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CO-OPERATIVE FOOD INDUSTRIES ASSESSMENT OF THE PRESENT  
SITUATION AND FUTURE POTENTIAL

XP/INT/86/007

SUDAN

Technical report: Food-processing activities in the Sudan\*

Prepared for the Government of Sudan  
by the United Nations Industrial Development Organization

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## S U M M A R Y

The co-operative food industry has a narrow base, being engaged primarily in the flour milling sector and to a limited extent in bakeries and dairy processing. According to the new directives to the co-operative movement, future efforts are to be focused on the development of food industries for processing of agricultural commodities supplied by the primary societies.

There is major interest in entering into vegetable oil milling, a sector which already suffers heavily from overestablishment. Thorough planning and co-ordination of activities is vital in order not to make the situation worse.

The scope for buying private oil mills for rehabilitation should be investigated. This would satisfy the co-operative ambition, provide a platform for better capacity utilization, particularly if the co-operative movement were to engage in the handling and trading of oil-bearing seeds, and save foreign exchange.

Expansion of the flour milling sector is called for in the next few years. Total additional processing milling capacity is estimated at some 350 to 400 tons per 24 hours, but co-operative project plans total 500 tons per 24 hours. Co-ordination on a national level is called for to ensure that no investment is made in excess capacity. This authority could be exercised by, for example, the National Co-operative Union.

Co-operative project plans in different regions include the establishment of bakeries, biscuit and macaroni manufacturing and breakfast cereals.

Molasses in New Halfa may be utilized as raw material for processing of medical alcohol and as substrate for the manufacture of bakers' yeast. Projects of this type, the yeast project in particular, are technically fairly advanced, requiring a high level of management. The capacity of such projects should probably be sufficient to cover the national demand for medical alcohol and bakers' yeast, both fresh and freeze dried.

The feasibility of establishing the appropriate facilities for fruit and vegetable handling, sorting, grading, marketing and later probably also processing, in some areas in Kordofan should be investigated.

The financial situation of the co-operative unions is generally weak in terms of making investments in food industries. One of the main constraints for future development of the co-operative food industry is thus project financing.

The viability of the food industries is closely related to the availability of managerial skill. Experience so far suggests that increased training, and probably also technical assistance, would make the prospects brighter for the future.

1.0 INTRODUCTION

1.0.1 This survey for an assessment of the food processing co-operatives in the Sudan was carried out 17 - 24 February 1986.

1.0.2 Meetings were held with representatives for the Ministry of Commerce, Co-operation and Supply, the Co-operative Movement at various levels and the Sudan Oil Seeds Company.

1.0.3 Information pertinent to the survey was also obtained from the Ministry of Agriculture and Natural Resources, the Ministry of Industry and Sudanese Industries Association, Food Industries Chamber.

Field trips were made to the Kordofan Region, the Central Region and to New Halfa in the Eastern Region.

1.0.4 The National Co-operative Union covers six regions, viz. Northern, Eastern, Middle, Khartoum, Kordofan and Darfur.

1.0.5 The three regions of the south, viz. Upper Nile, Bahr El Ghazal and the Equatorial Region, are administered from Juba by the Ministry of Rural Development and Co-operation. The co-operative food industries in these regions have not been included in this survey.

2.0 THE CO-OPERATIVE MOVEMENT IN THE SUDAN

2.1 Organization, responsibilities

2.1.1 The co-operative movement in the Sudan is administered centrally by a Co-operative Sector attached to the Ministry of Commerce, Co-operation and Supply. The main responsibilities of the Co-operative Sector include the preparation of co-operative guidelines, planning and programming.

2.1.2 The Ministry has Regional Offices which maintain Branch Offices to supervise and assist the co-operatives. There is thus a very close linkage between the Government and the co-operative movement.

2.1.3 At the top of the five-level co-operative pyramid is the National Co-operative Union, an apex organization with power and responsibility to promote co-operative activities in the country, represent the co-operative movement, domestically and abroad, participate in the implementation of State plans for fostering co-operative awareness, and undertake such commercial and/or economic steps as may be necessary to achieve the targets set.

2.1.4 The regional unions, which are 9 in number, co-ordinate and direct co-operative activities within the regions as one part of their obligations and responsibilities. The regional unions also have the function of channelling commodities to the co-operatives.

- 2.1.5 According to a new co-operative law, which is now being elaborated and which will replace the co-operative law of 1982, there will be some changes. One of these is that the regional unions are directed towards agro-industrial development to process food from farm produce supplied by the primary societies.
- 2.1.6 There are about 20 provincial co-operative unions in all. The objectives of the provincial co-operative unions are to promote co-operative activities within the Province and support the local co-operative unions, which consist of primary societies established for a particular purpose. These include societies for agricultural production, mechanized crop production, sales and marketing, flour milling, multi-purpose, etc., at present eight groups in all and one termed miscellaneous which includes, e.g. transport co-operatives. In total there are some 6 000 primary co-operative societies in the country.
- 2.1.7 The function of the local co-operative unions appears to be flexible in character and may be adapted to the requirements. For instance, the local co-operative unions may co-ordinate and arrange for collection, processing and marketing of agricultural commodities.
- 2.1.8 The flour mill co-operative societies operate small simple flour milling units on a semi-industrial scale at the village level. There are also examples of flour mill co-operatives operating larger commercial mills with a production capacity of about 200 tons/24 hour and with nearly 100 000 individual members.
- 2.2 Funding of projects
- 2.2.1 The funds necessary for the establishment of co-operatives requiring some kind of investment are obtained through (1) share capital put up by individual members, (2) loans from the Co-operative Development Bank which at present is represented in six regions; this is the main source of financing, and (3) loans from commercial banks.
- 2.2.2 Government contributions to co-operative projects include the exemption from import duties on imported machinery and equipment, allocation of land free of charge and sometimes Government grants.
- 2.2.3 The co-operatives have also benefited from tax exemption, which should put co-operative ventures in a favourable position in comparison with the private sector. Some changes in this respect are reportedly being discussed.
- 2.2.4 The regulations relative to the economic administration of a co-operative venture include the establishment of "reserve funds" intended for future reinvestment, for instance replacement of worn-out machinery and equipment. The co-operative law in force stipulates that 25% of net surplus after depreciation shall be allocated to the reserve fund.

2.2.5 Nevertheless, project financing is a major constraint, especially the foreign exchange part for imported equipment, spare parts, etc.

### 3.0 CO-OPERATIVE FOOD INDUSTRIES

#### 3.1 Existing food industries

3.1.1 Apart from the small semi-industrial milling operations at village level there are two co-operative flour mills in the country. The Goz Kabaro flour mill is run by the Gezira Managil Tenants Co-operative Corporation and the New Halfa mill is owned and operated by the Union of Co-operative Societies, New Halfa.

3.1.2 There are two co-operative dairies, the Kuku Dairy close to Khartoum and a dairy plant operated by Gezira Dairy Co-operative.

3.1.3 A bakery in El-Obeid is operated by the North Kordofan Provincial Co-operative Union.

3.1.4 It is concluded that the co-operative involvement in food industries so far has a very narrow base. This is to a large extent the result of the directives which have focused the co-operative movement on other tasks.

#### 3.2 Plans for the future

3.2.1 The National Co-operative Union does not have any central information on future plans, which would suggest that there is no actual co-ordination on this point.

3.2.2 Some information has been obtained at a regional level, a compilation of which is given below.

3.2.3 Khartoum Regional Co-operative Union:

- oil mill
- macaroni/biscuit factory

3.2.4 Workers Central Co-operative Corporation:

- oil mill, capacity 3 600 tons of vegetable oil/year

3.2.5 North Kordofan Provincial Co-operative Union:

- flour mill
- sesame sweet cake factory



3.2.6 Gezira Managil Tenants Co-operative Corporation:

- flour mill extension
- oil mill

Gezira Provincial Co-operative Union:

- macaroni plant

3.2.7 Union of Co-operative Societies, New Halfa:

- oil industries including oil mill, margarine and peanut butter plants
- macaroni/biscuit plant
- manufacturing of breakfast cereals
- bakery
- processing of locally available molasses into syrup and medical alcohol.

4.0 THE SUDANESE FOOD INDUSTRY

4.0.1 The present situation of the food industry in the Sudan is of some considerable importance when assessing the future prospects for the emerging co-operative food industry. The summary below has been obtained from the Sudanese Industry Association, Food Industries Chamber.

Type of food industry	No. of plants	Investment, current price million US\$	Capacity		Efficiency %
			Nominal	Actual	
Flour mills	11	40	2 200 t/day	1 300 t/day	60
Veg. oil mills	260	250	2 mil t/yr	600 000 t/yr	30
Fruit & veg. canning	8	35	20 000 t/yr	7 500 t/yr	37
Biscuit plants	5	4	15 000 t/yr	4 500 t/yr	30
Macaroni plants	26	20			
Confectionary plants	40	40	240 t/day	80 t/day	33
Carbonated beverages	8	22	40 mil .cases	15 mil .cases	37
Miscellaneous	15	200			

Miscellaneous includes cold stores, ice factories, dairy plants, 1 brewery and 2 - 3 distilleries, the last two of which have ceased production.

- 4.0.2 The efficiency is generally very low, implying exceedingly high processing costs per unit and doubtful viability of the average enterprise.
- 4.0.3 The major constraints are associated with inadequate imported inputs such as spare parts, chemical additives, packing materials, etc, due to weak financial position and lack of foreign exchange.
- 4.0.4 It is estimated that the food industry as a whole would need funds to an amount of about US\$ 56 million in order to utilize existing processing capacity to satisfy local demand. The milling industry alone would need US\$ 5 - 7 million worth of spare parts to keep production at an acceptable level.
- 4.0.5 The description of the status of the food industry at present is a clear warning that unless future co-operative food industries are established on a very good footing from the point of view of project preparation, financing, management, operation, maintenance and marketing, it is only a matter of time until problems arise.

4.1 Oil milling

- 4.1.1 The bulk of oil seed produced in the Sudan is cotton seed, mainly from Gezira, groundnuts and sesame, which are grown extensively in the western provinces Kordofan and Darfur.
- 4.1.2 There has been a significant drop in oil seed production since the 70s. This is due to drought, emigration of manpower to other countries, a shift to millet and sorghum cultivation caused by improved producers prices and comparatively high cost of production of oil-bearing seeds. The development of late is illustrated in the following compilation of Ministry of Agriculture statistics.

	5-yr average tons	1984/85 tons	1985/86 tons
Groundnuts	663 000	386 000	304 000
Sesame	211 000	133 000	215 000
Cotton seed <sup>1)</sup>	343 000	487 000	400 000
Total oil seeds	1 217 000	1 006 000	919 000

<sup>1)</sup> Assumptions: cotton seed 75% of cotton harvest;  
1985/86 production based on 1500 kg/ha.

- 4.1.3 According to another source, Bank of Sudan and Sudan Oil Seed Co Ltd, the development of groundnut and sesame seed has been as follows:

	National production, tons			
	1979/80	1981/82	1983/84	1984/85
Groundnuts	834 000	721 000	522 000	150 000
Sesame	226 000	242 000	235 000	100 000
Total	<u>1 060 000</u>	<u>963 000</u>	<u>757 000</u>	<u>250 000</u>

4.1.4 The oil crushing industry is in the hands of the private sector, except for one plant which is owned jointly by the Government and the Arab Authority for Agricultural Investment and Development.

4.1.5 The total national oil crushing capacity far exceeds the demand expressed in terms of availability of oil seed or domestic consumption of vegetable oil, estimated at 120 000 tons per annum.

4.1.6 The information regarding number of oil mills varies, depending on the source. However, there seems to be general agreement that the overall processing capacity is of the order of 2 million tons per year. The actual processing which is accomplished is only 600 000 tons per year, or 30% efficiency of installed capacity.

4.1.7 260 plants are registered with the Sudanese Industries Association and a somewhat smaller number is quoted by the Ministry of Industry.

4.1.8 It is concluded from the above

that the installed capacity is about twice the present level of national oil seed production, according to Ministry of Agriculture statistics,

that the oil seed industry, for various reasons, has not been capable of processing more than about 60% of the annual oil seed crop,

that the oil milling industry has very high processing costs, and

that establishment of new oil mills should be avoided.

4.1.9 Depending on local requirements and other considerations, the rehabilitation and relocalization of existing oil mills is one alternative worth looking into.

#### 4.2 Flour milling

4.2.1 Flour is a commodity which is sensitive regarding both supply and price level.

4.2.2 Only part of the requirement of wheat, about 25%, is produced domestically, the major part being imported, either as wheat for milling or as flour. The price of domestically produced wheat is Government controlled and subject to subsidies. The cost of flour is calculated from the net wheat price and the milling costs based on 70% utilization of nominal milling capacity.

- 4.2.3 On an average the flour mills in the Sudan are utilized to 60% only (ref Sect 4.0), which is bound to have repercussions on the scope for consolidating the economy of the flour milling enterprises.
- 4.3.4 Reasons for the low efficiency of the flour mills are claimed to be inadequate wheat supply and shortage of foreign exchange to import inputs, primarily spare parts and sacks.
- 4.2.5 The imported sacks, woven from plastic material, are reportedly the cheapest alternative. It may be worth investigating the overall cost implication of using locally produced short-fiber cotton and cotton of lower quality to manufacture at least part of the sack requirement. The combination of better utilization of existing cotton mills, additional orders to the textile industry, savings of foreign exchange and improved average quality of exported cotton lint may make the proposition interesting.
- 4.2.6 The overall capacity of the national flour milling industry is 2 200 tons/day and the demand by 1990 is estimated at 650 000 tons, according to information from the co-operative milling industry. The present flour milling industry would be capable of producing about 495 000 tons/year at an average of 75% utilization and barely 400 000 tons if the present average of 60% utilization cannot be improved.
- 4.2.7 Although efforts should be made to improve the efficiency of the existing flour mills, including suitable rehabilitation measures for the older ones, there is room for additional mills to be established.
- 4.2.8 On the assumption that 75% utilization is attained in the present mills, an additional 375 tons/24 hours flour milling capacity would be called for if the Government policy favours domestic milling as an alternative to imported flour.
- 4.2.9 If blending the wheat flour with sorghum (dura) flour were acceptable, this would further justify expansion of the national flour milling industry.

## 5.0 KHARTOUM REGION CO-OPERATIVE UNION

### 5.1 Organization

- 5.1.1 The organizational pattern of the Khartoum Region Co-operative Union is different from that of the other eight regional unions. Here the union is composed of four Sections, namely Khartoum, Omdurman, Khartoum North and Pural Khartoum North.

5.2 Experience from the food industry

- 5.2.1 The Union's experience from the food industry has been gained from a bakery. It is a semi-manual bakery with a rated capacity of 1800 loaves per hour each weighing 160 gr.
- 5.2.2 The bakery reportedly operates successfully with no financial, managerial or technical problems. It is the first step towards diversification of the Union's activities.

5.3 Project plans for food industries

- 5.3.1 Based on the favourable experience from the bakery, the Khartoum Region Co-operative Union has decided to establish one oil mill and one macaroni factory.
- 5.3.2 Feasibility studies have been prepared by officials at the Co-operative Sector, Ministry of Commerce, Co-operation and Supply. According to these the oil mill will have an output of 4 tons edible oil per shift. The rated processing capacity if, e.g. groundnuts are used would be about 30 tons/24 hours.
- 5.3.3 The feasibility study for the macaroni factory was prepared as early as 1980. The product list includes macaroni of different types and also biscuits. Total investment cost is estimated at ES 2 million.
- 5.3.4 Funds for realization of the projects have not yet been arranged. However, the Co-operative Development Bank is reportedly prepared to finance the macaroni project to 100%.
- 5.3.5 According to the present plans the project start for the macaroni project will be May 1987. The oil mill is expected to follow later, but no detailed plans have been made as yet.

6.0 WORKERS CENTRAL CO-OPERATIVE CORPORATION

- 6.0.1 The main objective of this organization is to serve the workers' interests, need for commodities and training within the field of co-operative awareness and activities.
- 6.0.2 Due to difficulties experienced in obtaining vegetable oil from the private oil milling enterprises at the Government fixed price level, the Co-operative has decided to engage in oil milling itself. This is to ensure that the needs of the Co-operative will always be catered for.
- 6.0.3 A feasibility study was prepared in 1980 and apparently no review or up-dating has been considered. Total investment cost was estimated at ES 2 million at that time.

- 6.0.4 Financing of the project has been looked into. The Workers' Central Co-operative Corporation will put up part of the necessary funds from their own resources. The Co-operative Development Bank is expected to provide some of the money and the Insurance Co-operative is reportedly prepared to participate. The balance is expected to be subject to foreign assistance either as suppliers credits, foreign loans or grants.
- 6.0.5 Although the reason for the Co-operative engaging in processing of vegetable oil is understandable, the aim of the project may not necessarily be attained, namely to supply oil at the Government fixed price, or less.
- 6.0.6 It is well documented that the vegetable oil processing industry has considerable economic problems, basically because the industry is over-dimensioned with large excess capacities. It follows that the processing costs are unreasonably high, for which the private companies most likely are trying to obtain compensation.
- 6.0.7 If the Workers' Central Co-operative Corporation invests in a new oil mill at 1986 cost level, there is always a danger that the ultimate processing costs in the new plant will be higher than those of competing firms. This must be considered in the light of the system for buying the oil-bearing seeds and the competition which must exist when the quantities of oil seeds marketed are less than the national processing capacity.
- 6.0.8 It would thus be advisable to review the feasibility study based on the present conditions, cost level and projections for the next 5-10 years.
- 6.0.9 Depending on the result, an alternative may be to seriously look for an attractive existing oil mill which is for sale, or simply try to negotiate a long term supply contract with an oil milling company. A closer look at this could be the best way to serve the Corporation's members.

## 7.0 KORDOFAN REGIONAL CO-OPERATIVE UNION

### 7.1 General

- 7.1.1 The Union covers the whole of Kordofan which has an area of 380 000 km<sup>2</sup>. There is one Provincial Co-operative Union in North Kordofan and one in South Kordofan.
- 7.1.2 The population, according to the 1983 census, was estimated at 1 823 million in the North Province and 1 417 million in the South Province, or 3.24 million for the region as a whole and an estimated growth of 2.5% per annum. The urban population accounts for 13%, the Nomads 24% and rural settled population 63%.

7.2 Brief history of the Co-operative

7.2.1 The co-operative movement started in 1952 with the establishment of the first Consumer Society in the town of El-Obeid. Additional consumer societies were formed in other urban areas and grain milling societies in rural areas.

7.2.2 The Grain Milling Co-operative Union was established in 1968 and through contacts with Denmark a number of village-level mills were imported.

7.2.3 The Regional Co-operative Union was registered in 1970, when it started to accumulate funds from the People's Co-operative Bank and deposits from the co-operative societies.

7.2.4 Development of the financial position of the Regional Co-operative Union is shown in the compilation below.

Financial year	Sudanese Pounds (ES)			
	Capital	Reserve	Turnover	Surplus
1975	6 900	5 859	344 836	14 203
1980	5 100	50 435	1 632 144	55 446
1984	95 025	231 440	43 916 680	209 934

7.3 Agricultural production

7.3.1 The soils vary from poor sand in the north to reasonably fertile light clays in the south. The semi-desert climate in the north changes further south into an arid zone followed by a vast stretch of land, semi-arid in character, changing to a humid environment in the south.

7.3.2 The major crops consist of sorghum, millet, groundnuts and sesame, apart from fruit and vegetables in certain areas with adequate ground water resources.

7.3.3 Crop yields from rainfed agricultural production vary and sometimes suffer from drought. This has been the case several years during the 1980s. The regional yield of sorghum was only 88 400 tons in 1984/85 but went back to a more normal level of 254 400 tons in 1985/86.

7.3.4 Production of groundnuts and sesame is estimated by the Ministry of Agriculture and Natural Resources as follows:

	5 year average tons	1984/85 tons	1985/86 tons
Groundnuts	169 000	12 000	53 000
Sesame	67 000	13 000	56 000
Total oil-bearing seeds	236 000	25 000	109 000

7.3.5 The variations in sales at the El-Obeid market during the period 1977 through 1985 also reflect the great span in level of production

	tons/year	
	high	low
Groundnuts	6 446	1 032
Sesame	18 048	2 600
Melon seed	13 393	593

7.3.6 Fruit and vegetable production is scattered, but nevertheless confined to a number of areas, probably about ten, the largest of which extends over 12 000 hectares. The compilation below gives the production of fruit and vegetables in the season 1980/81.

Crop	Overall production tons
Mango	32 141
Lemon	4 466
Guava	4 291
Grapefruit	1 335
Orange	1 028
Pumpkin	12 174
Tomato	8 226
Water melon seed	5 000
Okra	2 035
Onion	1 270
Chilli pepper	1 220
Egg-plant	707
Sweet pepper	97
Squash	30

#### 7.4 Marketing of agricultural commodities

7.4.1 All grain, oil-bearing seeds, gum arabic, etc., is sold at markets in El-Obeid, Umm Ruwaba, El Rahad and elsewhere, at daily auctions.

7.4.2 The commodities are sold by co-operative societies and individual farmers. It is thus noteworthy that the co-operative movement appears to have comparatively little influence on the marketing system and price level.



- 7.4.3 The buyers are mostly local private merchants, at the El-Obeid market reportedly about a hundred. Representatives from the Sudan Oil Seeds Company also bid for the oil-bearing seeds.
- 7.4.4 Minimum price for each commodity is set by the Government but lately the winning bids have been appreciably higher. For instance, the floor price for groundnuts is £S 20/45 kg, and the highest bid at a recent auction was £S 60/45 kg. The corresponding figures for sesame were £S 45 and £S 85 respectively.
- 7.4.5 Fruit and vegetables are basically sold fresh and it is estimated that 50% of all pumpkins marketed in Khartoum come from Kordofan. About 70% of mango consumed fresh in Khartoum, or exported, originate in Kordofan.
- 7.4.6 In areas with extensive production of vegetables there are invariably low prices due to poor marketing channels and difficulties with transport. Here products like okra, chillies and tomatoes are sun-dried and sold outside the areas of production.
- 7.5 Present food industries
- 7.5.1 Co-operative sector
- 7.5.1.1 The Kordofan Regional Co-operative Union owns and operates a bakery with a capacity of about 23 000 160-gram loaves per day (2 x 9 h). The bakery was built in 1983. A feasibility study was prepared by the Co-operative Section of the Ministry of Commerce, Co-operation and Supply. The total investment cost was £S 0.5 million, which was paid from the Regional Co-operative Union funds.
- 7.5.1.2 It is a semi-manual bakery with mechanical dough mixing and dough dividing/rolling of the loaves. Two rising cabinets and two oil-fired ovens complete the list of equipment. Since the power supply is erratic there is a standby generator.
- 7.5.1.3 The bakery operates 7 days a week with stops for maintenance one day every two weeks. Consumption of flour is on an average 3.1 tons/day or 930 tons/year, assuming that the bakery is running 300 days a year.
- 7.5.1.4 The flour is supplied by the Ministry of Commerce, Co-operation and Supply and stored in an adjacent storage room capable of receiving about 600 bags or 30 tons.
- 7.5.1.5 There are one foreman and six workers on each shift. A permanently employed electrician is responsible for maintenance of equipment and installations and running of the standby generator.
- 7.5.1.6 The operation of the bakery has not involved any problems. Management, production, marketing and maintenance all run smoothly. Spare parts are available as required if the spare parts stock runs low. The economy of the venture is reportedly good.

7.5.2 Private sector

7.5.2.1 There are presently 11 private bakeries in El-Obeid reportedly with capacities similar to that of the co-operative bakery. On the assumption that they are operated very much along the same lines as the co-operative bakery, they would consume about 10 000 tons of flour per annum.

7.5.2.2 Altogether, 8 private oil mills are established in El-Obeid.

No. of oil mills	No. of extruder presses	Per oil mill		Total est. requ. of oil seed/yr.
		Assumed rated cap. per 24 h.	Est. requ. of oil seed/yr.	
3	3	36 tons	3 000 tons	9 000 tons
3	4	48	4 000 tons	12 000 tons
2	6	72 tons	6 000 tons	12 000 tons
Estimated total demand/year				33 000 tons

A visit was made to one of the mills and the above estimates were made on the basis of the findings, after minor adjustments. The following assumptions were used:

Rated capacity 12 tons seed/hour.

The produce is processed twice in order to obtain a satisfactory yield of oil and thus an acceptable level of residue fat in the expellers.

Achieved mean processed quantity of seed per 24 hours, 4 tons/extruder press.

Number of working days/year, 250.

7.5.2.3 One plant with 6 expeller press units is reportedly provided with a decorticating line, thus equipped to process cotton seed.

7.5.2.4 The total output of edible oil from the oil mills in El-Obeid is estimated at some 12 000 tons per annum ± about 1 000 tons, depending on type of seed used, condition of the extruder presses, etc.

7.5.2.5 The FAO consumption figure for vegetable fats and oils in Sudan is on an average 36.9 gr per capita per day, or about 13.5 kg per year. The present oil crushing capacity in El-Obeid is thus sufficient for the entire urban population in Kordofan plus about 20% of the settled rural population.

7.6 Future plans for co-operative food industries

7.6.1 Both local and regional policies are strongly directed towards co-operative agro-industrial development with locally produced agricultural commodities as a base.

- 7.6.2 The Regional Co-operative Union is considering establishing a flour mill to cover the needs of the region, which are estimated at about 200 000 tons per annum.
- 7.6.3 Wheat is not grown in the region, nor will it be grown in the future. All wheat has to be transported to El-Obeid from other parts of Sudan or from abroad. Assuming 80% extraction, the annual quantities transported would be 250 000 tons.
- 7.6.4 From a national point of view, the long term benefit of establishing a wheat mill in Kordofan is debatable. However, a flour mill in El-Obeid would have a significant impact as a vehicle of co-operative food industrial development in the region. Should the Government policy for future supply of flour mean blending sorghum flour with the wheat, the position would be different.
- 7.6.5 On the assumption that 20% of sorghum flour is blended with the wheat flour, about 60 000 tons of locally produced sorghum would be needed in Kordofan.
- 7.6.6 The advantage of processing this in El-Obeid can hardly be questioned. The sorghum flour can be blended with wheat flour milled elsewhere, or alternatively certain quantities of wheat could be milled in an El-Obeid flour mill.
- 7.6.7 The blending of the flour requires some additional installations. However, the main drawback is the emptying of the flour bags when wheat flour and not the wheat is transported to Kordofan. The merits and demerits of the two alternatives would have to be studied in detail to determine the future line of action.
- 7.6.8 The capacity of a sorghum flour mill provided with the appropriate pre-milling process would have to be about 200 tons/24 h.
- 7.6.9 Local demand for vegetable oil from the co-operative societies is recognized by the Co-operative Union and the plans for the future include an oil mill, the capacity of which is yet to be determined.
- 7.6.10 The variation in availability of oil seeds from one year to another is well documented (see paras. 7.3.4 and 7.3.5), and the present local oil milling capacity is estimated at about 33 000 tons of oil seed per annum.
- 7.6.11 The general view on expansion of the oil milling industry discussed under Section 4.1 must also be considered in this connection. In this case the purchase of an existing oil mill for rehabilitation and transfer to El-Obeid (see para. 4.1.9) is well worth considering in an effort to save foreign exchange and increase the utilization of the oil milling capacity as a whole.

- 7.6.12 A sesame cake factory completes the list of the Co-operative Union's project ideas. The market is believed to be there but no studies have been carried out so far. The sesame seed is produced locally and, providing the market demand is clearly verified and the production costs prove to be acceptable, a small to medium scale project is likely to be a viable venture.
- 7.6.13 In addition to the project plans presented by the Co-operative, the extent of vegetable and fruit production in certain areas and the poorly developed marketing channels suggest that investigations should be carried out to determine suitable measures to improve the situation for the producers and consumers alike.
- 7.6.14 These may include the organization of collection, sorting and grading of the produce and transport to local and other domestic markets.
- 7.6.15 The appropriate fruit and vegetable sorting facilities and intermediate storage rooms would form part of the first phase of a project aiming at reducing waste and acting as a price-stabilizing agency. In a second project phase a processing plant may be added, tailored to the market demand.
- 7.6.16 A project of this type is likely to lead to improved incomes for the people engaged in the horticultural sector and to have a favourable influence on the development of the area as a whole.

8.0 GEZIRA MANAGIL TENANTS CO-OPERATIVE CORPORATION

3.1 General

- 8.1.1 This co-operative relates back to the early 1960s and has about 100 000 members. The main objective is to establish agro-industries based on farm commodities produced in the area.

All farmland is irrigated and was utilized as follows according to the 5-year average from 1981/82 to 1985/86:

	Feddan	Hectare	Crop yield 5-yr	
			per ha	total
Cotton	395 000	94 100	1.97	185 000
Wheat	284 000	67 600	2.03	137 000
Sorghum	331 000	78 800	1.81	143 000
Groundnuts	131 000	43 100	3.25	140 000
Fallow	909 000	216 400		
<b>Total</b>	<b>2 100 000</b>	<b>500 000</b>		

- 8.1.2 Variations occur from one year to another. So, for instance, has the cotton area increased slightly in 1985/86 in comparison with the 5-year average, the area in wheat diminished by about 12%, sorghum increased by 60% and the groundnut area reduced by over 40%.

8.2 Existing agro-industries

8.2.1 Goz-Kabaro Flour Mill Co-operative Society

8.2.1.1 The first flour mill was established in 1968. It had a capacity of 60 tons/24 hours, which was doubled in 1978 to 120 tons/24 hours and doubled again in 1981 to 240 tons/24 hours, which corresponds to about 11% of the total national milling capacity (para. 4.0.1).

8.2.1.2 All three mills are from Czechoslovakia and manufactured by Zavdy Vítězníko Unora, Hradec Královí. The oldest milling line is said to have an efficiency of 50% of rated capacity or probably less, and the new 1981 mill produces 80% to 90%. The overall utilization of the Goz-Kabaro Flour Mill varies between 50% and 60%.

8.2.1.3 The main constraints are stated to be lack of imported spare parts and bags. Failure in the electrical power supply also has an influence on the overall efficiency.

8.2.1.4 The procurement procedure when the 1981 flour milling project was implemented was based on international tendering on technical specifications prepared by a Government Committee. Six turn-key quotations were received which were evaluated by the same committee. The contract agreement with the successful supplier included technical assistance comprising:

- 1 head miller for 2 years
- 1 mechanic for 2 years
- training of 1 Sudanese head miller for 3 years
- training of 2 maintenance mechanics in the supplier's country.

In addition, the co-operative arranged for training of a total of 8 supervisors and shift millers in Egypt. Operation and maintenance of the plants has reportedly not caused any major problems in the past. It was noticed, however, that some rollers had been damaged by pieces of metal as a result of lack of supervision and control regarding cleaning of the magnetic traps.

8.2.1.5 The Gezira Managil Tenants Co-operative Corporation is planning to modernize the 1968 milling line and a quotation has been requested from the manufacturer. Financing of the rehabilitation has been arranged through the Sudan Development Corporation.

8.2.2 The feed plant

8.2.2.1 This was supplied in 1981 together with the last flour mill and by the same manufacturer. The capacity is stated to be 30 tons/2 shifts (16 hours).

- 8.2.2.2 The process does not include any equipment for milling or rolling of ingredients, nor any weighing installations. No proper mixer is provided and mixing of the ingredients is carried out in a tilted screw, about 8 m in length and 300 mm diameter. The ingredients are fed into the open trough and molasses may also be added.
- 8.2.2.3 The mixer screw conveyor feeds a pellet mill. The pellets are supposed to pass through a cooler, a sieve and finally to be bagged. These devices are disconnected and the pellets are bagged directly from the pellet mill.
- 8.2.2.4 So far only ruminant feed has been processed, a mix of wheat bran, cotton, groundnut and sesame cakes and molasses. The detailed formula was not known and marketing problems had been experienced.
- 8.2.2.5 The design and the process flow is very primitive and the plant may be acceptable for producing certain types of ruminant feeds where the requirements for exactness in the formula are limited.
- 8.2.2.6 Current plans for improving the plant utilization include manufacturing of poultry feeds. Weighing and thus proportioning of the ingredients is possible using, for instance, a platform scale, but mixing of the feed to ensure that the final product is uniform will not be possible. The mechanical means to do this are not available and processing of poultry feeds must be strongly discouraged in this type of installation without prior redesign and modification.

### 8.2.3 Gezira Dairy Co-operative

- 8.2.3.1 The dairy plant was established in 1982 and supplied by Alfa Laval. It has a capacity of 2 200 l/hour. Present daily intake of fresh milk is about 5 000 l. Average fat content was stated to be 5% and recombined milk is added to arrive at about 3% fat in the consumer milk. This is packed on a Pre-Pac machine in half-liter plastic bags.
- 8.2.3.2 With about 3 300 l of recombined milk for toning of the fresh milk the total quantity of milk processed per day is calculated at 8 300 l. The processing installations are operated 6h/day and the efficiency is calculated at 62%. The utilization of maximum processing capacity is less.
- 8.2.3.3 The milk is collected at the farms by the dairy to a maximum distance of about 20 km. Testing for quality is not practised except for acidity tests after mid-February, when the temperature goes up. The farms are not equipped with milk cooling facilities.

8.3 Future food industries

- 8.3.1 The list of future food-industrial projects includes another flour mill and a vegetable oil mill.
- 8.3.2 According to a feasibility report submitted to the Corporation in January 1985, the new flour mill is intended to have a capacity of 300 tons/24 hours.
- 8.3.3 Capacity utilization is expected to be 60% during the first year of operation, increasing to 90% in the fourth year, milling a total of 81 000 tons of wheat.
- 8.3.4 Taking the Government subsidies into account, the pay-back period is calculated at 7 years and 5 months, and return of investment 18% from year six.
- 8.3.5 The Gezira Managil Tenants Co-operative Corporation argues that with about 55% of the national cotton produced by the tenants and 21% of the groundnuts, calculated from a five-year average, it is reasonable that the processing of the seeds is carried out in processing facilities belonging to the Corporation.
- 8.3.6 It is reported that approval has already been granted by the relevant authorities for implementation of an oil milling project.

9.0 UNION OF CO-OPERATIVE SOCIETIES, NEW HALFA

9.1 General

9.1.1 The New Halfa Irrigation Scheme started in 1964 and covers now 330 000 feddans (138 600 ha) of irrigated land.

9.1.2 The total population is 256 000, according to the 1983 census. About 43% farm 22 000 farms of 15 feddans each. The remaining 57% live in New Halfa Town and two other towns within the New Halfa Scheme.

9.2 Agricultural production

9.2.1 The cropping pattern includes mainly cotton, groundnuts, wheat, sorghum and limited areas of horticultural crops.

9.2.2 The area planted and total crop yields are as follows, according to Department of Agricultural Economics, Ministry of Agriculture and Natural Resources.

Crop	5-year average		1985/86	
	ha	tons	ha	tons
Cotton	28 560	31 000	29 820	NA
Groundnuts	15 960	34 000	840	1 000
Wheat	18 900	20 000	12 600	NA
Sorghum	11 800	16 000	60 900	73 000

9.2.3 Sorghum production was increased temporarily in the 1985/86 season and a dramatic cut was made in the area planted with groundnuts after Government directives. Return to normal hectareage is expected for the 1986/87 cropping season.

9.3 Existing food industries

9.3.1 The Union of Co-operative Societies have two flour mills, one of them built in 1970 and one which is not yet commissioned.

9.3.2 The old mill has a rated capacity of 80 tons/24 hours and was delivered by Ocrim, Italy.

9.3.3 The washing plant, the trieur cylinder cleaner and the purifiers have been disconnected from the process flow, the plant is in general in a poor state of repair and plant hygiene leaves much to be desired.

9.3.4 Rehabilitation of the mill is planned to be carried out when the new mill has started production.

9.3.5 Excerpts from the flour mill production records show the following:

Year	Wheat input, tons	Flour, tons	Extraction rate %	Plant utilization %
1978/79	24 273	20 229	83.3	33
1982/83	21 260	16 905	79.5	73
1983/84	18 808	15 373	81.7	64
1984/85	21 460	17 340	83.1	73

9.3.6 The new flour mill is from Czechoslovakia and manufactured by Zavdy Vítězniko Unora, Hradec Královí. It is a steel structure building with profiled steel cladding. The equipment includes the necessary bucket elevators and conveyors which bring the wheat from a nearby warehouse.

9.3.7 The 10-roller mill installation has a rated capacity of 120 tons/24 hours and is expected to be commissioned in about three months, or around 1 June 1986.

9.3.8 The new flour mill project also includes a feed plant which is located in a separate building. It is designed for ruminant complete rations and is capable of handling and processing voluminous roughage feed ingredients such as straw and sugar tops. The design of the plant is not suitable for manufacturing poultry rations, which was stated to have been requested by the Union.

9.3.9 Small quantities of groundnuts and cotton seed are reportedly processed by a private oil mill in New Halfa. No capacity figures were available.



9.4 Proposed future projects

- 9.4.1 The program for development of the Union of Co-operative Societies includes the establishment of agro-industries that will stimulate local crop production, improve the level of income, and in the long term perspective stimulate export-oriented agro-industries.
- 9.4.2 Development of the vegetable oil sector is given top priority in the program. It is intended that a vegetable oil mill for groundnuts and cotton seed be vertically integrated with margarine and peanut butter manufacturing.
- 9.4.3 Funds are reportedly available for the necessary investments. However, pre-project studies have not yet been carried out and the investment requirements are not known.
- 9.4.4 The ambitions are geared towards a processing unit large enough to allow also for export of the products.
- 9.4.5 Manufacturing plant(s) for macaroni, biscuits, breakfast cereals and bread to supply the local market are placed second in priority. The project has not yet reached the stage where a request has been made for a feasibility study. It is reasonable to assume that a population of about a quarter of a million people, where more than 50% live in urban areas, will provide a sufficiently large and stable market for a viable project.
- 9.4.6 Molasses from a local Government-owned cane sugar factory is not utilized and the Union is considering using it for making syrup and medical alcohol. No feasibility study has been carried out and the market outlet for the syrup may prove to be uncertain. Moreover, two existing distilleries in Sudan have been closed down (para. 4.0.1); thus it may prove difficult to obtain a manufacturing licence for a distillery.
- 9.4.7 However, on the assumption that the annual national demand for medical alcohol is some 5 000 to 7 000 tons per year, this would justify the establishment of a medium sized manageable project.
- 9.4.8 The alternative of using some of the installations in the closed-down distilleries should be investigated. This would help in keeping the investment cost down and save foreign exchange.
- 9.4.9 In addition to the Union's project plans, the manufacture of baker's yeast, using molasses as substrate, may be considered. The yeast could be both fresh and freeze dried, the latter to facilitate distribution nation-wide without having to rely on refrigerated transport.
- 9.4.10 The process involves fairly high technology. This is indeed a challenge, and adequate project preparations and the securing of sufficient technical assistance are vital for project success.

10.0 CONCLUSIONS AND COMMENTS

- 10.0.1 The co-operative engagement in food industries is at present limited primarily to flour milling on two locations, a few bakeries and dairy processing plants. It is thus concluded that certain experience has been gained from operation of food industrial enterprises.
- 10.0.2 The narrow base of the co-operative food industrial sector is the result of earlier directives to focus the co-operative movement on other tasks. The new line of action implies that the co-operative unions will engage in agro-industrial development to process commodities supplied by the farmers or the primary societies. This may in turn call for a modification of the present marketing and pricing system for agricultural products.
- 10.0.3 The financial status of the co-operatives is generally weak, at least considering the investments required in food industrial ventures. Project financing is therefore a main constraint for further development. Difficulty in obtaining foreign exchange adds to the problems.
- 10.0.4 Co-operative food industries must operate with adequate profit margins to ensure that the economy is consolidated sufficiently to generate funds for new projects. In order to achieve this target the plants have to be operated efficiently with high quality output.
- 10.0.5 Managerial skill at a high level is essential and improved training is an important element in this connection. Efforts have been made by the co-operatives to include technical assistance, in terms of expatriate expertise, and training of personnel in the delivery contracts. These appear to have been fairly successful but maintenance and repair of older installations give evidence of shortcomings which are not acceptable.
- 10.0.6 The economic situation of the Sudanese food industry is generally weak, basically due to low or very low efficiency. In the case of the vegetable oil milling industry the main reason for this is that available overall processing capacity by far exceeds the availability of raw materials, oil-bearing seeds, and estimated domestic demand for cooking oil.
- 10.0.7 Despite this fact, vegetable oil milling is the most "popular" sector for co-operative engagement. This can only add to the problems with further overall costs for the national vegetable oil milling industry. Better co-ordination is essential between production of oil seeds and the processing industry. The co-operative movement in Sudan could play an important role in this process if given the necessary authority to do so.

- 10.0.8 As suggested earlier in this report, the scope for purchasing private oil mills should be investigated. They would most likely have to be rehabilitated and could also be moved to other locations to suit the co-operative union wishing to enter the vegetable oil milling industry. In the long term perspective this would form the basis for future co-operative vertical integration of the vegetable oil sector.
- 10.0.9 Further expansion of the flour milling capacity by some 350 to 400 tons/24 hours will be called for in the near future. The co-operative project plans include two new flour mills with a total milling capacity of 500 tons/24 hours. In order to avoid the wrong investments being made in co-operative food industries, careful planning and co-ordination on a national level is of vital interest. The National Co-operative Union appears to be the obvious body to have this responsibility.

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