were exported (table 4.5.).

Sudan exported 95,000 tons of groundnut cake in 1980/81 which demonstrated that it is a good foreign currency earning commodity. It is also considered to be an excellent and highly nutritious feed for dairy and beef cattle.

(3) Sesame Cake

Sesame cake is palatable to all classes of livestock and has a mildly laxative effect. If it forms too large a part of the ruminant ration, it will result in the production of soft butter. It is recommended that dairy animals be given no more than 3 kg of sesame cake per day, as larger amounts will give the milk a disagreeable taste. It should not be wetted when fed as the meal will acquire an unpleasant taste.

It is high protein feed rich in methionine and arginine, and has great potential as a poultry feed when mixed with lysine-rich materials (blood meal). It has a high content of phytic acid and

appears to bind calcium, hence the amount of calcium in diets containing sesame meal should be increased. The cake will become rancid if stored for any length of time.

(b) Slaughterhouse By-Products

The raw materials of slaughterhouse by-products are animals that have died from disease, carcasses or parts of carcasses that have not passed meat inspection, technical blood, inedible parts of the digestive tract (e.g. biles), reproductive organs, bones and other trimmings that are not acceptable as food for aesthetic reasons.

(1) Meat Meal

It is most widely used in feeds for poultry. It is very expensive to feed to ruminants which, in many cases generally find meat products unpalatable . It is used to balance the amino-acid composition of the diet rather than as a major source of protein.

(2) Blood

Only about 6 kg of blood meal can be produced from 1000 kg liveweight. On a semi-commercial scale, blood meal is made by steaming or boiling the blood for 20 minutes, collecting the coagulate, drying and milling it. Care should be taken not to allow the temperature to exceed 120°C in any phase of the process, or else the meal will be of inferior quality.

Blood meal contains only small amounts of minerals, but is very rich in protein which has, however, a rather baised amino acid composition. Because of less palatability, under 5% is usually included in the diets for poultry. Larger amounts are seldom

required nutritionally, and can also cause scouring. Higher proportions may be used for cattle and in milk substitutes for calves. For the latter it should not constitute more than 50% of the protein in the diet because of i s low palatability.

(3) Bone Meal

With simple equipment the bones can be processed into either raw bone meal or calcinated bone meal.

- Raw Bone Meal

Fresh bones are boiled in open kettles until they are free of all adhering material. The bones are then dried and ground.

- Calcinated Bone Meal (bone ash)

The bones are piled on a metal frame and burned to sterilise them and rid them of all organic matter. This is the only recommendable method for utilising desert bones. The charcoal like bone ash is friable and can easily be pulverized.

Bone meals are used as a phosphorous and calcium source in animal feeding. They are also good sources of trace elements and can either be mixed with concentrate supplement or used in cattle licks in the field.

However, its cultivation in Sudan is very limited due to the shortage of seeds on the local markets.

4.3.2. DRY FORAGE :

(a) Bagasse

Bagasse is one of the by-products of the sugar cane industry, and its total annual production in Sudan is about 1,152,000 tons. Although a significant percentage of bagasse (an average of 60% of the production)is burnt as fuel in sugar mills, there is still a large quantity available (691,200 tons) as a surplus which is not only unwanted by the factory but is a constant source of worry to the management because its presence is a potential fire hazard.

Bagasse contains low nitrogen, fat and ash content, its nutritive value is about 40% total digestible nutrients (TDN). Bagasse contains 20% Pignin.

Studies on Bagasse as a feedstuff show that young ruminants use more energy to digest bagasse than they obtain from it(1). Bagasse pith has been used in proportions of up to 27.5% in beef cattle rations before production decreased markedly. The poor palatability of bagasse can be improved by mixing it with molasses. As animals over two years old seem to utilise bagasse better, it is a more satisfactory feed for these animals. The digestibility of dry matter in old animals is often about 50%. Bagasse is comparable to hay for older animals and has been used in fattening rations for older bullocks with good results.

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(1) Source : Nadia A.G. Mohamed, (1981), M.Sc. Thesis University of Khartoum

Bagasse and pith are good carriers of molasses ; several mixtures of bagasse and molasses exist on the market. The use of bagasse to absorb molasses simplifies the transport and handling of molasses. In a hot, humid climate, however, there is the risk of moisture absorption and fermentation, therefore the moisture content of the bagasse must be less than 10% and the final product must be stored dry. The following are the most common bagasse : molasses mixtures -

	Bagasse	:	Molasses
1. Camola	4	(W/W)	10
2. Molascuit	1		6.25

(b) Sugar Cane Tops

In the Sudan, Sugar cane tops which constitute 30% of the cane stalk yield are burnt at harvest in the local sugar factories. In other countries the tops are cut off the plant during harvesting and are widely used for feeding drought animals or cattle.

The quantity of sugar cane tops in the Sudan was about 282,000 tons during the year 1979/80 . As fodder, fresh sugar cane tops provide adequate nutrients to meet the maintenance requirement of cattle but, for production, it is necessary to add a protein concentrate. For better utilization, it should be chopped and ensiled by adding molasses or a molasses and urea mixture. Sugar cane tops are generally low in nitrogen and phosphorous.

(c) Corn Stalks

When maize is grown for grain the stalks left after husking can be important feed for livestock. When cattle have access to

5.2.5. ANTHRAX :

It is an acute, infectious, febrile disease which attacks virtually all animals and man and is caused by Bacillus anthracis.

It is reported that the disease first occurred in Sudan in 1920 in Singa Province, apparently having entered the country from Ethiopia. In the following year it occurred in the Nuba Mountains in Kordofan Province ; that same year the disease was diagnosed in two export quarantines in Khartoum North and Wadi Halfa among both cattle and sheep. In 1945 the disease affected a herd of elephants in Bahr el Ghazal Province.

Nowadays the disease is under full control because of the regular annual vaccination of producers' herds as well as all export cattle and sheep. Table 5.4. shows the amount of vaccine issued.

TABLE 5.4. AMOUNT OF ANTHRAX VACCINE ISSUED 1976 - 1981

Year	Doses of vaccines issued
1976/77	2,192,850
1977/78	1,130,875
1978/79	1,726,450
1979/80	2,920,870
1980/81	1,424,750

Source : Ministry of Agriculture & Irrigation

5.2.6. BLACKQUARTER (Blackleg)

It is an acute infectious disease affecting cattle and sheep caused by clostridium chauvei and is characterised by inflammation of muscles, severe toxaemia and a high mortality rate.

The disease was first known in 1939 when some cases were reported in the Nuba Mountains of Kordofan Province. In 1942 outbreaks were reported from Gedaref in Kassala Province, and in Rashad in Kordofan Province where about 1000 head of cattle died.

At present the disease is under full control and therefore it is of no significant importance. The veterinary authorities have an organised annual vaccination campaign against the disease, specially in Kordofan, Darfur and Bahr El Ghazal Provinces. The Blackquarter vaccine is produced locally in sufficient quantities to meet all requirements. Table (5.5) shows quantities of vaccine issued.

TABLE 5.5. AMOUNT OF BALCKQUARTER VACCINE ISSUED 1976 - 1981

Year	No. of doses issued
1976/77	197,040
1977/78	232,320
1978/79	324,660
1979/80	994,920
1980/81	830,280

Source : Ministry of Agriculture and Irrigation.

are acaricides e.g. Camatox, Asuntol and Delnav, this last one being a very effective new drug on the market.

As for internal parasites, the diseases they cause are chronic. Following are some of the internal parasitic diseases commonly found in Sudan :-

(a) Bovine Cycticercosis
(b) Bovine Schistosomiasis
(c) Fascioliasis
(d) Haemonchiasis and other intenstinal worm infestation.

5.3. DISEASE SITUATION IN WESTERN SUDAN AND WHITE NILE PROVINCE :

Western Sudan (N. Kordofan, S. Kordofan, N. Darfur , and S. Darfur Provinces) and the White Nile Province are the areas of production where the provincial holding grounds have been selected. The cattle will be purchased from these areas for supplying the PHGs and the CAA at Omdurman, therefore special stress should be given to veterinary activities i.e. personnel, establishments, disease situation and disease control in all these areas.

5.3.1. VETERINARY PERSONNEL AND ESTABLISHMENTS IN WESTERN SUDAN AND WHITE NILE PROVINCE :

There are about 115 veterinarians stationed in Western Sudan and White Nile Provinces out of 740 working in the whole of Sudan i.e. the Ministry of Agriculture, University of Khartoum and the private sector. The majority of these 115 veterinarians are working in the field with a few in the two Regional Veterinary Laboratories in El Obeid and Nyala performing diagnosis and field investigations for the area. There are also 140 Veterinary Assistants and Technicians engaged in field work, laboratory and animal production

research and services. Also there are 27 veterinary hospitals and 85 dispensaries. (Table 5.7).

TABLE 5.7. DISTRIBUTION OF THE VETERINARY PERSONNEL HOSPITALS AND DISPENSARIES IN THE AREA

Province	No. of Vet	No. of Vet. Asst. and	No. of Hospitals	No. of Vet. Dispensaries
N. Darfur	11	26	6	20
S. Darfur	28	37	6	10
N. Kordofan	30	57	7	23
S. Kordofan	19	23	5	9
White Nile	17	27	3	13
Total	115	140	27	85

Source : Ministry of Agriculture & Irrigation

5.3.2. RINDERPEST :

The general situation of this disease was discussed fully and it was concluded as being favourable. In Western Sudan and White Nile the position is the same (Table 5.8.).

TABLE 5.8. RINDERPEST DISEASE SITUATION IN WESTERN SUDAN AND WHITE NILE PROVINCE 1978-1981

Province	No. of Cases			No. vaccinated		
	1978/79	1979/80	1980/81	1978/79	1979/80	1980/81
N. Darfur	-	1	-	123049	250419	122898
S. Darfur	-	-	-	N/A	N/A	570981
N. Kordofan	-	-	-	N/A	222886	N/A
S. Kordofan	7	3	-	142457	280866	724206
White Nile	-	-	-	468?2	31310	226644

Source : Ministry of Agriculture and Irrigation

5.3.3. FOOT AND MOUTH DISEASE

It was not possible to get separate records of this disease for Western Sudan and White Nile Province, but the situation can be described generally as under control, similar to other parts of Sudan. Cases of this disease usually increase during the rainy season because of the animals' northward movement away from the fly belt. During the rains the grass is green and so infection is mild, especially among calves. In the dry season infection can be severe and casualties are heavy.

5.3.4. ANTHRAX :

This disease is fully under control as all cattle moving towards Omdurman are vaccinated against it and a movement certificate is issued to this effect. Generally, the situation is good (Table 5.9).

TABLE 5.9. NUMBER OF CASES OF ANTHRAX AND VACCINATION
1978 - 1981

Province	No. of Cases			No. Vaccinated		
	1978/79	1979/80	1980/81	1978/79	1979/80	1980/81
N. Darfur	-	-	-	33491	10337	29914
S. Darfur	N/A	N/A	N/A	N/A	N/A	149245
N. Kordofan	N/A	-	N/A	N/A	120894	N/A
S. Kordofan	13	99	5	175885	80474	129250
White Nile	-	-	-	37504	22379	37504

Source : Ministry of Agriculture and Irrigation

5.3.5. HAEMORRHAGIC SEPTICAEMIA :

As stated under the disease situation the general condition of H.S. in Western Sudan and White Nile Province is favourable on the whole. An annual vaccination programme is conducted regularly in these provinces ; moreover all trade cattle moving from these areas towards Omdurman are vaccinated against the disease (Table 5.10)

TABLE 5.10. INCIDENCE OF HAEMORRHAGIC SEPTICAEMIA
AND VACCINATION FIGURES 1978 - 1980.

Province	No. fo Cases			No. Vaccinated		
	1978/79	1979/80	1980/81	1978/79	1979/80	1980/81
N. Darfur	-	-	-	31262	121513	40225
S. Darfur	N/A	N/A	20	N/A	N/A	442195
N. Kordofan	N/A	-	N/A	N/A	163338	N/A
S. Kordofan	55	99	16	307142	213471	148481
White Nile	-	-	-	24150	24465	34602

Source : Ministry of Agriculture and Irrigation

5.3.6. BLACKQUARTER (Blackleg)

The situation of this disease in the five provinces can be described as under full control as elsewhere in the country. The veterinary authorities organise annual vaccination campaigns especially in Kordofan and Darfur Provinces (Table 5.11).

TABLE 5.11. INCIDENCE OF BLACKQUARTER AND VACCINATION FIGURES 1978-1980

Province	No.of Cases			No. Vaccinated		
	1978/79	1979/80	1980/81	1978/79	1979/80	1980/81
N. Darfur	-	-	-	6364	48043	16300
S. Darfur	N/A	-	3	N/A	48815	50770
N. Kordofan	N/A	N/A	N/A	N/A	N/A	N/A
S. Kordofan	13	59	17	175885	1520	152318
White Nile	-	-	-	4180	12795	18228

Source : Ministry of Agriculture & Irrigation

5.3.7. TRYPANASOMIASIS

As was stated previously under disease situation in the Sudan, the incidence of Trypanasomiasis in these five provinces is high. Although these provinces are outside the tse tse area, the infection is maintained by the biting flies such as Tabanidae and Stomoxys and treatment is conducted by the drug ethidium bromide. Also, as mentioned before, two campaigns were launched in 1971/73 for the treatment of all animals against this disease in Southern Darfur and Southern Kordofan Provinces : about one million head of cattle

were treated and more than 25 thousand blood samples were collected for the disease survey. Incidences of the disease and number of animals treated are given in Table (5.12).

TABLE 5.12. INCIDENCES OF TRYPANASOMIASIS AND NUMBER OF ANIMALS TREATED 1978 - 1980

Province	No. of Cases			No. Vaccinated		
	1978/79	1979/80	1980/81	1978/79	1979/80	1980/81
N. Darfur	4	-	-	3366	1522	357
S. Darfur	N/A	63	23	N/A	124753	23778
N. Kordofan	N/A	-	N/A	N/A	11335	N/A
S. Kordofan	227	237	32	41332	71200	83705
White Nile	-	-	-	58026	118045	68709

Source : Ministry of Agriculture & Irrigation

5.3.8. PARASITIC DISEASES :

(a) Ticks and Tick-born Diseases

Cattle become infested with ticks in the grazing areas and in watering places. In addition to sucking blood and damaging the hides, ticks transmit several diseases - babesiosis, theiberiosis and anaplasmosis.

Tick-born diseases are acquired early in calfhood and the animal remains in a state of pre-immunity which may break down as a result of stress factors and super-imposed infections e.g. (tryps).

With the exception of Babesiosis the other diseases are not well known by livestock owners due to the presence of mixed infections and misleading symptoms in most of the cases, if not all. A fact worth mentioning is that indigenous cattle are affected less than exotic and cross breeds.

(b) Liver Flukes (Fascioliasis)

The disease is reported from the White Nile, Southern Kordofan and Southern Darfur Provinces.

It is widespread in the White Nile due to massive infection occuring along the river banks (presence of snails that harbour the parasites). The White Nile River is sluggish and overflows its banks on both sides. This, coupled with the growth of weeds and grasses along the banks create a suitable environment for the spread of the disease.

(c) Schistosomiasis

In the White Nile Province the disease is endemic causing periodic large scale outbreaks, which usually take place during the dry season when the animals are concentrated in watering places. No records of casualties from this disease are kept because livestock owners normally do not report it as no treatment is available.

In Western Sudan, the disease is encountered only among some cattle that migrate south into Bahr El Ghazal Province where the disease is mild and involves only a few animals.

(d) Haemonchiosis and other Intestinal Worm Infestation

There are several species of tape and round worms that infect cattle in the production areas. Infestation with worms usually takes place when animals are crowded around watering places and in limited grazing areas. When the number of worms inside the animal is small no symptoms of sickness are shown, but if the number is great the animal becomes weaker, sick and open to other infection. If not treated, the animal might succomb.

However, owners know the symptoms of worm infestation and they are accustomed to dosing their animals routinely with drugs in common use such as Phenovis, Nilvern. There is a good new drug on the market now with a wide spectrum known as Syspamex.

IDA	25.0	million dollars
ODA	3.1	" "
Saudi Fund	3.1	" "
Sudan Government	23.2	" "
	54.4	million dollars

The main components of the project are :-

(a) Livestock transport consisting of 10 locomotives and 69 double deckers plus 48 livestock wagons from the railway's present rolling stock.

(b) Transport infrastructure which includes six holding yards, three transit yards and one terminal yard.

(c) Market infrastructure which includes the establishment of one terminal market, 11 secondary markets, and improvement of 30 primary markets.

(d) LMMC headquarters comprising the HQ building staff, equipment, vehicles, telecommunications network linking the HQ with markets and the transport facilities, houses for the staff, trucks tankers and trailers.

(e) Technical assistance in the nature of six experts for 5 years, and 40 man-months of training for Sudanese senior staff through fellowships and tours.

6.1.4. MINISTRY OF COOPERATION, TRADE AND SUPPLY (CTS)

This Ministry used to have the responsibility for all export activities and trade agreements but, after the establishment of the

Livestock and Meat Marketing Corporation, it delegated its authority for matters concerning livestock and meat to that corporation ; only over camels exported on the hoof to Egypt did they retain their control.

Trade agreements with other countries in respect of livestock and meat are finalised in coordination by both the LMMC and the Ministry of CTS. In addition, there is a permanent Price Committee composed of representatives from LMMC, Ministry of CTS, and the Bank of Sudan. This Committee reviews the export prices every three months, and sets confidential minimum prices for live animals and meat.

6.1.5. BANK OF SUDAN

As mentioned under 6.1.4. above the Bank of Sudan participates with the LMMC and the Ministry of CTS in reviewing every three months the exports prices for livestock and meat. In fact, the Bank of Sudan is responsible for issuing export licences, controlling currencies, and ensuring that the remitted foreign currency earnings correspond with the export sales receipts.

6.1.6. REGIONAL GOVERNMENTS

All vaccination programmes, extension works, administration of provincial dairy and poultry units, and improvement of hides and skins production have become the full responsibility of the appropriate provincial authorities in the regions : but veterinary and animal production research, manufacture of vaccines, and coordinated control of epidemics throughout the whole country still remain the obligation of the Central Government i.e. Ministry of Agriculture and Irrigation.

The Irrigation Works and Earth Moving Public Corporation completed under contract the whole main canal and the secondary canals for the irrigation of 16,000 feddans by 1980. Huge water pumps have been installed in the Blue Nile, and electric generators have been placed in position. The project is ready to commence operations but financing for the working capital has yet to be made available. At present the Arab Livestock Development Company and a French company are negotiating with the ELWAHA Project authority in an endeavour to acquire that financing so that the project may start functioning.

The project is designed to provide for the establishment of an irrigated fodder farm and feedlot in an area of 27,000 feddans. The capacity of the feedlot is 50,000 cattle and 100,000 sheep : 32% of the cattle and 20% of the sheep are destined for the domestic market, and the balance will be exported as chilled meat to Kuwait, Saudi Arabia and the Gulf States.

(c) Damazine Agricultural and Animal Production Company
(Sudan, Saudi Investment Company)

This project comprising about half a million feddans lies about 80 km south of Damazine in the Blue Nile Province on the edge of the Ingessana Hills.

The total estimated investment of £ 9.5 million was provided by Prince Mohamed El Faisal the Sudanese private sector, and Damazine Executive Council. The animal production target was aimed at 120,000 cattle and 240,000 sheep.

The project started in 1977 under a Sudanese management assisted by foreign consultant experts (Delgetity Australia) Ltd.

Progress was hindered largely by the following contributing factors : boreholes not sunk to give a satisfactory water supply; insufficient rainfall to fill the 2 haffirs intended for watering the livestock ; difficulty with imports of breeding stock from Kenya ; and the high rates of mortality among the sheep. Because of the latter it was decided to exclude sheep production from the project's scheduled future plans.

The company has now invited some consultants to conduct a new feasibility study for the breeding and fattening of livestock in this area.

6.2.2. PROJECTS UNDER IMPLEMENTATION

(a) Green Valley Project

This project is located near Roseires in the Blue Nile Province with an area of 133,000 irrigated . It is a Sudanese private sector enterprise owned by Sayed Abdel Karim Hussein Gaafar, and the management is Sudanese.

Total cost of the project is estimated to be £S. 24 million (1979 prices) and it is designed to produce crops and livestock on rainfed and irrigated lands. The total annual production of livestock is estimated to be 30,000 cattle and 240,000 sheep most of which will be exported as chilled meat to Arab Countries, with a sizeable portion being left for local consumption.

(b) Arab Sudanese Dairy Company

This project is located about 35 km south of Khartoum on the Wad Medani Road near Semair village in an area of 5,500 feddans.

TABLE 7.2. COMPOSITION (%) OF FEED INGREDIENTS IN THE PELLETED RATIONS FOR FATTENING CATTLE IN KHARTOUM.

Feed Ingredients	A	B
Groundnut cake	-	10
Decorticated cotton seed cake	35	5
Wheat bran	35	28
Sorghum	5	32
Molasses	12	10
Groundnut hulls	12	12
Lime stone	-	2
Salt and Vitamins	1	1

Sources : (1) Arab Organisation for Agricultural Development (1981) Feasibility Study of Animal Feeds from by-products in the Sudan. Page 148.

(2) El Gadid Feed Mill, Khartoum, Sudan.

TABLE 7.3. PRICES OF RAW MATERIALS AND SUPPLIES IN KHARTOUM (1982) £S. / TON.

Feed Ingredient	Price
Sorghum	150
Groundnut cake	158
Wheat bran	100
Salt	150
Lime stone	100
Sugar cane bagasse	20
Groundnut hulls	20
Molasses	20

Sources : (1) Commercial feed manufacturers in Khartoum

(2) Government authorities.

consider : one which produces mash, and one which produces pellets. The equipment required for the pelletizing plant is less complex than that required for the production of mash, but is more expensive. The additional capital and operating costs associated with the pelletizing process are more than justified because of the possible improvement in material handling, and the ability to store pellets for prolonged periods.

7.2. SLAUGHTER HOUSES :

According to the Meat Inspection Act, 1974, slaughterhouses in Sudan are classified into three types : rural urban and export abattoirs.

7.2.1. RURAL ABATTOIRS :

These are very primitive consisting only of concrete floors and hoists for skinning and removing the hide from the slaughtered animal. There are about 105 of these municipal abattoirs distributed all over the country, and they are further classified into five types depending on their daily kill out of cattle and sheep (table 7.4.).

TABLE 7.4. TYPES OF RURAL ABATTOIRS

Type	Daily Kill Out	
	Cattle	Sheep
One	7 60	150 - 300
Two	50 - 60	100 - 120
Three	20 - 50	50 - 70
Four	10 - 20	40 - 50
Five	5 - 10	20 - 30

Source : Ministry of Agricultural Animal Resources (1981)

7.2.2. URBAN ABATTOIRS - OMDURMAN CENTRAL ABATTOIR :

Omdurman Central Abattoir is the only one of its kind in Sudan and was constructed in the late fifties as a typically modern and hygienic model. It is owned and operated by the municipality as a service to the local wholesale and retail meat trade ; and until the 1974 ban on meat exports it played an important role in the considerable and increasing trade in chilled carcasses for export.

The plant was designed for a daily throughput of 150 cattle and 500 sheep and goats : in practice those numbers have been well and constantly surpassed. Now, the actual daily capacity is believed to be 300 cattle and 1000 heads of sheep. Such an increase has placed an inevitable strain on the abattoir's facilities and so operations are often delayed due to mechanical failures and hygienic problems.

In the outskirts of the Three Towns and within Khartoum Province, there are six small slaughterhouses where meat inspection is carried out as well as slaughtering. While their throughout has increased strikingly during the past few years that of the central abattoir has been somewhat reduced for the reasons stated above. Due to lack of finance earlier plans for replacing the plant had to be abandoned, but measures are now being taken to improve the hygienic facilities only as its present standards are not acceptable internationally.

Omdurman Central Abattoir is semi-mechanized utilising both the gravity-on-rail and floor stationary cradle system for cattle, and the gravity-on-rail system for sheep.

A refrigeration unit with a capacity of 30 tons was added to the plant some years after its construction, but it is now out of order and will require a lot of repair work to be done before it can be made functional.

Three trucks with six refrigerated semi-trailers used to carry the meat from the abattoir to the airport but most of them are not in use now.

Omdurman abattoir used to be a substantial supplier of animal casings to the Lebanon ; as many as 12,000 sheep casings were sent there annually.

Other by-products processed are protein meals, but the rendering facilities are very limited with only one small cooker and one grinder being operational. Gallstones are collected by the workers on their own account and are sold for export. Other valuable by-products are neither recovered nor processed.

7.2.3. EXPORT ABATTOIRS - KADERO EXPORT ABATTOIR

As mentioned above, Omdurman Abattoir does not comply with international sanitary regulations and so the export of meat or meat products from that plant could not be envisaged on a commercial scale. For this reason a scheme for building two export abattoirs was incorporated in the first Five Year Plan for Economic Development 1970/71 - 1974/75. Kadero Export Abattoir was inaugurated in 1976 and is the only one in the country.

The site at Kadero, 13 kms north of Khartoum, was well chosen since it fulfils the following important requirements :-

- it lies inside the Disease Free Zone ;
- it is close to Khartoum International Airport ;
- It is adjacent to the meat markets of the Three Towns where unexported meat products, including the fifth quarter, can easily be marketed ;
- easy flow of livestock from production areas into the abattoir and, after completion of the stock routes and LMMC projects, this can be facilitated further ;
- fodders and animal feeds are sufficiently plentiful to support feedlots ;
- other infrastructure and supporting services are available, e.g. fuel, water, electricity, skilled labour etc.

Kadero abattoir stands within a fenced-in area of 15 feddans adjacent to the quarantine station. Its construction was financed with a Danish loan and by a Danish contracting company named " Intercool". Daily capacity for a 10-hour day is given as 250 head of cattle and 1000 sheep and goats. However, the excellent " on-rail" layout and equipment on the killing floor indicate that, with slight modifications and more trained staff, these numbers could be significantly expanded.

The buildings are well designed and constructed with very good service installations (water, steam and electricity). Water is obtained from a bore hole on the site and pumped to ahead tank but, in the event of a capacity slaughter, it would not hold more than one hour's supply. Generally, under conditions such as those prevailing at Kadero, a reserve supply of water to cover at least one day's full kill is desirable : this would require the construction of a reservoir capable of holding about 170,000 gallons of water. Electricity is drawn from the main city supply but, as this is

subject to frequent power cuts, the abattoir is greatly dependent upon its standby diesel generator. The boiler is small and steam production may not be sufficient to cope with the anticipated increase in production.

The abattoir is comprised of the following departments :-

- Lairages :

These are models for any slaughterhouse, well laid out and fully shaded with capacities for 100 sheep and 300 cattle. Animals are rested here for 18-24 hours where the ante-mortem inspection is also carried out. A livestock scale is situated at the entrance gate for recording the liveweight of each animal. However, the race leading to the stunning pen is poorly designed, being too wide to be functional. Cattle turn back in the race and, despite the use of electric prodders, a lot of effort is required to rope and drag the animals into the stunning pen. This leads to inevitable delays on the killing and dressing floors.

- Cattle Slaughterhall

Capacity is 25 - 30 heads per hour. Animals are stunned in a stunning box equipped with a captive bolt pistol ; the pen is the large revolving wheel ritual type. To cope with the expected increased throughput, the standard box type stunning with drop bottom and rising side would be required.

The carcass is conveyed by gravity along an overhead rail where several processes are performed before it is finally splitted and quartered. A wide combination of tools, machines and correlated equipment are in use on the killing and dressing floors, but more sophisticated apparatus would be necessary to cope with and enhance

future operations.

- Sheep Slaughterhall

Capacity is 120 heads per hour. Electrical stunning is employed, and the animals are dressed while on the rail.

- Edible Offal Treatment

These include head and feet, plucks, stomachs, and intestines. Each is treated in a separate room, capacity corresponding with the daily throughput of the plant. Hot and cold water is used. Stomachs can be cleaned and converted into tripe.

The main room is fitted with two stainless steel cleaning tables, one stomach emptying table, and one beef and two sheep casing cleaning machines. Two gut cold store rooms complete the department.

The space available for cleaning, defatting and sliming the casings is inadequate ; if calibrating and measuring the casings were to be undertaken, the salt and manure rooms would have to be used that purpose.

- Hides and Skins Store

This is a spacious room where hides and skins are collected, trimmed and weighed before being sent on in a fresh condition to the tanneries. Salting facilities are also available.

- Dry-Rendering Plant

This consists of a small dry-melter (2500 litres content) which has a capacity of 1500 kgs; a small centrifuge ; one small

disintegrator ; and two tallow refining vessels. Both the building and the machinery installed are far too small and will be totally inadequate for dealing with the bones when the boneless beef section comes into operation.

Daily output of this plant is said to be :-

Blood powder	:	700 kgs
Meat and Bone Meal	:	1000 kgs
Technical Fat	:	600 kgs

- Emergency Slaughterhall

This is a small room incorporated in the above buildings.

- Refrigeration Plant

This comprises the following units :-

- 7 chilling rooms each with a capacity of 10 tons. Here, quick chilling of meat can be performed where the temperature of the carcass can be reduced from 39°C to 1°C in 16 - 20 hours.
- 2 cold stores, total capacity 70 tons, where chilled meat can be stored at 1-2°C.
- A freezing tunnel, capacity 10 tons, where meat can be deep frozen to a temperature of 40°C.
- Frost store, capacity 50 tons, where deep frozen meat can be stored at - 18°C.
- A small chilling room where plucks or casings can be kept.

- Refrigerated Trucks

Meat can be transported from the abattoir to the airport in refrigerated trucks thus keeping the cold chain intact. The fleet is composed of 3 Mercedes trucks and 6 refrigerated semi-trailers.

- The Despatch Hall

Here the meat is wrapped, or packed and weighed before being despatched to the airport.

- Offices, Welfare facilities etc.

Services incorporated in the abattoir include :

Workshop, laundry, carshed, administrative offices, laboratory, staff canteen, toilets, changing rooms, stores, guard rooms etc.

An asphalt road links the abattoir to the main highway.

- Sub-projects

Four sub-projects are supposed to be under execution in the abattoir but most of them have witnessed great delays for various reasons, e.g. problems with contractors, price inflation, lack of finance etc. The major part of the machinery and equipment was delivered on site a long time ago ; unfortunately, some have sustained serious damage and will have to be replaced. The sub-projects are :-

- Refrigeration Unit :

This is composed of two chilling rooms with a total capacity of 30 tons, and one cold store of 30 tons. About 70% of the civil works have been executed and, hopefully, the project should be completed by the end of 1982, provided that the problems with the contractor can be resolved and finance made available.

- Meat Cutting Plant :

This is a very important project as, when completed and in operation, it will be the facility for supplying the export market with selected boneless cuts which attract premium prices. The sub-standard cuts and remainders of the carcasses can be marketed locally at prices lower than those currently prevailing.

- Additional Equipment :

It was found necessary to purchase selected additional equipment in order to improve the hygience of the slaughterhouse, facilitate meat inspection procedures, and to be instrumental in effecting increasing productivity rates on the dressing floors.

- Waste Water Purification Plant :

This is a significant project as its objective is to scientifically treat the effluent of the plant thus enabling the throughput to be increased. The cleaned water will then be used for irrigating the 60 feddans which have been reserved adjacent to the abattoir for future cultivation. The project should be completed during 1982 provided a suitable contractor can be found.

7.2.4. PROJECTED ABATTOIRS :

It was originally projected that 2 export abattoirs, one at Nyala and the other at Port Sudan, would be executed during the period of the 6-year Development Plan. Neither has been built. Nyala was deleted from the Plan due to lack of finance. It was

expected that the one at Port Sudan would be financed from a Danish loan, and so calls for tender were put out. However, the Danish authorities later decided that the project should be postponed until a new feasibility study could be done.

Also, as part of the 6-Year Plan, 6 urban abattoirs were projected for Kosti, Damazin, El Obeid, Kassala, Atbara, and Wad Medani. Now the responsibility for these has been transferred to the provincial councils where the projects will be financed from local resources.

8. INFRASTRUCTURE

8.1. ROADS :

There are now some 190,000 kilometers of roads in Sudan of which only about 700 kilometers are paved (mostly in the vicinity of Khartoum) and 6,000 which are gravelled. The remainder, particularly in the more populated areas, pass over heavy clay soils which become impassable during the rainy season (June - September). The main road network is principally a feeder to the railway system: imported consumer goods are moved from the railway by road transport to the outlaying scattered towns and settlements.

The Government has undertaken the construction of several important new roads to link the most strategic areas of the country, the most notable one being the highway connecting Khartoum to Port Sudan. This road offers alternative transport opportunities for those wishing to move goods between the capital and the port ; it has also relieved some of the congestion on the railway. The Western provinces, the main supply areas for livestock, are served only by dirt tracks which are quite impassable in the wet season and, even in the dry season, long haul lorry transport cannot be completed.

8.2. ROUTES :

The nomads of Western Sudan contribute 70 per cent of the livestock consumed in Central Sudan, and 90 per cent of those exported. As 95 per cent of this livestock is trekked on the hoof through the centre of the country, the main stock route runs for a distance of 1,400 kilometres from Nyala to Khartoum via El Obeid. There are no services or facilities for trade stock on the trail ; the roads are rough and the railways inadequate. Thus there is a great rush to

move the animals on hoof during and just after the rainy season (June - September) because grazing and water are then available. The animals are then held in feedlots bordering on the consumption areas where they can be supplied on demand to the markets. Even when the LMMC's livestock, Meat and Marketing cooperative project, which will include a block train service from the west, will be in full swing, a large portion of trade animals will still be trekked to the East.

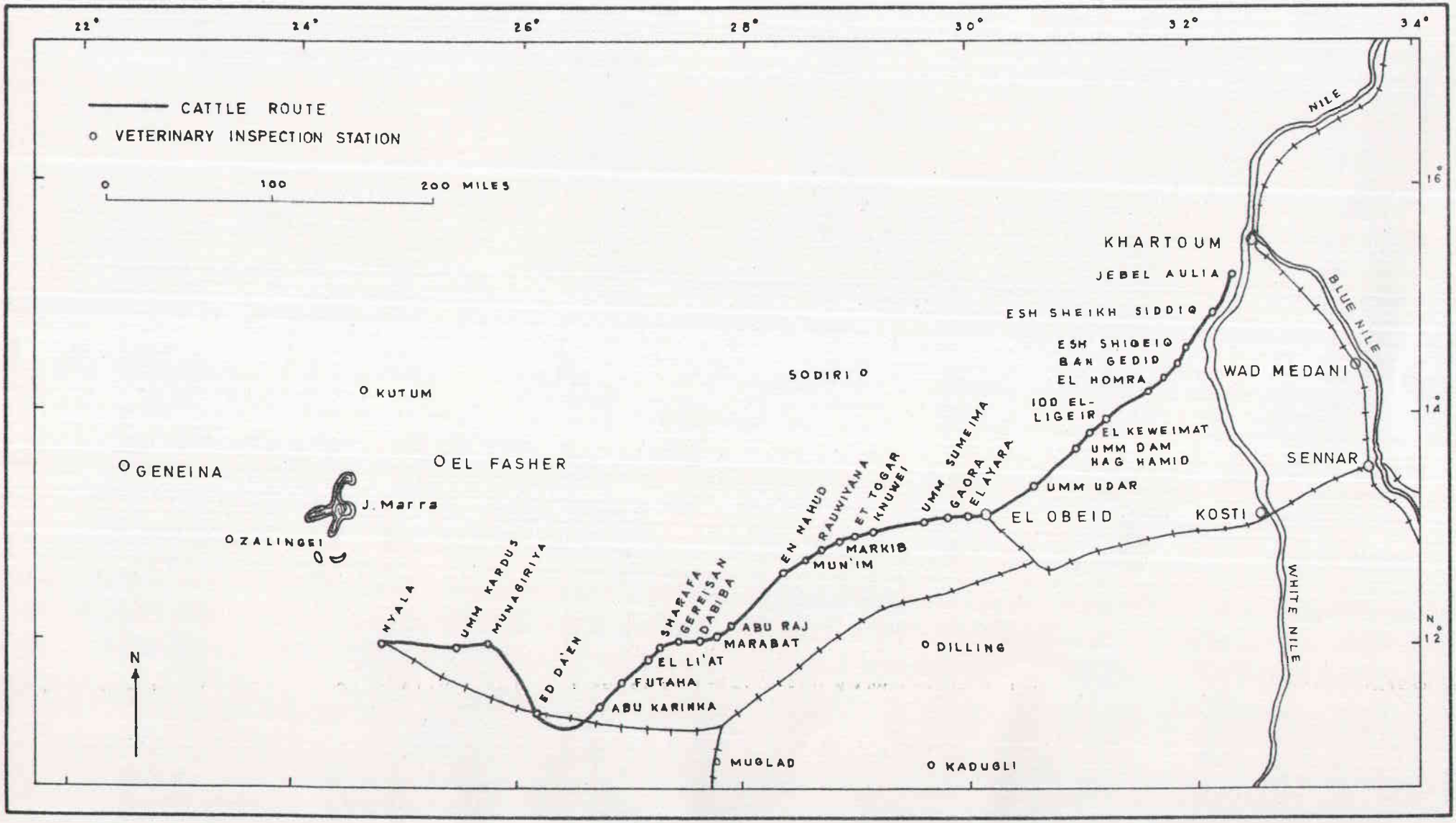
The seasonal movement of trade stock has resulted in periodical shortages in the consumption areas as well as steep price fluctuations. The export market, on which Sudan depends greatly for its foreign currency earnings, is equally affected.

Services required along the trekking route are : (a) water yards every 20 km, each having a deep bore hole, pump, storage tank drinking roughs ; (b) Fodder which can be obtained from the open range along the stock route, as most of the species are annuals which dry out and fall down before baling is possible ; and (c) Veterinary facilities to control the spread of diseases by early detection and treatment. Map No. 8.1. shows the cattle route from the Provincial Holding Grounds to the Central Assembly Area in Omdurman.

8.3. RAILWAYS :

The railway system is the primary mode of commercial transport in the Sudan with road and river transport serving as its feeder routes. The railway's single tracks covers some 4,800 kilometres from Port Sudan to Nyala and an alternate eastern route between Sennar and Haiya. The railway is administered by Sudan Railways Corporation (SRC) and its Chairman reports directly to the Minister of Transport who advises on overall policy matters. For several years the railway has been characterised by a generally low operating

MAP NO. 8.1. **LOCATION OF LIVESTOCK ROUTE**



efficiency and poor maintenance, both of which are reflected in the paucity of locomotives, frequency of breakdowns, unreliability in its timetables etc. Consequently SRC has failed to meet the rapid rise in demand for freight services between Khartoum and Port Sudan. Some of the excess traffic has been carried by trucking companies (at significantly higher rates) but the greater part still lies at the port awaiting shipment by rail, and the delay could be for several months.

Currently SRC has 149 diesel and 56 steam locomotives, 392 passenger coaches, and 4,971 freight wagons of which 380 are designed for the transport of livestock(1). It is expected that the Fourth Railway Project will give priority to improving the operating efficiency of its rolling stock although continuing substantial difficulties will face SRC's freight services over the next decade. Lack of transport capacity will, undoubtedly, present a serious bottleneck in the implementation of any future development programmes : not only will there be heavy competition for the transport of imported vital commodities such as construction materials, and other items from Port Sudan, but also there will be accelerated demands for transporting hard-currency earning exports to Port Sudan.

The transportation of livestock is severely constrained because of the acute shortage of suitable livestock wagons coupled with the overall inefficiency of the railroad leading to delays of up to three months sometimes which is extremely critical when trying to move animals across the country. As stated above SRC owns 380 livestock-type wagons but generally they are employed

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(1) Source : SRC authority in Khartoum

in hauling high value cash crops such as cotton and groundnuts in preference to the livestock. The existing tariff structure does not encourage the SRC to give priority to livestock ; for example, a wagon hauling groundnuts can be rented at four times the rate for livestock.

Notwithstanding any revision in the existing tariff structure, there would still be a serious shortage of wagons because the volume of freight now, and in the immediate future, greatly exceeds the availability of wagons or freight space. Traders have been greatly discouraged from utilising the railway services because of the high risk of delays caused by breakdowns enroute etc. After livestock have been loaded onto a wagon any delay will be deterimental to its health, as usually there is neither food nor water provided which results in unacceptable high mortality and weight losses. Thus the disadvantages of rail transport effectively neutralise its other associated advantages.

8.4. AIRLINES :

Sudan's airports range from the all-weather 24-hours international jet airport at Khartoum to a completely unimproved field at Dinder. With the exception of Khartoum and Juba, all airports are subjected to close-down during seasonal rains because of their soft runways.

All meat exports from the Kadero Abattoir are presently airlifted from Khartoum airport. One private merchant succeeded in airlifting 13,000 sheep to Jeddah during the period December 1976 and February 1977, although the cost of the operation was triple that of the alternate rail/sea route. The flexibility of the service made it a reasonably profitable activity.

8.5. WATER RESOURCES :

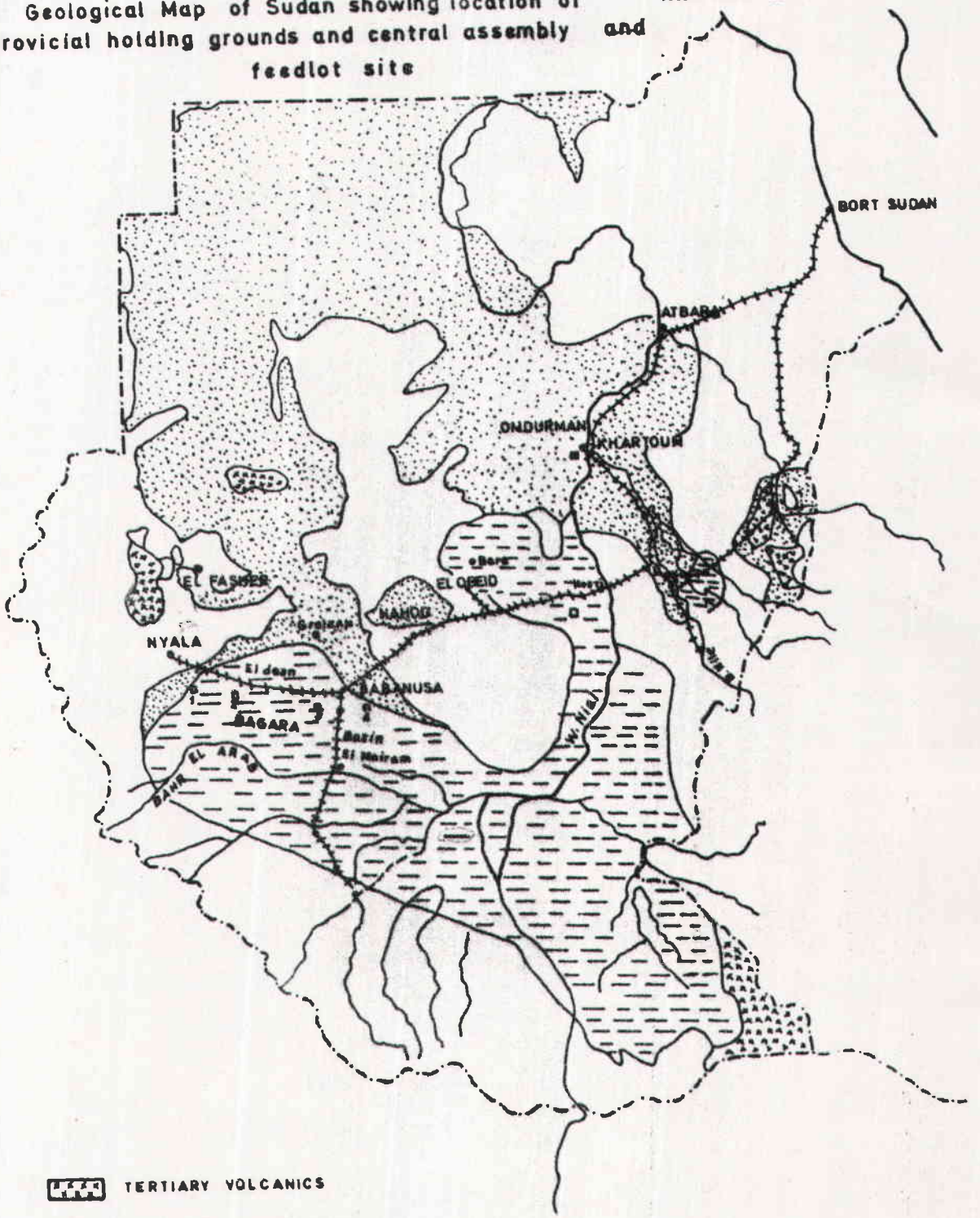
8.5.1. LIVESTOCK PRODUCTION AREA :

Groundwater is the most reliable source of water in the cattle production area of Southern Darfur and South Western Kordofan. The area is underlain by the extensive and rich aquifers of Umm Ruwaba and Nubian formations occupying a big trough in the basement complex substratum, which extends in a south-easterly direction from Nyala - Greiban axis to south of Bahr el Arab. This extensive groundwater body is known as the Baggara Ground Water Basin in the hydrogeological setup of Sudan (Map 8.2.). The aquifers are semi-confined with transmissibility values ranging from 100 to over 1140 m^2/day correlated to screen section permeability of 4 to 30 m/day. Groundwater instorage is estimated at 7.1 milliard cubic metres while the basin receives an annual recharge of 115 million cubic metres as subsurface inflow at its peripheries. The chemical quality of water falls within the acceptable health standards having total dissolved solids rarely exceeding 800 parts per million and free of any excessive harmful salts. Sites selected for establishment of holding grounds in the cattle production area are located within this basin (Map 8.1.)

Groundwater is tapped through tube-wells sunk to depths ranging from 200 to 600 metres with water levels standing at 30 to 75 metres below ground surface. The specific capacity of tube-wells varies from 0.16 to 41 m^3/hour/metre of drawdown and is 12.96 on the average. The cattle production area is presently served by some 560 tube-wells located at 355 water yards to provide drinking water supply for the human population and their animal herds (Map 8.3.). Each yard consists of one or more tube-wells fitted with a diesel reciprocating pump (6.5 m^3/ hour maximum discharge at 122 metres

MAP NO. 8.2.

Geological Map of Sudan showing location of provicial holding grounds and central assembly and feedlot site



total head), an elevated 50 m^3 capacity storage tank, animal watering troughs and stand-pipes for human use. A sales clerk, a pump operator, and a guard make up the attendant staff at each yard. The water rates are fixed : charges per head for watering animals are 2.5 pt. for camels, 1.5 pt. for cattle, 0.5 pt. for donkeys, horses, sheep and goats. The charge for filling one 18- litre tin or a goat or sheep skin, is 0.5 pt.

The operational conditions of these water yards has deteriorated badly over the last six years due to lack of spare parts and very poor maintenance services. Fuel shortage has aggravated the situation leading to frequent long stoppages at most of the yards. An intensive rehabilitation programme to the value of US $ 1.3 million is set for the water yards in Southern Darfur under the support of the Western Savannah Development Corporation. Hopefully, a similar programme will be launched in south western Kordofan where some foreign financing supporting is expected from UNICEF.

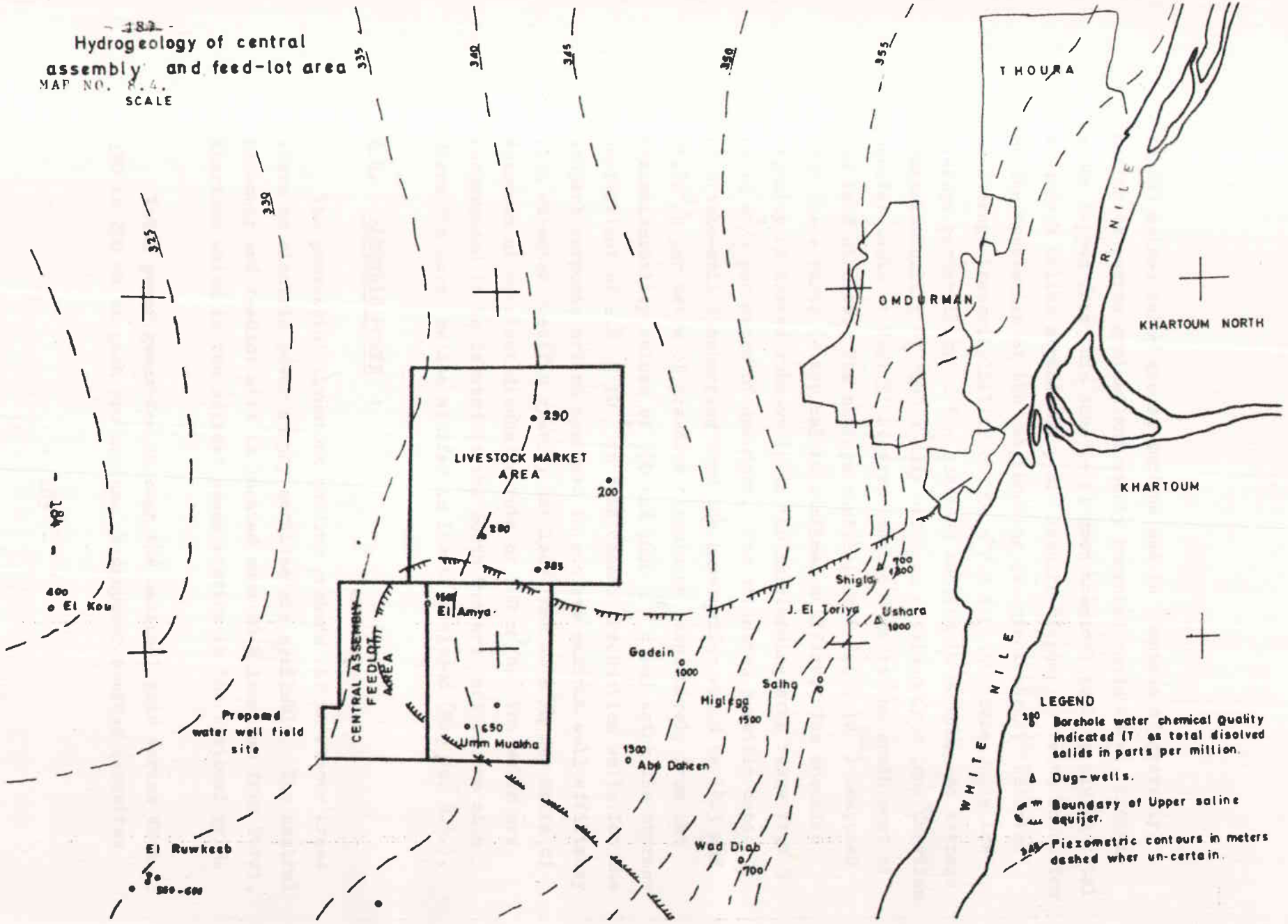
Shallow-seated perched groundwater bodies are commonly found in the area along the seasonal streams (Khors or Wadis) and "Rugab", and constitute the traditional water sources used by the cattle owners for watering their herds. They dig shallow water holes (locally called " idd"), 3 to 10 m. deep, at these sites and use leather buckets to withdraw the water. The bulk of cattle herds in the area are watered from such sources. Water yards are only approached during the seasonal movement. This may be attributed to the unreliability of services, the water rates charged, and the rather long waiting time to get service at the water yards.

" Bute ", " rahad" and " ragaba" are various forms of inland clay depressions where rain water drains and remains in storage

Hydrogeology of central assembly and feed-lot area

MAP NO. 8.4.

SCALE



and Sennar dams) contribute about 75 per cent of the generated power, whereas thermopower stations (diesel, gasoil, and steam driven generators) account for the remainder.

Complex problems such as low reservoir head, silting and wood blockage of the gates of the hydro-turbines, lack of spare parts, maintenance and operational difficulties in thermo-power stations recurrently cause severe drops in the level of power generated, especially during the flood period. Power consumption in Khartoum at present is estimated to be about 90 MW but it is a known fact that this does not in any way satisfy the demand. Most factories and manufacturing centres in Khartoum are operating far below their capacities because of shortages of power supply. New residential areas, established in the suburbs of the Three Towns more than ten years ago, are still waiting for electric power supply services.

The Government began to implement their Power III Project in 1981 at a total cost of £S.252.8 million. Its target is to provide additional 180 MW by mid-1984. The execution of the programme is already behind schedule ranging from 1-6 months in the different components of the project. It is now anticipated that the project will be completed by early 1985.

9. LEGISLATIONS

9.1. REGULATIONS :

Considerable time has passed since livestock disease control was legalised by the Government of Sudan through the enactment and enforcement of laws, regulations, and some animal health acts, in order to enable veterinarians and their assistants to carry out their duties with the backing of the law.

At the same time, in order to encourage Sudan's livestock and meat export trade, mutual health agreements were signed between Sudan and each individual importing country. In every case Sudan is bound to fulfil the conditions of the agreement, and to ensure that all shipments of live animals or meat shall be accompanied by health certificates to this effect.

The Encouragement of Investment Act, 1980, was passed by the Government to encourage investment in the following fields : agriculture, livestock, mining, industry, transport, tourism, storage and housing. In general, the objectives of the Act are to attract investment to projects aimed at achieving the objectives of the Development Plan of the Democratic Republic of Sudan. For the purposes of this study the following Acts were reviewed .

9.1.1. ANIMAL LAWS AND REGULATIONS

The important health laws and regulations included here are:-

- The Animal Export and Import Ordinance
- The Animal Export (Quarantine) Ordinance

- The Cattle Export Regulations
- The Animals Export and Import (Fees) Order
- The Disease of Animals Ordinance
- The Disease of Animals Ordinance (Application) Order

9.1.2. ANIMAL HEALTH (DISEASE FREE ZONE) REGULATIONS

These include full descriptions of the veterinary and health measures that are followed inside the (D.F.Z.) towards all animals.

9.1.3. ANIMAL HEALTH (BUFFER ZONE) REGULATIONS

These apply to cattle, sheep and goats, and include several strict veterinary health actions to be followed in the Buffer Zone before allowing the animals to move to the (D.F.Z.).

9.1.4. THE MEAT INSPECTION ACT, 1974

This Act covers the veterinary health measures followed in ante-mortem and post-morten inspections, meat transportation, containers, staff working at the slaughterhouses, the butchers, etc. etc.

9.1.5. THE LIVESTOCK ROUTE AND VETERINARY CONTROL STATIONS ACT, 1974

This Act describes the purpose of the route measures necessary for using the route and the role of the veterinary control stations.

9.1.6. THE ENCOURAGEMENT OF INVESTMENT ACT, 1980

The following three earlier Acts have been incorporated into this one Act :

(a) The Encouragement of Investment in Economic Services Act, 1973

(b) The Development and Encouragement of Industrial Investment Act, 1974.

(c) The Development and Encouragement of Agricultural Investment Act, 1976.

This Act describes the fields of encouragement of investment, priveleges and facilities, guarantees against nationalization or acquisition of the project, guarantees for permitting transfers of profits, interests and foreign capital abroad, etc.

9.1.7. ANIMAL HEALTH EXPORT AGREEMENTS BETWEEN SUDAN AND OTHER IMPORTING COUNTRIES

The following countries have health agreements with Sudan for the importation of live animals and meat : Egypt, Libya, Kuwait, Lebanon, Saudi Arabia and the Arab Gulf States. The veterinary authorities in Sudan have to ensure full implementation of these agreements. Some countries send their own veterinarians to Sudan to witness the full implementation of the agreement and to countersign the health certificates with the Sudanese veterinarians.

conducted ante- and post-mortem inspection and the animals are free from diseases communicable to man and animal.

9.2.2. THE AGREEMENT BETWEEN SUDAN AND LIBYA

(a) Meat :

- All animals the meat of which is intended for export should be slaughtered in a Government abattoir where health measures are ensured and practised.

- The meat should be from young bulls of an average 4 - 5 years which have been vaccinated against infectious diseases common in the Sudan.

- All cattle the meat of which is intended for export to Libya should be vaccinated against rinderpest (Rabbit virus or Tissue culture vaccines) but not (Goat virus vaccine), and all ordinary quarantine measures should be applied as if the animals were going to be exported.

- All cattle, the meat of which is intended for export to Libya, should be vaccinated against rinderpest 40 days before quarantine and slaughter.

- The meat intended for export to Libya should be from healthy cattle, and not from sick or suspected sick animals especially those with contagious bovine pneumonia. All meat intended for export should be wrapped with cloth.

- The meat should be chilled for at least 24 hours in a temperature between 20° - $25^{\circ}F$.

- Samples of copies of the stamps and signatures used for all export procedures for animals the meat of which is intended for export and the meat itself should be sent to the Ministry of Agriculture and Animal Resources in Libya .

(b) Shipments :

The following documents should accompany the shipments.

- All animals should be slaughtered in the Islamic way, and date of slaughter stated.

- All animals vaccinated against mentioned diseases and quarantined for the specified period, i.e. not less than 90 days between vaccination and date of slaughter, and also stating date of a vaccination.

- The animals the meat of which is intended for export should be free from rinderpest and specially bovine pleuro-pneumonia ; in addition the shipments should be accompanied by veterinary health certificates to this effect.

(c) Export of Meat :

In the Agreement signed between the Ministry of Animal Resources and the Libyan Agricultural Bank in 1970 for export of meat from Sudan to Libya the following conditions were made :

- the Lebanese authorities.

- Animals vaccinated against Rinderpest should not be admitted into this quarantine unless 15 days have passed from the date of vaccination.

- Cattle should be vaccinated against Anthrax.

- Cattle should be vaccinated against Foot and Mouth Disease with strains (A.O. Sat 1) within a minimum of 14 days and a maximum of 120 days.

- When unexpected other diseases occur an agreement between the two parties i.e. Sudan and Lebanese Authorities, should be made about the vaccination.

- Control of ecto-parasites should be practised by dipping twice.

- All shipments should be accompanied with veterinary health certificates.

- Special and separate quarantines should be made available for animals intended for export to Lebanon.

9.2.4. THE AGREEMENT BETWEEN SUDAN AND KUWAIT

(a) Live animals :

- All animals intended for export to Kuwait should be accompanied with a veterinary health certificate indicating exposure of the cattle to the test against contagious Bovine Pleuro-Pneumonia (C.F.T.), and that

the animals are vaccinated against this disease 20 days from the date of issuing the veterinary health certificate.

- All animals should be vaccinated against Rinderpest, Haemorrhagic Septicaemia and Anthrax, and the dates of vaccination should be specified on the accompanying veterinary health certificates.

- All animals intended for export to Kuwait should be dipped or sprayed with acaricides so that no ticks will be found on the animals when they arrive in Kuwait.

(b) Meat :

No special measures are required but the same procedures used for Egypt are followed.

9.2.5. THE AGREEMENT BETWEEN SUDAN AND SAUDI ARABIA :

- There is no special agreement.

- The same veterinary health measures for the export of meat and live animals to Egypt are applied here.

9.2.6. THE AGREEMENT BETWEEN SUDAN AND ARAB GULF STATES :

The same as given above for Saudi Arabia.

9.3. CUSTOMS AND DUTIES :

Imports of capital goods into Sudan as well as various exports are subject to customs and other duties. Under the Encouragement of Investment Act, 1980, the Government of Sudan stipulates certain priveleges for those investment projects which are geared to the achievement of the objectives of the Development Plan.

The present laws exempt tractors, harvesters, land-levelling machines, as well as veterinary medicines, from both customs duties and the defence tax. For trucks with no less than a 5 - ton pay-load, customs are 20% + 10% defence tax. Automobiles valued less than £S 9,000 pay duties equal to 100% + 10% defence tax ; automobiles of a value more than £S 9,000 pay customs equal to 100% for the first £S 9,000 and 150% on the amount over and above that figure + defence tax. Customs duties on imported lumber and iron bars equals 20% + 10% defence tax ; cement is 15% + 10% defence tax. Exports of livestock are subject to an export tax of 10% plus 5% development tax. At the present time all the above-mentioned items pay an additional duty equal to 10% of the value of the commodity CIF.

The Encouragement of Investment Act, 1980 gives the Minister concerned the authority to exempt the project wholly or in part from the following duties :-

(a) Customs duties relating to :-

(i) machines, equipment, apparatus and imported spare parts necessary for the project ;

(ii) imported raw, artificial or intermediary materials necessary for the project which cannot be found locally in the required quantity or quality.

(b) Import duties on artificial and semi-artificial goods arising out of the project.

(c) Any other duties or taxes imposed on the project.

The Minister may also exempt the project wholly or partly from excise duties levied on materials or commodities locally produced which are necessary for the project.

Also after consultation with any authority legally concerned, the Minister may allot the land necessary for the project ; he may reduce the price of such land or order that the price be paid in instalments subject to such reasonable terms as he may prescribe.

The Act stipulates also that no local duties shall be imposed on the project which has been given exemption, according to the above-mentioned rules, within the period of exemption save with the consent of the Minister.

Finally the Minister may, after consultation with the other competent authority, grant to the project any of the following facilities :

(i) reduction of the prices for electricity used for the purposes of the project ;

(ii) reduction of transport prices imposed on the traffic of imports and products of the project.

Even if the project is granted exemption under the Encouragement of Investment Act, 1980, there are certain fees that have to be paid : clearance fees equalling ½% of the CIF value ; quay dues equalling 1½ % of the CIF value ; landing and portage

charges equal to £S. 0.75 per freight ton. As it will be difficult to estimate these landing and portage charges at this stage, it will be assumed that these charges in addition to various unmentioned expenses at the port equal ½ % of the CIF value. Thus, the total percentage of all these fees, dues and charges is equal to 3 % of the CIF value.

9.4. TAXES AND INTEREST :

Public limited liability companies are supposed to pay Business Profit Tax at the rate of 25% on the first £ S 1,000 , 40% on the next £ S 9,000, 45% on the next £ 10,000, then 50% on the next £ S 30,000 . Any profits over the level mentioned will be taxed at 60%.

For private limited liability companies the rates of Business Profit Tax are slightly different. 25% is paid on the first £ S 1,000, 40% on the next £ S 9,000, 50% on the next £ S 10,000, and any profits over this figure will be taxed at 60%.

The encouragement of Investment Act, 1980, gives the Minister concerned the authority to exempt the project wholly or partly from Business Profit Tax for a period of five years starting from the date of commencement of production. This period can be extended by a maximum period of five years. Companies established by the AAAID in Sudan usually have an equity loan ratio of 60:40. Part of the loans are covered by suppliers' credits which equals approximately 85% of the value of the equipment ; interest paid in this case ranges between 8% to 10%. The rest of the loans are covered by long-term loans where the interest paid ranges between 14% to 15%.

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